ABSTRACT BOOK

Venue: Renaissance Mumbai Convention Centre Hotel, Mumbai, India

Theme: Towards One World

4th - 8th December, 2019

The Joint Meeting of
The 15th Asian Australasian Congress of Neurological Surgeons,
68th Annual Conference of The Neurological Society of India and
International Meningioma Society Congress &
40th Annual Conference of Society of Indian Neuroscience Nurses
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basant Misra</td>
<td>Congress President</td>
</tr>
<tr>
<td>Atul Goel</td>
<td>President - NSI</td>
</tr>
<tr>
<td>Ketan Desai</td>
<td>Organizing Secretary</td>
</tr>
<tr>
<td>Bhawani Sharma</td>
<td>Chairman - Organizing Committee</td>
</tr>
<tr>
<td>Lokendra Singh</td>
<td>Chairman - Scientific Committee</td>
</tr>
<tr>
<td>Suresh Nair</td>
<td>Chairman - Scientific Committee</td>
</tr>
<tr>
<td>Ramesh C. Mishra</td>
<td>Secretary General</td>
</tr>
<tr>
<td>N. Muthukumar</td>
<td>Co-Chairman - Organizing Committee</td>
</tr>
<tr>
<td>Milind Sankhe</td>
<td>Co-Chairman - Organizing Committee</td>
</tr>
<tr>
<td>Basant Misra</td>
<td>Co-Chairman - Scientific Committee</td>
</tr>
<tr>
<td>Dilip Panikar</td>
<td>Co-Chairman - Scientific Committee</td>
</tr>
<tr>
<td>Batuk Diyora</td>
<td>Co-Organizing Secretary</td>
</tr>
<tr>
<td>Smita Sharma</td>
<td>Co-Organizing Secretary</td>
</tr>
<tr>
<td>Vernon Velho</td>
<td>Co-Organizing Secretary</td>
</tr>
<tr>
<td>Rajan Shah</td>
<td>Chairman - Reception Committee</td>
</tr>
<tr>
<td>Suresh Sankhla</td>
<td>Chairman - Reception Committee</td>
</tr>
<tr>
<td>Name</td>
<td>Position</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Atul Goel</td>
<td>President - NSI &amp; Chairman - Organizing Committee</td>
</tr>
<tr>
<td>Lokendra Singh</td>
<td>President Elect - NSI</td>
</tr>
<tr>
<td>N. Muthukumar</td>
<td>Secretary - NSI</td>
</tr>
<tr>
<td>Daljit Singh</td>
<td>Treasurer - NSI</td>
</tr>
<tr>
<td>P. Sarat Chandra</td>
<td>Editor, Neurology India</td>
</tr>
<tr>
<td>Sanjay Behari</td>
<td>Former Editor, Neurology India, Executive Committee Member</td>
</tr>
<tr>
<td>Achal Srivastava</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Dilip Panikar</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Girish Menon</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>J. K. B. C. Parthiban</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Krish Sridhar</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Lakshmi Narasimhan</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Manjari Tripathi</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Rakesh Jalali</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Sanjay Pandey</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Y. R. Yadav</td>
<td>Executive Committee Member</td>
</tr>
<tr>
<td>Suresh Nair</td>
<td>Past President</td>
</tr>
<tr>
<td>Deepu Banerji</td>
<td>Past President</td>
</tr>
<tr>
<td>Hemant Bhartiya</td>
<td>Organizing Secretary - NSICON 2018</td>
</tr>
<tr>
<td>Name</td>
<td>Position</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Basant Misra</td>
<td>President - AASNS</td>
</tr>
<tr>
<td>Kate Drummond</td>
<td>Vice-President</td>
</tr>
<tr>
<td>Kaoru Kurisu</td>
<td>Vice-President</td>
</tr>
<tr>
<td>Wan Tew Seow</td>
<td>Secretary - General</td>
</tr>
<tr>
<td>Ying Mao</td>
<td>Treasurer</td>
</tr>
<tr>
<td>Andrew Kaye</td>
<td>Past President - AASNS</td>
</tr>
<tr>
<td>Bhawani S Sharma</td>
<td>Chairman - Organizing Committee</td>
</tr>
<tr>
<td>Ramesh C. Mishra</td>
<td>Secretary General</td>
</tr>
</tbody>
</table>

**Asian Australasian Society of Neurological Surgeons**
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael McDermott</td>
<td>President</td>
</tr>
<tr>
<td>Suresh Nair</td>
<td>Chair, IMS 2019</td>
</tr>
<tr>
<td>Vladimir Benes</td>
<td>President Elect</td>
</tr>
<tr>
<td>James K. Liu</td>
<td>Secretary-Treasurer</td>
</tr>
<tr>
<td>Kenji Ohata</td>
<td>Past President (2016-2018)</td>
</tr>
<tr>
<td>William T. Couldwell</td>
<td>Past President (2014-2016)</td>
</tr>
</tbody>
</table>
PRE-CONFERENCE WORKSHOPS

DECEMBER 4, 2019
Endoscopic Skull Base Cadaver Workshop  
Venue: Grant Medical College & Sir J. J. groups of Hospitals, JJ Marg, Nagpada-Mumbai Central, Off. Jijabhoy Road, Mumbai - 400 008  
Course Director: Vernon Velho

Neuro Endovascular Simulation Workshop  
Venue: Physiology Lecture Hall, 3rd Floor, College Building, L.T.M.M.C. & L.T.M.G. Hospital, Sion, Mumbai - 400 022  
Course Director: Batuk Diyora

Microvascular Anastomosis Workshop  
Venue: ETHICON Institute of Surgical Education, No. 64/66, Johnson House, Senapati Bapat Marg, Mahim, Mumbai - 400 016  
Course Director: Trimurti D. Nadkarni

Deep Brain Stimulation Techniques Workshop  
Venue: P. D. Hinduja National Hospital, Veer Savarkar Marg, Cadel Road, Mahim, Mumbai - 400 016  
Course Director: Milind Sankhe

Comprehensive Epilepsy Workshop  
Venue: Seth G. S. Medical College & KEM Hospital, Acharya Donde Marg, Parel, Mumbai - 400 012  
Course Director: Dattatraya Muzumdar, Abhidha Shah

Neuromonitoring Workshop  
Venue: Dr. L. H. Hiranandani Hospital, Hillside Rd, Hiranandani Gardens, IIT Area, Powai, Mumbai, Maharashtra - 400 076  
Course Director: Joseph Monteiro

09.00 - 17.00  1st NSI Executive Committee (EC) Meeting

19.30 - 21.30  Faculty Cocktail Dinner  
(Venue: Renaissance Mumbai Convention Centre Hotel, Powai, Mumbai)
PROGRAMME

DAY 1: DECEMBER 5, 2019
HALL A

Session: Morning Symposium 1 - Skull Base

Chairpersons: Amir Samii, Suresh Nair, V. P. Singh, B. Indiradevi

08.00 - 08.12 Intra Arachnoid Excision of Acoustic Schwannoma: Venkata Ramana
08.12 - 08.24 Radiosurgery for Vestibular Schwannomas: Myths And Realities: Manjul Tripathi
08.24 - 08.36 Facial Nerve Preservation in Vestibular Schwannomas: Sunil Gupta
08.36 - 08.48 Staged “Intentional” Bridging Vein Ligation: A Safe Strategy in Avoidance of Venous Complication in Skull base Surgery: Kenji Ohata
08.48 - 09.00 Impact on Extent of Resection and Facial Nerve Outcomes using Subperineural Dissection Technique for Surgical Resection of Acoustic Neuromas: James Liu

HALL B

Session: Morning Symposium 2 - Epilepsy

Chairpersons: Ian Dunn, Dattatraya Muzumdar, Malla Bhaskar Rao, Nilesh Kurwale

08.00 - 08.12 Surgical Treatment of Frontal Lobe Epilepsies: Ravi Mohan Rao
08.12 - 08.24 Parietal Lobe shape and Febrile Seizures: An Evolutionary Quest of Thermodynamic Safety: Alexandra Kunz
08.24 - 08.36 Curative Resection for Refractory Epilepsy in Children: Azmi Alias
08.36 - 08.48 Epilepsy Surgery for Children below the age of 5 years: Milind Sankhe
08.48 - 09.00 Epilepsy Surgery: Peter A. Winkler

HALL C

Session: Morning Symposium 3 - Neuro Oncology

Chairpersons: Joao Paulo Farias, Ramesh C. Mishra, Dilip Panikar, Kamlesh Bhaisora

08:00 - 08:12 Rethinking Meningiomas?: Linda Bi
08.12 - 08.24 Awake Craniotomy - Tools of the Trade for the Neurosurgeon: Aliasgar Moiyadi
08.24 - 08.36 Progressive Mathematization of Glioblastoma treatment! Implications to Neurosurgical Education: Mohan Raj Sharma
08.36 - 08.48 Surgery of Pineal Tumours: Experience of 100 consecutive cases: Mathew Abraham
08.48 - 09.00 Functional mapping in Hemispheric gliomas - Lessons learnt from Awake craniotomy: Dilip Panikar
HALL E
Session: Morning Symposium 4 - Neuro Oncology
Chairpersons: Andre Grotenhuis, Ari Chacko, Deepu Banerji, Dattaraj Sawarkar

08.00 - 08.12  Post-operative Mortality in Pituitary Adenoma - Analysis of 300 cases and review of literature: Hemant Bhartiya
08.12 - 08.24  Endoscopic Approach to Pituitary: Dwarakanath Srinivas
08.24 - 08.36  Uninostril Endoscopic Surgery for Giant Pituitary Adenomas: V. Rajshekhar
08.36 - 08.48  Endoscopic Skull Base Surgery: Parimal Tripathy
08.48 - 09.00  Pitfalls and Avoidance of Complications in Endoscopic Pituitary Adenoma: Najia El Abbadi

HALL A
Main Topic Session 1 - Neuro Oncology
Chairpersons: Michael Link, Anandh Balasubramaniam, B. K. Damany, Mahesh Chaudhary

09.00 - 09.12  What is the Role of Microsurgery in the Treatment of Vestibular Schwannomas? : Amir Samii
09.12 - 09.24  "Orbital Surgery - The Neurosurgeon's Perspective": Joao Paulo Farias
09.24 - 09.36  Clinical trials of Surgical Immunotherapy for Glioblastoma: Antonio Chiocca
09.36 - 09.48  Exploring the Immune phenotype of Vestibular Schwannoma: Ian Dunn
09.48 - 10.00  Quality of life in Vestibular Schwannoma patients treated with either Observation, Radiation or Surgery: Michael Link

HALL B
Main Topic Symposium 2 - Epilepsy
Chairpersons: Lukas Rasulik, Mathew Chandy, Sarat Chandra, Vikas V.

09.00 - 09.12  Surgical management of Focal Cortical Dysplasia involving Eloquent Cortex: Mallin Bhaskar Rao
09.12 - 09.24  Management of Epilepsies arising from Eloquent cortex: Sarat Chandra
09.24 - 09.36  Surgery for Drug refractory Mesial Temporal Lobe Epilepsy: Dattatraya Muzumdar
09.36 - 09.48  Advances in Epilepsy Surgery: Stereo-Encephalography, Laser ablation and Responsive Neurostimulation: James Rutka
09.48 - 10.00  New strategies in Modulative Manipulation of Pain: Claudio Gustavo Yampolsky

HALL C
Main Topic Session 3 - Skull Base

09.00 - 09.12  Radiosurgery Now: Modern management of Brain Metastasis: Dheerendra Prasad
**HALL E**

**Session: Main Topic Session 4 - Neuro Oncology**

**Chairpersons:** Russell Andrews, Manmohan Singh, Rewati Raman Sharma, Awadesh Jaiswal

- 09.00 - 09.12  Endoscopic management of Giant Pituitary Adenoma: Amr Safwat
- 09.12 - 09.24  Treatment of Recurrent Craniopharyngioma: Andrew Kaye
- 09.24 - 09.36  Management of Craniopharyngiomas; Open vs Endoscopic Techniques - Current State of the Art: Fred Gentilli
- 09.36 - 09.48  Surgery of Glioma of Gyrus Cinguli: Volker Seifert
- 09.48 - 10.00  Intraoperative CT/MRI and Neurophysiological Monitoring in Spinal Cord Tumors: A luxury? : Franco Servadei

**10.00 - 10.30  Tea/Coffee Break**

**Session: Plenary**

**Chairpersons:** Basant Misra, Yong Kwang Tu, Atul Goel

- 10.30 - 10.45  Strategies in Cavernous Sinus Lesion Today: Necmettin Pamir (15 min)
- 10.45 - 11.00  Rapid Ventricular Pacing: Volker Seifert (15 min)
- 11.00 - 11.15  Craniopharyngioma: Treatment Outcome: Kenji Ohata (15 min)
- 11.15 - 11.35  CNS President Lecture: Steven Kalkanis (20 min)
- 11.35 - 11.38  Introduction of Speaker: Keki Turel (3 min)
- 11.39-12.05  Key Note Lecture: Brain Surgery Today: Madjid Samii (27 min)

**Chairpersons:** Anil Nanda, Atul Goel, N. Muthukumar

- 12.05 - 12.08  Introduction of Speaker (3 min)
- 12.09 - 12.35  B Ramamurthi Oration
  - Seven bypasses: Evolving the craft of bypass surgery*: Michael Lawton (27 min)

**Chairpersons:** Chandranath Sen, Lokendra Singh, Suresh Nair

- 12.35 - 12.38  Introduction of Speaker (3 min)
- 12.38 - 13.10  NSI Presidential Oration: Atul Goel (32 min)

**13.10 - 14.00  Lunch**
### HALL A

**Skull Base Free Paper Session**

**Chairpersons:** Batuk Diyora, N. C. Pooniya, Vivek Bonde, Anil Kumar Pithambaran

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>A Very Common Pathology in a Very Uncommon Location</td>
<td>Bandi Bharath Kumar Reddy</td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Automating Neurosurgical Meningioma Outpatient follow-up with Artificial Intelligence</td>
<td>Ali Rezaei Haddad</td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Tailored far Lateral Approach to Anterior Foramen Magnum Meningiomas - The importance of Condylar Preservation</td>
<td>Dwarakanath Srinivas</td>
</tr>
<tr>
<td>14.28 - 14.34</td>
<td>Surgical management of Tuberculum Sellae Meningioma using Transcranial and Endonasal Endoscopic Approaches: Our experience and review of literature:</td>
<td>Suresh K. Sankhla</td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Transciliary Supraorbital Keyhole Cranietomy: A versatile minimally-invasive approach:</td>
<td>Harjinder Singh Bhatoe</td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Surgical strategies for removing the Intracanalicular portion of Vestibular Schwannoma and Clinical Outcomes:</td>
<td>Rami M. Z. Darwazeh</td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Surgical management of Tuberculum Sellae Meningiomas: Functional Outcome:</td>
<td>Hemal Prafull Chheda</td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Evolution of a Neurosurgeon - Experience with Endoscopic Transnasal Skull base surgeries:</td>
<td>Varun V.</td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>Incidence and Risk factors for Post-operative Frontal Lobe Contusion following Unilateral Supra-orbital Cranietomy and Excision of Olfactory Groove Meningiomas:</td>
<td>Bijesh Ravindran Nair</td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Surgical management and Outcomes of Medial Sphenoid wing Meningiomas:</td>
<td>Palak A. Jaiswal</td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Surgical outcome &amp; Occipital Lobe Functions in Occipital Transtentorial approach for Lesions located in Pineal region:</td>
<td>Abhishek Katyal</td>
</tr>
<tr>
<td>15.38 - 15.44</td>
<td>Intraoperative Lumbar Cerebrospinal fluid drainage for Endoscopic Endonasal Pituitary surgery - Is it necessary?:</td>
<td>Sourav Chowdhury</td>
</tr>
</tbody>
</table>

### HALL B

**Neuro Oncology Free Paper Session**

**Chairpersons:** Manish Agarwal, Vivek Sharma, Prakash Shetty, Vikram Muthusubramaniam

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>Institutional experience with 212 cases of Adult Supratentorial Low grade Glioma:</td>
<td>Bagatheesh Sugathan</td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Posterior Fossa Hemangioblastoma:</td>
<td>Hrushikesh Kharosekar</td>
</tr>
<tr>
<td>14.14 - 14.20</td>
<td>Trans septal Endoscopic Approach to Pituitary Tumors using a Unique Retractor:</td>
<td>Sarat P. Chandra</td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Giant Spinal Schwannomas - A Reappraisal:</td>
<td>K. Sridhar</td>
</tr>
<tr>
<td>14.28 - 14.34</td>
<td>Review of 235 cases of Meningioma after Simpson’s grade 1 &amp; 2 Excisions - Can Ki-67 index alone be a predictor of recurrence?:</td>
<td>Hariharasuthan Ponraj</td>
</tr>
<tr>
<td>Time</td>
<td>Presentation</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Time for a new Neurosurgical Classification of developmental Posterior Fossa Cysts: S. S. Dhandapani</td>
<td></td>
</tr>
<tr>
<td>14.42 - 14.48</td>
<td>Medulloblastomas - Applicability and Incorporation of the New Molecular Diagnosis - Initial experience: Vishwanath Sahukar Eshwarappa</td>
<td></td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Management Algorithm of Pineal region Tumors: Chhitij Srivastava</td>
<td></td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Experience of surgery for Brain Tumors at AIIMS Rishikesh: Garga Basu</td>
<td></td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Recurrence and Indication for Re-surgery in Pituitary Macroadenoma: Mayank Nakipuria</td>
<td></td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>Use of Absolute Alcohol as an Intraoperative Embolisation material for Aggressive Vertebral Hemangioma Surgery: Amol Vijay Deogaonkar</td>
<td></td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Calvarial Tumours: A Tertiary Centre Experience: Ved Prakash Maurya</td>
<td></td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Awake Craniotomy with Electrophysiological Mapping and Neuronavigation for Lesion in eloquent areas of the Brain: Sachin Sambhaji Chemate</td>
<td></td>
</tr>
</tbody>
</table>

**HALL C**

**Functional and Epilepsy Free Paper Session**

**Chairpersons:** Dattatraya Muzumdar, Shibu Pillai, Shankar Athawale, Nilesh Agarwal

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>Volumetric analysis of the Subthalamic and Red Nuclei based on MRI and its 3D Reconstruction in Patients with Advanced Parkinson’s disease: Varshesh Kirankumar Shah</td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Surgical Intervention in Trigeminal Neuralgia: Shailesh Kelkar</td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Clinical Characteristics, Surgical and Neuropsychological outcomes in Drug Resistant Tumoral Temporal Lobe Epilepsy: Dattatraya Muzumdar</td>
</tr>
<tr>
<td>14.28 - 14.34</td>
<td>Trigeminal Neuralgia with Pain at Cranial nerve V2 Maxillary branch and V3 Mandibular branch nerve distribution which induced by light in a 58-year-old woman: Ivan Pradhana</td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Surgery for Movement Disorders - Difficulties and Surgical Nuances: Milind Sankhe</td>
</tr>
<tr>
<td>14.42 - 14.48</td>
<td>Robotic guided surgery in the management of Pediatric Epilepsy: Ramesh Doddamani</td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Use of Intrathecal Baclofen Pump for Spasticity management: Our experience: Vikas Maheshwari</td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Surgical and Functional Outcomes of Migraine Surgery: A pilot study: Jitin Bajaj</td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Complication avoidance in Deep Brain Stimulation (DBS) - A beginners perspective: Vemula Venkata Ramesh Chandra</td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>Patient selection for Deep Brain Stimulation for Parkinson’s Disease - A very convenient tool: Amit Kumar Ghosh</td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Technical Nuisance in MVD Surgery: Harish Naik</td>
</tr>
</tbody>
</table>
**HALL D**

**Spine Free Paper Session**

**Chairpersons:** D. B. Katikar, Sudhir Dubey, Shyam Babhulkar, Satish Rudrappa

14.00 - 14.06  MRI predictors of outcome after surgical intervention for cervical spondylotic myelopathy: Bhogawar Sushil Dattatray


14.14 - 14.20  Transforaminal lumbar interbody fusion (TLIF) for spondylolisthesis of lumbar spine and its functional outcome: Melkundi Sateesh

14.21 - 14.27  Biomechanics - Relevance in Spine Surgery & Neurosurgery: Ram Kumar Menon

14.28 - 14.34  Brucellar Spondylodiscitis - Lumbar spine a rare case report: Dhirendra Kirtansinh Hada

14.35 - 14.41  Importance of navigation in Dorsal Spine Stabilization in terms of Margin of Safety: Giridharan K.


14.49 - 14.55  Autologous bone graft from adjacent vertebral body in anterior cervical discectomy and fusion- (1 year follow up of 16 cases): Sheena Ali

14.56 - 15.02  MIS discectomy and MIS decompression: Outcomes and learning curve in a tertiary care university hospital: Vupuloori Arvind Kumar

15.03 - 15.09  A clinical study of anterior versus posterior approach for management of multilevel (2 or more) cervical spondylotic myelopathy- An institutional experience: Ravitejha Akumalla

15.10 - 15.16  Clinical and Radiological Comparison between Unilateral and Bilateral Facetectomies in Transforaminal Lumbar Interbody Fusion (TLIF): Is additional facetectomy required?: Himanshu Champaneri

15.17 - 15.23  Impact of post operative ABG analysis and ICU weaning protocol in surgical outcome of Atlanto-axial dislocation: It’s not the towering sail, but the unseen wind that moves the ship: Raghavendra M.

15.24 - 15.30  Comparison of clinical outcome of anterior cervical discectomy and fusion (ACDF) with plate and without plate: Achal Gupta

15.31 - 15.37  Management of Odontoid Fractures - An institutional experience: Nikhil Sunil Tadwalkar

**HALL E**

**Miscellaneous Free Paper Session**

**Chairpersons:** Hukum Singh, George Vilanilam, D. K. Vatsal, P. K. Balakrishnan

14.00 - 14.06  Predicting the Tumor grade of Glioma using Cognitive Assessment tools: Sandhya Cherkil


14.14 - 14.20  Adverse Events, Errors and Outcomes in Neurosurgery: A proposed new classification: George C. Vilanilam

14.21 - 14.27  Proposal of a Criteria to Determine the Extent of Resection of Craniofaryngiomas - Study based on analysis of functional outcome with evolving surgical strategies: Binoy Kumar Singh

14.28 - 14.34  Vascular Neurosurgery in Private Practice: Vivek Kumar Vaid

14.35 - 14.41  Technology based learning for the young neurosurgeons: Mohammed Imran

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.49 - 14.55</td>
<td>Frequency of Contusion associated with Skull Fracture in Children: Nigad Ahmad</td>
</tr>
<tr>
<td>14.56 - 14.02</td>
<td>Endoscopic evacuation of Spontaneous Intracerebral Hematoma - An institutional experience: Rajeshwari Kondabathini</td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Retrospective analytic study of cases who underwent unanticipated CSF diversion procedures after definitive treatment of primary neurosurgical pathologies not associated with CSF obstruction in pre-operative stage: Kunal Kumar</td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Advantages of Neuroendoscopy over Open Craniotomy in the management of Spontaneous Intracerebral Hemorrhage (SICH) - A randomized control study: Uday Goutam Nookathota</td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>A Comparative Study between Mini Craniotomy and Burr-hole Evacuation for Chronic Subdural Haematoma: Pranoy Hegde</td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Safety and Efficacy of Gamma Knife Radiosurgery for management of Trigeminal Neuralgia: A retrospective study: Karishma Kini</td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Post Traumatic Neuropsychiatric changes in Diffuse Axonal Injury: Bibhuti Bhusan Das</td>
</tr>
<tr>
<td>15.38 - 15.44</td>
<td>Nuances and Complications of Endonasal Endoscopic Transphenoidal Pituitary Surgery: Less is More: Deepak Bhangale</td>
</tr>
</tbody>
</table>

**Tea/Coffee Break**

**HALL A**

**Session: Main Topic Session 1 - Skull Base**

**Chairpersons:** Kenan Arnautovic, Keki Turel, Bhabani Sankar Das, Manoj Sobti

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Molecular Characterization and Immune Microenvironment in Vestibular Schwannomas: Michael Link</td>
</tr>
<tr>
<td>16.12 - 16.24</td>
<td>Preservation of Facial &amp; Hearing Preservation in Vestibular Schwannoma: Michihiro Kohno</td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td>Treatment Strategy and Long-term outcome for Skull Base Chordomas: Kyu Sung Lee</td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Role of Embolization in Jugular Foramen Paranganglioma: Luis Borba</td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>Novel Strategies for Large and Giant Vestibular Schwannomas: Amir Dehdashti</td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Microsurgical Resection of Large &amp; Giant Posterior Fossa Tumors: Arnautovic Kenan</td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Management of Venous Problems in Skull Base Surgery: Chandranath Sen</td>
</tr>
</tbody>
</table>

**HALL B**

**Session: Main Topic Session 2 - Complex Cranial**

**Chairpersons:** Sukru Caglar, K. V. R. Sastry, Mathew Abraham, Ashok Mahapatra

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Trends in the Management of Brainstem Glioma: V. S. Mehta</td>
</tr>
<tr>
<td>16.12 - 16.24</td>
<td>Stereotactic Radiosurgery for Cerebral AVM’s - Evidence base for five clinical questions: Yigal Shoshan</td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td>AVM Resection: General principles and important steps: Lanzino Giuseppe</td>
</tr>
</tbody>
</table>
HALL C

Session: Main Topic Session 3 - Miscellaneous

Chairpersons: Daniel Barrow, Paresh Doshi, Krishan Kumar Yadav, Chandrashekhar Pakhmode

16.00 - 16.12  The business of Neurosurgery: Optimizing the Care of the Spine Patient: Shekar N. Kurpad
16.12 - 16.24  Intraoperative Neurophysiological monitoring for Skull Base Tumors: Akagami Ryojo
16.24 - 16.36  Current status of Acute Stroke Intervention in Japan: Shinichi Yoshimura
16.36 - 16.48  Top Ten problems in Peripheral Nerve Surgery: Lukas Rasulic
16.48 - 17.00  Pushing the boundaries of Deep Brain Stimulation: Paresh Doshi
17.00 - 17.12  Posterior Subthalamic Stimulation for Tremor using Multidirectional Leads: Sarah Olson
17.12 - 17.24  Early experience in using directional lead in Deep Brain Stimulation for Parkinson’s disease in Hong Kong: Poon Tak Lap

19.00 - 20.00  Inauguration Ceremony
20.00 - 21.00  Cultural Programme
21.00 - 22.30  Cocktail Dinner (Venue: Renaissance Mumbai Convention Centre Hotel, Powai, Mumbai)
PROGRAMME

DAY 2: DECEMBER 6, 2019
HALL A

Session: Morning Symposium 1 - Frontiers

Chairpersons: Nirav Patel, Sandip Chatterjee, Krishna Reddy, Deepak Gupta

08:00 - 08:12  Long term Prognosis of Antenatally Diagnosed Arachnoid Cyst: Report of 12 children: Naresh Biyani
08.12 - 08.24  First successful Craniopagus twin separation surgery of India (closed doors open windows): Time to say goodbye to venous bypass in shared circular sinuses: Deepak Gupta
08.24 - 08.36  Dealing with Intramedullary Tumors: Giampietro Pinna
08.36 - 08.48  The Role and Significance of Fluid Biomarkers in Spinal Cord Injury: Parmenion P. Tsitsopoulos
08.48 - 09.00  Percutaneous techniques in Trigeminal Neuralgia: Sarah Olson

HALL B

Session: Morning Symposium 2 - Vascular

Chairpersons: Abdeslam E. Khamlichi, Aadil Chagla, S. N. Mathuriya, Alok Umredkar

08.00 - 08:12  Evolution of Cerebral Aneurysms Surgery in Morocco and Africa: Abdeslam E. Khamlichi
08.12 - 08.24  SAH with Takotsubo Cardiomyopathy - Strategies of Management: L. N. Tripathy
08.24 - 08.36  Intraoperative Imaging in Neurovascular Surgery: Talat Kiris
08.36 - 08.48  SONOBIRDIE: Carotid randomized study on effect of Sonolysis: David Netuka
08.48 - 09.00  NPH: Building an Institutional Protocol: Claudio Gustavo Yampolsky

HALL C

Session: Morning Symposium 3 - Neuro Oncology

Chairpersons: Jesus Lafuente, Rakesh Jalali, Pramod Giri, Arivazhagan

08.00 - 08:12  The Impact of Advanced Technology on Survival and Functional Outcome of Patient with High-grade gliomas: Yigal Shoshan
08.12 - 08.24  New developments in understanding of CSF Hydrodynamics: Miroslav Vukic
08.24 - 08.36  Intraoperative MRI: New Paradigms: Michael Schuler
08.36 - 08.48  LINAC-based Radiosurgery Outcome in Skull base Meningioma in Hong Kong population: Poon Tak Lap
08.48 - 09.00  Proton Beam Therapy: Initial experience: Srinivas Chilukuri

HALL E

Session: Morning Symposium 4 - Spine

Chairpersons: Amro F. Al-Habib, Sushil Patkar, Jutty Parthiban, Alok Ranjan

08.00 - 08:12  Fractures of Odontoid: New understanding and New Treatment: Sushil Patkar
08.12 - 08.24  Endoscopic Spine Surgery - My experience disc to SOL, single chip to 3D endoscope: Srinivas S. Rohidas
08.24 - 08.36  Neurosurgery for Cerebral Palsy: A. K. Purohit
08.36 - 08.48  Complications, Avoidance and Management in Spinal Surgery: Siddhartha Ghosh
08.48 - 09.00  Complex Spine Surgery: Shashank Kale

TIME: 09.00 - 10.30

HALL A

Main Topic Session 1 - Frontiers

Chairpersons: Sarah Olson, V. G. Ramesh, Ketan Desai, Nupur Purthi

09.00 - 09.12  Top Ten problems in Peripheral Nerve Surgery: Lukas Rasulic
09.12 - 09.24  Brachial Plexus Tumors - Our experience: Ketan Desai
09.24 - 09.36  Stereotactic Radiation Therapy in the management of Skull Base Tumors: Hari Chandran
09.36 - 09.48  The Intraoperative usage of Neuronavigation, Fluorescein Guidance, Intraoperative CT and Robot in Skull Base Surgery: Sukru Caglar
09.48 - 10.00  White Fibre Anatomy and Surgical Implications: Abhidha Shah
10.00 - 10.12  Image guided Neurosurgery – A personal conclusion after 25 years: Amir Samii
10.12 - 10.24  From Localisationism to a Connectomal Organization of Human Brain: Lessons gained from Direct Electrical Mapping: Hugues Duffau

HALL B

Main Topic Symposium 2 - Vascular

Chairpersons: Jacques Morcos, Paritosh Pandey, Rajneesh Kachhara, Shaswat Mishra

09.00 - 09.12  Results of Microsurgical Management of Anterior Communicating Artery Aneurysms: Martin Sames
09.12 - 09.24  Natural History and Management Strategy of Unruptured Intracranial Aneurysms: Unsolved 7 challenges: Akio Morita
09.24 - 09.36  Bypasses for Complex Aneurysms: Bin Xu
09.36 - 09.48  Basic techniques of Microvascular Decompression for Hemifacial Spasm: Shusaku Noro
09.48 - 10.00  The Evolving Role and Techniques of Bypass Surgery for Cerebral Ischemia and Aneurysms: Jacques Morcos
10.00 - 10.12  The Evolution of Giant Aneurysm treatment: Jafar J. Jafar
10.12 - 10.24  Microsurgery of Aneurysms not amenable to EVT: Basant Misra

HALL C

Main Topic Session 3 - Pediatrics and Imaging

Chairpersons: Yigal Shoshan, Uday Andar, Naresh Biyani, Samerndranath Ghosh

09.00 - 09.12  Role of Advanced Neuro Imaging in Surgery of Intra Axial Tumors: K. Sridhar
<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.12 - 09.24</td>
<td>Comparison of Outcomes in Navigation Guided versus Robotic Surgery: Girish Nair</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>Factor influencing Management of Split Cord Malformation from personal experience: Ashok Mahapatra</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>Primary Congenital Skull Base Encephalocele: Azmi Alias</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>Intraventricular Tumors in Children: Wan Tew Seow</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>Management of Incompletely Excised Cystic Craniopharyngioma: Amr Safwat</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>Skull Base Surgery during Childhood: Andre Grotenhuis</td>
</tr>
</tbody>
</table>

**Hall E**

**Main Topic Session 4 - Minimally Invasive & Spine**

**Chairpersons:** P. S. Ramani, Alok Sharma, Srinivas S. Rohidas, Arun Agarwal

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.12</td>
<td>Modified Costo-transversectomy: An Easy &amp; Effective Treatment for Posterolateral Dorsal Spine Lesions: Lokendra Singh</td>
</tr>
<tr>
<td>09.12 - 09.24</td>
<td>Simultaneous Transcranial-Endoscopic Transsphenoidal surgery for Complex Pituitary Adenomas: Ari Chacko</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>Role of Surgery in Prolactinoma: Manas Panigrahi</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>Complications Avoidance in Endoscopic Pituitary Surgery: Suresh Sankhla</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>Endoscopic Endonasal Approach for Complicated Skull Base Tumors: Takeo Goto</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>Achondroplasia and Spine-case based Update: N. Muthukumar</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>Spinous Process Split Laminectomy for Canal Stenosis and Intradural Tumors: Deepu Banerji</td>
</tr>
<tr>
<td>10.30 - 11.00</td>
<td>Tea/Coffee Break</td>
</tr>
</tbody>
</table>

**Session: Plenary**

**Chairpersons:** Andrew Kaye, V. S. Mehta, V. Rajshekhar

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00 - 11.15</td>
<td>Chordoma: An Update: Chandranath Sen (15 min)</td>
</tr>
<tr>
<td>11.15 - 11.30</td>
<td>Giant Pituitary Adenoma: William Couldwell (15 min)</td>
</tr>
<tr>
<td>11.30 - 11.45</td>
<td>Frontiers Of Neurosurgery. Preserving Neurosurgery: Jesus Lafuente (15 min)</td>
</tr>
<tr>
<td>11.45 - 12.00</td>
<td>Evidence Based Process Of Guidelines Production Neurosurgery: Time For A Change?: Franco Servadei (15 min)</td>
</tr>
<tr>
<td>12.00 - 12.20</td>
<td>NSI Presidential Lecture: Atul Goel (20 min)</td>
</tr>
<tr>
<td>12.20 - 12.23</td>
<td>Introduction of Speaker: Girish Menon (3 min)</td>
</tr>
<tr>
<td>12.23 - 12.53</td>
<td>AASNS President Lecture: Basant Misra (20 min)</td>
</tr>
</tbody>
</table>
Chairpersons: William Couldwell, Atul Goel, Lokendra Singh

12.53 - 12.56 Introduction of Speaker (3 min)

12.56 - 13.23 P. N. Tandon Oration

“Navigating Neurosurgical Oncology into an Optimal Future”:
James Rutka (27 min)

13.25 - 14.00 Lunch

TIME: 14.00 - 15.30

BUSINESS CENTRE

Video Presentation: 3D Video

Chairpersons: Batuk Diyora, Suresh Dugani

14.00 - 14.05 Anatomy of white fibers of the brain: Abhidha Shah

14.06 - 14.11 Cadaver demo: cavernous sinus and anterior transpetrous approach: Ashish Suri

14.12 - 14.17 Aneurysm surgery: Batuk Diyora

14.18 - 14.23 Large pontine cavernous angioma -Navigation guided microsurgical removal: Suresh Dugani

14.24 - 14.29 'Previously coiled or complex aneurysm’: Daniel Barrow

14.30 - 14.35 Lateral approach to brainstem cavernous malformations: Anil Nanda

14.36 - 14.41 Extended Middle Fossa approach to Petrous Tentorial Meningioma: Luis Borba

14.42 - 14.47 Occipital artery - to - PCA (P4) microsurgical bypass for P2/3 recurrent aneurysm after stent coiling:
Jacques Morcos


14.54 - 14.59 Cerebral Bypass case: Amir Dehdashti

15.00 - 15.05 Middle petrous apex meningioma: Philip Theodosopulus

15.06 - 15.11 Endoscopic canal decompression, bilateral decompression with unilateral approach: Shrinivas Rohidas

15.12 - 15.17 Chondrosarcoma invading the cavernous sinus, extradural removal: Kyu Sung Lee

TIME: 14.00 - 15.40

HALL A

Cerebrovascular Free Paper Session

Chairpersons: Trimurti Nadkarni, Abhidha Shah, Sukhdeep Singh Jhawar, C. Ramasamy

14.00 - 14.06 Hydrocephalus following Aneurysmal Subarachnoid Hemorrhage: Incidence, Timing & Predictors of Ventricular Shunting: Rakesh Das

14.14 - 14.20 Carotid Endarterectomy - An experience of 140 cases: Trimurti Nadkarni

14.21 - 14.27 Endovascular management of AVM - Current concepts: Nitin Narayan Dange

14.28 - 14.34 Microsurgical clipping techniques for Ophthalmic Segment Aneurysms (OSA): Rajneesh Kachhara

14.35 - 14.41 Surgical outcome of 110 consecutive patients operated for ICA communicating segment aneurysm: Mathew Abraham

14.42 - 14.48 Rebleeding following Aneurysmal Clipping: Manas Panigrahi


15.03 - 15.09 Ruptured Cerebral Aneurysm: Surgical outcome of a low volume non-subspecialized neurosurgical unit in India: Siddhartha Shankar Sahoo

15.10 - 15.16 Our experience of clipping 150 Aneurysms in Rural Peripheral Centre - Difficulties and Dilemmas: Shivashankar Bandu Marajakke

15.17 - 15.23 STA-MCA bypass for Symptomatic Moya Moya disease - Lessons learnt from 89 Revascularisations: Amol Raheja

15.24 - 15.30 Giant Aneurysms: Not so “Giant” in behavior!!: Debajyoti Pathak

15.31 - 15.37 Different strokes for difficult folks: Pediatric Syndromic Cranio-vertebral Anomalies (SCVA) - Surgical Nuances and Pattern of Recovery: Ashutosh Kumar

15.38 - 15.44 Surgical Outcome in 110 cases of MCA Aneurysm - A Retrospective Cohort Study: Biren Patel

**HALL B**

**Spine Free Paper Session**

**Chairpersons:** Arun Babu Joseph, Sameer Paltewar, Ram Kumar Menon, Sajesh Menon

14.00 - 14.06 Endoscopic experience of first 20 cases of Spinal Intradural Extramedullary Tumors: Somil Jaiswal

14.07 - 14.13 The Anatomy of Intravertebral Disc Herniations and the role of Vertebroplasty in their Treatment: Dominik Taterra

14.14 - 14.20 Outcome Predictor after Surgical Treatment of Intramedullary Spinal Tumours: Hukum Singh

14.21 - 14.27 360 degree Minimally Invasive Surgical Approaches for Lumbar Degenerative diseases. Transformaminal Lumbar Interbody Fusion (TLIF), Oblique Lumbar Interbody Fusion (OLIF) and Anterior Lumbar Interbody Fusion (ALIF): An institutional experience: Vamsi Krishna Yerramneni

14.28 - 14.34 Management of Craniovertebral Junction Disorders in Children less than 8 years - An institutional experience: Chandan Mohanty

14.35 - 14.41 Surgery for CVJ Anomalies using Customised 3D Printed Models: Making the operation safe: Rashim Kataria

14.42 - 14.48 The Cauda Equina Syndrome..not that rare: Tapas Chatterjee

14.49 - 15.05 Morphometric analysis of Atlas in Down Syndrome Patients: Abdullah A. Alatar

14.56 - 15.02 Surgical management of Pott’s Spine - A single centre experience: Arun Kumar A.

15.03 - 15.09 Anterior Single Screw Fixation of Type II Odontoid Fractures: An institutional experience: Anurag Sihag

15.10 - 15.16 Anterior Cervical Discectomy and Fusion with Iliac Crest Bone Graft and Titanium Cage for Treatment of Patients with Single level Cervical Degenerative Disc Disease: Experience of single institute: Yogendra Singh
HALL C

Peripheral Nerve / Radiosurgery / Basic Science Free Paper Session

Chairpersons: Milind Sankhe, Manjul Tripathi, Deepak Ranade, Prasad Krishnan

14.00 - 14.06  Thoracic Outlet Syndrome: Our experience: Ujwal Yeole

14.07 - 14.13  Management of Cubital Tunnel Syndrome by Anterior Trans-muscular Transposition of the Ulnar Nerve: Mohamed Ahmed Eltable

14.14 - 14.20  Complete Brachial Plexus Injury! Is the outcome gloomy?: Ketan Desai

14.21 - 14.27  Peripheral Nerve Sheath Tumors: A retrospective analysis of 25 patients: Anshul Goel

14.28 - 14.34  Benign Neurogenic Lumbo - Sacral Plexus Tumors: An experience of 16 cases: Rohan Roy

14.35 - 14.41  Facial Nerve Regeneration: An experience of 27 cases: Rabi N. Sahu

14.42 - 14.48  Safety and Efficacy of Primary Multisession Gamma Knife Radiosurgery for large volume Paraganglioma: Manjul Tripathi

14.49 - 14.55  Post Trigeminal Frameless Radiosurgery - Identifying shot accuracy in Euclidean space through serial MR imaging: Vangipuram Shankar

14.56 - 15.02  Outcome of Gamma Knife Radiosurgery for Meningiomas: An retrospective institutional review of 441 cases: Nishanth Sadashiva

15.03 - 15.09  An Electrical Kindling model of Epilepsy results in Cell type-specific changes to Inhibitory Neurons in the Primary Olfactory Cortex: Jennifer Joy Robertson

15.10 - 15.16  The Active Function of Venous Brain System on Hemodynamic Brain Circulation: Jan Hemza

15.17 - 15.23  3D printing in Neurosurgery: A comparative analysis of Fused Deposition Modeling Technique with 2D/3D Computational Imaging: Ranjit Rangnekar

15.24 - 15.30  Immunologically Tolerable Biofabricated Functional Human Neurological Conduits for treating Spinal Cord Injury: Syed Ameer Basha Paspa

15.31 - 15.37  Clinical grade Neurogenic cells generated under Xeno-free conditions for Neuro-regenerative applications: Aleem Ahmed Khan

HALL D

Pediatric Free Paper Session

Chairpersons: Suhas Udaykumaran, Santosh Kumar Dinkar, Chhitij Srivastava, G. K. Prusty

14.00 - 14.06  Lessons learnt in doing Endoscopic third Ventriculostomy in children: The beginner's experience: Ankur Bajaj

14.07 - 14.13  Endoscopic third Ventriculostomy and Shunt Dependency: Yee Hwa Khoo
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.35 - 14.41</td>
<td>Management of Cranial vault Encephaloceles: An institutional experience</td>
<td>Sachin Ashok Giri</td>
</tr>
<tr>
<td>14.42 - 14.48</td>
<td>Role of Intra op Nerve Monitoring (IONM in tethered cord surgery) our early experience: A case series</td>
<td>Shighakolli Ramesh</td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Material of Choice in Pediatric Cranioplasty</td>
<td>Anooja Abdul Salam</td>
</tr>
</tbody>
</table>

**HALL E**

**Miscellaneous Free Paper Session**

**Chairpersons:** Rakesh Gupta, Vasant Dakwale, Anita Jagetia

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>Role of Dynamic Extension Reserve (DER) and T1 Slope (T1S) in determining the Loss of Cervical Lordosis following Cervical Laminoplasty: A proposal for a novel classification system</td>
<td>Sachin A. Borkar</td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Controversies in the management of Colloid Cyst</td>
<td>Hemant Bhartiya</td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Dural Repair: A focused review on few materials &amp; our clinical experience with special reference to collagen matrix duraplasty</td>
<td>Shameem Ahmed</td>
</tr>
<tr>
<td>14.28 - 14.34</td>
<td>Second opinion in Neurosurgery Practice</td>
<td>Rakesh Gupta</td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Step ladder Expansive Cranioplasty: A concept</td>
<td>Sudipkumar Sengupta</td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Analyzing the Utility and Radiation dose following Cranial Surgery</td>
<td>Chinmaya Dash</td>
</tr>
<tr>
<td>14.56 - 15.02</td>
<td>A 3 Dimensional CT Angiography study to help in Surgical Planning for Retrosigmoid Craniotomies: Pradeep Sethuramalingam</td>
<td>Pradeep Sethuramalingam</td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Role of d-Dimer in Post-operative Recurrence of Chronic Subdural Hematoma</td>
<td>Sangeetha Adhikesavan</td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Factors affecting the Facial Nerve Outcome after Retromastoid Suboccipital excision of Vestibular Schwannomas</td>
<td>Dilip Kumar Macharla</td>
</tr>
<tr>
<td>Time</td>
<td>Session Title</td>
<td>Speaker(s)</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>Diverse presentation of Intraventricular Colloid Cysts- A tale of eight cases!</td>
<td>R. J. V. V. Prasad</td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>LSA Aneurysms: Anshu Mahajan</td>
<td></td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Microsurgical management of Cavernous Sinus Tumors in the era of Radiosurgery: A case series:</td>
<td>Rajasekhar Rekapalli</td>
</tr>
<tr>
<td>15.38 - 15.44</td>
<td>“PTFE Sleeve Graft” technique to remove the Neurovascular Conflict in Micro Vascular Decompression (MVD) for Trigeminal Neuralgia:</td>
<td>Shrey Jain</td>
</tr>
</tbody>
</table>

**HALL F**

**Neurotrauma Free Paper Session**

**Chairpersons:** Vikram Karmarkar, Anil Pande, Maneet Gill, S. P. Thiruppathy

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>Unplanned Readmissions in unknown patients with head injury - A surrogate marker of rehabilitation services in developing country?</td>
<td>Manoj Phalak</td>
</tr>
<tr>
<td>14.14 - 14.20</td>
<td>Predictors of Severe Head Injury in Tertiary Centre:</td>
<td>Rajendra Shrestha</td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Cognitive and Functional Outcomes of Early versus Delayed Cranioplasty after Decompressive Craniectomy:</td>
<td>Biswaranjan Nayak</td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Epidemiology of Traumatic CSF Rhinorrhoea in our institution:</td>
<td>Sathyanarayana L. D.</td>
</tr>
<tr>
<td>14.49 - 14.55</td>
<td>Tranexamic acid in Symptomatic Chronic Subdural Hematoma in the absence of Surgical Intervention:</td>
<td>Raghavendra Nayak</td>
</tr>
<tr>
<td>14.56 - 15.02</td>
<td>Cerebral Infarction and Angioarchitecture associated with Traumatic Brain Injury, Incidence and Risk factor: A institutional study:</td>
<td>Vikas Chandra Jha</td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Safe window: A Novel Approach for stabilising Thoracolumbar fracture by stand-alone Expandable Cage by “Diaphragm Sparing Mini Open Thoracotomy”: A prospective study:</td>
<td>M. Narayana Swamy</td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Surgical experience of Acute Odontoid fractures with Single Screw Anterior Fixation:</td>
<td>D. Mukhopadhyay</td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Role of serial CT brain in Management of Mild Traumatic Brain Injury:</td>
<td>Vijay Anand</td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Etiopathogenesis of Decompressive Craniectomy:</td>
<td>Uday Gupta</td>
</tr>
<tr>
<td>15.38 - 15.44</td>
<td>Traumatic Posterior Fossa Hematoma: Role of site of Impact and other factors:</td>
<td>Nitin Dwivedi</td>
</tr>
</tbody>
</table>

**14.00 - 15.30** WFNS Executive Committee (EC) Meeting

**15.40 - 16.00** Tea/Coffee Break
**HALL A**

**Main Topic Session 1 - Vascular**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Tricks and Pitfalls of Aneurysm surgery: Abdessamad El-Azhari</td>
<td></td>
</tr>
<tr>
<td>16.12 - 16.24</td>
<td>Temporal Horn Tapping in Acute Aneurysm Surgery - A Safe Alternative to Paines point: Girish Menon</td>
<td></td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td>Microsurgical Management of Blister and Fusiform Aneurysms: Barrow Daniel</td>
<td></td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Endoscopic Controlled Clipping of Anterior Circulation Cerebral Aneurysms: Bhawani Sharma</td>
<td></td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>Revascularization in Moyamoya disease: Ashish Suri</td>
<td></td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Surgical Strategies for the Management of Complex Intracranial Aneurysms: Acerbi Francesco</td>
<td></td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Tiny Aneurysms: Surgical difficulties for Management: Rajneesh Kachhara</td>
<td></td>
</tr>
</tbody>
</table>

**HALL B**

**Main Topic Session 2 - General Neurosurgery**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Neurosurgical Education and Training - Can we make it better?: Wan Tew Seow</td>
<td></td>
</tr>
<tr>
<td>16.12 - 16.24</td>
<td>Organizing Training in Neurosurgery in Developing Countries, what is the Best Model?: Jesus Lafuente</td>
<td></td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td><em>Excellence in Neurosurgery</em>: Joao Paulo Farias</td>
<td></td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Disaster Neurosurgery: Improving Global Surgery with Mass Casualty Centers online: Russell J. Andrews</td>
<td></td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>Memento Mori: Art, Public Health and Neurosurgery: Anil Nanda</td>
<td></td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Neurorestoration and Beyond: Charles Liu</td>
<td></td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Research laboratory for Microsurgical Neuroanatomy as a Translational Approach: Peter A. Winkler</td>
<td></td>
</tr>
<tr>
<td>17.24 - 17.36</td>
<td>Spirituality and Neuroscience - The Convergence: R. C. Mishra</td>
<td></td>
</tr>
</tbody>
</table>

**HALL C**

**Main Topic Session 3 - Surgical Techniques**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Surgery of Orbital Mass Lesions: Christian Matula</td>
<td></td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td>Improved Optic Nerve Visualization and Surgical planning through a novel MRI protocol (Has implications for surgical approach): Ian Dunn</td>
<td></td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Acom aneurysm -management and difficulties: Vernon Velho</td>
<td></td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>Brain Computer Interface and Motor Reanimation: Milind Deogoankar</td>
<td></td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Thalamic Tumors - Choice of Surgical Corridors: V. P. Singh</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Speaker(s)</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Optogenetic Stimulation reduces Neuronal Nitric Oxide Synthase Expression after Stroke</td>
<td>Arjun Pendharkar (AASAN)</td>
</tr>
<tr>
<td>17.24 - 17.36</td>
<td>Keyhole Approach to Anterior Circulation Aneurysms - Learning Curve, Apprehensions and Advantages to the Neurosurgical Community</td>
<td>Asheesh Tandon</td>
</tr>
<tr>
<td>17.45 - 18.15</td>
<td>An Evening with a Legend</td>
<td>Madjid Samii</td>
</tr>
<tr>
<td>18.30 - 20.00</td>
<td>Annual General Body Meeting</td>
<td></td>
</tr>
</tbody>
</table>

**Chairpersons:** Basant Misra, Atul Goel
PROGRAMME

DAY 3: DECEMBER 7, 2019
**Time: 08.00 - 09.00**

**HALL A**

**Session: Morning Symposium 1 - Cerebrovascular**

**Chairpersons:** Martin Sames, Giuseppe Lanzino, Dilip Kiyawat, Venkatesh Madhugiri

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00</td>
<td>Repeat Gamma Knife Radiosurgery for Cerebral Arteriovenous Malformations: A critical analysis</td>
<td>Shweta Kedia</td>
</tr>
<tr>
<td>08.10</td>
<td>Clipping of Aneurysms: Everything does not always fall into place</td>
<td>Nishant Goyal</td>
</tr>
<tr>
<td>08.20</td>
<td>Pan Synangiosis for Moya Moya disease: Surgical technique, Intraoperative Saline test for Patency of Bypass and Clinical outcome</td>
<td>N. K. Das</td>
</tr>
<tr>
<td>08.30</td>
<td>Intraoperative Neuromonitoring</td>
<td>Smita Sharma</td>
</tr>
<tr>
<td>08.40</td>
<td>Surgery for Giant MCA Aneurysms</td>
<td>Kamlesh Singh Bhaisora</td>
</tr>
<tr>
<td>08.50</td>
<td>Double Bone Flap Craniotomy to expose Dural Venous Sinuses</td>
<td>Ganpati Prasad Mishra</td>
</tr>
</tbody>
</table>

**HALL B**

**Session: Morning Symposium 2 - Surgical Technique**

**Chairpersons:** Khaled El-Bahy, Rajan Shah, Sumit Sinha, Harsh Jain

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00</td>
<td>Intraoperative O-Arm Corroboration of Electrode placement in Frame based Deep Brain Stimulation</td>
<td>Sanjeev Srivastava</td>
</tr>
<tr>
<td>08.10</td>
<td>Routine Extradural Clinoectomy for Anterior Skull base Meningiomas: FAB or FAD?</td>
<td>Shashwat Mishra</td>
</tr>
<tr>
<td>08.20</td>
<td>Modified Semilateral positioning for Petrous and CP angle Lesions: Our experience</td>
<td>Vikram M.</td>
</tr>
<tr>
<td>08.30</td>
<td>Role of Endonasal &amp; Transventricular Endoscopy for third Ventricular Mass Lesions</td>
<td>S. S. Dhandapani</td>
</tr>
<tr>
<td>08.40</td>
<td>C2 Bone in Cervical Spine: Surgeon friendly for CVJ Fixation</td>
<td>Anita Jagetia</td>
</tr>
<tr>
<td>08.50</td>
<td>Minimally Invasive and Keyhole Surgery- A New Paradigm in Neurosurgery</td>
<td>Sumit Sinha</td>
</tr>
</tbody>
</table>

**HALL C**

**Session: Morning Symposium 3 - Cerebrovascular**

**Chairpersons:** Jafar Jafar, Pankaj Gupta, Ravi Mohan Rao, Harshad Purandare

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00</td>
<td>Management Strategies for Hypervascular Lesions</td>
<td>Anil Pande</td>
</tr>
<tr>
<td>08.10</td>
<td>Clip reconstruction of Aneurysm: An Art to Master</td>
<td>Amit Thapa</td>
</tr>
<tr>
<td>08.20</td>
<td>Recurrent Artery of Heubner: A Meta-analysis of Anatomical Characteristics</td>
<td>Bendik Skinningsrud</td>
</tr>
<tr>
<td>08.30</td>
<td>Microneurosurgical excision of Cerebral Arterio Venous Malformations - A Neurosurgical &quot;Bete Noire&quot;</td>
<td>Maneet Gill</td>
</tr>
<tr>
<td>08.40</td>
<td>Multiple Clip Application for large Middle Cerebral Artery Aneurysms</td>
<td>Malay Chakraborty</td>
</tr>
<tr>
<td>08.50</td>
<td>Microsurgical Treatment of Anterior Circulation Aneurysms, Principles of Treatment - 980 cases</td>
<td>Suresh Dugani</td>
</tr>
</tbody>
</table>
HALL E

Session: Morning Symposium 4 - Spine

Chairpersons: S. R. Dharkar, Y. R. Yadav, A. Netalkar, Nikhil Shah

08.00 - 08.10 Two Decades, Two Eras of Cranio-Vertebral Junction Stabilisation techniques: An institutional experience of 239 patients: Vidyasagar Kanneganti

08.10 - 08.20 Does modified K line correlate with Preoperative Nurick grade and can it predict improvement in Nurick grade in Degenerative Cervical Myelopathy? - A study on 214 patients: B. Vivek Joseph

08.20 - 08.30 Cervical Laminoforaminotomy - A Viable Functional Restorative surgery for Cervical Radiculopathy: Kiran M.

08.30 - 08.40 Minimally Invasive Surgical Techniques for the management of Thoracic Disc Herniations: Sudhir Dubey

08.40 - 08.50 Surgery for Degenerative Cervical Myelopathy: Influence of IONM in decision making: K. R. Suresh Bapu

08.50 - 09.00 Expanding Horizons of Endoscopic Spine Surgeries: Anant Mehrotra

HALL F

Session: Morning Symposium 5 - Trauma

Chairpersons: Shekar N. Kurpad, Dhaval Shukla, Tapas Chatterjee, K. K. Bansal

08.00 - 08.10 Post Traumatic Hydrocephalus: Rakesh Gupta

08.10 - 08.20 Decompressive Craniectomy and Cranioplasty in Severe Traumatic Brain Injury: Sanjay Sharma

08.20 - 08.30 Post traumatic Gangliocapsular Hemorrhage: Where do we stand? : Chirag N. Solanki

08.30 - 08.40 Cranioplasty: Complications & Advances: Krishan Kumar Yadav

08.40 - 08.50 Traumatic Brain Injury in India: Where do we stand in 2020? : Mayank Agarwal

08.50 - 09.00 Head Injury Prevention - A collective responsibility & we can do it!: Jogi Patissapu

09.00 - 09.30 Tea/Coffee Break

Session: Award Papers


Category: Cost Effective Management in Neurology

09.30 - 09.39 Microsurgical DREZotomy in Spastic Cerebral Palsy: Poor man’s Baclofen Pump: Nishant Goyal

09.39 - 09.48 Protocol based early Decompressive Craniectomy in a Resource Constrained Environment: A tertiary care hospital experience: Sanjeev Pattankar

Category: Neuro-oncology Award

09.48 - 09.57 Supratentorial low grade Glioma: Proposing a Prognosticating system based on Single Institutional review of 150 patients: Vikrant Keshri

09.57 - 10.06 Predictors of Hydrocephalus in Cerebellopontine angle tumor patients and Validity of HASS SCORE in patients requiring CSF diversion: Review of 300 patients: Neeraj Sharma
Category: Epilepsy Award
10.06 - 10.15 Surgery for Refractory Epileptic Spasms in Children: Clinical Characteristics and Predictors of Outcome after Surgery: Raghavendra Harpanahalli

Category: Best Paper in Allied Neurosciences
10.24 - 10.33 Gamma-Knife Radiosurgery in Partially Embolized AVM - Management Dilemmas and Outcomes: Harsh Deora

Category: Award Paper in Neurosurgery
10.33 - 10.42 Correlation of Pre-operative Functional Magnetic Resonance Imaging (fMRI) with Intraoperative Cortical Stimulation in Surgeries of Eloquent Brain Lesions: Pawan Chawla
10.42 - 10.51 Sagittal balance correction in Cervical Compressive Myelopathy - Is it helpful?: Chiragkumar K. Patel
10.51 - 11.00 When to do Anterior Cervical Discectomy - An evidence-based Study: P. John Paul

TIME: 11.00 - 13.15
Session: Plenary
Chairpersons: Franco Servadei, Daljit Singh, Sunil Pandya

11.00 - 11.15 Medical Education: Ancient Indian Guidelines: Sunil Pandya (15 min)
11.15 - 11.30 Dharma: The Redemptive Strenuosities Of Neurosurgery: Anil Nanda (15 min)
11.30 - 11.45 Hearing Preservation In Acoustic Neuroma Surgery: Andrew Kaye (15 min)
11.45 - 12.00 Complication Avoidance And Management In Aneurysm Surgery: Daniel Barrow (15 min)
12.00 - 12.15 Changing The Paradigm Of Managing Diffuse Low-Grade Gliomas: From Early Maximal Safe Surgical Resection To Screening: Hugues Duffau (15 min)
12.15 - 12.30 AVM Surgery - Did ARUBA Have Any Impact?: Vladimir Benes (15 min)
12.30 - 12.45 A New Surgical Strategy for an Old & Common Problem of Post Op Rebleeds in Multi Layered Chronic SDH: Lokendra Singh (15 min)
12.45 - 13.00 Craniopharyngiomas - The Case For The Endonasal Corridor: Nelson Oyesiku (15 min)
13.00 - 13.15 The Evolution Of Skull Base Surgery From Open To Endoscopic Techniques: Fred Gentili (15 min)

13.15 - 14.00 Lunch

TIME: 14.00 - 15.40
HALL A
Skull Base Free Paper Session
Chairpersons: Santosh Lad, Jayesh Sardhara, Jayant Chawla, R. Raghavendran

14.00 - 14.06 Observational study on Clinical Presentation, Management and Outcome in patients with Cerebello-pontine angle Lesions at a tertiary care centre: Abhirama Chandra Gabbita
Elderly patients with Intracranial Meningioma: Surgical considerations in 228 patients with a comprehensive analysis of the literature: Murat Sakir Eksi

Identifying and Preventing Cavernous Carotid Injury in Invasive Pituitary Adenoma: Deepu Banerji

Experience of sitting position in Neurosurgery: Bipin Kumar Chaurasia

Endoscopic anatomy of Sella and Cavernous Sinus Triangles in 3D: A cadaveric study: Sukhdeep Singh Jhawar

The Chiasmal Compression Index - An integrative assessment tool for visual disturbances in patients with pituitary macroadenomas: Elad Avraham

Safety of Ventriculostomy at modified Paines point for Intraoperative Brain relaxation during Pterional Craniotomy: Hitesh Kumar Gurjar

Use of Intrathecal Fluorescein as a guide for Endoscopic CSF Rhinorrhoea Repair in Spontaneous CSF leaks: Nirmala S.

Endoscopic Endonasal approach to the Petroclival Synchondrosis: A case series: Prakash Nair

Excision of Intracranial Epidermoids using a Keyhole Endoscopic Approach: Seeing is believing: Pawan Kumar Verma

Trigeminal Schwannomas: A Case Series of Six Cases: Debadutta Senapati

Triple layer reconstruction technique of Cribriform defects after resection of Anterior Skull base tumors: Abhishek Hirai Jain

The Straight road to Meckels cave: Endoscopic Approach to Giant Trigeminal Schwannomas: Sandeep Kandregula

Evaluation of long term outcome in surgically treated Posterior Fossa Epidermoid: Sanjay H. M.

HALL B

Neuro Endovascular Free Paper Session

Chairpersons: Santosh Prabhu, Ganpati P. Mishra, Srikanth Balasubramanian, Srinivasan Paramasivam

Digital Subtraction Angiography: Starting from scratch- single neurosurgeon’s experience at AIIMS Rishikesh: Aditya Kiran Patil

Electrocardiograph Abnormalities in Intracranial Hemorrhage, Prognosis and Outcomes: A retrospective cohort study, at King Abdulaziz University Hospital, Jeddah 2010-2018: Maryam Zuhair Enani

Carotid Endarterectomy, without shunt under GA & Continuous Scalp EEG monitoring: Ravi Mohan Rao

Analysis of data of 136 operated cases of brain aneurysms: An institutional experience: Nemi Chand Poonia

Cost Effective Treatment Of Vasospasm with Intracisternal Papaverine: Arvind Kumar Suman

Clinical, Radiological profile and Outcomes in the management of Spetzler-Martin Grades I-III Arteriovenous Malformations at a Tertiary Care Institute: Goutham Hanu Tammireddy

Intramedullary Spinal Cavernoma: Clinical presentation, Microsurgical approach and Long-term outcome: Anamalla Vishnu Vardhan

Factors predicting Rupture of an Aneurysm in Multiple Intracranial Aneurysms: Harshal Agrawal

An Institutional Experience of Intracerebral Aneurysm Clipping: Looking for factors affecting outcome: Tanusree Chakraborty

Endovascular Therapy in Complex Posterior Circulation Atherosclerotic Disease: Raj Vinodkumar Agarbattiwala
**Miscellaneous Free Paper Session**

**Chairpersons:** Sunil Shah, Chandan Mohanty, Narsinga Rao, M. Mohan Sampath Kumar

14.00 - 14.06 Unusual location and Presentation of Epidermoid Cyst - A systematic review: Amit B. Aiwale


14.14 - 14.20 Chhabra Medium Pressure valve in Thecoperitoneal shunt - An effective & cheap solution to prevent low pressure headache in Benign Intracranial Hypertension: Jayunkumar Maheshchandra Shah

14.21 - 14.27 Comparative study of Open versus Endoscopic discectomy (Destandau technique) in Lumbar Disc Herniation: Kamesh Konchada

14.28 - 14.34 Comparative study of Endoscopic vs Open Craniotomy in treatment of Suprasellar bleed- Which one is the best option to choose? : V. S. S. K. Chaitanya Juluru


14.42 - 14.48 The impact of Body Habitus on Outcomes after Aneurysmal Subarachnoid Hemorrhage treated by Microsurgical Aneurysmal Repair: Anil Jadav

14.49 - 15.05 Use of 3D printer generated Polylactic Acid Mold for Cranioplasty with customized Polymethyl Methacrylate Implants: An institutional experience: Ashim Kr Boro

14.56 - 15.02 Management of Multiloculated Hydrocephalus in Children with emphasis on role of CT Ventriculography: Siddharth Vankipuram

15.03 - 15.08 To compare results of Subgaleal Pouch vs Subdural Drain in cases of Chronic SDH: Arunav Sharma

15.10 - 15.16 Spinal Tumour Syndrome of Tuberculous origin: Elangovan Duraipandian

15.17 - 15.23 Endoscopic third Ventriculostomy for Hydrocephalus in Infants: A single centre experience: Krishna Govind Lodha

15.24 - 15.30 Study to identify prevalence of Pituitary Gland Injury in Severe Traumatic Brain injury: Jitendra M. Tadghare

15.31 - 15.37 Primary Thalamic Hemorrhage - Clinical profile and Prognostic predictors from a series of 117 cases: Sandesh Onkarappa

**Neuro Oncology Free Paper Session**

**Chairpersons:** Komal Prasad, Sudheer Ambekar, Dushyant Thaman, Venkatesh Raju

14.00 - 14.06 Surgical results of Craniopharyngioma: Experience with 81 cases: Naresh Kumar Damesha

14.14 - 14.20 Value of Intraoperative high field 3 tesla Magnetic Resonance imaging (iMRI) in Assessment and Improvement of Extent of Resection of Pituitary Adenomas: Anandh Balasubramaniam
14.21 - 14.27 Intracranial Tumors: Correlation of ki-67 proliferation index, biological behavior and survival rate: Azra Zejnelagic
14.42 - 14.48 Institutional analysis of Patients with Posterior Fossa Meningioma: Gokanapudi Sreeram
15.03 - 15.09 Epidemiological study of Pediatric Brain Tumor Patients presenting at Tertiary Neurosurgical Oncology centre: Vikas Singh
15.10 - 15.16 Postoperative Central Diabetes Insipidus with Normal Urine output - A relatively undisussed entity: Sandesh Khandelwal
15.17 - 15.23 Role of p53, BRAF and EGFR Gene Mutations in Glioma Tumorigenesis and their co-relation with Tumor Histopathological Grading: Deep Dutta
15.24 - 15.30 Excising large Cranial Meningiomas with Minimal Resources with cost benefit to the patients: Dushyant Thaman
15.31 - 15.37 Efficacy of simultaneous Endoscopic Tumor Biopsy and Endoscopic Cerebrospinal Fluid Diversion procedures in Intra and Paraventricular Tumors: Gagandeep Attri

**HALL E**

**Miscellaneous Free Paper Session**

**Chairpersons:** Vivek Tandon, Jaydev Panchwagh, Survendra Rai, P. R. Rajkumar

- **14.00 - 14.06** Minimal Invasive Surgery in Thoracolumbar Fractures using SEXTANT and LONGITUDE system - A single centre experience: Mohana Murali Krishna N.
- **14.07 - 14.13** Study of the Mechanism, Severity and Outcome of Traumatic Head Injury in Elderly population: Maruti Nandan
- **14.14 - 14.20** Institutional study of Different Aspects of Posterior Fossa Meningiomas: Sanjeev Kumar Meher
- **14.21 - 14.27** Comparative study of Expandable Cage versus non Expandable Cage in Cervical Spine: Nakul Pahwa
- **14.28 - 14.34** Polymethylmethacrylate (PMMA) Cranioplasty Flaps: A cosmetic comparison with other low cost methods of cranioplasty: Manish Baldia
- **14.35 - 14.41** Impact of Functional Imaging, Neuromonitoring and Awake Craniotomy in Glioma Resection: Vivek Tandon
- **14.49 - 14.55** Bifrontal vs Pterional Craniotomy for Craniopharyngiomas: Ghanshyam Das Singhal
- **14.56 - 15.02** A Study on Modification of Goel’s Technique of C1-C2 fixation for Atlanto-Axial Dislocation: Nishant Kumar Shukla
- **15.03 - 15.09** Homemade Simulators for Neurosurgical Skill Training: A frugal solution to economic challenges in resource limited scenario: Manbachan Singh Bedi
15.10 - 15.16 ACM with Syrinx: Management, Clinical and Radiological outcome analysis: Hanuma Naik Banavath
15.17 - 15.23 Role of Pre-operative SSEP as Post-operative outcome indicator in IDEM patients: Piyush Kumar Panchariya
15.31 - 15.37 MINI Craniotomy- A valid option for management of chronic Sub-dural Hematoma: Sai Kalyan Savarapu

TIME: 14.00 - 15.30

HALL F

Neuro Quiz
Moderator: Manas Panigrahi

14.00 - 15.30 AASNS Executive Committee (EC) Meeting

15.40 - 16.00 Tea/Coffee Break

TIME: 16.00 - 17.40

HALL A

Main Topic Session 1 - Vascular
Chairpersons: Rose Du, Suresh Dugani, L. N. Tripathy, Suresh Jayabal

16.00 - 16.12 3D anatomy of the extracranial arteries: Lluis (Roberto) Rodriguez Rubio
16.12 - 16.24 Genetics of Cerebrovascular Diseases: Rose Du
16.24 - 16.36 Surgery without Embolization for AVM Management: Nirav Patel
16.36 - 16.48 30 years and 500 brain AVM surgery - Lessons learned: Jafar Jafar
16.48 - 17.00 Bypass for Complex Aneurysms: Amir Dehdashti
17.00 - 17.12 Open Vascular And Endovascular Neurosurgery: Can You Do Both?: Lanzino Giuseppe
17.12 - 17.24 Cerebral Aneurysms: Clipping and Coiling: Batuk Diyora
17.24 - 17.36 Microsurgical Management of Large and Giant Aneurysms in the Endovascular era: Roopesh Kumar
17.24 - 17.36 Endovascular management of Complex Aneurysms: Nitin Dange

HALL B

Main Topic Session 2 - Recent Advances
Chairpersons: Kate Drummond, K. R. Suresh Bapu, Aditya Gupta, V. Sundar

16.00 - 16.12 The use of Fluorescein for the Resection of CNS Tumors: Francesco Acerbi
16.12 - 16.24 Role of Supracerebellar Infratentorial Approach in Posterior Thalamic Lesions: Vladimir Benes
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker/Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.24 - 16.36</td>
<td>MRI guided Focused Ultrasound for Movement Disorder - Technique, Results and 5 years follow-up:</td>
<td>Menashe Zaaroor</td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Awake Craniotomy - A simplified technique with excellent outcomes:</td>
<td>Kate Drummond</td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>The surgical treatment of Sphenoidal Wing Meningioma: Experiences 96 cases:</td>
<td>Van He Dong</td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Postoperative Validation of Accuracy following Stereotactic Needle Biopsy:</td>
<td>Iddo Paldor</td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Management Of Pineal Tumors:</td>
<td>Vernon Velho</td>
</tr>
<tr>
<td>17.24 - 17.36</td>
<td>Maximising resections in High grade Gliomas - Use of Monitoring, Yellow fluorescence and Intra-op MRI:</td>
<td>Anandh Balasubramanian</td>
</tr>
</tbody>
</table>

**HALL C**

**Main Topic Session 3 - Spine**

**Chairpersons:** Jose Landeiro, Abhaya Kumar, Hemant Bhartiya, Ramesh Chandra

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker/Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.12</td>
<td>Microsurgical Resection of Intrinsic Spinal Cord Tumors:</td>
<td>Arnautovic Kenan</td>
</tr>
<tr>
<td>16.12 - 16.24</td>
<td>Understanding prognostic factors in Compressive Cervical Myelopathy- Results from a 12 year Prospective Study:</td>
<td>Sandip Chatterjee</td>
</tr>
<tr>
<td>16.24 - 16.36</td>
<td>Minimally Invasive Oblique Lumbar Interbody Fusion (MI-OLIF): New roads and Impediments:</td>
<td>Jayesh Sardhara</td>
</tr>
<tr>
<td>16.36 - 16.48</td>
<td>Craniocervical Junction Tumors Management:</td>
<td>Sames Martin</td>
</tr>
<tr>
<td>16.48 - 17.00</td>
<td>Spinal Cord Tumors:</td>
<td>Prabin Shrestha</td>
</tr>
<tr>
<td>17.00 - 17.12</td>
<td>Lateral approach for Ventrally located Upper Cervical Meningioma:</td>
<td>Ali Ayyad</td>
</tr>
<tr>
<td>17.12 - 17.24</td>
<td>Tba: Jose Landeiro</td>
<td></td>
</tr>
</tbody>
</table>

**HALL E**

**Video Session**

**Chairpersons:** Ashish Suri, Girish Menon

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker/Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00 - 16.05</td>
<td>Key hole surgery for brain tumor:</td>
<td>Sumit Sinha</td>
</tr>
<tr>
<td>16.05 - 16.10</td>
<td>Keyhole approach for Pcom. art. Aneurysm:</td>
<td>Lokendra Singh</td>
</tr>
<tr>
<td>16.10 - 16.15</td>
<td>High flow bypass with saphenous vein graft:</td>
<td>Roopesh Kumar</td>
</tr>
<tr>
<td>16.15 - 16.20</td>
<td>Interhemispheric Vertical hemispherotomy:</td>
<td>Milind Sankhe</td>
</tr>
<tr>
<td>16.20 - 16.25</td>
<td>Encountering Cavernous Carotid in Invasive Pituitary Adenoma:</td>
<td>Deepu Banerji</td>
</tr>
<tr>
<td>16.25 - 16.30</td>
<td>Cavernous hemangioma of the cavernous sinus:</td>
<td>Atul Goel</td>
</tr>
<tr>
<td>16.30 - 16.35</td>
<td>Intramedullary tumor:</td>
<td>V P Singh</td>
</tr>
<tr>
<td>16.35 - 16.40</td>
<td>Extended subfrontal approach for tuberculosis meningioma:</td>
<td>Akagami Ryojo</td>
</tr>
<tr>
<td>16.40 - 16.45</td>
<td>Microsurgical resection of large craniocervical junction ventral dumbell Schwannoma:</td>
<td>Arnautovic Kenan</td>
</tr>
<tr>
<td>16.45 - 16.50</td>
<td>Endoscopic Resection of Chordoma with lateral extension to the CP angle:</td>
<td>Gentilli Fred</td>
</tr>
<tr>
<td>16.50 - 16.55</td>
<td>Complete corpus callosotomy, and removal of unilateral SEGA in a child with seizures and tuberous sclerosis:</td>
<td>James Rutka</td>
</tr>
</tbody>
</table>
16.55 - 17.00 Neurosurgical approaches to the orbit: Joao Paulo Farias
17.00 - 17.05 Resection of a pial cervical AVF: Lanzino Giuseppe
17.05 - 17.10 Microsurgery for the large and giant aneurysms (carotid-ophthalmic with prophylactic bypass, choroidal artery aneurysm): Sames Martin
17.10 - 17.15 Minimally invasive Middle cerebral artery aneurysm surgery: Vladimir Benes
17.15 - 17.20 Brainstem Cavernoma: Vernon Velho

HALL F
AASP Ni Session
Coordinator: C. Deopujari
Moderators: H. Sakamoto, N. Venkatramana, B. Chidambaran

16.00 - 16.12 Management of Syndromic craniosynostosis in Infants: Hiroaki Sakamoto
16.13 - 16.25 Management of Germ Cell Tumors in Children: Tai Tong Wong
16.39 - 16.51 Management of Moya Moya Disease in the Very Young: Young Shin Ra
16.52 - 17.00 Management of Complex Hydrocephalus: Nunthisir Wittayanakorn
17.00 - 17.08 Surgical management of Neonatal IVH: Suresh Sankhla
17.09 - 17.17 Management of Complex Spinal Dysraphism: Natarajan Muthukumar
17.18 - 17.26 Management of Congenital AAD in the Very Young: Sandip Chatterjee
17.27 - 17.35 Surgery for Epilepsy in Children below 2 years: Dattatraya Muzumdar

17.30 - 18.30 2nd NSI Executive Committee Meeting
19.30 - 20.30 Entertainment Programme
20.30 - 22.30 Cocktail Dinner (Venue: Renaissance Mumbai Convention Centre Hotel, Powai, Mumbai)
HALL A

Session: Morning Symposium 1 - Trauma & Spine

Chairpersons: Mohan Raj Sharma, V. D. Sinha, Sanjay Kumar, Ranjeet Rangnekar

08.00 - 08.12  Cranioplasty using Three-dimensional Printer and Polymethyl-methacrylate Implant: V. D. Sinha
08.12 - 08.24  Congenital TORCH Infection in Pediatric Patients and their Proximity to Anterior Circulation Territories of Brain - An observational study: Dheeman Chaudhury
08.24 - 08.36  Unfavourable Functional Outcome is expected for Elderly Patients suffering from Acute Subdural Hematoma even when presenting with preserved level of consciousness: Yuval Sufaro
08.36 - 08.48  Surgical Management of Intramedullary Pathologies: Dar-Ming Lai
08.48 - 09.00  Evidence Based Neurotraumatology: Wilco C. Peul

HALL B

Session: Morning Symposium 2 - Vascular

Chairpersons: Anil Karapurkar, Suresh Sankhla, Vikas Gupta, Vishwanath Iyer

08.00 - 08.12  Revascularization for the Stroke patient: Acute, Subacute and Chronic: Nirav Patel
08.12 - 08.24  Endovascular Superselective Intra-arterial infusion of Mesenchymal Stem Cells loaded with Delta-24 in a Canine Model: Visish Srinivasan
08.24 - 08.36  Tailored surgical treatment for Moya Moya disease: Bin Xu
08.36 - 08.48  Moya Moya disease: Indian experience: Paritosh Pandey
08.48 - 09.00  Surgical management of Pediatric Moya Moya disease by EDAS (Encephalo-Duro-Arterio-Synangiosis) procedure: Trimurti D. Nadkarni

HALL C

Session: Morning Symposium 3 - Functional

Chairpersons: Michael Schulder, Malay Chakraborty, Aliasgar Moiyadi, Chandrashekhar Raman

08.00 - 08.12  Outcome of 1123 cases of Trigeminal Neuralgia treated by MVD by a single surgeon with new insight in to the Pathoanatomical variations of TN-REZ and its Implications in Surgical Strategies: Jayadev Panchwagh
08.12 - 08.24  Microvascular Decompression for Trigeminal Neuralgia associated with the Vertebrobasilar Arter: Shusaku Noro
08.24 - 08.36  Updates on Molecular Biology and Recent Mechanistic Discoveries: David Raleigh
08.36 - 08.48  Normal Pressure Hydrocephalus - Current Understanding: Daljit Singh
08.48 - 09.00  Anaesthesia in Sitting position in Neurosurgery: Joseph Monteiro
**HALL A**

**Main Topic Session 1 - Miscellaneous**

*Chairpersons: Wilco C. Peul, Dwarakanath Srinivas, Sandeep Mohindra, Shaam Bodeliwala*

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.12</td>
<td>Evidence Based Guidelines in the Treatment of Geriatric Odontoid Fractures</td>
<td>Vivek Tandon</td>
</tr>
<tr>
<td>09.12 - 09.24</td>
<td>Microsurgery of Cranial Dural AV Fistula</td>
<td>Batuk Diyora</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>The surgical treatment of Acoustic Neurinoma by Retrosigmoid Transmeatal Approach</td>
<td>Van He Dong</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>Long-term Patient Reported Outcome Measures (PROMS) for the Conservative Management of Odontoid Peg Fractures</td>
<td>Andreas Demetriades</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>The Surgical and Ablative Management of Trigeminal Neuralgia</td>
<td>Hari Chandran</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>Treatment of Cervical Myelopathy: Anterior or Posterior Approach</td>
<td>Dar-Ming Lai</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>Why Success in Chordoma surgery still remains elusive</td>
<td>Ashish Pathak</td>
</tr>
</tbody>
</table>

**HALL B**

**Main Topic Session 2 - Vascular**

*Chairpersons: Bin Xu, Girish Menon, S. N. Shenoy, Prashant Khandelwal*

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.12</td>
<td>Natural history of Dural Arteriovenous Fistulas: A Multicenter Study</td>
<td>Rose Du</td>
</tr>
<tr>
<td>09.12 - 09.24</td>
<td>Classification and Treatment of Cranial Dural AVF's</td>
<td>Talat Kiris</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>Combined Surgical &amp; Endovascular treatment of Spinal Dural Arteriovenous Fistulas</td>
<td>Miroslav Vukic</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>AVM treatment after ARUBA study</td>
<td>Yoko Kato</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>Surgery for AVM</td>
<td>Atul Goel</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>Classification of Superior Hypophyseal Artery Aneurysms</td>
<td>Sanjay Behari</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>Vascular Complications and Avoidance during Brain Tumor and Skull Base Surgery</td>
<td>Akio Morita</td>
</tr>
</tbody>
</table>

**HALL C**

**Main Topic Session 3 - Functional Neurosurgery**

*Chairpersons: Claudio Gustavo Yampolsky, Siddharth Ghosh, Satnam Singh Chhabra, Deepak Bhangale*

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.12</td>
<td>Results of Cellular Therapy in Neurotrauma</td>
<td>Alok Sharma</td>
</tr>
<tr>
<td>09.12 - 09.24</td>
<td>Pediatric Epilepsy: Our Experience</td>
<td>Suchanda Bhattacharjee</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>&quot;Psychosurgery, Reconsidered&quot;:</td>
<td>Michael Schulder</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>The USC Epilepsy Care Consortium - Integrating The Healthcare Ecosystem For Epilepsy Care In Southern California</td>
<td>Charles Liu</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>Surgical Treatment of Facial Pain: From Trigeminal Neuralgia to Trigeminal Autonomic Cephalgias</td>
<td>Giovanni Broggi</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>HIFU: The Development, Current &amp; Future Applications</td>
<td>Zion Zibly</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>Does Parkinson’s DBS need to be Awake?</td>
<td>Girish Nair</td>
</tr>
</tbody>
</table>
### TIME: 09.00 - 10.30

### HALL D

**Video Session**

**Chairpersons:** Sampath S., Tushar Soni

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.05</td>
<td>Ipsilateral giant and contralateral kissing superior hypophyseal artery aneurysm approached via a unilateral frontotemporal craniotomy and intradural condylar drilling: Sanjay Behari</td>
</tr>
<tr>
<td>09.06 - 09.11</td>
<td>Managing intraoperative aneurysmal rupture: Girish Menon</td>
</tr>
<tr>
<td>09.12 - 09.17</td>
<td>ICG videoangiographic-guided occlusion of a spinal DAVF. Pre and post: Francesco Acerbi</td>
</tr>
<tr>
<td>09.18 - 09.23</td>
<td>Eloquent AVMs: Rose Du</td>
</tr>
<tr>
<td>09.24 - 09.29</td>
<td>Brain stem cavernoma surgery: Talat Kirish</td>
</tr>
<tr>
<td>09.30 - 09.35</td>
<td>Acoustic Neuroma Surgery: Basant Misra</td>
</tr>
<tr>
<td>09.36 - 09.41</td>
<td>CP Angle Epidermoid Cyst Microsurgical Excision: Adil Chagla</td>
</tr>
<tr>
<td>09.42 - 09.47</td>
<td>Endonasal resection of the clival meningioma: Akio Morita</td>
</tr>
<tr>
<td>09.47 - 09.52</td>
<td>MVD Arteries, Veins n More: Keki Turel</td>
</tr>
<tr>
<td>09.53 - 09.58</td>
<td>Surgery of Cervical Perimedullary AVM: K Sridhar</td>
</tr>
<tr>
<td>09.59 - 10.04</td>
<td>Intramedullary spinal cord tumour surgery with intraop monitoring: Sandip Chatterjee</td>
</tr>
<tr>
<td>10.05 - 10.10</td>
<td>1 New technique of CVJ fixation: Sushil Patkar</td>
</tr>
<tr>
<td>10.11 - 10.16</td>
<td>Endoscopic Hemispherectomy: Sarat Chandra</td>
</tr>
<tr>
<td>10.17 - 10.22</td>
<td>Multimodality approach to resection of eloquent region glioma: Ali Asgar Moyadi</td>
</tr>
</tbody>
</table>

### TIME: 09.00 - 10.30

### HALL E

**Main Topic Session 4 - Spine**

**Chairpersons:** Prabin Shrestha, Vernon Velho, Rahul Gupta, Kailai Rajan

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00 - 09.12</td>
<td>Expandable Cage with Screws for Cervical Corpectomy: D. B. Katikar</td>
</tr>
<tr>
<td>09.24 - 09.36</td>
<td>Endoscopic Technique for Single Stage Anterior Decompression and Anterior Fusion by Trans-cervical approach in Atlanto-axial Dislocation: Y. R. Yadav</td>
</tr>
<tr>
<td>09.36 - 09.48</td>
<td>Minimally Invasive TLIF: Abhaya Kumar</td>
</tr>
<tr>
<td>09.48 - 10.00</td>
<td>Recent Guidelines and Recommendations in Management of Cervical Spondylotic Myelopathy: Parthiban Jutty</td>
</tr>
<tr>
<td>10.00 - 10.12</td>
<td>Spinal Cord Elasticity: What do we know so far?: Amro F. Al Habib</td>
</tr>
<tr>
<td>10.12 - 10.24</td>
<td>The Rationale for Regenerative Treatment for the Injured Spinal Cord: Shekar N. Kurpad</td>
</tr>
</tbody>
</table>
10.30 - 11.00  Tea/Coffee Break

TIME: 11.00 - 13.00

Session: Plenary

Chairpersons: Yoko Kato, R. C. Mishra, Deepu Banerji, Bhawani Sharma

11.00 - 11.23  SPECIAL LECTURE - IAN PRESIDENT

11.00 - 11.03 Introduction of Speaker (3 min)

11.03 - 11.23  “DBS for Movement Disorders in India: Matching the Expectations”: Pramod Pal (17 min)

11.23 - 11.38  Is Vestibular Schwannoma A Sub Or Epi Arachnoid Tumor: Suresh Nair (15 min)

11.38 - 11.53  Minimally Invasive Strategies In Aneurysm Surgery: Yoko Kato (15 min)

11.53 - 12.08  Current status of Endoscopy in Pediatric Neurosurgery: Andre Grotenhuis (15 min)

12.08 - 12.23  Bypass in Complex Cerebral Aneurysm: Yong Kwang Tu (15 min)

12.23 - 12.38  Flow Diverter Treatment of Giant Aneurysms: Anil Karapurkar (15 min)

12.38 - 12.53  How to deal with Complication in Neurosurgery: Keki Turel (15 min)

13.00 - 14.00 Lunch

TIME: 14.00 - 15.40

HALL A

Spine Free Paper Session

Chairpersons: Mazda Turel, Sanjay Mongia, Mohinish Bhatjiwale, B. C. M. Prasad

14.00 - 14.06  Use of assessment tools in cervical spondylotic myelopathy - Results of an anonymised survey among spine surgeons: Kanwaljeet Garg

14.07 - 14.13  Analysis of clinical outcome following C2 nerve-root sectioning and the factors affecting the feasibility of its preservation in patients with congenital atlantoaxial dislocation: Karthigeyan M.


14.21 - 14.27  The role of endoscopic lumbar canal decompression in severe lumbar canal stenosis: L. Feroz Ahmed

14.28 - 14.34  Combining PVCR and ponte osteotomy in surgical management of complex thoracolumbar kyphoscoliotic deformity: Asheesh Tandon

14.35 - 14.41  Two level minimally invasive transforaminal lumbar interbody fusion (MIS-TLIF): A boon in redo lumbar spine surgery: Mazda Keki Turel


14.49 - 14.55  Ossification of cervical posterior longitudinal ligament: Clinico radiological correlation and surgical outcome: Pravesh Kumar Goyal
**HALL B**

**Congenital / Cost effective Free Paper Session**

**Chairpersons:** M. C. Vasudevan, N. Muthukumar, Ashok Hande, Vijaya Sekhar

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>The Pathology in Chiari Malformation: Balasenthil Kumaran Meda Rabindranath</td>
<td></td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Four quick, easy and cost-effective hacks in Neurosurgery: Gopalakrishnan Madhavan Sasiaran</td>
<td></td>
</tr>
<tr>
<td>14.21 - 14.27</td>
<td>Ventricle to Sylvian Fissure Shunt for Obstructive Hydrocephalus: Sushil Patkar</td>
<td></td>
</tr>
<tr>
<td>14.28 - 14.34</td>
<td>The Spectrum of Complex Split Cord Malformations: N. Muthukumar</td>
<td></td>
</tr>
<tr>
<td>14.35 - 14.41</td>
<td>Type 1A Split Cord Malformation with Tethered Cord and Syringomyelia: R. J. V. V. Prasad</td>
<td></td>
</tr>
<tr>
<td>14.56 - 15.02</td>
<td>Influence of Age and Height of Fall on Head Injuries in Pediatric Age Group: Single Centre Study: Theanmullai Palanisamy</td>
<td></td>
</tr>
<tr>
<td>15.03 - 15.09</td>
<td>Can Activity Aprons for Inpatients requiring Individual Nursing Care be Beneficial? : Jayawant Mandrekar</td>
<td></td>
</tr>
<tr>
<td>15.10 - 15.16</td>
<td>Correlation and Efficacy of Single-Photon Emission Computerized Tomography (SPECT) and Magnetic Resonance Imaging (MRI) in the Management of Back pain: Shamayitri Ghosh</td>
<td></td>
</tr>
<tr>
<td>15.17 - 15.23</td>
<td>Giant Occipital Meningoencephalocele in a Neonate - A Therapeutic Challenge: Satish Balsiram Dere</td>
<td></td>
</tr>
<tr>
<td>15.24 - 15.30</td>
<td>Cine flow Magnetic Resonance Imaging - An important imaging tool for Arnold Chiari Malformation: Mayuresh Kumar Hinduja</td>
<td></td>
</tr>
<tr>
<td>15.31 - 15.37</td>
<td>Choroid Plexus Tumors in Children - An institutional experience: Mihir Dilip Chawda</td>
<td></td>
</tr>
</tbody>
</table>

**HALL C**

**Neuro Oncology Free Paper Session**

**Chairpersons:** Hrushikesh Kharosekar, Rakesh Ranjan, Ashwani Chaudhary, Vivek Vaid

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00 - 14.06</td>
<td>Large Brain Tumors: Tricky Terrain to Travel: Deepak Kumar Jha</td>
<td></td>
</tr>
<tr>
<td>14.07 - 14.13</td>
<td>Ventricular Meningiomas: Surgical strategies and a new finding that suggest an Origin from the Choroid Plexus Epithelium: Abuzer Gungor</td>
<td></td>
</tr>
</tbody>
</table>
14.00 - 14.05 Clipping large ACom & MCA Aneurysm: M Vikram
14.06 - 14.11 Anterior Temporal Resection for MTS: Bhaskar Rao
14.18 - 14.23 Surgery for brainstem cavernoma: C. Deopujari
14.24 - 14.29 How I do Craniosynostosis!: Naresh Biyani
14.30 - 14.35 Cavernous hemangioma of cavernous sinus: Rajneesh Kachhara
14.36 - 14.41 Sylvian Fissure Dissection: Sudheer Ambekar
14.48 - 14.53 Techniques used in AVM: Yong Kwang Tu
14.54 - 14.59 Endoscopic excision of clival chordoma: Sudhir Dubey
15.00 - 15.05 Endoscopic Endonasal removal of Craniopharyngioma: Suresh Sankhla
15.06 - 15.11 Transcallosal Fenestration of Thalamic Cyst: Trimurti Nadkarni

Chairpersons: Deepak Patel, Roopesh Kumar

TIME: 14.00 - 15.30

HALL D

Video Session
HALL E

History of Neurosciences Free Paper Session

Chairpersons: Krishan Kumar Yadav, S. S. Dhandapani, Ashish Pathak, B. Chandramouli

14.00 - 14.06 Pituitary: The Passion of Harvey Cushing - An anecdote: Harjinder Singh Bhatoe
14.07 - 14.13 Tribute to Harvey Cushing: His formative years - His travel abroad: Aadil Chagla
14.21 - 14.27 Neurosurgery at JPN Apex Trauma Centre - The Journey till now the 2nd choice: Deepak Agarwal
14.28 - 14.34 Neurosciences & The extraordinary life of Thomas Willis: Krishan Kumar Yadav
14.35 - 14.41 An inspirational journey with Professor Yasargil in 8 minutes: Dushyant Thaman
14.42 - 14.48 Epilepsy: As described in Ancient Indian Medical Texts: Satya Shiva Munjal
14.49 - 14.55 What is history? The guiding light of our neurosurgical practice: Anil Pande
14.56 - 15.02 History of spinal surgery in Nepal: Krishna Sharma
15.03 - 15.09 Dr. S. Balaparamesswara Rao: Neurosurgical journey and contributions: Mayank Agarwal
15.10 - 15.16 The department of neurosurgery: UCMS and Guru Tej Bahadur Hospital, New Delhi: Pragyan Sarma
15.17 - 15.23 The evolution of Trans-sphenoidal Surgery: From humble beginnings to modern advances: Harshal Agrawal
15.24 - 15.30 Neuroscience in Outer Space: History and Relevance: Sundaravadhanan Shashivadhanan

HALL F

Infection / Neuropathology / Miscellaneous Free Paper Session

Chairpersons: Alexandra R. Kunz, Sumit Thakar, Suchanda Bhattacharjee, Bijesh Nair

14.00 - 14.06 Molecular Characterisation of Adult Thalamic Glioblastoma: Shilpa Rao
14.07 - 14.13 Neurosurgery and Neurosyphilis: An update on the evolution of Treponema Pallidum. We have not won our independence from nature: Alexandra R. Kunz
14.14 - 14.20 Case series of Pituitary Abscess and it’s Management: Lee Chun Lin
14.28 - 14.34 The extent of Midline Shift Reversal on CT scan and its Correlation on Clinical Outcome among patients who underwent Craniotomy of Cranectomy for Intracerebral Hemorrhage: Allan Francisco Ocampo Ong
14.35 - 14.41 Intracranial Aspergillosis amongst Immunocompetent patients: A study to assess the impact of neurosurgical intervention on outcome: Santanu Kumar Bora
14.42 - 14.48 Large Cranietomy and Extended Membranectomy for Initial Treatment of Organized Chronic SDH- An Institutionale Experience: Pranjal Mohan Sinha
14.49 - 14.55 Intracranial Tuberculomas - Pathological correlation with Neuroimaging: Anand Munghate
14.56 - 15.02 The Perpetual challenge of managing Cushing’s Disease: A retrospective review of a series of unusual post-operative complications: Sumit Thakar
15.03 - 15.09 Retrospective analysis of Cerebral Abscess: An institutional experience: Nitin Barde
15.10 - 15.16 Intracranial Solitary Cysticercosis with or without Albendazole Therapy: Ankur Vivek
INTERNATIONAL MENINGIOMA SOCIETY CONGRESS (IMS)

DAY 1: 4TH DECEMBER, 2019
Welcome Remarks: Basant Misra, Suresh Nair

**TIME: 14.30 - 15.45**

**HALL A**

**Session I: IMS**

**Chairpersons:** V. S. Mehta, Michael McDermott, James Liu

14.30 - 14.44 Surgical Management of Complex Sphenoid Wing Meningioma: James Liu

14.45 - 14.59 Hyperostosising Sphenoid Wing Meningiomas: Surgical Outcomes and Strategy for Bone Resection and Multi-disciplinary Reconstruction: Michael McDermott

15.00 - 15.14 Anterior Skull Base Meningiomas: The Role of Endoscopic Techniques - Indications and Limitations: Gentilli Fred

15.15 - 15.29 Open versus Endonasal Approach to Anterior Skull Base Meningiomas: Morcos Jacques

15.30 - 15.44 Intraventricular Meningiomas: Necmettin Pamir

15.45 - 16.00 Tea Break

**TIME: 16.00 - 17.30**

**HALL A**

**Session II: IMS**

**Chairpersons:** Keki Turel, Luis Borba, Kenji Ohata

16.00 - 16.14 Safe Maximal Resection of Primary Cavernous Sinus Meningiomas via a Minimal Anterior and Posterior combined Transpetrosal Approach: Kenji Ohata

16.15 - 16.29 The Failure of Insufficient Surgery: William Couldwell

16.30 - 16.44 Role of Supracerbellar-infratentorial Approach in Meningioma: Vladimir Benes

16.45 - 16.59 Meningioma: The Good & Bad Tumor: Basant Misra

17.00 - 17.14 Petroclival Meningioma: Choosing the Best Route: Luis Borba

17.00 - 17.14 Strategy in Petroclival Meningioma: Suresh Nair

17.15 - 17.29 Experience with Petroclival Meningioma: Kyu Sung Lee

19.30 - 21.30 Faculty Cocktail Dinner (Venue: Renaissance Mumbai Convention Centre Hotel, Powai, Mumbai)
INTERNATIONAL MENINGIOMA SOCIETY CONGRESS (IMS)

DAY 2: 5TH DECEMBER, 2019
**HALL D**

**Session III: IMS**

*Chairpersons: Bhawani Sharma, Imad Kannan, Kyu Sung Lee*

- **09.00 - 09.14** Microsurgical removal of Tuberculum Sellae Meningiomas in Endoscopic era: *Khaled El-Bahy*
- **09.15 - 09.29** Intraventricular Meningiomas: *H. S. Bhatoe*
- **09.30 - 09.44** Recurrence of Meningioma: Experience in last 30 Years at HCFMRP, Ribeirao Preto Sao Paulo, Brazil: *Benedicto Oscar Colli*
- **09.45 - 09.59** Multiple Meningioma: *Manas Panigrahi*

**14.00 - 15.30** IMS Executive Committee (EC) Meeting

---

**TIME: 15.45 - 17.30**

**HALL D**

**Session IV: IMS**

*Chairpersons: Suresh Nair, William Couldwell, Necmettin Pamir*

- **15.45 - 15.59** Spheno-orbital Meningioma: *Girish Menon*
- **16.00 - 16.14** Incidental Meningioma: *Sarat Chandra*
- **16.15 - 16.29** Petroclival Meningiomas: *Giampietro Pinna*
- **16.30 - 16.44** The Challenge of Skull Base Meningioma Surgery: *Christian Matula*
- **16.45 - 16.59** Surgery of the Cavernous Sinus Tumors: *Sanjay Behari*
- **17.00 - 17.14** Radiosurgery for Meningiomas Gr 1-3: A 20-year Experience: *Dheerendra Prasad*
- **17.15 - 17.29** Suprasellar Meningiomas: Principles of Microsurgical management: *Suresh Dugani*
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30 - 08.44</td>
<td>Genomic Sequencing of Meningiomas - Extent of Resection and Prognosis</td>
<td>Raj K. Shrivastava</td>
<td></td>
</tr>
<tr>
<td>08.45 - 08.59</td>
<td>Spheno-orbital Meningiomas</td>
<td>Link Michael J.</td>
<td></td>
</tr>
<tr>
<td>09.00 - 09.14</td>
<td>Management of anterior skull base meningioma</td>
<td>Najia El Abbadi</td>
<td></td>
</tr>
<tr>
<td>09.15 - 09.29</td>
<td>Novel Skull Base Approaches for Skull Base Meningioma</td>
<td>Bhawani Sharma</td>
<td></td>
</tr>
<tr>
<td>09.30 - 09.44</td>
<td>Foramen Magnum Meningioma</td>
<td>Giampietro Pinna</td>
<td></td>
</tr>
<tr>
<td>09.45 - 09.59</td>
<td>QOL After Resection of a Meningioma</td>
<td>Kate Drummond</td>
<td></td>
</tr>
<tr>
<td>10.00 - 10.14</td>
<td>QOL After Petroclival Meningioma</td>
<td>Sunil Gupta</td>
<td></td>
</tr>
<tr>
<td>10.15 - 10.29</td>
<td>Radiosurgery for Meningioma</td>
<td>V. P. Singh</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.45 - 15.58</td>
<td>Recurrent Malignant Meningioma: Treatment Options</td>
<td>Linda Bi</td>
<td></td>
</tr>
<tr>
<td>15.59 - 16.12</td>
<td>The Puzzle of Atypical Meningioma</td>
<td>R. C. Mishra</td>
<td></td>
</tr>
<tr>
<td>16.12 - 16.25</td>
<td>Atypical / Anaplastic Meningioma: State of Art and Future Perspectives</td>
<td>Giovanni Grasso</td>
<td></td>
</tr>
<tr>
<td>16.26 - 16.39</td>
<td>Suprasellar Meningioma</td>
<td>Atul Goel</td>
<td></td>
</tr>
<tr>
<td>16.40 - 16.53</td>
<td>Surgery of Sphenoid Wing Meningiomas</td>
<td>Keki Turel</td>
<td></td>
</tr>
<tr>
<td>16.54 - 17.07</td>
<td>Taming the Neurosurgical Challenge through Cavernous Sinus Route</td>
<td>Manmohan Singh</td>
<td></td>
</tr>
<tr>
<td>17.08 - 17.21</td>
<td>Supraorbital approach using Endoscopic-assisted Microsurgical Technique for Resection of Anterior Cranial Fossa Meningioma</td>
<td>Ali Ayyad</td>
<td></td>
</tr>
<tr>
<td>17.21 - 17.34</td>
<td>UCSF series: Convexity meningiomas with DWI, Quality of Life Updates</td>
<td>Michael McDermott</td>
<td></td>
</tr>
</tbody>
</table>
INTERNATIONAL MENINGIOMA SOCIETY CONGRESS (IMS)

DAY 4: 7TH DECEMBER, 2019
**HALL D**

**Session VII: IMS**

**Chairpersons:** Suresh Sankhla, Najia El Abbadi, David Netuka

**08.00 - 08.14** UCSF series: Petroclival Meningiomas with DWI, Quality of Life Updates, Extent of Resection & Prognosis: Michael McDermott

**08.15 - 08.29** Meningioma Imaging: Practical Clinical Techniques and Emerging Applications: Javier E. Villanueva-Meyer

**08.30 - 08.44** Deciding Surgical Approach in Petroclival & other CP Angle Meningioma: Michihiro Kohno

**08.45 - 08.59** Mini-combined Petrosal Approach to Large Petroclival Meningiomas: Goto Takeo

**TIME: 15.45 - 17.30**

**HALL D**

**Session VIII: IMS**

**Chairpersons:** V. P. Singh, Nelson Oyesiku, Fred Gentilli


**16.00 - 16.14** Tuberculum Sellae Meningiomas: Endoscopic vs Transcranial: Theodosopoulos Philip

**16.15 - 16.29** 10+ years after Simpson Grade IV Meningioma Resection: David Netuka

**16.30 - 16.44** Surgery of Clinoidal Meningiomas: Tips, Tricks and Complication Avoidance: Khaled El-Bahi

**16.45 - 16.59** Medial Sphenoid Wing Meningiomas towards Total Convexitization: Mathew Abraham

**17.00 - 17.14** Central Skull Base and Cavernous Sinus: Endonasal Endoscopic vs Transcranial Microscopic: Ashish Suri

**17.15 - 17.29** Use of Mixed Reality (Augmented and Virtual) in Endoscopic Skull Base Surgery: Raj K. Shrivastava
AP-001: Microsurgical DREZotomy in Spastic Cerebral Palsy - Poor man's baclofen pump

Dr. Nishant Goyal1*, Prof. Shobha Arora1, Dr. Poorvi Kulsheshta1
1) All India Institute of Medical Sciences, Rishikesh, India

Background: Spastic cerebral palsy is a sub-group of patients of cerebral palsy with severe spasticity and weakness in their limbs. These patients require life-long physiotherapy and constant care. The spasticity results in severe restriction in their activities and makes it difficult for the caregiver to do physiotherapy and provide perineal care. The financial burden of such patients on the family and the society is substantial. Microsurgical DREZotomy is a neurosurgical procedure which involves selective sectioning of the myotatic and nociceptive fibres, thereby decreasing the increased tone.

Materials & Methods: A prospective clinical study was conducted from August 2016 to July 2019. All patients of spastic cerebral palsy (with grade III or IV Ashworth grade) presenting to us were included in the study. All patients underwent DREZotomy by the first author. Neuronomonitoring (trigger EMG) was used in the last 3 (out of 8) patients. Pre-operative and post-operative modified Ashworth grade and GMFCS level was measured.

Results: Eight patients (6 males, 2 females) of spastic cerebral palsy with age range 6 to 18 years (mean age- 12.9 years) were operated by a single surgeon over the study period. Seven patients had spastic diplegia and one had spastic hemiplegia. The preoperative Ashworth grade in all patients was 3 or 4 in various involved muscle groups. Six patients with spastic diplegia underwent microsurgical DREZotomy at L3-S1 level bilaterally, one patient with spastic diplegia and bladder complaints underwent microsurgical DREZotomy at L3-S4 level bilaterally whereas one patient with spastic hemiplegia on the right side underwent microsurgical DREZotomy at C5-T1 level and L3-S1 level on the right side. The post-operative Ashworth grade in all patients improved to 0 or 1. The caregivers of all patients reported increased ease in doing physiotherapy.

Conclusions: Microsurgical DREZotomy is a cost-effective tool in deceasing limb spasticity in patients of spastic cerebral palsy. Neuronomonitoring should be used as an adjunct to avoid complications.

* * * * *

AP-002: Protocol based early decompressive craniectomy in a resource constrained environment: A tertiary care hospital experience

Dr. Sanjeev Pattankar2*, Dr. Basant K. Misra1
1) P. D. Hinduja Hospital & MRC, Mumbai, India

Objective: Decompressive Craniectomy (DC) is an emergency life-saving procedure used to treat refractory intracranial hypertension secondary to pathologies like traumatic brain injury, malignant cerebral infarction, intracranial haemorrhage etc. The authors aim to analyse their experience with protocol based early DC (< 24 hrs) without presurgery ICP monitoring over 10 years.

Methods: This is a retrospective, cross-sectional study which included 58 consecutive patients who underwent decompressive craniectomy by the senior author at a single institution between 2007 & 2017. Background variables, outcome in the form of Glasgow Outcome Score- extended (GOS-E) at 6 months & 1 year were analysed.

Results: Fourteen patients had traumatic brain injury, 17 had intracranial haemorrhage, 14 had malignant Cerebral infarcts & reminder 13 patients had other causes. At 6 months, mortality rate was 22.4%. Good recovery, moderate & severe disability was seen in 13.8%, 17.2% & 43.1% of patients respectively. Two patients were in vegetative state. The cut-off for favourable/unfavourable outcome was defined as GOS-E 4–8/1–3. By this application, 63.8 % patients had favourable outcome at 6 months. The favourable outcome in patients of traumatic brain injury, intracranial haemorrhage & malignant cerebral infarct was 57.1%, 58.8% & 85.7% respectively.

Conclusion: Decompressive Craniectomy helps in obtaining a favourable outcome in selected patients with defined pathology. Protocol based early DC without presurgery ICP monitoring has comparable results with that of DC following ICP monitoring done in developed countries. Risk of vegetative state is small. Protocol based early DC is reasonably justified as the way forward for resource constrained environments.

Keywords: Decompressive Craniectomy; Early DC; Resource constrained environment; Malignant Cerebral Infarction; Refractory Intracranial Hypertension; Traumatic Brain Injury.

Introduction: Acute brain injury (ABI) is a leading cause of death and disability worldwide.[1,2] Major causes of ABI include Traumatic Brain Injury (TBI), Malignant Cerebral Infarction (MCI), Intracranial Haemorrhage (ICH) & so on. Intracranial pressure (ICP) lowering therapies which prevent secondary brain injury are usually administered in a stepwise manner, starting with safer first-line interventions (head elevation, osmotic agents, controlled hyperventilation, hypothermia and sedation), while reserving higher-risk options for patients with refractory intracranial hypertension (RICH).[2,3,4] DC is one such high-risk surgical procedure in which part of the skull is removed and the underlying dura opened to reduce raised ICP & ensure normal cerebral perfusion.[5] Although DC is effective in reducing ICP & mortality, it is accompanied by a myriad of non-trivial complications & there is a concern that survivors will experience permanent severe disability. DC has been evaluated in a few randomized controlled trials for traumatic brain injury and acute ischemic stroke, which has further widened the controversy.[2,3,4,6] Role of DC in countries with low neurocritical care & neurological resources is under scanner.[7–9] Low- & middle-income countries (LMICs) cannot afford the higher costs associated with protocol based ICP monitoring as a requisite for diagnosing RICH for all ABI patients. Alternatively, protocol based early DC could be offered to patients with RICH diagnosed based on clinical and radiological features. Early DC (done within 24 hrs of insult) may be helpful to improve the long-term outcome of patients with RICH due to any underlying cause.[7–9] The aim of this retrospective, cross-sectional study is to analyse our experience with protocol based early DC without pre-surgery ICP monitoring.
monitoring in patients with clinical & radiological features of RICH over a period of 10 years.

Materials & Methods: This is a retrospective, cross-sectional case series including all the consecutive DC cases done by the senior author between 2007 and 2017 at P D Hinduja hospital, Mumbai. The study group included 58 patients with clinical and radiological evidence of intracranial hypertension refractory to first-line interventions, who underwent early DC. There was no pre-surgery ICP monitoring done. Patients requiring DC along with or subsequent to evacuation of an extra axial intracranial hematoma were excluded from the study. A pre-informed consent in a uniform format was taken from all these patients / relatives for being a part of this study and their details to be published. Outcome in the form of Glasgow Outcome Score- extended (GOS-E) at 6 months & 1 year were analysed from the patient’s follow-up records. Nine patients lost to follow up at 1 year. The clinical and demographic profile, complications and factors associated with prognosis were analysed.

Results: A total of 58 patients with refractory intracranial hypertension (secondary to any pathology) who underwent early DC were analysed. The median age of presentation was 44.1 years & male to female ratio was 39:19. Patients in the age group of 31-60 years constituted 57% (33 cases) of the total cases, followed by <30 years seen in 13 cases (22.4%) [Table 1]. Most common cause of ABI was ICH which was seen in 17 (29.3%) cases, followed by TBI & MCI accounting for 14 (24.1%) cases each. Other causes included post-op ICH, venous infarct, aneurysmal bleed, etc [Table 2].

Patients reaching P D Hinduja Hospital - Emergency Department were first resuscitated according to ATLS guidelines. Computed tomography (CT) scan brain was advised immediately after resuscitation and was classified based on Marshall scoring. Patients were admitted to neuro ICU and started on first line ICP lowering interventions like head elevation, osmotic agents, controlled hyperventilation, hypothermia & sedation. Those patients with Marshall score $\leq$ III usually responded well to first-line interventions. DC option was reserved for patients with refractory intracranial hypertension (RICH) diagnosed on clinical and radiological basis. Pre-determined criteria for RICH & in turn the DC at our institute is - “Marshall score $\geq$ III with GCS $\leq$ 8 or with GCS of 9-12 requiring ventilation where clinical/ neurological monitoring not possible +/- clinical signs of herniation”. No pre-surgery ICP monitoring is carried out. Early DC within 24 hours of diagnosis of RICH was offered to all patients. Most patients who underwent DC belonged to Marshall VI seen in 44 (75.9%) cases followed by type IV in 14 (24.1%) cases [Table 1]. Patients were divided into two groups based on Glasgow coma scale - Motor component (GCS-M) at the time of presentation. Forty-eight (82.7%) cases had GCS-M score of 3–6 whereas 10 (17.3%) cases had GCS-M score 1–2 [Table 1].

Patients with refractory intracranial hypertension underwent DC at the earliest. Fifty- six cases underwent unilateral DC and two cases underwent bilateral DC. Thirty-eight (65.5%) cases underwent ICP monitoring in post-op phase. Sedation & ventilation was continued for variable periods. Post-op CT brain was done after 24 hrs to see reversal of mass effect & midline shift. Hyperosmolar therapy was continued based on post-op ICP monitoring (ICP > 20 for more than 15 mins). Bone flaps were placed in the abdomen in the initial 50 cases & last 8 cases had their bone flaps preserved in the bone bank. Percutaneous tracheostomy was done in those cases were weaning off the ventilator was difficult. Once off the ventilator, patient received rigorous physiotherapy & rehabilitation both in hospital & at home after discharge.

The outcome was measured by GOS-E at 6 months & 1 year. The mortality rate was 22.4% (13 patients). The GOS-E at 6 months post-surgery for the remaining patients was analysed. Eight (13.8%) patients had good recovery, ten (17.2%) patients had moderate disability & twenty-five (43.1%) suffered from severe disability. Only two (3.5%) patients were in vegetative state. The cut-off for favourable/unfavourable outcome was defined as GOS-E 4–8/1–3. By this application, 63.8% patients had favourable outcome.

The favourable outcome in patients of TBI, ICH & MCI was 57.1%, 58.8% & 85.7% respectively, the best outcome being in MCI. Though few, aneurysmal bleed and post-op ICH cases requiring DC also showed fair outcome. Outcome at 1 year was identical to that of 6 months.

It was seen that patients operated on Right side had marginally better favourable outcome then compared to those operated on Left side. Those patients with normal pupillary reactions preoperatively had significantly better outcome compared to those otherwise. Pre-op GCS-M score of 3-6 resulted in better favourable outcome. Twenty-seven (46.5%) patients underwent cranioplasty at an average of 6.07 months post DC.

Discussion: DC has been widely utilized as a modality to treat refractory intracranial hypertension (RICH) since long with controversial history.[5] The removal of different parts of the skull has been utilized in the management of severe ABI after the first reports of this surgical technique directed at controlling ICP was published by Cushing.[5] DC can be categorized to be primary or secondary,[4,10] Primary DC is often performed in early phase after ABI and refers to the surgery leaving a large bone flap out after evacuation of intracranial lesions.[4] Secondary DC is often conducted as the last resort for RICH when medical therapies failed.[4] Commonest causes of ABI are TBI, ICH, MCI, aneurysmal SAH etc.

While many studies have shown the efficacy of DC in reducing ICP and improving mortality from severe TBI, others have questioned on its usefulness.[3,4,6,11,12] Four notable randomised controlled trials (RCTs) have been published to study the effectiveness of DC in TBI.[4] Taylor et al (2001) published a RCT which randomly assigned 27 children with RICH after TBI into standardized management alone or standardized management plus DC.[13] Despite of the small sample size, the trial concluded that children treated with standardized management plus DC had lower ICP and better functional outcome (54% versus 14%) compared to those treated with standardized management alone.[13] Oli et al (2009) studied 74 patients with brain swelling & randomly divided them into unilateral DC group and unilateral routine temporoparietal craniectomy group.[14] Decreased ICP, reduced mortality rate (27% versus 57%) and improved neurological outcomes (56.8% versus 32.4%) in patients receiving DC.
were suggested in the findings.[14] The DECRA trial (2011) randomly assigned 155 adults with TBI and RICH to receive bifrontotemporoparietal DC or standard care. Results suggested that DC group had lower ICP, fewer days in ICU and greater risk of an unfavourable outcome (GOS-E <5; 70% versus 51%) than those in the standard care group, whereas the mortality rate at six months (19% versus 18%) was similar in two groups.[6] This trial was criticized for the fact that the recruitment criterion of ICP > 20 mm Hg for 15 minutes did not necessarily indicate an ongoing secondary brain injury and any potential benefit derived from DC might be offset by surgical morbidity.[6] The RESCUEicp trial, was designed to assess the effect of DC as a last-tier therapy in patients with TBI and RICH (ICP > 25 mm Hg for 1 to 12 hours).[3] RESCUEicp is the largest RCT so far with 408 patients being randomized to undergo DC or medical care. The study concluded that DC contributed to lower ICP and mortality rate (26.9% versus 48.9%), higher incidence of vegetative state (8.5% versus 2.1%), lower severe disability (21.9% versus 14.4%), and upper severe disability (15.4% versus 8%) as compared with medical care at six months.[3] Despite similar risk of favourable outcomes (GOS-E > 3) in two groups, patient in DC group had better functional outcomes than those in control group at 12 months. A meta-analysis was published by Zhang et al in 2017 analysing four RCTs, five retrospective studies & one prospective study in the role of DC in TBI.[4] It confirmed that DC in TBI could significantly lower ICP, reduce mortality rate, but was associated with more complications compared to medically treated patients. While DC was associated with similar risk of favourable outcome at six months compared with medical management, early surgery (surgery <36 hrs) resulted in improved outcomes in subgroup analysis for GOS-E score at six months. These above-mentioned results were alike for both adults & children.[4]

Malignant cerebral infarction (MCI) is another common cause of ABI. The condition leads to space-occupying brain oedema, resulting in raised intracranial pressure (ICP), with subsequent ischaemic cell death and brain herniation.[2] The prognosis is poor, with mortality as high as 70% to 80%, and the survivors being left with severe disabilities.[14,15] Patients receive ICP lowering therapies similar to that in TBI, DC being reserved for those with RICH.[16,17] A meta-analysis was published by Gul et al (2018) which included eight RCTs & eight non-RCTs studying the outcome of DC in MCI. The analysis concluded that there was significant survival advantage associated with DC in patients of all ages, when performed within 48 hours of onset of stroke.[2] However, early DC may not reduce poor functional outcome (modified rankin score; mRS >4) in survivors, and DC performed after this time may not reduce mortality or unfavourable functional outcome.[2] The DESTINY II trial provides the strongest analysis concluded that there was significant survival advantage associated with DC in patients of all ages, when performed within 48 hours of onset of stroke.[2] However, early DC may not reduce poor functional outcome (modified rankin score; mRS >4) in survivors, and DC performed after this time may not reduce mortality or unfavourable functional outcome.[2] The DESTINY II trial provides the strongest evidence so far that the DC in older patients has worse favourable functional outcome than in the younger group (19% vs. 4%).[17,19] Currently, there is no reason to use a watchful waiting approach for DC after a diagnosis of MCI in young patients.[2,19] Further research to establish guidelines for DC in older patients & after 48 hours of MCI required.

DC is also an acknowledged treatment measure for aneurysmal SAH leading to intractable ICP.[10] The timing and functional outcome of DC in aneurysmal SAH is heavily debated. A clinical study on mice model by Bühler et al (2015) concluded that performing DC to reduce ICP either during or acutely after SAH resulted in more severe bleeding, a higher chance of rebleeding, and poorer functional outcome.[20] Thus, elevated post-SAH ICP has a tamponade effect in controlling bleeding and should therefore not be reduced acutely. Any DC considered in SAH patients should take these effects into consideration.[20] In contrast, Jabbarli et al (2016) analysed 245 aneurysmal SAH cases who had undergone either primary or secondary DC, to report no difference in unfavourable outcome (mRS >3) between primary and secondary DC (65.5% versus 74.3%).[10] Patients with early primary DC (< 24 hours) had significantly better functional outcome compared to secondary DC & even late primary DC. The data showed that early surgery improves the functional outcome of SAH patients requiring DC independently of the initial clinical condition (WFNS grade), severity of SAH, patients’ age, aneurysm location and treatment modality.[10] However, in this era of endovascular treatment it will be challenging to select proper candidates for early DC.[10]

Cerebral venous thrombosis (CVT) is an important cause for stroke in the young where the role for decompressive craniectomy is now well established.[21,22] Aaron et al (2015) published the largest series on decompressive cranectomy for CVT in literature to date (44 cases) & concluded that DC should be considered as a treatment option in large venous infarcts.[21] Very good outcomes can be expected especially if done early and in those below 40 years. All the RCTs and majority of the literature available have studied the role of DC as a last-tier procedure following diagnosis of RICH based on continuous ICP monitoring. RICH is diagnosed based on predefined ICP criterion which may vary slightly from centre to centre. The same is not economically feasible in most nonsurgical centres in LMICs with resource constraints. There is lack of formal prehospital setup, insurance coverage, neurocritical care & neuro rehabilitation in LMICs.[7,8] At our centre, early DC is offered to patients with RICH diagnosed on the basis of clinical & radiological evidence without ICP monitoring. A single surgery in the form of DC compared to two surgeries – one for ICP monitoring followed by another for DC if required was economical and preferred; as health insurance is still a privilege most people do not possess. Nevertheless, our results of protocol based early DC in patients with ABI are as good as & even better than that reported in the literature from developed countries, maybe related to the case selection as per our mentioned criteria. An institutional review of DC from a tertiary corporate hospital like ours is unique in a way, as the results reflect in a descriptive way how DC is used in real practice in developing countries than can be evaluated by RCTs. We hope that this paper will contribute to keeping the discussion alive regarding the place of DC in ABI and to stimulate the initiation of further studies.

Conclusion: Despite its limitations, DC clearly demonstrates a survival benefit in patients with ABI with RICH in all age groups, though there are conflicting inferences regarding the incidence of favourable outcome following DC.[2,3,4,6,19] DC helps in obtaining a favourable outcome in selected patients with defined pathology. Protocol based early decompression without pre-surgery ICP monitoring has
comparable results with that of DC following ICP monitoring as done in developed countries. Outcome was significantly better in MCI. Risk of vegetative state was small in our series. For clinicians, it is imperative to communicate the potential range of outcomes and the expected quality of life with next of kin before DC. A recent systematic review of QoL of patients after DC reported that most disabled patients (mRS >3) and caregivers were satisfied with their lives and would opt to have the procedure again.[23,24] It is clear that DC is here to stay as the last tier procedure again.[23,24] It is clear that DC is here to stay as the last tier


Highlights:
- DC demonstrates a survival benefit in patients with ABI with RICH in all age groups.
- DC helps in obtaining a favourable outcome in selected patients with defined pathology.
- Protocol based early decompression without pre-surgery ICP monitoring, as done in developing countries, has comparable results with that of DC following ICP monitoring as done in western countries.
- DC is here to stay as the last tier option against RICH in ABI.

* * * * *

AP-003: Supratentorial Low Grade Glioma - Proposing a prognosticating system based on single institutional review of 150 patients

Dr. Vikrant Keshri1*, Dr. Manas Panigrahi1
1)  KIMS Hospital, Secunderabad, India

Objectives: There is ethnic and genetic variation in cancer risk. Hence, we studied risk factors to prognosticate long term outcome in LGG in our population to validate or differ from preexisting risk criteria by EORTC.

Methods: We observed 150 supratentorial LGG patients, classified based on WHO 2016 classification with integration of molecular markers. Prognostic factors were assessed for their effect on outcome.

Results: Mean age of the patients studied was 37.67 years and 70% were males. 24 patients were in the age group >50 years. 64 patients had tumor size more than 5cm.

72.3% patients underwent GTR, 23.8% STR, and 3.8% patients underwent biopsy only. 40.8% patients had oligodendrogloma, 33.8% astrocytoma, 19.2% oligoastrocytoma and 2.3% gemistocytic astrocytoma based on morphology. 27% patients had higher MIB1 index (>5%). The mean PFS and OS were 4.7 & 4.9 years respectively. Recurrence occurred in 9 patients and death in 6 patients. 5-year PFS and OS rates were 81.3% and 92.3% respectively. Mean survival of patients with KPS score <70 and >70 was 1.5 & 4.9 years respectively.

Conclusion: Based on multivariate analysis of various prognostic factors we further propose to use following five factors as to describe the prognosis and tumor recurrence in Indian population: 1) Age >50 years, 2) tumor size >5 cm, 3) MIB index >5%, 4) KPS score <70 and 5) gemistocytic pathology. Molecular markers were not included in risk criteria as long term follow up is not available presently.

Funding: No Funding were received by any one of the presenters for this study or to attend the NSI annual meeting.

* * * * *

AP-004: Predictors of Hydrocephalus in Cerebellopontine angle tumor patients and validity of HASS SCORE in patients requiring CSF diversion: Review of 300 patients

Dr. Neeraj Sharma1*, Dr. Suchanda Bhattacharjee1, Dr. Kiran Karamtot Sugali1
1) NIZAMS Institute of Medical Sciences, Hyderabad, India

Introduction: Cerebellopontine angle is a shallow triangular space between the cerebellum, the lateral pons and the inner third of the petrous ridge. Although most of the cerebellopontine angle tumors are benign, the complex anatomy and important neurovascular structures traversing this space makes the management of these tumors, a surgical challenge. Vestibular Schwannoma (VS) comprise 6–8% of all intracranial tumors, 25–33% of the posterior cranial fossa, and 80–94% of the CP angle tumors. Meningioma are the second most common CP angle tumor (3–10%), followed by epidermoids (2–4%). The rest of the tumors are arachnoid cysts, other rare tumors are trigeminal schwannomas, facial nerve schwannomas, exophytic brainstem gliomas, secondaries and choroid plexus papillomas. The management of these cerebellopontine angle tumors is essentially surgical except for the smaller ones (<2.5 cm) which can be managed by radiosurgery.

Vestibular schwannomas (VS) are benign tumors of the vestibular nerve that are usually diagnosed when they produce unilateral sensorineural hearing loss and tinnitus. VSs can protrude into the cerebellopontine angle (CPA) to compress the cerebellum, the fourth ventricle, the brainstem, and the seventh and fifth cranial nerves. Large VSs can also produce obstructive hydrocephalus by compressing the fourth ventricle and obstructing the flow of cerebrospinal fluid (CSF). This type of hydrocephalus produces symptoms and signs of intracranial hypertension, such as headache, nausea and vomiting, altered sensorium, and papilledema. In such cases these symptoms often resolve following the resection of the tumor and the resultant decompression of the CSF pathways. [9] Smaller VS can be associated with communicating, or non-obstructive, hydrocephalus and produce gait ataxia, memory loss, and urinary incontinence. Although the association of hydrocephalus (HCP) and cerebellopontine angle (CPA) Schwannoma is well recognized occurring in 3.7–42% of patients, the frequency, etiological factors, mechanisms, and management of HCP in association with CPA tumors are not well established. Although there...
is a lack of evidence in literature, it is true that surgery in patients with HCP and increased intracranial pressure (ICP) is presumably more challenging. [2,6]

HCP is usually related to tumor size and occurs more frequently in association with tumors greater than 3 cm in diameter. The most common cerebrospinal fluid (CSF) abnormality associated with VS in general is elevated total protein concentration, which is probably secondary to increased vascular endothelial permeability. [1] At least five treatment options are available for the associated HCP in patients with this diagnosis, including CSF diversion procedures before, during, or after tumor removal; treatment of HCP alone without tumor removal; or tumor removal alone.

The goal of our study was to assess a cohort of patients with CPA tumors and accompanying HCP, to characterize the incidence, presenting symptoms, signs, radiographic findings, and predictive factors of HCP, and then to analyze the selection of management options and patients’ outcomes and also determine the validity of HASS score in predicting need of permanent CSF diversion in patients with Cerebellopontine angle tumor and hydrocephalus.

**Subjects & Methods:** In this study, we conducted a retrospective clinical and radiographic review of 300 consecutive patients with CPA tumors who were treated at Nizam’s Institute of Medical Sciences between 2010-2019. Out of 300 patients 189 patients had associated hydrocephalus (HCP). The size of the patient’s tumor was calculated on the basis of the largest diameter of the tumor in the CP Angle region and in general this measurement was done in the plane parallel to the petrous ridge. The extent of the HCP was graded by assessing the ratio of the maximal width of the frontal horns to the biparietal diameter at the same level (Evan’s ratio). All patients were operated via the Retromastoid suboccipital craniotomy/craniectomy using standard microsurgical techniques. Patients undergoing primary tumor removal were further subdivided in 4 groups – Group I: patients undergoing CSF access device placement followed by tumour removal and thereafter shunt; Group II: patients undergoing CSF access device placement and tumour removal; Group III: patients undergoing only tumour removal; or Group IV: patient requiring shunt only after surgery.

**Results:** 189 (63%) of 300 patients with CPA tumors had clinical and/or radiographic evidence of hydrocephalus at some stage during management. These 189 patients comprised 88 men and 101 women, and their ages ranged from 8 to 75 years (mean, 44.9yr). The symptoms and signs with patients presented were headache (69), papilledema (50), visual deterioration (34) in form decreased acuity or blindness, with both headache and papilledema (20) and all 3 symptoms (16). The majority of patients (138 patients, including 2 with bilateral tumors) had vestibular schwannomas; the remainder of patient tumors included 34 meningiomas and 17 epidermoid tumours. The radiological and clinical characteristics of these tumors were strongly indicative of meningioma in 20 patients and of vestibular schwannoma in 100 patients. Tumors ranged in size from 2.0 to 6.5cm, with an average size of 4.3 cm. The HCP-related symptoms were intermittent to severe headache, progressive visual impairment, ataxia. Acute neurological dysfunction, including persistent severe headache, nausea was rare, except in the postoperative obstructive HCP group. 86 patients had associated papilledema preoperatively. HCP was graded as mild in 104 (55%), moderate in 43 (22%) and severe in 42 (33%) on the basis of available imaging and according to the above-described radiological definitions. The HCP was mainly of the communicating type (125), and only 64 patients had obstructive HCP at the level of the fourth ventricle. Several different treatment modalities were used in these 189 patients. Retromastoid approach was used in all patients. An CSF access device was inserted at the beginning of microsurgical tumor removal at the time of surgery on operating table (11 patients). If long waiting period was there prior to definitive surgery (35 patients) CSF access device was placed preoperatively except those with preoperative shunts. The hypothesis for putting CSF access device was, external ventricular drainage of CSF facilitates brain retraction and tumor removal. The CSF access device remained in place for 5 to 11 days post-operatively in most patients. Thereafter CT scan was done and if hydrocephalus persisted the CSF access device was converted to shunt; or shunt surgery was also done when there was wound complications such as pseudomeningocele or CSF leak. 84 of the 189 patients required only the operation for tumor removal without any further treatment of their HCP. Out of 105 patients 46 patients preoperative CSF access device was placed, 4 patients had preoperatively shunt placed, 15 patients had CSF access device placed after tumor excision and rest 40 patients required shunt after tumor excision. With respect to tumor histology, patients with meningioma and epidermoid tumors (49), required only excision of tumor and only 2 patients required CSF access device prior to surgery due to long waiting period prior to tumor excision. In the 138 patients of VS, the hydrocephalus was mild in 62 (45%) of 138 patients, moderate in 23 (17%), and severe in 53 (38%) patients. With less severe symptoms of hydrocephalus, only primary VS surgery was carried out in 37 (27%) patients and required no further CSF diversion for treatment of hydrocephalus; complete tumor removal was achieved in most of the cases. In 101 patients, however, the symptoms either persisted or worsened despite surgery, necessitating further treatment. Of these 89 (65%) patients required placement of CSF access device (Ommaya) for 5-11 days. Weaning from the CSF access device, performed as described above, was successful in 59 (58%) cases; the remaining 26 (25.7%) required the conversion of access device to VP shunt. In the rest 12 patient VP shunt placement was done in view of collapsed fourth ventricle seen on CT scan postoperatively. CSF protein values were available for 99 of 139 patient with VS showing protein <100 mg/dl in 18 patients, 100-200 mg/dl in 70 patients and protein > 200 mg/dl in 11 patients.

**Discussion:** Scarce literature regarding the association of HCP and CPA tumors has been published, particularly with regard to schwannomas. It has been reported that 3.7% to 15% of patients with CPA schwannoma develop HCP. [4] The most frequent clinical manifestations of HCP in these patients are usually headache, visual disturbances/blindness & papilledema. In our series incidence was 0.63.
Pathophysiology of HCP associated with CPA tumors

Various pathophysiological mechanisms have been proposed to explain the occurrence of HCP with CPA tumors, most of which have been of the communicating type. The protein concentration within the CSF is distributed as a gradient: it is lowest in the ventricles, rises as it reaches the cisterns at the base of the brain, and is highest in the lumbar subarachnoid space. Gardner and associates in 1954 described an increased level of protein in the CSF in CPA tumors, has been deemed to be the main cause of this presentation on the basis of protein molecules’ clogging the pores of the semipermeable membrane that forms the barrier in the arachnoid granulations, leading to impaired absorption of CSF.\[3,4\] Tumors of the CPA-especially vestibular schwannoma-are almost always associated with increased protein levels in the CSF, with values frequently being greater than 1 g/L. Passage of CSF over a tumor in a patient with an abnormal blood-brain barrier, indicated by marked enhancement with agents such as gadolinium, may permit leakage of serum proteins into the CSF.\[4,5\] Although proteins in the CSF may play a key role in the development of communicating hydrocephalus in patients with a small VS, the concentration of protein necessary to produce this is unknown.

The management of hydrocephalus associated with cerebellopontine angle tumors have been a matter of debate for a long time with no evidence based appropriate treatment followed presently.\[4,5\] The definitive treatment of cerebellopontine angle tumors remains the gross total excision of the tumor and the favourable outcome of the surgery has increased with refinements in micro neurosurgical techniques but the management of associated hydrocephalus still remains in dubious condition.\[6\] We in this series evaluated factors such as visual symptoms, papilledema, CSF protein levels, size of tumor, grade of hydrocephalus and tumor histology in patients who presented with cerebellopontine angle tumors and correlated them with need of CSF diversion temporary or permanent for better outcome in these patients. Of the 189 patients who had associated hydrocephalus (51) had Meningioma and Epidermoid tumor. Of these 51 Non-VS tumors 49 required only tumor excision and 2 required temporary CSF access device. This validates that the hydrocephalus associated with Meningioma or Epidermoid tumor is obstructive type which gets resolved on removal of tumor as the CSF pathway is restored. On the other hand, VS tumor associated hydrocephalus presents with a much more complex situation and various factors define need of CSF diversion procedures.

In our study patient with VS, who presented with visual deterioration or blindness (34), 30 of them required VP shunt placement even after tumor removal (p = 0.023): 2 requiring temporary CSF access device and other 2 only tumor excision. The patients who had papilledema on presentation (50), 38 of them required VP shunt placement (p = 0.09), 5 required temporary CSF access device and 1 only tumor excision. CSF protein levels was also a major factor, patients having protein levels > 100mg/dl (81), 38 patients required VP shunt (p = 0.004), 48 requiring temporary CSF access device and no patient got treated with tumor excision alone. The size of tumor always plays a major determinant in development of hydrocephalus, but in patient with VS only tumor excision did not cure associated hydrocephalus. Especially in tumors of size > 4cm, in our study 40 patients out of 89 patients required VP shunt post excision of tumor (p = 0.449). Lastly, grade of hydrocephalus on presentation was also influencing factor on management, with 34 of 53 severe grade hydrocephalus requiring VP shunt (p = 0.381).

Based on the above findings, we attempted to devise a scoring system Hydrocephalus Associated with Schwannoma Surgery (HASS score) [decreased visual acuity = 1 point; blindness = 2 points; papilledema = 2 points; Hydrocephalus mild = 0 point; moderate = 1 point; severe = 2 points; size of tumor < 3cm = 0 point; 3-5 cm = 1 point; > 5 cm = 2 points; CSF protein levels < 1g/L = 0 points; 1-2 g/L = 1 point; > 2 g/L = 2 points] to predict need of VP shunt prior to definitive tumor excision and thereby addressing several postoperative issues of CSF leak/pseudomeningocele, sudden deterioration in GCS, persistent hydrocephalus on postoperative scans or in case there is delay in the definite surgery.

Preoperative severe hydrocephalus (Ewan’s ratio > 0.6), presence of blindness/visual deterioration/papilledema and CSF protein levels > 1g/l showed statistical correlation for need of permanent CSF diversion procedure in case of CPA vestibular schwannoma. However, size of tumour and grade of hydrocephalus predicting need for permanent CSF diversion procedure did not show statistical significance, but there was need for permanent CSF diversion device placement in patients with tumour size > 4 cm and severe grade hydrocephalus. Based on the above findings we suggest that patients with HASS score > 5 should undergo Ventricular peritoneal shunt placement prior to definite tumor excision surgery in view of smoother surgical exposure and better postoperative outcome.

References:


* * * * *

AP-005: Surgery for Refractory Epileptic Spasms in children - Clinical characteristics and predictors of outcome after surgery

Dr. Raghavendra Harpanahalli*1, Dr. Sita Jayalakshmi1, Dr. Manas Panigrahi1, Dr. Shailaja Reddy1
1) Krishna Institute of Medical Sciences, Secunderabad, India

Background: Epileptic Spasms (ES) are a distinct seizure type in children with “uncertain” onset. When it is refractory to medical management, surgical treatment has been advocated with variable success.

Objective: To determine the clinical profile and predictors of outcome of surgery in children with refractory epileptic spasms.

Methods: Detailed clinical, interictal, Ictal EEG, MRI brain, FDG PET and ictal SPECT data were reviewed from 65 (40 male) children aged 16 and below with Epileptic spasms as the only/predominant seizure type. They underwent surgery in last ten years, with at least two years post-surgical follow-up. Palliative surgeries like corpus callosotomy and Vagal Nerve Stimulation was an exclusion criteria.

Results: Of the 65 children included, 36 (55.4%) had onset of epilepsy before 2 years of age. The mean duration of epilepsy was 7.46±6 years. Fifty four (83.1%) had daily seizures at presentation. Only 19 (29.2%) were frontal, 2(3.1%) were parietal, 6(9.2%) were occipital, 5(7.7%) were multilobar, 23(35.4%) were hemispherical and 1(1.5%) was hypothalamic hamartoma. Forty eight (73.8%) had mental retardation and 62 (95.4%) had poor quality of life. The lesion was temporal in 26(40%), extratemporal, most common was hemispherical (35.4%). Interictal EEG was multifocal/generalized pattern in 50(76.9%) and ictal EEG onset was generalized in 26(40%). PET/SPECT scan were lateralizing/localizing in 40(61.5%) and 18 (27.7%) respectively. Most common surgery performed was lesionectomy (53.8%) and most common histopathological diagnosis was focal cortical dysplasia (56.9%). Outcome was favourable including complete seizure freedom in 38 (58.5%). On outcome analysis, functional hemispherotomy was associated with favorable outcome ($b=0.415$, $p=0.001$) while lesionectomy ($b=-0.282$, $p=0.015$) and generalized interictal EEG patterns ($b=-1.084$, $p=<0.001$) were associated with poor outcome.

Conclusion: Epileptic spasms in children carry significant morbidity, but are amenable to surgical measures with good results when refractory to medical management.

* * * * *

AP-006: A Foldoscope: Scope in Neurosurgery - A feasibility study

Dr. Venkata Satya Raman Bhavana*, Dr. Vinay Bhushan T.1
1) Pinnacle Hospital, Visakhapatnam, Andhra Pradesh

Objectives: To compare the study of pathological slides by foldscope with conventional microscope in the diagnosis of Central Nervous System (CNS) space occupying lesion and to assess the utility of the foldscope which cost $1 for the rapid diagnosis in the neurosurgical biopsies for real time intraoperative consultation.

Methodology: This was a prospective study conducted in the Department of Neurosurgery and neuropathology of pinnacle hospital, Visakhapatnam for a period of 3 months. Of radiologically suspected CNS space occupying lesions were sent for intraoperative smear cytology and subjected to both histopathological examination and squash smear cytology. The study compared the ability to diagnose as well as grade the tumor by foldscope and microscope. Appropriate statistical analysis was applied

Results: Mobile phone- based microscope acquired images were observed and compared with a conventional microscope and found morphology of the tissue sections were significantly similar as of conventional light microscope images.

Conclusion: Intraoperative cytological diagnosis by foldscope is fairly accurate, safe, simple, reliable and cost-effective tool for rapid diagnosis of CNS space occupying lesions and is of great value in intraoperative consultation of CNS tumors.

Keyword: Foldoscope, brain tumour, pathologist

* * * * *

AP-007: Gamma-Knife Radiosurgery in partially embolized AVM - Management dilemmas and outcomes

Dr. Harsh Deora*, Dr. Mehul Modi1, Dr. Dwarkanath Srinivas1, Dr. Arivazaghan Arinappamagan1, Dr. Vikas Vazhayil1, Dr. Sampa Somanna1
1) National Institute of Mental Health & Neurosciences, Bangalore, India

Background/Introduction: The role of gamma knife radiosurgery (GKRS) in partially embolized AVMs has always remained subject of debate.
Aims: To evaluate the efficacy of GKRS in partially embolized AVMs and to analyze factors influencing obliteration.

Materials and methods: This is a retrospective study from a single institute performed over a period of 10 years (2005-2015). It included all the patients who underwent GKRS for partially embolized AVMs. Demographic characteristics, treatment profiles, clinical and radiological follow-ups of a minimum of two years was obtained.

Results: A total of 36 patients with a mean age of 31 years (range: 13-60 years) were included in the study. Follow up was available for 29 patients, out of which, 17 had complete obliteration (100% obliteration), one had near-total obliteration (> 90% obliteration), 10 had subtotal obliteration (<90%) and one had no change in the volume following GKRS. Mean duration for complete obliteration was found to be 3.59 years (range: 1-10 years). An obliteration rate of 59% was noted in our study. The factors analyzed were not found to be significantly influencing obliteration. Nine out of 12 patients (75%) presenting with seizures, were seizure-free after the treatment. Hemorrhage was noted in three patients following combined treatment. All of these cases were managed non-surgically.

Conclusion: GKRS in partially embolized AVM has a lesser obliteration rate compared to that of non-embolized AVMs. However, due to the more complicated nature and the higher grade of these AVMs, embolization followed by GKRS is a valid modality of management.

Keywords: Gamma knife radiosurgery, AVM, Embolization

Introduction: Arteriovenous malformations (AVMs) are abnormal connections between arteries and veins without normal intervening capillary beds. They are among the most complex symptomatic vascular malformations that a neurosurgeon is called to treat. A large autopsy series has found the AVM frequency to be 1.4% to 4.3%. They are responsible for two percent of all strokes and are frequently involved as a cause of intracerebral hemorrhage in young, accounting for nearly 38% cases. AVMs have a varied presentation from being incidentally detected to having neurological symptoms secondary to hemorrhagic or non-hemorrhagic etiology. The non-hemorrhagic etiology include seizure, headache, neurological deficits. Due to the complexity of AVM and associated dilemma in treating them, the need for interdisciplinary approach comprising of microvascular surgery, endovascular neurosurgery and radiosurgery seem a reasonable approach.

The advent of radiosurgery has brought about a significant change in the management of complex AVMs. While Spetzler-Martin (SM) grade I and II AVMs can be managed by either surgery or radiosurgery, grade III AVMs need to be treated with a combination of the three modalities available (surgery, embolization, and radiosurgery). In conditions where microsurgery carries significant risk, a combination treatment frequently consisting of embolization and radiosurgery is being used. However, many researchers are skeptical about this modality, as prior embolization has a negative effect on the rate of obliteration. It still has the potential benefit of improving vascular steal, reducing the volume of the nidus, hemorrhagic risk reduction in latency period and eliminating radio resistant features like presence of fistulas.

Here we present our institutional experience over ten years of the outcomes following GKRS in partially embolized AVMs.

Aims & Objectives: To study the efficacy of GKRS in the obliteration of partially embolized AVMs. To analyze the possible factors influencing the obliteration of AVM.

Material & Methods: This retrospective study included all the patients who underwent GKRS for partially embolized AVMs at National institute of mental health and neurosciences, Bangalore, from the year 2005 to 2015. Case files were obtained from the medical record department. Demographic characteristics, treatment profiles, clinical and radiological follow up were obtained. Radiological follow up included MRI or DSA. Patients included had a minimum follow up of 2 years. Subjects had given written informed consent prior to the conductance of this research and the institute’s committee on human research approved the study protocol.

Imaging and Planning: All GKRS procedures were performed on Model-4C Gamma Knife Unit (LEKTA INSTRUMENTS, GEORGIA, US), A Leksell stereotactic frame (LEKTA INSTRUMENTS, GEORGIA, US) was applied under local anesthesia. Patients then underwent an MRI. Two sets of images are obtained before GKRS. First was a T1-weighted contrast MPR sequences [TR-9.7E+0ms, TE-4.0E+0ms, ST-1.0E+0mm] with 2D acquisition type and zoom of 2.37. The second was TOF images [TR-3.5E+1ms, TE-6.0E+0ms, ST-1.0E+0mm] with 3D acquisition type and zoom of 2.37. Then Biplane DSA was performed (Neurostar-Siemens). Images were imported into the planning system through Picture archiving and communication system. Using the Gamma plan software (Leksell Gamma Knife Planner version 4C) dose planning was performed. The draining vein was usually avoided as this would cause thrombosis and increase the risk of future rupture. After the dose plan was reviewed by the radiosurgical team comprising of a medical physicist, neurosurgeon, and radiation oncologist, the patient was subjected to radiation. The radiation dose varied from 166y to 426y (mean 22 ± 46y) with an average coverage of 95% at 50% isodose. All patients have prescribed a course of steroids and analgesics for a week and discharged the following day. A radiosurgery based AVM score was calculated as follows: 0.1 x (AVM volume in ml) + 0.02 x (age of the patient in years) + 3 x (0 if frontal or temporal; 1 if occipital, parietal, intraventricular, cerebellar or corpus callosum; 2 if basal ganglia, thalamic, or brainstem).

Follow-Up Imaging: Patients were followed up with DSA or MRI. Obliteration in DSA was defined as an absence of draining veins and abnormal vessels previously present. The absence of flow voids and disappearance of nidus in MRA was taken as complete obliteration in MRI. This study assumes that every AVM that shows obliteration on MRI would be completely obliterated if DSA was done on them.50 out of 29 patients who had an adequate follow-up of over two years, 16 (55%) were evaluated with DSA and 13 (45%) with MRI for completeness of obliteration.

Statistics: IBM SPSS version 22 for Windows was used for statistical analysis. Descriptive statistics like frequency and percentage have been used to describe nominal variables. Mean and standard deviation have been used to describe a continuous variable. Median and
Discussion: have adequate control despite medications. were seizure-free at follow-up. However, three (25%) patients failed to Among the 12 patients who had a seizure at presentation, nine (75%) less than the natural history of ruptured AVM, which is around 4.5%6. The annual hemorrhage rate was found to be three percent, which is and none of these showed complete obliteration at follow-up (p=0.06). There were two patients who underwent GKRS twice. The first patient had a rebleed following GKRS and subsequently, GKRS was repeated for the residue, at follow up this patient still had residue. In the second patient, following embolization nidus was split into two parts and GKRS was given on different occasion for the two niduses.

Obliteration Rates: The follow-up of patients varied from two to ten years (mean 3.3 ± 1.8 years). Seven out of 36 patients (19%) did not have an adequate follow-up. Among the 29 patients, 17 had complete obliteration (100% obliteration) one had near-total obliteration (>90% obliteration), 10 had subtotal obliteration (<90%) and one had no change in the volume following GKRS. The obliteration rate was found to be 59% with a mean duration for complete obliteration of 3.6 years (range: 1-10 years). Factors like age, gender, presentation before embolization, pre and post-embolization nidus volume had no association with obliteration (Table 3). Both SM grade and radiosurgery-based AVM score had no influence on obliteration. However, the presence of bleed after GKRS during the latency period seemed to have a negative impact on obliteration but did not achieve statistical significance (p=0.06).

Complications: Following embolization three patients (10%) had permanent neurological deficits. Two of them had mild deficits consisting of quadrantanopias and one had moderate deficit consisting of hemiparesis. However, no new deficits were seen in any of the patients following GKRS. There were three episodes of hemorrhage in three patients. All of these patients had ruptured AVM at presentation and none of these showed complete obliteration at follow-up (p=0.06). The annual hemorrhage rate was found to be three percent, which is less than the natural history of ruptured AVM, which is around 4.5%6. In our study history of previous bleed, SM grade, radiosurgery-based AVM score had no association with rebleed. Among the 12 patients who had a seizure at presentation, nine (75%) were seizure-free at follow-up. However, three (25%) patients failed to have adequate control despite medications.

Discussion: AVMs are the most common symptomatic vascular malformations. They are being increasingly detected because of the advances and widespread use of cross-sectional brain imaging. In a meta-analysis by Gross and Du, it was found that the annual risk of future hemorrhage was 2.2% in unruptured AVMs and 4.5% in ruptured AVMs. Factors like previous hemorrhage, deep location, exclusive deep venous drainage and associated hemorrhage were found to increase the risk of future bleed in their study.6 There is a general consensus among treating clinicians for the need for some form of intervention (microsurgery/embolization/radiosurgery or a combination of these) for ruptured AVMs7. But when it comes to the management of unruptured AVMs, there is a constant debate about whether to opt for medical management or to go with some form of intervention. In our study, there were totally 14 patients with unruptured AVM, among nine of these patients who had adequate follow up, the obliteration rate was found to be 67%. Moreover, none of these patients had hemorrhage/major disability during the latency period. The unruptured AVMs predominantly belonged to SM grade III (6 out of 9 patients). The rest belonged to grade IV (2/9) and grade I (1/9). In the background of debatable results put forth by ARUBA trial8, the concept of conservative management for unruptured AVM does not seem practical as there is a constant risk of imminent rupture. As stressed upon by Deora et al9 there is a need for an individual approach and keeping the heterogeneous nature of AVM in mind, multimodality management involving all three streams is necessary.

Radiosurgery has revolutionized the treatment of AVM especially in cases where microsurgery carries significant risk. Pollock et al10 reported a 73% rate of complete obliteration and a 14% rate of major complications following radiosurgery. Though radiosurgery seems efficient and safe, its use in large and complex AVMs has a lot of limitations. Ellis et al11 and Pan et al12 have reported an obliteration rate of 44% and 50% in AVM greater than 10cc. This limitation of radiosurgery can be overcome with prior embolization in such complex AVMs. Embolization not only reduces large AVM to a size amenable for GKRS but also reduces the risk of future hemorrhage by tackling intra nidal aneurysms13. The mechanism of AVM obliteration after GKRS involves intimal thickening, thrombosis of irradiated vessels and eventually obliteration of lumen14,15. However, this is a slow process and has a latency of 2-3 years until obliteration. In some cases, it might take 3-5 years. The mean obliteration time in our study was around 3.3 years. The obliteration rate in this combined approach varies from 29% to 70% as reported in various studies. Our study showed an obliteration rate of 59% without any permanent major neurological deficits.

In a study by Gobin et al, an obliteration rate of 65% was seen following combined management. The study included 125 patients and embolization itself resulted in complete occlusion in 11.2% of AVMs and reduced nearly 76% of AVMs to a size amenable for radiosurgery. Radiosurgery produced total occlusion in 65% of these partially embolized AVMs and an obliteration rate of 79% was seen in cases where residual nidus was less than 2 cm in diameter. Mortality of 12.8% attributable to the endovascular procedure was noted. However, in the post radiosurgery period, no major complications were found. The annual hemorrhage rate of about 3% was found; with none...
of the patients having completely occluded AVM experiencing rebleed13. Our study too had comparable annual hemorrhage risk with no incidences of hemorrhage noted after complete obliteration. The latency period post-GKRS was also free from any new onset morbidity. Similarly, Huo X et al retrospectively analyzed all partially embolized cases of AVM that underwent GKRS for residual nidus at their center. The study included 162 patients with a median pre embolization and post-embolization volume of 14.3 ml and 10.9 ml respectively. The annual hemorrhage rate was found to be 1.71% with a total obliteration rate of 56.8%. The volume of the nidus was found to be significantly influencing the obliteration in multivariate analysis. Hence, they concluded that partially embolized AVMs could be successfully treated with GKRS16. Though we had comparable obliteration rate as this study, we did not find any association between nidus volume and obliteration.

Although GKRS in partially embolized AVM seems promising, it is frequently criticized for having lesser obliteration rate compared to non-embolized AVMs. There are a number of studies supporting the above argument. In a retrospective study by Schwyzer et al, 215 embolized AVMs were analyzed and were compared with non-embolized AVM. An obliteration rate of 33% was found in the combined treatment group compared to the non-embolized group, which had an obliteration rate of 61%. This could have been because of the fact that the combined treatment group had higher grade AVMs compared to non-embolized group (percentage of grade III - V AVMs was 58.6% for combined treatment group and 48.8% for the non-embolized group).17 Similar study was done by Andrea-Souza et al in which embolized AVMs were compared with non-embolized AVMs. Each group had 47 patients and were matched with respect to nidus volume, site, and radiation dose. Complete obliteration was found in 22 patients in the embolized group (47%) and 33 patients in the non-embolized group (70%). Significant bias can be expected in this study as the matching was done retrospectively. The authors also speculated that the lower obliteration rate observed in the partially embolized group could be due to recanalization in previously embolized nidus and also due to difficulty in radiosurgical planning. However, newer liquid embolic agents, such as Onyx may offer some improvement in this regard.21

Han et al too performed a comparative retrospective study on 120 patients who underwent combined treatment between 1987 and 2006. The overall rates of total obliteration were found to be 35, 53, 55 and 59% at 3, 4, 5 and 10 years, respectively. Using a case-match control technique, they concluded that GKRS in partially embolized AVM had lower obliteration rate (p = 0.028) when compared to radiosurgery alone.19 Various reasons for incomplete nidus obliteration post-embolization have been postulated. These include geographic miss (targeting errors), stereo-angiographic incompleteness, recanalization of previously embolized part of AVM, large nidus volume, radio-resistance associated with an intranidal AV fistula.11 20

Despite the rising number of studies in the literature on this modality of management, the results yet seem to be conflicting. Hence there is a need for a well-designed prospective study. In our study, the combined management has shown promising benefits with fewer complications. Yet, there is a need for careful patient selection with a multidisciplinary approach.

Conclusion: Though a lot of literature suggests GKRS in partially embolized AVM have a lesser obliteration rate compared to that of non-embolized AVMs, due to the complicated nature and higher grade of these AVMs, embolization followed by GKRS seems to be a valid modality of management. Further evaluation by well-designed prospective or randomized cohort studies would provide a better understanding in this regard.

Acknowledgment: None

Statement of Ethics: The research was conducted ethically in accordance with the world Medical Association Declaration of Helsinki. The institute’s committee on human research approved the study protocol.

Disclosure Statement: The authors have no conflicts of interest to declare.

Funding Sources: None

References:
10. Pollock BE, Gorman DA, Coffey RJ. Patient outcomes after...


25. Guo WY, Wiholm G, Karlsson B, Lindquist C, Svendsen P, Ericson K. Combined embolization and gamma knife radiosurgery for cerebral arteriovenous malformations. Acta Radiol. 1993;34(6):600-606. * * * * *

**AP-008: Correlation of pre-operative Functional Magnetic Resonance Imaging (fMRI) with intraoperative cortical stimulation in surgeries of eloquent brain lesions**

Dr. Pawan Chawla1, Dr. Basant Kumar Misra1, Dr. Vrajesh Udani1, Dr. Neelu Desai1, Dr. Santosh Gupta1

1) 1P. D. Hinduja National Hospital & MRC, Mumbai, India

**Context:** Direct Cortical Stimulation (DCS) represents the gold standard for mapping of eloquent brain cortex. However, DCS is an invasive time-consuming procedure. fMRI has become a useful tool to delineate motor and sensory eloquent cortex from the areas of planned neurosurgical resection. In our study, we will be studying the reliability of pre-operative investigations when compared with the intraoperative investigation.

**Aims:** To assess the reliability of fMRI by comparison with DCS

**Settings and Design:** Study area & population: 30 patients with eloquent cortex lesions were admitted in the Department of Neurosurgery at Author’s Hospital.

**Study type:** Study of diagnostic efficacy

**Methods and Material:** fMRI sequences were loaded into a neuro-navigational system. Intraoperative motor and/or language mapping was done by DCS. The location of all cortical stimulated points was correlated with the cortical functional structures. Preoperative and Postoperative Jezanofsky score and MRC grading was noted down.

**Statistical analysis used:** The eloquent brain areas were divided into true-positive, true-negative, false-positive and false-negative. Based on it, specificity, sensitivity, positive predictive value, negative predictive value of fMRI was calculated.

**Results:** Concordance between fMRI and DCS was noted in 26 cases. Overall mean sensitivity, specificity, positive and negative predictive value of fMRI as compared to DCS was 95%, 92.48%, 85.56% and 96.08% respectively.
**Conclusions:** DCS will stay the gold standard for mapping eloquent cortex in spite of side effects like invasiveness, seizures etc. Although fMRI can’t replace DCS, it can guide and increases the efficacy in resection and preservation of neurological status in eloquent brain lesions.

**Key-words:** functional MRI (fMRI), Direct Cortical Stimulation (DCS), Eloquent Cortex, Concordance

**Key Messages:** Functional MRI should be considered a useful preoperative surgical tool for mapping eloquent brain lesions.

**INTRODUCTION**

Motor movements and language are considered as one of the basic functions of human being that helps in their survival. In the past, there had been lots of clinical and pathological studies in patients with brain lesions, showing that different cortical areas are crucial for different functions and that some of the regions of cortex are indispensable for a defined cortical function. These areas are referred to as ‘ELOQUENT CORTEX’. 1

Neurosurgery of a lesion in an eloquent area in the brain is always challenging. In pre-surgical planning, the determination of eloquent afferent and efferent subcortical white matter tracts is important for preservation of function. Loss of language and motor movements following a neurosurgery could lead to a great personal and social breakdown to a patient, and thus a surgeon always aims to preserve these eloquent areas.

In the last decade, technical developments in the field of functional brain mapping demonstrated the existence of a physiological inter-individual anatomical-functional variability 2,3, along with the plastic potential of the central nervous system allowing a short- and long-term redistribution of the functional maps within the same subject, in particular in learning or memory 4,5: this is the so-called “NATURAL PLASTICITY”.

The spatial localization of eloquent areas may show large inter-individual differences 6, 7, proving the classical concept of a constant localization incorrect and thus the exact identification of eloquent areas in each individual is crucial. Interestingly, reshaping of various brain functional areas has been seen with many progressive lesions such as slow-growing tumors 8. This explains the frequent lack of neurological deficit despite the growth of infiltrative neoplasms such as low-grade gliomas within the so-called “eloquent” areas.

Intraoperative Direct Cortical Stimulation (DCS) is the method often used for localizing the eloquent cortex but it has various disadvantages of invasiveness, complexity, extended operation time, and failure to predict the risk of postoperative functional disorder. 9 Applying Intraoperative cortical stimulation of cortex sometimes necessitates the performance of surgery in the conscious patient. This can be a severe burden both for the patient and the operating team in a procedure that lasts several hours; in addition, cortical stimulation may evoke epileptic seizures which can be harmful to the patient in this setting.

In the past decade, new imaging techniques have developed that can be used to define and localize these functional and structural cortical tracts in vivo. Functional Magnetic Resonance Imaging (fMRI) is a non-invasive, more readily available, and clinically feasible tool in clinical settings. While diffusion tensor imaging is most helpful to illustrate structural connectivity, fMRI is used to depict functional connectivity. Matching of these data with a conventional 3D-CT or MRI allows the exact transfer of this information into the surgical field by neuro-navigation.

In this study, we discuss about the reliability and accuracy of fMRI and DTI as compared to DCS along with the processing and reporting of the data pertaining to the clinical neurosurgical cases from our institute. We have also given emphasis on the clinical condition of the patient before and after the surgery thus trying to decipher the safety of these investigations for the patient.

**SUBJECTS AND METHODS**

**Clinical Setting:** Patients with brain lesions within or adjacent to eloquent cortex were admitted in the Department of Neurosurgery at P. D. Hinduja National Hospital & Medical Research Centre.

**Study Design:** The study was a prospective study of diagnostic efficacy to assess the reliability of fMRI by comparing them with DCS and to achieve maximum extent of resection with maximum preservation of patient’s neurological status. The identity of the patient was not declared in any part of the study. The study was approved by the ethical committee of Hinduja Hospital and the patient data was purely used for study purpose.

**Sample Size:** The study included thirty patients with brain lesions within or adjacent to eloquent cortex undergoing surgery at Author’s Hospital.

**Study Duration:** The study was conducted prospectively over a period of two years from April 2016 to March 2018.

**Selection Criteria:**

(A) Inclusion Criteria:
- Lesions within or adjacent to eloquent Brain areas
- Age > 7 years

(B) Exclusion Criteria:
- Lesions in Non eloquent brain areas
- Patients incompatible for MRI like pacemakers or implant.

**INTERVENTION**

**Pre-operative evaluation:**

Informed written valid consent was taken.

Preoperative Neurological examinations was performed a day before the surgery to evaluate existing neurological deficits. Karnofsky score and MRC grading of power were noted preoperatively.

Pre-operative blood investigations were also performed which included complete blood count, liver function test, kidney function test and coagulation profile along with chest X-ray and electrocardiogram.

**PATIENT PREPARATION**

Once the paradigms were decided, an imitation of the entire fMRI study was done before taking the patient inside the MRI scan. Final paradigms were different from the simulation paradigms to avoid priming of language networks.
All studies were performed on Philips Ingenia 3T digital scanner (Eindhoven The Netherlands), along with EPrime with ESys In vivo (In vivo Corporation, Gainesville USA) hardware and software for fMRI. The fMRI sequences used were of “block design.” A 30 s rest period with visual fixation to central + sign or # sign, followed by a 30-s task was a basic standard block design. Each paradigm was of 4 min and had eight blocks of 30 s each with alternating rest and function blocks. A paradigm was a dynamic scan consisting of 80 dynamics, with dynamic scan time of 3 s. Following were the paradigms used in our study:

- Finger movement
- Toe movement
- Noun-verb generation
- Word generation
- Comprehension task
- Semantic discrimination
- Story listening

All the above paradigms were available in patient’s native languages. We had these set in English, Hindi, Gujarati, and Marathi languages, which were common to this region. Generally, at least two different paradigms were used, and if the patients allowed, then three.

POST PROCESSING

The standard software used for processing was statistical parametric mapping (SPM), using Dyna Suite Neuro system. All the processed data was fed into the neuronavigation system and the activated areas were coregistered. A StealthStation S7 neuro-navigational system (Medtronic, Minneapolis, MN, USA) was used in all our cases.

OPERATIVE PROCEDURE

Position: Surgery done in Supine / Lateral position. (Lateral position preferred for Awake patients. Supine position preferred for GA patients)

Anaesthesia: Awake / General Anesthesia

SURGICAL TECHNIQUE

Anaesthesia: Scalp block was performed bilaterally in all awake patients by either 0.375% L-Bupivacaine with 1:2,00,000 epinephrine or bupivacaine 0.375% with 1:2,00,000 epinephrine or 0.375% Ropivacaine with 1:2,00,000 epinephrine. The volume was restricted to max. 40 ml, 30-35ml for initial block before pin insertion and the remainder divided between scalp injections before Mayfield head pin insertion and skin incision. All patients received inj. Ondansetron 0.1mg/kg and inj. paracetamol 1000mg IV before pin insertion pre emptively. Antibiotics, anti convulsants, steroids were given according to the protocol for the procedure. For breakthrough pain relief, inj. fentanyl 1-2mcg/kg and propofol 1-2mg/kg IV were given intraoperatively. As far as possible muscle relaxants were avoided or discontinued at least 30 minutes before DCS (peripheral response to nerve stimulation was used to confirm that the muscle relaxant had worn off).

Surgical procedure: After the craniotomy, dura mater was opened (after confirmation with Neuronavigation). Eloquent cortex was identified using fMRI data embedded in Neuronavigation system. SSEP was used to confirm motor-sensory cortex junction with the phase reversal phenomenon. The contralateral arm, leg, and face were uncovered to observe for movement, stimulation mapping begins with identification of the motor cortex. A 4 point contact strip electrode (5 mm spacing, 60 Hz, 100us phase duration and 10s train duration) was placed on the surface of the brain initially depending on identification of the rolandic fissure / fMRI motor map. DCS was performed with the current amplitude between 1 and 15 mA using Nicolet / Nihon Kohden Cortical stimulator incorporated with the ongoing electrocorticography. The motor strip was stimulated with a starting current of 1 mA and increased in 1 mA increments until a motor response was visually identified. The current amplitude which identified the motor cortex usually was 5 mA or less in the awake patient. Gradual sliding technique was used to move the electrodes under neuronavigation monitoring.

At the same time, Neuronavigation was utilized to confirm the location of eloquent cortex as par with DCS. The electrocorticography (ECoG) was used to monitor for after discharges induced by direct stimulation of the cortex. The presence of after discharge potentials indicated that the maximum strength required for motor response had been exceeded and further increase in current strength was not warranted.

When movements or paresthesias were evoked, it was assumed to be at / close to eloquent motor cortex and this would be used to limit resection (current spread with bipolar stimulation is 2–3 mm from the electrode contacts).

During cortical mapping, no sedatives were administered except in young / anxious patients where motor mapping was performed under sedation / anesthesia. If seizures occurred during cortical mapping and are not controlled with cold Ringer’s lactate solution, propofol followed by injection midazolam was given for seizure suppression.

The findings of fMRI and DCS monitoring regarding the localization of eloquent cortical areas were compared. True positive, false positive, true negative, false negative areas were noted down. If the fMRI and cortical stimulation areas were exactly the same or less than 5 mm apart, these studies were considered concordant. If the distance between the fMRI and the DCS defined eloquent areas were more than 5 mm, the employed studies were considered discordant. During the procedure, DCS findings were analyzed by the Neurologist team and fMRI and Neuronavigation findings were analyzed by the Radiologist. Both the teams were blind about each other’s finding.

Post-operative Evaluation: In the postoperative period, kamofsky score and MRC grading were noted down in the immediate period and after 8 days of surgery. The histopathological reports were recorded in all the cases.

Outcome Measures: Demographic data of patient was noted down. Location and histopathology reports recorded.
**Primary Outcome:** The eloquent brain areas were mapped using fMRI and Direct Cortical Stimulation. These areas were divided into true positive, true negative, false positive and false negative. Based on it, Specificity, Sensitivity, Positive predictive value, Negative predictive value of fMRI as compared to DCS was calculated.

**Secondary Outcome:** Patient’s preoperative and postoperative neurological status were compared using kamofsky scale and MRC scale. And outcome was measured as Improvement, same or worsening of neurological status.

**Data Management And Statistical Analysis:** Data analysis was done with the help of Microsoft Excel and SPSS V.23. Statistical analysis of our data was performed by employing Pearson Chi-Square, Fisher’s Exact test, Mann Whitney U test, while the level of significance was set at 5%. The receiver operator characteristic (ROC), sensitivity, specificity, PPV and NPV for each region were calculated.

**RESULTS**

**Patients Characteristic:** In the present study, patients were classified into various age groups, with most (50%) being within 40-59 year group followed by 9 patients in 20-39 year group and 5 patients above 60 years age. Only 1 patient (age = 13 year) was below 20 year age. Mean age was 45 years with standard deviation of 14 years. 20 patients (66.7%) were males and 10 patients (33.3%) were females.

Most of the patients presented with history of seizures (23/30, 77%). There was overlapping of symptoms in some patients in the form of seizures and motor weakness. 10 patients had motor weakness and 4 patients had speech difficulty.

Local and General anesthesia was utilized in 21 cases and 9 cases respectively.

**Lesion Characteristic:** Most of the lesions were present in frontal lobe predominantly posterior frontal region in the motor cortex region [22/30]. 5 lesions were present in parietal lobe. 2 lesions were in temporal lobe and 1 was in insular lobe.

Majority of the lesions were gliomas [19/30]. There were 5 cases of meningioma, 3 cases of AVM, 2 cases of lymphoma and 1 case of metastasis.

**Primary Outcome:** Concordance of fMRI with DCS was noted in 26 cases.

Overall mean sensitivity of fMRI as compared to DCS was 95% with a C.I. of 90.05-87.88. Overall mean specificity of fMRI as compared to DCS was 92.48% with a C.I. of 87.88-97.08.

Overall mean positive predictive value of fMRI as compared to DCS was 85.6% with a C.I. of 77.42-93.68. PPV is used to indicate the probability that in case of a positive localization of eloquent cortex by fMRI, that the identified cortex is really the specified eloquent cortex. Overall mean negative predictive value of fMRI as compared to DCS was 96.08% with a C.I. of 96.07-100.0.

**Secondary Outcome:** Pre-operative and Postoperative Kamofsky score stayed same in most of the cases [26/30]. Improvement in kamofsky score was noted in 3 cases where motor weakness improved after surgery. There was worsening of score in 1 individual case from 80 to 40.

**Discussion:** As already mentioned, cortical stimulation is considered as the Gold Standard for mapping eloquent brain cortex. However, DCS allows only mapping of a local region, and not of the whole brain, and they are invasive and time-consuming with associated complications like seizure. Therefore, combination with other functional non-invasive and invasive methods seems currently mandatory.

The primary aim of the present study was to assess the reliability of fMRI and DCS by comparing them with DCS. The secondary objective was to achieve maximum preservation of patient’s neurological status after surgery with maximum safe resection during surgery.

There have been various studies in past comparing the functional MRI with Direct cortical stimulation, however with conflicting results. Atlas et al. reported that were able to localize the eloquent cortex in 71.5% of their cases by fMRI and they reasoned it with blaming the glioblastomas and high-grade gliomas for altering BOLD signals. Fandino et al. reported only 82% fMRI (1.5 T units) accuracy in outlining the eloquent cortex. However, both these clinical series had limited-number of study populations.

Spena et al. reported that the accuracy in localizing the eloquent cortex was 100% by fMRI with an error margin within 10 mm. Similarly, Hirsch et al. reported their results from a large prospective study of 125 patients with various intracranial pathologies and of 63 healthy volunteers. There was accuracy of 100% in identifying central sulcus in healthy volunteers and in 98.4% of their patients. Wernicke’s and Broca’s areas were also identified in 91% and 77%, respectively, in their patients, while the respective percentages were 100% and 93% for their healthy volunteers.

100% fMRI (1.5 T units) accuracy in localizing language-related cortical areas by Yetkin et al and Ruge et al. reported 81% sensitivity and 53% specificity for fMRI (performed at 1.5 T unit) when the margin error was 10 mm, while the respective percentages were 92% and 0% when the margin error was 20 mm.

Pouratian et al. reported the fMRI sensitivity and specificity rates were 100% and 66.7%, respectively, for the frontal lobe, while 96.2% and 69.8% for the temporal and parietal lobes respectively.

Similarly, Bizzz et al. reported 80% sensitivity and 78% specificity for language fMRI (performed at 1.5 T unit). Tomczak et al. found only 33.3% concordance between the fMRI and DCS findings in their series.

In 2005, Duffau et al. compared a series of patients with LGG that was resected with intraoperative electrical stimulation with patients in a historic control group in which operations were not performed with the aid of stimulation mapping. The mapping group consisted of more patients with eloquently located LGG, and the rate of severe permanent...
deficits decreased from 17% to 6.5% in the mapping group while the rate of gross total resection increased 25.
In a recent meta-analysis on 8091 patients, late severe neurological deficits were observed in 3.4% of patients with intraoperative DCS mapping and in 8.2% of patients after resections performed without DCS mapping. Moreover, gross total resection was 75% with and 58% without stimulation mapping 26.

It is interesting to note that Concordance of fMRI with DCS was noted in 26 cases (87%) in our study of 30 patients although the number of cases was limited. Discordance was labeled whenever the distance between fMRI activation areas and DCS stimulated areas was more than 5mm.

The relationship between the pre-operative karnofsky score and concordance was calculated however the results were not significant (Mann Whitney U value 32.00, p value 0.14). The relationship between the post-operative karnofsky score and concordance was calculated however the results were not significant (Mann Whitney U value 31.00, p value 0.11).

There was worsening of score in 1 individual case from 80 to 40. Patient had cortical vein injury during the surgery which can act as a confounding reason for hemiparesis and hence drop in karnofsky score.

Discordance between SSEP and DCS was seen in 6 cases. SSEP was used in all cases and phase reversal phenomenon helps in the identification of motor and sensory cortex interphase. Despite an accurate registration between the patient's physical space and intraoperative images, it is mandatory to be careful with image-guided surgery for (voluminous) tumors, because of the high risk of intraoperative brain shift, due to surgical retraction, mass effect, gravity, extent of the resection or cerebrospinal fluid leakage. In our series, intraoperative cortical stimulation was carried out just after opening of the dura mater to avoid effects of surgical retraction, extent of resection or any CSF leakage.

In spite of taking all possible precautions, 4 cases had discordance between fMRI and DCS. One of the possible reasons can be deformation induced by craniotomy, which reduces image registration and thus decreases the accuracy of fMRI. Also the paradigms applied for fMRI and intraoperative stimulation cannot be exactly the same because of different setups.

Activation areas of fMRI depends on the statistical thresholds that were chosen by the radiologists, directly influences the localization of eloquent cortex by fMRI. In our case series, only 1 radiologist was involved to avoid inter-observer error. A low threshold may increase both the number of non-essential areas as well as the size of the critical areas, whereas a stringent threshold may result in critical areas not reaching statistical significance.

In addition, mapping principles of fMRI and DCS are radically different: functional neuroimaging shows all brain areas involved during the performance of a voluntary task, whereas DCS only points at the area essential to the task, by disturbing the function against the will of the patient.

The lack of complete concordance raises the question about the accuracy of specificity, sensitivity and predictive values of fMRI when compared with the DCS. DCS is and will remain the GOLD STANDARD for mapping eloquent cortex. On the other hand, we cannot ignore the importance of fMRI as an adjuvant to DCS during planning of eloquent cortex surgeries.

Conclusion: With the recent advances in medical healthcare, every specialty needs an upgrade and Neurosurgery is no exception. The primary objective of this study was to assess the reliability of fMRI and DTI by comparing them with DCS and the secondary objective was to achieve maximum preservation of patient's neurological status after surgery with maximum safe resection during surgery.

In the present Indian healthcare system, the widespread presence of MRI scanners allows fMRI exams to be done at most modern neurosurgical centers. fMRI data can be of utmost importance in assessing surgical risk, guiding surgical approaches and exposure for the resection of eloquent cortical lesions.

fMRI has several advantages over DCS, including its non-invasiveness, its higher spatial resolution, and its ability to assess function within the sulcal depths. fMRI acquisitions can be impaired, however, by technical factors such as motion artifact, infiltrative tumors and venous effects, and fMRI data are not perfectly correlated with DCS, particularly for language localization.

Several perspectives could be considered to continue to improve Brain surgery in eloquent regions. DCS will stay the gold standard for mapping eloquent cortex in spite of side effects like invasiveness, seizures etc. Although fMRI cannot replace DCS, it can guide and increases the efficacy in resection and preservation of neurological status in eloquent brain lesions. Functional MRI should be considered a useful preoperative surgical tool for mapping eloquent brain lesions.

References:


* * * * *

AP-009: Sagittal balance correction in cervical compressive myelopathy - Is it helpful?

Dr. Chiragkumar Patel1, Dr. Manas Panigrahi2, Dr. YBVK Chandrasekhar3, Dr. Sudhindra Vooturi M.P.T3

1) Krishna Institute of Medical Sciences, Secunderabad, Telangana, India

Background: Laminectomy with lateral mass and transfacet fixation are widely accepted surgical techniques for cervical compressive myelopathy (CCM), especially if more than one segment is involved. In multi-level fixation, additional fixation C7-T1 transfacet junction may help achieve better surgical outcome by improved balance in the sagittal plane.

Material and Method: Sixty six consecutive patients under-going surgery for CCM were randomized into two groups, as, Group A: cervical laminectomy with lateral mass fixation only, and Group B: cervical laminectomy and lateral mass fixation including C7-T1 transfacet junction in fixation. The two groups were compared at persistence of pre-operative (baseline) symptoms with symptoms at three months post-operatively. Neurological outcome (measured by MJOS scoring) and sagittal balance (T1 slope) of cervical spine were also compared between the groups.
**Result and outcome:** The average age of the study population 59.11±12.05 years with 58(87.8%) men. Although patients in both the groups reported significant reduction in pain at three months, there was no statistical difference (p=0.622). Patients in group B had significant improvement in neurological symptoms (measured on MJOS scoring) than in Group A (13.68 ± 3.42 vs 15.38±1.90; p<0.01). Similarly, post-operative T1 slope was significantly lower in group B (26.93±8.73 degrees vs 19.48±4.31 degree; p<0.001).

**Conclusion:** Normalizing sagittal balance in patients of Compressive cervical myelopathy by cervical laminectomy and posterior fixation including cervical thoracic junction (C7-T1 transfacet junctional fixation) may significantly improve short-term neurological outcome. The consistency on our findings should be evaluated in larger studies, with longer follow-up periods.

**Keywords:** Cervical compressive myelopathy, Posterior cervical fixation, cervical thoracic junctional transfacet fixation, sagittal balance.

**Introduction:** Cervical cord compressive myelopathy (CCM) is characterized by spinal cord compression due to physiologic narrowing of the sagittal diameter of the spinal canal either due to congenital or degenerative changes in the cervical spine1. Clinical features often include neck pain, weakness of limbs and/or sensory changes with an insidious, progressive or acute onset, usually after a trivial trauma. Nurick Grades2, Modified Japanese Orthopedic Associations Score3 are often used to assess prognosis post-intervention in patients with CCM. Whereas associated pain evaluation is often done using Denis pain score4 and score on visual analogue scale.

Among the various surgical fixation methods employed for CCM, posterior cervical fixation with lateral mass screws, first described by Roy-Camille at al in 19795 is regarded as gold standard especially for the management of multilevel CCM. However, if the etiology of CCM is degenerative changes of cervical spine, a deteriorating sagittal balance of the cervical spine is often associated with worsening clinical symptoms. In fact, measuring T1 slope angle, Cobb angle, neck tilt angle (NTA), thoracic inlet angle (TIA) and sagittal vertical axis (SVA), are all proven techniques of measuring sagittal balance6. Perhaps correcting sagittal balance of cervical spine during the surgical fixation, may improve post-operative outcome. However, role of optimal sagittal balance in post-operative period is largely un-explored in these patients.

Singrakhia, et al7 recently suggested that in patients with multilevel cervical myelopathy, multi-level laminectomy with lateral mass screw is a safe technique than laminoplasty and uninstrumented laminectomy. In fact the authors question the need for lateral mass screw at each segment to ensure neurological and sagittal outcome7. In the current study, the lateral mass screws were utilized at alternate segments in addition to cervical thoracic junctional fixation (transfacet C7-T1) in laminectomy and posterior fixation in patients with CCM. We investigate if surgical fixation improves post-operative sagittal balance and thereby improve short-term outcome.

**MATERIALS AND METHODS**

Sixty six consecutive patients diagnosed of CCM and who underwent cervical laminectomy between January 2015 and December 2018, formed the study population. The study was done at a tertiary referral centre in South India, after institutional ethics committee approval was obtained. An informed consent was obtained from all the patients. The inclusion criteria was – CCM with multilevel pathology (more than two levels), lordotic and straight spinal alignment, with definitive radiological features of cervical cord compression, as diagnosed by an experienced radiologist8. 9. Patients with kyphotic cervical curvature10 and failure to obtain informed consent, formed the exclusion criteria.

**Data Collection:** Data was collected at baseline (pre-operatively) and at three months post-surgery. The study variables included: demographics, pre-operative neurological assessment, duration and severity of symptoms, neurological status. The primary outcomes of the study pain as measured by Denis pain score4 and neurological status measured by modified Japanese orthopedic association score3. Additional outcome measures included, sagittal balance measured as T1 slope using a Computed Tomography (CT) scan of cervical spine, demonstrated in Figure 111. a) T1 slope: the angle between an upper end plate of T1 and horizontal line. b) Neck tilt angle: the angle formed by a vertical line of sternum tip and the line drawn in the center of upper end plate of T1. c) Cobb’s angle C2-7: the angel between the horizontal line of C2 lower end plate and the horizon—tal line of C7 lower end plate. d) SVA C2-7: the distance between the plumb line of C2 dens tip and the plumb line of the center of C7 upper end plate. Thoracic inlet angle: sum of T1 slope and Neck tilt angle.

**Surgical procedure:** All patients were operated under general anesthesia with necessary precautions taken of cervical spine during intubation. The patient was positioned in prone-lying with head fixed by Sugita frame and pins with slight flexion. In all the patients, digital fluoroscopic guidance was utilized during the surgery. After sufficient exposure of the cervical spine level, the lateral masses were initially drilled and fixation was done with screws and rods, followed by laminectomy. Screw placement was done at three levels instead of every level. In both group either lateral mass or transfacet screw placement done at different level. In Group A, the lowest level of screw placement was either at C5 or C6 vertebra, either lateral mass or transfacet. Whereas, in group B the lowest level of screw placement was at C7-T1 junction, which involved trans-facet screw placement and fixation. Whereas Intra-operatively, position of each screw position was assessed separately by fluoroscopy imaging guidance. Postoperatively, patients in both the groups were advised to use a soft cervical collar for six weeks. One week after surgery, all the patients were advised neck exercises. Radiograph of cervical spine or CT of cervical spine was done on the first post-operative day. Any intraoperative or postoperative complications were noted.

**Lateral mass screw placement:** The entry point of lateral mass screw was approximately 1 millimeter medial to the midpoint of the lateral mass. The screws were angulated at 25° laterally and superiorly to achieve the best position of the lateral mass and to minimize the risk of...
neural or vascular violation, (modified Anderson and Sekhon techniques)12.

**Transfacet screw placement**: Screw placement was perpendicular to the facet joint of adjacent vertebrae, Dal Canto technique (Entrance point: 2 millimeter caudal to the midpoint of the lateral mass. Lateral angulation: 20° laterally, Sagittal inclination: 40°caudally.

**Statistical Analysis**: All continuous variables are expressed as mean ± standard deviation. Categorical variables are expressed as percentages. Study population was divided into two groups - Group A: patients underwent cervical laminectomy and lateral mass fixation without junction fixation, Group B: patients undergoing cervical laminectomy and lateral mass fixation including C7-T1 trans-facet junction fixation. Differences between groups for continuous variables were evaluated using independent student t-test. Chi-square test was employed to evaluate differences between groups for categorical variables. All statistical analysis was done using SPSS version 17.0 for windows, IBM Computers, New York USA. A p < 0.05 was considered to be significant.

**Results**: The average age of the study population was 59.11±12.05 years with 58(87.8%) men. There were no significant differences between the groups for age and gender distribution (Table 1). On comparison for presenting complaints, more number of patients in group A reported muscle weakness either in right (35.7% vs 7.9%;p=0.003) or left (35.7% vs 5.3%;p<0.001) upper limb. Similarly, nearly one-fourth of the patients in group A had a history of fall.

On evaluation of MJOS scores, both the groups did not differ for score on pain rating scale, sensory symptoms, sphincter function either at baseline or at three months follow-up. In group A patients average pre operative Denis pain scale was 3.64 was reduced to 1.43 at 3 months post operative, which was statistically significant. In group B patients average pre operative Denis pain scale was 3.64 as reduced to 1.43, at 3 months post operative, which was also statistically significant. So we noticed statistically significant pain relief in both groups of patients after surgery at 3 months. But improvement in pain was not statistically significant different in both groups (Table 2). In our study, group A patients had pre operative Upper extremity motor score was 3.00 ± 1.33, Lower extremity motor score was 4.89 ± 1.85, sensory score was 2.14 ± 0.65, sphincter function score was 2.61 ± 0.49, total pre operative MJOS score was 12.64 ± 3.78. Post operative (at 3 months), Upper extremity motor score was 3.64 ± 1.19, Lower extremity motor score was 5.07 ± 1.72, sensory score was 2.29 ± 0.60, sphincter function score was 2.68 ± 0.47, total post operative MJOS score was 13.68 ± 3.42. There was statistically significant improvement in upper extremity motor function. In group B patients, pre operative Upper extremity motor score was 2.89 ± 1.39, Lower extremity motor score was 4.50 ± 1.65, sensory score was 2.21 ± 0.62, sphincter function score was 2.58 ± 0.68, total pre operative MJOS score was 12.32 ± 3.21 and post operative (at 3 months), Upper extremity motor score was 4.35 ± 0.59, Lower extremity motor score was 5.71 ± 1.24, sensory score was 2.53 ± 0.50, sphinter function score was 2.79 ± 0.41, total post operative MJOS score was 15.38 ± 1.90. There was statistically significant improvement in upper extremity motor function, lower extremity motor function and sensory function. On comparing the improvement in MJOS score at pre and post operative (at 3 months), there was a significantly more improvement in group B patients compared to group A patients (Table 3). We observed statistically significant reduction of T1 slope in which cervical thoracic junction C7-T1 (group B) was included in lateral mass fixation (Table 4).

We additionally calculated sagittal balance parameters post operatively in group 2 patients, in which Neck tilt angle was 61.04, Thoracic inlet angle was 79.69, Cobb’s angle was 11.14 degree and sagittal vertebral axis was 7-18. We compared this value to reference value of asymptomatic and same age group population. We observed that these values were similar range as in asymptomatic population.

Post-operative complications: two and three patients in group A and B respectively, had post operative serous discharge which was managed with overstitch and antibiotics. One patient in each group had post operative transient mild weakness of bilateral upper limbs, which was improved during the subsequent follow-up.

**Discussion**: In the current study, we evaluated the short term outcomes of patients with CCM at multiple-segments who underwent routine laminectomy and posterior fixation in comparison to laminectomy and posterior fixation with additional C7-T1 junctional transfacet fixation. All the patients underwent lateral mass screw fixation at alternate levels than routine each level. We report that in patients with multi-segment CCM undergoing surgical management, an additional C7-T1 junctional trans-facet fixation improves short-term stability in sagittal plane. Moreover, these patients had better symptomatic relief than patients where additional C7-T1 posterior fixation was not done.

The mean age and gender distribution and presenting complaints reported in the current study are similar to that reported by Watter et al13 and O’laorie et al14. It is now well-known that each regional spine level keeps balance against the global axis of gravity with spinal curvature15 and imbalance of the spine in the sagittal plane is an important determinant of clinical symptoms, de-generative changes and therefore post-operative recovery16. Sagittal balance in cervical spine is as important as the more established pelvic incidence and lumbar lordosis20. Infact, Jun HS et al17 suggested T1 slope was high in symptomatic compressive myelopathy patients compared to asymptomatic group patients. The results of the current study show that correction of this disturbed sagittal balance, by fixation of C7-T1 level and improve T1-slope, help improve short-term post-operative outcomes than traditional laminectomy with posterior fixation. Since it is well-established that sagittal balance of cervical spine changes with increasing age and deteriorating clinical symptoms17; we opted for transfacet screw fixation at C7-T1 level because of greater pull-out resistance of transfacet screw placement than lateral mass fixation18. At the rest of the involved spine segments, we opted for placements of screws at alternate levels followed by rod fixation as suggested by Singrakhia7, et al, to avoid surgical complications and thus making the technique cost-effective.
At three months follow-up, although both the groups reported a significant pain reduction, the difference was not statistically significant, probably because of a short follow-up duration or perhaps the T1-slope sagittal balance correction does not influence pain but only influences other symptoms. Further research in for rationale behind our findings will be beneficial. However, in short-term, better neurological outcome, measured by MJOS scores, in patients where fixation of C7-T1 level is encouraging. This better outcome may be attributed to the concomitant, significant improvements observed in T1 slope in these patients (with fixation of C7-T1 segment) (FIG-5). In fact the post-operative T1 slope (19.48 ± 4.31) achieved with C7-T1 fixation is similar to the T1 slope of 23.16 degrees reported in asymptomatic patients, of similar age group quoted in JH Park, et al.19.

Conclusion: In patients with multi-segment CCM undergoing surgical management, an additional C7-T1 junctional trans-facet fixation improves short-term stability in sagittal plane. This improved sagittal stability helps attain better symptomatic relief than patients where additional C7-T1 posterior fixation was not done. Moreover, lateral mass screw fixation may not be necessary at each level, this may reduce surgical complications and make the technique cost-effective. The findings of our study should be validated in larger population with a longer follow-up.

Disclosure & Conflict Of Interest: None of the authors have any disclosures to make. None of the authors have any conflict of interest.

References:

** * * * **

AP-010: When to do Anterior Cervical Discectomy - An evidence-based study
Dr. P. John Paul

Aim: To study the indication for cervical discectomy using a simple tabular scoring system.

Materials & Methods: In this prospective observational case series study, 126 patients presenting with pain, paresthesia, weakness of upper limb were included from July 2015 to June 2019. Patients with more than two level disc herniations, significant degenerative changes, joint disorders, fractures were excluded. After taking informed consent using 24 size needle, 2 to 2.5 ml of 2% lignocaine was injected in the
site of posterior interosseous nerve under USG guidance. Results were tabulated giving 6 points for reduction in pain (2 points each for mild, moderate and marked reduction), 3 points for reduction in paresthesias, 6 points for improvement in motor symptoms, -1 point for persisting suboccipital pain, -1 point for delayed improvement. Results were tabulated for each level, C4 to T1. Patients having scores between 10 to 15 were good candidates for single or two-level ACDF and values 5 to 10 had moderate improvement. Patient having values below 5 were followed up. Postoperatively patients were followed for 36 months and results were recorded.

**Results:** It was observed that 72 patients having scores between 10 to 15 had very good improvement. 42 patients having scores between 5 to 10 had moderate improvement, but since they were counselled before surgery, satisfaction levels were good.

**Conclusions:** Patient satisfactory levels were high when ACDF was planned based on this tabular scoring system. This simple scoring system will help young Neurosurgeons to decide correctly on cervical disc surgeries.
**FP-001: A very common pathology in a very uncommon location**

Dr. Bandi Bharath Kumar Reddy**, Dr. K. Selvamuthukumaran¹, Dr. Bhagat Singh K.*, Dr. K. Gowtham¹

1) Meenakshi Mission Hospital & Research Centre, Madurai, Tamilnadu, India

**Introduction:** In developing countries, tuberculomas constituted up to 30% of Intracranial SOL. However incidence is dramatically decreased after advent of antitubercular chemotherapy and now intracranial tuberculoma account for 0.15-4%. Tuberculoma of CNS might occur at any site and in any age group, however, sellar and suprasellar regions are not the usual site. The histological diagnosis is essential, as clinical manifestations and imaging of tuberculomas are usually non-specific and simulating pituitary adenoma. We present a short case series of sellar tuberculoma mimicking pituitary adenoma which were operated in our institute over the past 3 years.

**Materials & Methods:** We retrospectively analysed patients diagnosed with pituitary Tuberculoma over the past 3 years. We had 4 patients and all are of female sex, with complaints of intermittent headache with normal visual acuity, one patient had bitemporal hemianopia, two patients had cortisol deficiency, all four underwent transphenoidal excision of pituitary lesion, biopsy reported as pituitary Tuberculoma. Post operatively started on ATT and discharged, all 4 patients were doing well.

**Conclusion:** In the absence of history or symptoms of tuberculosis, the diagnosis of intrasellar tuberculoma is possible only on histopathological and by immunohistochemical methods. In developing countries with high prevalence of intracranial tuberculomas, pituitary tuberculomas must be considered as a differential diagnosis of nonsecreting adenomas, especially when associated with dural thickening of the hypophysial stalk. Further studies with larger sample are needed for clinical and radiological characterization preoperatively to avoid surgery.

**FP-002: Automating Neurosurgical Meningioma Outpatient Follow Up with Artificial Intelligence**

Dr. Ali Rezaei Haddad**, Mr. Sanjeeva Jeyaretna¹

1) John Radcliffe Hospital Oxford, Oxford University Hospital, Oxford, United Kingdom

**Introduction:** Thanks to the advancement of artificial intelligence, a number of tasks that follow rigorous patterns in healthcare can be automated. One area where automation can be deployed is to assist with the follow-up screening of the large number of patients with a history of meningiomas.

**Aim:** To develop an automated artificially intelligent conversational agent which can clinically assess patients with meningiomas in order to enhance patient experience, improve patient safety, and reduce costs.

**Methods:** Probabilistic graphical models were created by experienced neurosurgeons for the follow up of meningioma patients. The automated conversational agent (OArTiA) used the created models to reason the probability of tumour progression based on the user-entered symptoms. Once trained on sham data, the agent was introduced into the outpatient clinic as a demo to interact with patients prior to their appointments with the neurosurgical team.

**Results and Conclusion:** 53 patients used the conversational agent (OArTiA) whilst attending their routine outpatient appointments. Oarita achieved a 100% sensitivity rate, with a specificity rate of 85%. These results indicate that in all cases Oarita was able to successfully identify symptoms in patients with tumour progression, hence showing its potential as a tool to prioritise certain patient follow up appointments. In the future, further training will enable Oarita to reduce its false positive rates (6) as it processes more symptoms and interactions. Patients enjoyed using and interacting with Oarita, and were overall positive about using this tool as an additional resource for their longterm follow-up appointments.

**FP-003: Cerebello Pontine Angle Epidermoid Cysts - Lessons learnt (personal series)**

Dr. Aadil Shaukat Chagla¹

1) King Edward Memorial Hospital, Mumbai India

**Introduction:** Epidermoid cysts of the central nervous system are slowly growing congenital lesions, majority of them involving the cerebellopontine angle (CPA). They are the third most frequent lesions in this location, after acoustic schwannomas and meningiomas. Surgery is the only form of treatment. These lesions tend to encircle brain structures and invaginate into crevices, making radical excision, at times, fraught with danger.

**Objective:** The present study was carried out to describe clinical characteristics, microsurgical techniques and surgical outcome of CPA epidermoids.

**Methodology:** 42 patients were surgically treated from 2012 onwards by the author. The ages ranged from 15 to 72 years with male predominance. The commonest symptom was headache, followed by imbalance on walking and trigeminal pain. Magnetic Resonance Imaging was performed in all patients. Patients were operated in semi sitting or the park bench positions with retro sigmoid craniectomy. Sharp dissection of the capsule was carried out and tags of capsule attached to perforators were gingerly dissected. (video presented)

**Result:** Total resection of the tumor was achieved in most of the patients (36 out of the 42 cases). All patients improved symptomatically except one case which developed lower cranial nerve paresis. There were four cases of chemical meningitis treated symptomatically with good outcomes. There were no recurrences. No patient needed any cerebrospinal fluid diversion. There was no mortality.

**Conclusion:** CPA Epidermoid cysts can pose surgical challenges...
The transcranial approach has traditionally been used for the treatment of sellar and suprasellar meningiomas. Objective:

FP-004: Tailored far lateral approach to Anterior Foramen Magnum Meningiomas - The importance of condylar preservation

Prof. Dwarakanath Srinivas*, Prof. Sampath Somanna1
1) NIMHANS, Bangalore, India

Introduction: Anterior and anterolaterally situated foramen magnum meningiomas are a technically complex subgroup of meningiomas. The need for an extensive exposure and bone work and their complex anatomy make them a difficult and challenging group of tumors to resect. The bone work has ranged from an extensive condylar resection to condylar preserving exposures. In this paper, we present our experience with condylar preserving or minimal condylar resection based approaches to these tumors.

Materials and Methods: All patients who underwent surgical resection of anterior and anterolaterally situated foramen magnum meningiomas were included in the analysis. The study period was more than 10 years from 2005 to 2015 at our institute; a tertiary referral centre in India. The records along with demographic profile, clinico-radiological features, surgical strategies, outcomes as well as mortality and morbidity were analysed.

Results: There were a total of 20 patients (9 males and 11 females) who were operated during the study period. The average age was 36.7 years. In 16 patients, gross-total or near-total resection could be achieved, four patients underwent subtotal resection. Eight patients had fresh morbidity in the form of new motor deficits, pseudomeningocele formation, worsening of the lower cranial nerve functions or post-operative adhesions leading to syrinx formation. The follow-up ranged from 6 months to 140 months.

Conclusion: Foramen magnum meningiomas are an eminently treatable group of tumors. Condylar preservation provides a good visualization, while helping to preserve joint stability and in avoiding instrumental stabilization.

FP-005: Surgical management of Tuberculum Sellae Meningioma using Transcranial and Endonasal Endoscopic approaches - Our experience and review of literature

Dr. Suresh K. Sankhla*, Dr. G. M. M. Khan
1) Global Hospital / Saifee Hospital, Mumbai, India
2) Global Hospital, Mumbai, India

Objective: The transcranial approach has traditionally been used for removal of tuberculum sellae meningiomas. Recently, the use of endoscopic transsphenoidal technique has gained popularity amongst neurosurgeons for surgery of a number of sellar-suprasellar lesions, including tuberculum sellae meningiomas. In this report, the authors present their own experience with both the surgical approaches, and review the selection criteria most critical for deciding the optimal approach on individual basis.

Methods: All cases of tuberculum sellae meningioma treated surgically using transcranial or endonasal endoscopic methods at our institute were reviewed and their demographic informations, clinical presentations, operative findings, and clinical and radiological outcomes were evaluated.

Results: Of total 36 patients, 23 had transcranial and 13 had endonasal endoscopic surgery for removal of tuberculum sellae meningiomas. Overall, gross total tumor removal was achieved in 89% patients, 87% in transcranial and 92% in endonasal endoscopic groups. Postoperatively, visual deterioration was observed in 2 patients, seizures in 1, and CSF rhinorrhea in 2 patients.

Conclusions: Both, transcranial and endonasal endoscopic methods are safe and effective in the surgical management of tuberculum sellae meningioma. With respect to the goal of gross-total tumor resection and visual improvement, the results of the endoscopic endonasal technique are comparable to the conventional microscopic methods. Both techniques have advantages and disadvantages that should be evaluated during selecting the most optimal approach in a particular case.

FP-006: Transciliary Supraorbital Keyhole Craniotomy: A Versatile Minimally Invasive Approach

Dr. Brig Harjinder S Bhatte*1
1) Max Super Specialty Hospital, Mohali, Chandigarh, India

Aim: The aim of this study is to review the indications, nuances, and limitations of the SOKHA.

Material & Methods: We describe the technique in treatment performed in 249 patients. The eyebrow incision is 2.5 cm long lateral to the supraorbital nerve, and 1.75 cm in craniocaudal width. Dura is opened, frontal pole retracted, and operative corridor achieved by gentle retraction, opening of cisterns, CSF suctioning and lysis of arachnoid. Sylvian fissure was opened and complete normal and abnormal anatomy could be defined with preservation of the perforators and branches. Lysis of arachnoid, suction of gyrous rectus, preservation of olfactory tract, opening of lamina terminals, optic nerve decompression and freeing of carotid artery were some of the maneuvers that could be done without any difficulty. We clipped aneurysms of anterior circulation, excised meningiomas in anterior cranial fossa, craniohypogliomas, multicompartmental and recurrent pituitary adenomas, optic apparatus gliomas, basal frontal arteriovenous malformation, orbital tumors, and repaired CSF leaks.
FP-007: Cerebellopontine angle tumor surgery in various intraoperative positions - An institutional experience
Dr. Sameer Paltewar*, Dr. Jitendra Tadghare,  
1) Meditrina Institute of Medical Sciences, Nagpur, Maharashtra

Background: The most common methods of positioning patients for suboccipital approaches are the lateral, lateral oblique, sitting, semisitting, supine with the head turn, and park bench. The sitting position of the patient offers a number of advantages for the neurosurgeon, including the lax brain, clean operating field, possibility of bimanual dissection, and reduced venous pressure creating an optimal environment for surgery.

Aims: Our aim is to report surgical management results of cerebellopontine angle tumor in various intraoperative position in our institute.

Materials & Methods: Retrospective study of 56 patients treated during the years 2012 to 2019. The surgery done by placing the patients in various intraoperative positions. The most common approach taken was retrosigmoid suboccipital craniotomy.

Results: Results of patients in the sitting and other positions were good and similar in the form of minimal post-op morbidity and good outcome.

Conclusions: Sitting position is still a relatively safe modification. Complete tumor excision with good facial nerve preservation can be achieved with minimal bleeding. This position can provide quick and better exposure of the CPA with minimal complications.

Keywords: Cerebellopontine angle, sitting position.

FP-008: Surgical strategies for removing the intracanalicular portion of vestibular schwannoma and clinical outcomes
Dr. Rami M. Z. Darwazeh*, Dr. Mazhar Darwazeh', Dr. Ibrahim Stelih
1) Arab Women’s Union Hospital, Palestine, Jordan

Objectives: The purpose of this study was to analyze the surgical strategies for removing the intracanalicular portion of vestibular schwannoma.

Methods: Between June 2011 to June 2016, 145 patients with unilateral vestibular schwannoma were retrospectively analyzed. All patients underwent conventional enhanced cranial Magnetic Resonance Imaging (MRI), petrous bone computed tomography (CT) scanning as well as head and neck CT angiography/venography before the operation. Additionally, intraoperative neuromonitoring was used and the suboccipital retrosigmoid approach was performed in all patients.

Results: Among 145 patients, gross-total resection was achieved in 134 patients (92.4%), subtotal resection in 9 patients (6.2%), and partial resection in 2 patients (1.4%). Furthermore, the facial nerve was preserved in 135 patients (93.1%). Follow-up after six months revealed grade I - II in 25 patients (17.2%) and grade III in 120 patients (82.7%) according to the House-Brackmann grading system. Postoperative complications included five patients (3.4%) with cerebrospinal fluid leakage, seven patients (4.8%) with dysphagia, and six patients (4.1%) with ataxia.

Conclusions: Sufficient preoperative investigations and careful removal of the tumor in the internal auditory canal are extremely important to achieve gross-total resection of the tumor and preserve the facial and auditory nerves.

FP-009: Surgical management of Petroclival Meningioma using Modified Dolenc-Kawase approach: Factors affecting resection and postoperative outcome
Dr. Shah Ankit Sanjaykumar*, Dr. Ashish Suri', Dr. Amol Raheja
1) All India Institute of Medical Sciences, New Delhi, India

Introduction: Despite advances in neurosurgery, petroclival meningiomas remain a technical challenge for neurosurgeons given their deep location, narrow operative corridors, and proximity to critical neurovascular structures. This study reviews a single surgeon’s experience with petroclival meningiomas operated via Modified Dolenc-Kawase (MDK) approach.

Methods: Retrospective analysis of 52 patients (2003-2019) operated by MDK approach for petroclival meningiomas were done. The patient’s medical records and imaging studies were reviewed to analyze neurological outcomes, complications, and resection rates.

Results: Headache was the most common presentation followed by varying degrees of cranial neuropathies. Gross-total resection (GTR) was achieved in 23 patients (42.5%). 12 patients with tumor remnants were treated with Gamma Knife surgery, 2 underwent radiation, 3 required redo surgery, and rest were followed up conservatively. New postoperative cranial neuropathies were noted in 22 patients (41%).
commonly involving extraocular nerves (31.4%) followed by trigeminal (14.8%). The mean follow-up was 17 months. In 9 patients, tumor progression or recurrences were noted. Overall 42 patients (81.5%) had favorable outcomes at the time of discharge. Tumor resectability was significantly impacted by preoperative findings of T2 signal intensity, arachnoidal cleavage plane and cavernous sinus invasion. Additionally, findings of brainstem edema significantly affected immediate postoperative outcome.

Conclusions: Prioritizing neurological function and quality of life, GTR should be aimed, but even near-total resection with postoperative radiosurgery results in good long-term tumor control. Resection rates and outcomes were influenced by tumor consistency, arachnoidal cleavage plane, and brainstem invasion. MDK approach provides a wider operative corridor and contributes to favorable outcomes with acceptable morbidity and mortality.

* * * * *

FP-010: Surgical Management of Tuberculum Sellae Meningiomas - Functional Outcome

Dr. Hemal Prafful Chheda\textsuperscript{a}, Dr. Kadali Satyavaraprasad\textsuperscript{b}

1) King George Hospital, Andhra Medical College, Visakhapatnam

Objective: The objective of this study was to analyse a series of patients harbouring a tuberculum sellae meningioma with regards to clinical presentation and long-term functional outcome.

Methods: Data in a consecutive series of 28 patients having a tuberculum sellae meningioma treated micro-surgically between 2013 and 2019 were retrospectively reviewed.

Results: The mean age of the 18 women and 10 men enrolled in the study was 54 years (range = 27-79 years). The presenting symptom was visual compromise in 82.14% of the patients, and examination revealed decreased visual acuity in 71.43% and impaired visual fields in 57.14% of the patients. In addition, 10.71% of the patients had preoperative hormonal abnormalities. Through ptorial approach, Simpson grades I and II resections were achieved in 85.71% of the patients. In addition, 10.71% of the patients had preoperative hormonal abnormalities. Through ptorial approach, Simpson grades I and II resections were achieved in 85.71% of the patients. Postoperatively, vision improved in 60.72%, remained unchanged in 28.57%, and deteriorated in 10.72% of the patients. The intraoperative finding predicting an unfavourable visual outcome was a thin atrophic optic nerve, encasement of the nerve, or tumour adhesion to its under surface. Of the patients, 7.14% required permanent postoperative hormonal replacement. After a mean follow-up period of 1 year, 78.57% of the patients resumed normal life activity and 2 recurrent tumours were observed (7.14%) and re-operated.

Conclusions: Total 28 cases were studied and analysed for functional outcomes like visual improvement, hormonal imbalances, seizures, headache and Karnofsky score.

* * * * *

FP-011: Evolution of a Neurosurgeon- experience with endoscopic transnasal skull base surgeries

Dr. Varun V\textsuperscript{a}, Dr. Raj Chandran\textsuperscript{b}, Prof. Rajmohan B. P.\textsuperscript{c}

1) Government Medical College Hospital, Thiruvananthapuram, Kerala, India

Endoscopic skull base surgeries are highly demanding operations that entail a very steep learning curve and these take many years of experience to master. Operative skills with the endoscope and knowledge of endoscopic anatomy of the skull base are an essential part of a neurosurgeon’s repertoire. Here, we present a statistical account of our experience with skull base surgeries done endoscopically through the transnasal corridor. A total of 75 endoscopic skull base surgeries performed over the last five years are analysed with respect to duration of surgery, complications encountered, and assistance of ENT surgeon needed. In this period, we have witnessed an increase in the number of skull base procedures done endoscopically with steady improvement in efficiency with shorter duration of operations, fewer complications and more surgeries performed without ENT assistance. The incidence of CSF leaks and the need for lumbar drains postoperatively have come down. In addition, we are increasingly utilising the endoscopic transnasal route to assist with transcranial approaches to deal with pathologies involving the skull base.

* * * * *

FP-012: Incidence and risk factors for post operative frontal lobe contusion following unilateral supra orbital craniotomy and excision of olfactory groove meningiomas

Dr. Bijesh Ravindran Nair\textsuperscript{a}, Dr. Vedantam Rajshekhar\textsuperscript{b}

1) Christian Medical College, Vellore, TamilNadu, India

Objective: To analyze the incidence and risk factors for frontal lobe contusion following unilateral frontal craniotomy and excision of olfactory groove meningiomas (OGM).

Materials & Methods: We retrospectively analyzed data from 50 consecutive patients who underwent excision of OGM using unilateral subfrontal approach, between January 2002 to December 2018. Postoperative brain contusion was graded as none, mild, moderate or severe on CT scans done on day 3 after surgery. Risk factors studied were tumor size, peritumoral edema, histology and use of retractors during surgery. Impact of contusion on post operative seizures, duration of hospitalization and Karnofsky Performance Score (KPS) at discharge was analyzed.

Results: Tumors were larger than 5cm in size in 48% patients and 76% had significant perilesional edema. 92% patients had Simpson grade II excision. 68% patients had no postoperative contusion, while 16% had mild, 6% had moderate and 10% had severe contusion with none requiring any surgical intervention for contusion. With dynamic retraction, 16% had contusion compared to 34.1% using fixed retraction (p = 0.29). 72% patients were discharged within 7 days of surgery, with improved KPS in 8% and same KPS in 84%. One patient had recurrent tumor (recurrence rate of 2.4%) on follow-up ranging
from 3 to 186 months (mean = 58.2 months, SD 60.88).
Conclusion: Unilateral supraorbital craniotomy and lateral subfrontal approach provided adequate operative corridor for total excision of even large tumors extending across the midline with minimal complications related to frontal lobe retraction. Dynamic brain retraction might reduce retraction induced brain contusion.

* * * * *

FP-013: Surgical management and outcomes of medial sphenoid wing meningiomas

Dr. Palak A. Jaiswal¹, Dr. Mathew Abraham¹, Dr. Easwer H. V.¹, Dr. Jayanand B. Sudhir²
1) SCTIMST, Trivandrum, Kerala, India

Objective: A comparative analysis of the clinico-radiological features, surgical outcome and recurrence rate of two different subgroups of medial sphenoid wing meningiomas (SWM), viz. Group I – without cavernous sinus involvement and Group II – with cavernous sinus involvement.

Methods: Among 168 sphenoid wing meningiomas over a period of 10 years, there were 72 medial sphenoid wing meningiomas of globoid shape. They were classified into Group 1 (without cavernous sinus involvement) and Group 2 (with cavernous sinus involvement). En plaque meningiomas were excluded from the analysis. The charts of the patients including surgical records, discharge summary, follow-up records, and imaging studies were analysed retrospectively.

Results: There were 43 Group 1 tumors and 29 Group 2 tumors. 14% in group 1 and 34% group 2 were of size more than 4 cm. For microsurgical tumor removal, pterional approach was performed for most of the cases (86%). Total resection was achieved in 72% of patients with Group 1 tumors and 41% of those with Group 2 tumors. Radiological residue was seen in 8 (18.6%) cases in group I and 15 (51.7%) cases in group II. Recurrence was observed in 9.3% (Group 1 tumors) and 27% (Group 2 tumors). The mean follow-up time was 3.95yrs for group 1 and 4.7yrs for group 2. Improvement of visual function (or stable visual function) was observed in 79% of patients with Group 1 tumors, in 69% with Group 2 tumors. Group II patients experienced higher motor deficits due to infarct, 6 (20.7%) cases in group II versus 2 cases (4%) in group I.

Conclusion: The surgical treatment of medial SWM still remains a challenge for neurosurgeons. The major determining factors for subtotal resection are the CS infiltration, repeat surgery for recurrence and vascular encasement. Group II tumours though can be managed aggressively, it may be associated with increased morbidity like permanent cranial nerve deficits of extraocular movements, infarct and poorer KPS.

* * * * *

FP-014: Surgical outcome & occipital lobe

functions in occipital transtentorial approach for lesions located in pineal region

Dr. Abhishek Katyal¹, Dr. Anil Jadhav¹, Dr. Anita Jagetia¹, Dr. A. K. Srivastava¹
1) GB Pant Institute of Post Graduate Medical Education & Research, New Delhi, India

Introduction: The occipital transtentorial approach is commonly used for pineal region lesions and is well known as Poppen’s approach. The pineal region contains certain tissues that have distinct histological characteristics, including the pineal gland and lesions located around the suboccipital part of tentorium such as the quadrigeminal plate, posterior part of thalamus, tentorial surface of cerebellum, splenial region, posterior falc & torcular region etc (1). The operative field surrounding the midbrain is widened by this procedure, and safe dissection of the tumor from the brainstem and other neurovascular structures was performed with direct observation of the interface although this approach involves retraction of the occipital lobe (2).

This study aims at comparison of preoperative and postoperative occipital lobe functions & assessment of surgical outcome in lesions resected via this approach.

Keywords: Occipital transtentorial approach, occipital lobe functions, pineal region.

Materials & Methods: Between 2018 and 2019, 16 (8 male & 8 female) patients from 3 to 66 years underwent microsurgical resection of lesions within the pineal region via the Poppen’s approach. The data were prospectively collected by reviewing inpatient records, pre- and postoperative computed tomographic and/or magnetic resonance imaging (MRI) studies, and operative and pathological reports. Description of venous architecture i.e occipital veins & venous sinuses present in the sub-occipital region via pre-operative MRI/MRV/CT Venogram was the deciding factor to choose the site of operative approach i.e Right or Left sub-occipital route of surgical intervention. Pre-operative examination of occipital lobe functions was performed in consultation with a neuro ophthalmologist which were Visual acuity, Visual Field by perimetry, Visual hallucinations Visual Illusions, Ability to discriminate size, shape, and color, distortion of objects (metamorphopsia), impairment of visual memory, difficulty in spatial localisation, color anoma, simultagnosia & cortical blindness. Visual acuity although not an occipital lobe functions was assessed; patients with low visual acuity hampering the evaluation of other functions & those who were un-cooperative for functional visual assessment were excluded from the study. Postoperative surgical outcome, however was evaluated in all patients.

Pre-operative endoscopic third ventriculostomy & ventriculoperitoneal shunt was carried out in 1 & 5 patients respectively for hydrocephalus. All patients were operated in prone position & a U-shaped skin incision was made with vertical limb just lateral to midline, burr hole made placed just lateral to midline near torcula, another burr hole approx 5 cm above it & making 5*5 cm craniotomy. The dura was opened in a C-
shaped fashion hinged on the superior sagittal sinus. Retraction of the occipital lobe was done rostrally, taking care not to injure the bridging veins around the occipital pole. After careful visualisation of tentorium, incision was made 1 cm lateral & parallel to straight sinus, interhemispheric cistern was opened & cfs was drained. This improved the field of vision for observation of the basal vein, the vein of Galen which were preserved. For large and deep-seated tumors, avoidance of injury to the superior medullary velum, tectum, deep veins was observed. Histopathological samples were obtained directly from the superficial portion of the lesion. Tumour decompression was performed taking care to avoid deep venous system injury. The resection was defined as gross total if the lesion was completely removed by the surgeon’s determination with no residual lesion detected on the postoperative ct scan, near total resection if more than 90% of the lesion was removed and subtotal resection if less than 90% of the lesion was removed. Postoperative assessment of occipital lobe functions was done with follow up at 1 week & 3 months. Assessment of surgical outcome was done in terms of anatomical accessibility, extent of tumor resection & histopathological diagnosis, & post op recovery evaluation by modified Rankin scale

**Results:** The Poppen’s approach was used for the treatment of pineal region tumors in 17 patients (8 males and 9 females). These patients ranged in age from 3 to 66 years. Average age was 25.4 years. Tumor localization was pineal gland in 10 (59%) cases, thalamus in 2 (12%) cases, and tectal plate in 2 (12%) cases, tentorial & adjacent cerebellum in 3 (17%) cases. Clinical symptoms at presentation commonly were those attributable to increased intracranial tension & included headache (70%), gait disturbances (64%), nausea/ vomiting (50%), visual deterioration (29%). Concomitant hydrocephalus was present in 10 (59%) patients. Out of these, pre operative ventriculoperitoneal shunts were carried out in 5 patients & endoscopic third ventriculostomy in one patient having loss of vision. Based on the side of lesion, status of occipital lobe draining veins & side of transverse sinus dominance as evaluated on MR venogram studies, the right and left Poppen’s approach was performed in 7 cases and 10 cases, respectively. Gross total, Near total and subtotal resection were achieved in 5 (24%), 7 (42%) and 5 (24%) cases respectively. Partial resection was attributable to adherence of lesion to deep venous system, infiltration into brainstem parenchyma & hard tumour consistency. The lesions after histopathological examination were reported as both neoplastic & non neoplastic i.e Pineocytoma (3), Pinealoblastoma (2), Pilocytic astrocytoma (3), Pineal ependymoid (1), Tuberculoma (1), Anaplastic oligodendroglioma (3), Primitive neuroectodermal tumor (2), Ganglioglioma (1) and Metastatic small cell carcinoma (1).

Occipital lobe functions were assessed in 13 patients out of 17, 4 patients uncooperative for visual assessment were excluded. Amongst the occipital lobe functions studied, homonymous hemianopia developed in 1 (7%) (p< 0.05) patient which was attributable to post operative occipital lobe infarct. Rest of the functions were unaffected as compared with preoperative status. There were 2 perioperative mortalities attributable to development of post operative hydrocephalus. Average postoperative modified Rankin score was 2.3.

**Conclusion:** Occipital transtentorial approach provide excellent exposure for lesions in pineal region, the optimized exposure maximizes the chances of gross total resection of lesions in these locations with reasonably low morbidity. Visual field deficits are among the most common occipital lobe functions affected. Can be minimised by limiting the occipital lobe retraction & deciding the side where minimal veins are encountered.

**References:**


**FP-015:** Intraoperative lumbar cerebrospinal fluid drainage for endoscopic endonasal pitutary surgery - Is it necessary?

Dr. Sourav Chowdhury*, Dr. Shejoiy P. Joshua, Dr. Dilip Panikar
1) Aster Medcity, Kochi, Kerala, India

**Objective:** Cerebrospinal fluid leakage is a major complication of trans-sphenoidal surgery. Lumbar cerebrospinal fluid drainage post operatively is used to treat this complication. However preoperative insertion and intraoperative CSF drainage reduce the need for re-exploration for further repair of CSF leaks.

**Method:** 81 patients with pitutary macroadenoma who had not undergone prior trans-sphenoidal surgery underwent Navigation guided endoscopic endonasal approach and excision of pituitary tumour from June 2014 to July 2016. All patients after induction, underwent lumbar drain placement prior to the surgery. Lumbar drain
**FP-016: Institutional experience with 212 cases of Adult Supratentorial Low Grade Glioma**

**Dr. Bagatheesh S**, Dr. Siddhartha Ghosh, Dr. Anil Pande, Dr. Selvapandian S, Dr. Anbuselvam M, Dr. Sadiya S

1) Apollo Specialty Hospital, Chennai, India

**Objectives:** Low grade glioma have an indolent course. Surgery has become the mainstay. Awake craniotomy, advanced brain mapping, neuroimaging, neuronavigation, evolving surgical techniques and newer molecular classification is improving outcomes. To evaluate surgical series of 212 cases of adult supratentorial low grade glioma and effect of extent of resection (EOR) and age on progression free survival (PFS), overall survival (OS) and seizure control.

**Methods:** Retrospective study (n=212) newly diagnosed, histologically confirmed, age >18, supratentorial, low grade glioma (WHO grade II) and with postoperative radiotherapy between 1998-2019. Prognostic factors such as age, KPS score, histological type and EOR on their effect on OS, PFS and seizure control analysed.

**Results:** Age range (19 - 67; <40 - 87, >40-125). Male:Femail-146:66. Median followup 108 months (5-204 months). Gross total resection (GTR), subtotal resection (STR) and biopsy were 119, 39 and 54 respectively. Histologically Diffuse Astrocytoma 133, Oligodendroglioma 60 and Oligoastrocytoma 19. Awake craniotomy performed on 31 patients. 87 were lost to follow up/did not report back. 5 year OS and PFS was 85% and 67% for age <40 and age > 40 respectively. KPS score >70 had 78% OS and 67% PFS. GTR vs STR had OS and PFS (93% vs 70% and 82% vs 32%). Seizure vs Focal deficit on OS and PFS (77% vs 45% and 68% vs 34%). Seizure control with GTR vs incomplete resection or biopsy (88% vs 54%).

**Conclusions:** GTR had higher survival and seizure control than incomplete resection. Seizure alone symptom has higher OS than with other neurological deficit. Younger age had higher OS.

---

**FP-018: Trans Septal Endoscopic approach to Pituitary Tumours using a unique retractor**

**Prof. Poodipedi Sarat Chandra**, Dr. Ramesh P Doddamani, Dr. Rajesh P. Meena

1) Aiims, New Delhi, India

**Background:** Endoscopic surgery for pituitary tumors is an established surgical technique. However, there is significant morbidity due to damage to nasal and mucosal structures. The authors describe a unique pituitary retractor for midline trans-septal approach.

**Material & Methods:** The patient is positioned supine under GA. A small incision is given on one side of nasal septum and using a dissector a mucosal tunnel is created. A specially designed retractor (Easytracâ) is now passed along the tunnel. This retractor is made of bio-compatible alloy and coated with Teflon which is non-stick. A string attached to the distal part of the retractor is pulled out which opens up the retractor to form a tunnel. This expansion also breaks the septum at the Vomer and pushes it one side. The rest of the procedure is performed as usual. The endoscope is placed along the 12 'o' clock position. Following surgery, the retractor is removed, and a single stitch is placed over the mucosa with the septum closing the tunnel.

**Results:** n=30, 25 pituitary tumors, 5 craniopharyngiomas, 18 giant tumors. The time of insertion was between 3-7 minutes. Blood loss for insertion was minimal. Overall, the ease of use of retractor, the surgical visualization and efficacy was excellent.

**Conclusion:** Trans-septal approach with the use of retractor seems to be very promising, easy to use and non-traumatic to the mucosa with excellent visualization.

---

**FP-019: Giant Spinal Schwannomas - A Reappraisal**

**Dr. K. Sridhar**

1) MGM Healthcare, Chennai, Tamilnadu, India

**Introduction:** The confusion regarding the definition of "Giant Schwannoma" prompted us to publish a classification of schwannomas in 2001, defining them as lesion extending more than 2 vertebral bodies in height, with an extraforaminal extension of more than 2.5 cms or being "invasive". Management of these uncommon lesions still poses problems for the surgeon and it is important to understand the salient surgical points that will help in radical excision.

**Methods:** The records of patients with giant spinal schwannoma were analysed. The radiological features, and details of operative approach and intraoperative findings were noted.
Results: Thirty two giant tumors were operated between 1994 and 2018 by the author out of a total of 276 spinal schwannomas. MRI scans delineated the extent of the tumours and helped in preoperative planning. Radical excision of the tumours was performed in twenty six of the patients, in multiple stages as necessary. Dural reconstruction was required in ten patients. Seven out of fourteen patients with Invasive tumours underwent an additional instrumentation procedure. There was no mortality. No patient deteriorated following surgery. Seven patients with residual tumours had a regrowth which was dealt with appropriately.

Conclusion: Giant schwannomas are a group of lesions that are different in that they need an understanding of the pathological anatomy and planning before the procedure. Some tumours need multiple approaches or multiple stages or may also need instrumentation for reconstruction of the spinal column. When recognized they can be excised with excellent results.

FP-020: Review of 235 cases of Meningioma after Simpson’s grade 1 & 2 excision - Can Ki-67 index alone be a predictor of recurrence?

Dr. Hariharasuthan P1*, Dr. Siddhartha Ghosh1

1) Apollo Hospitals, Chennai, India

Background: Histology, grading, resection, proliferation indices including Ki-67/MIB-1 monoclonal antibody are among various indicators of outcome in Meningiomas. Objective of this study is to assess the prognostic value of Ki-67/MIB-1 labelling index (LI) as a predictor of recurrence after Simpson’s Grade 1 or 2 meningioma excision.

Materials & Methods: Among 274 meningiomas resected between 2012 and 2018, Simpson’s grade 1 or 2 excision was achieved in 247 cases of which Ki-67 index was assayed in 235. Relevant clinical details were analysed retrospectively and statistical analysis performed. Ki-67 LI was correlated with histological subtype, recurrence-free survival, grade of resection, location, pre-operative embolisation status, osseous or sinus involvement and vascularity.

Results: Among the 235 patients (143 females, 92 males), there were 201 WHO I meningiomas (mean LI 2.88%), 34 WHO II meningiomas (mean LI 9.75%) and no WHO III lesions. 28 cases were recurrent among which 19 underwent excision and 9 underwent conservative treatment or radiotherapy. Mean Ki-67 LI was 7.09% in recurrent lesions against 3.34% in non-recurrent lesions. The mean Ki-67 LI increase from Grade I to II and non-recurrent to recurrent was statistically significant. There was considerable overlap of indices between the groups.

Conclusion: Meningiomas with a Ki-67 LI beyond 4% indicate an increased recurrence rate. Ki-67 is a significant marker in predicting outcome in meningiomas. Minor discrepancies in few recurrent lesions questions its role as a sole marker of recurrence.

FP-021: Time for a new neurosurgical classification of developmental posterior fossa cysts

Dr. Dhandapani S. S.1*

1) PGIMER, Chandigarh, India

The description of cystic malformations of posterior fossa has been enigmatic. First reported by Dandy & Blackfan in 1914, further expounded by Taggart & Walker, it was Benda who clearly defined Dandy-Walker Malformation (DWM) in 1954. Gonsette et al. in 1968 described clinico-radiology of Mega Cisterna Magna (MCM). Later Harwood-Nash described milder forms of DWM such as Dandy-Walker Variant (DWV) and Blake’s Pouch Cyst (BPC). In 1989, Barkovich et al. classified DWM & DWV under Dandy-Walker Complex (DWC) type A, whereas select cases of erstwhile Mega Cisterna Magna were kept under DWC type B. These were separate from discrete posterior fossa cysts and prominent cisterna magna, without mention of BPC. Tortori-Donati et al. in 1996 grouped all these except arachnoid cysts as DWC, differentiating them on the basis of proposed origin of anomaly as anterior or posterior membraneous area. There was considerable overlap with no vindication of their differences in timing & severity of clinical presentation, as well as the prominence of hydrocephalus. Recently we had proposed a new endoscopic classification of these developmental cysts of posterior fossa, which elucidates pathophysiology, clinical presentation as well as surgical management.

FP-022: Medulloblastomas - Applicability and incorporation of the new molecular diagnosis - Initial experience

Dr. Vishwanath Sahukar Eswarappa*, Dr. Siddhartha Ghosh1, Dr. Mitra Ghosh1, Dr. Selva Pandian1, Dr. Anil Pandey1, Dr. Anbu Selvan1, Dr. Sadiya N.1, Dr. Bagatheesh S1

1) Apollo Hospitals Chennai, India

Background: Medulloblastoma being the most common malignant tumour of childhood, radical excision and postoperative craniospinal radiation has shown good overall 5 year survival rate. Newer molecular diagnosis of medulloblastoma has transformed the categorisation and prognostication of the disease.

Objective: Analysis of various factors affecting the outcome of the surgery and 5 year overall survival rate with an overview of newer molecular diagnosis.

Materials & Methods: Retrospective analysis of 20 patients (both adult and paediatric) with Medulloblastoma, operated between December 2012 and June 2019. All patients underwent VP shunt prior to excision.

Results: 12 male and 8 female patients aged between 2 - 34 years were followed up for a mean duration of 39 months (3 months -78 months). 15 underwent total excision, 3 near total and 2 subtotal
excision. Histologically 6 were desmoplastic variant and 14 classic variant. 5 were lost to followup. Recurrence was noted in 2 cases- one desmoplastic and 1 classic variant. 1 patient had shunt infection with Mycobacterium.

Conclusion: Total excision followed by radiation continues to be the main stay. Cost and availability are major limiting factors for newer molecular diagnosis.

FP-023: Management algorithm of Pineal region tumors

Prof. Chhitij Srivastava1, Prof. Bal Krishna Olha2, Prof. Sunil K. Singh3, Prof. Anil Chandra4, Dr. Somil Jaiswal5, Dr. Manish Jaiswal6, Dr. Awdhesh Yadav7
1) King George’s Medical University, Lucknow, India

Material and Methods: 38 patients managed at KGMU were taken into study. Management was planned based on tumor location and type. Management algorithm was planned as per current literature evidence.

Result: Diagnosis was made by CSF tumor markers in 3 patients. 33/38 patients had associated hydrocephalus. Endoscopic biopsy was done in 23 patients. Krause approach was done in 16 patients. Occipital transtentorial approach was planned in 4 patients. Management protocols of these tumors were discussed

Conclusion: Adherence to evidence base management protocols results in good outcome in long term

FP-024: Biopsy of brainstem and other deep seated lesions of brain using frameless navigation system, its technical nuances and our initial experience

Dr. Anandkumar Shah1, Dr. Siddhartha Ghosh1, Dr. Mitra Ghosh1, Dr. Anil Pande2
1) Apollo Hospital, Chennai, India

Background: Multiplanar image reconstruction and three-dimensional planning (preoperative and intraoperative using MRI), real-time intraoperative image guidance and sub-millimetre accurate localization of targets are advantages of navigation guided biopsy. Frame-based technique provides a diagnostic yield of 81.3 to 99.2% and the frameless technique has reported accuracy of 89 to 99.3%.

Methods and Material: Navigation guided biopsies for intra-axial brain lesions located in critical areas performed by a single neurosurgeon between January 2015 and June 2019 were enrolled. Data regarding the technique of the biopsy procedure, morbidity, yield of histopathological diagnosis were retrospectively analyzed.

Results: MRI guided frameless navigation biopsy was performed in 41 (28 males and 13 females) patients during 2015 to 2019 among which we had 8 pediatric cases (including 6 cases of pediatric brainstem lesions) and 33 adults cases. Biopsy showed 18 cases of high grade gliomas, 13 cases of low grade glioma, 3 cases of lymphoma, 3 cases of necrotizing granulomatous inflammation, 1 case of radiation necrosis and 1 case of metastasis. Three cases initial results were inconclusive (technical error- later on corrected by company Bio-Engineer). There were no instances of intracranial hemorrhage or significant morbidity and mortality directly attributable to the procedure.

Conclusions: Navigation biopsy technique has a learning curve. Its efficacy is comparable with significant advantages of patient comfort, short procedural time, easy repeatability. Choosing the best trajectory for each lesion, using MRI as guidance for targeting, adjusting accuracy in sub-millimetre and taking a limited number of biopsy reduces morbidity rates in brainstem and other deep lesion biopsy procedures.

FP-025: Experience of surgery for brain tumors at AIIMS, Rishikesh

Dr. Garga Basu1, Dr. Nishant Goyal2, Dr. Rajnish Arora3, Dr. Jitender Chaturvedi1, Dr. Priyanka Gupta4
1) AIIMS, Rishikesh, Uttarakhand, India

Background: Brain tumors causing significant morbidity and mortality in both adults and children and result in severe disabilities thus producing a significant burden on the patient’s family and society in general.

Material and Methods: All patients operated for brain tumor at our institute between April 2016 to July 2019 were included in the study. Demographic profile of patients, location of tumor, type of craniotomy performed, histological diagnosis and surgical adjunct used during surgery were analyzed. Preoperative NCCT head and MRI brain was done in all the patients. Post-operative NCCT head and a follow up MRI brain was done at 3-6 months.

Results: A total of 157 patients (86 males, 71 females) with a mean age of 40.007 (range 1 to 74 years) underwent surgery for brain tumors during the study period. Of these major peoportion was glioma. Among these, 47 patient had infra tentorial lesions while 110 patients had supra tentorial lesions. Trans-ciliary supra orbital key hole approach was craniopharyngioma(n=3), olfactory groove meningioma(n=1)anterior falcine meningioma(n=1). Awake craniotomy(N=4) for lesions involving or close to eloquent areas. Fluorescence guided resection was done for eight patients with a preoperative diagnosis of high grade glioma. In 15 cases, electrophysiological monitoring was used. In four cases, neuro-navigation system was used.

Conclusion: The management is guided by analysis of patient's symptomatology, patient's profile and imaging. Surgical adjuncts helps surgeon to achieve maximum resection and avoid damage to vital structures. Outcome depends on good surgical management, but also
FP-026: Recurrence and indication for re-surgery in Pituitary Macroadenoma

Dr. Mayank Nakipuria, Dr. Anil Pande, Dr. Siddhartha Ghosh, Dr. S Selvapandian, Dr. Anbu Selvam
1) Apollo Hospitals, Chennai, India

Objective: To study cases of pituitary macroadenomas undergoing surgery in our hospital and to determine the necessity of re-surgery.

Methods: All pituitary macroadenomas from 2014 to July 2019 were included. The patients' clinical details, radiological findings, intraoperative findings and follow-up details were reviewed. A total of 122 patients with age ranging from 17 years to 76 years out of which 64 were Male and 58 were Female patients. Post operative CT and MRI were followed up.

Results: 31 patients required re-surgery, out of which 3 patients required adjuvant RT. 21 patients with visual deterioration on follow up underwent re-surgeries. 4 patients without visual deterioration with recurrence on MRI underwent re-surgery. In 3 cases with no visual deterioration, detected radiologically, patients underwent RT only. 3 patients had post-op CSF leaks for which CSF leak repair was done. 3 patients had post-operative bleeds for which re-surgery was required. The earliest re-surgery was at 2 months for residual tumour and the longest recurrence was at 14 years in our series. Mean time for recurrence was 3 years. There were 2 patients who underwent re-surgery on 4 separate occasions over a time of 6 to 10 years. 4 Patients underwent pterional craniotomy as the primary surgery. Navigation was found to be useful in recurrent cases and was used in 21 cases.

Conclusion: As most surgeries on pituitary macroadenomas is near-total and as most of these lesions remain quiescent, recurrence in pituitary tumors is difficult to quantify.

FP-027: Use of absolute alcohol as an intraoperative embolisation material for aggressive Vertebral Hemangioma surgery.

Dr. Amol V. Degaonkar
1) Shri Markandeya Sahakari Rugnalaya Hospital, Solapur, Degaonkar/Vivekanand Hospital, Maharashtra, India

With increase in surgical horizon, many of CUSA and local hemostats coming in to play. We studied the efficacy of absolute alcohol in management of aggressive vertebral hemangioma. We used one case study of L1 aggressive vertebral hemangioma who presented with partial cauda equina syndrome. In this case absolute alcohol was used as an intraoperative embolisation material to reduce amount of bleeding while debulking canal part of tumour. Surgery went uneventful it was being followed up with one and half year of follow-up MRI study without subjecting him to radiation therapy. Clinically and radiologically disease is static. A fairly large study done at AIIMS India reported similar results with successful follow ups of aggressive vertebral hemangioma with no need of radiation therapy. Apart from this indication alcohol being used as an intraembolisation material in extraaxial tumors and as a local residual pituitary adenoma cells ablative material.

FP-028: Calvarial tumours - A tertiary centre experience

Dr. Ved Prakash Maurya, Dr. Arun Kumar Srivastava, Dr. Gagandeep Attri, Dr. Sanjay Behari
1) Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India

Aims and Objectives: To evaluate clinico-radiological aspects, surgical nuances and histopathological characteristics of calvarial tumours managed at a tertiary care centre.

Material and Methods: 33 patients who underwent surgical excision between February 2004 and December 2018 were analysed. Demographic and clinical details were obtained from hospital record system. Preoperative computerised tomography and magnetic resonance imaging of head with contrast revealed the extent and nature of tumour. In multiple calvarial tumours, the most symptomatic lesion was addressed first.

Results and Discussion: Age distribution range from 2 to 62 years, out of these 55% were male and 45% were female. Calvarial swelling (23 cases, 70%) and raised intracranial pressure (19 cases, 58%) were most common presentation, while features of parenchymal invasion manifested as seizures in 15 cases. Examination revealed decreased visual acuity 6 cases, otological complaints 3 cases, anosmia 2 cases and altered sensorium 1 case. Radiologically, frontal bone was the most common site in addition to orbital wall and skull base invasion. Quick and precise tumour excision was done to avoid major blood loss. The underlying dura and cortex were evaluated in view of long standing pathology. Titanium mesh cranioplasty were done in 6 out of 21 cases, who underwent complete tumour excision. Histopathology revealed primary calvarial tumour in 27 and metastatic in 6 cases. Chemo-radiotherapy were offered where indicated.

Conclusion: Calvarial tumours are one of the least explored but rewarding tumours in neuro oncolgical arena. Multi-specialty collaboration gives best outcome in this less explored zone of neuro oncology.

FP-029: Awake Craniotomy with electrophysiological mapping and neuronavigation for lesion in eloquent areas of the brain
Conclusions: Based on our aims and objectives, we learned that 100% of the patient had intraoperative seizure. Intraoperative electrophysiological monitoring, Neuronavigation has provided an extra tool to the surgeon to do maximum safe resection of Intracranial lesion, especially those located at the eloquent area of the brain. Postoperative tumour volume was calculated and Extent of resection (EOR) was defined. Postoperatively, detailed clinical and neurological assessments were done in all patients. Subthalamic Nucleus and Red nucleus were measured. The volumes of the Subthalamic nucleus was 216.36 mm³ and red nucleus is 146.82 mm³.

Materials and Methods: Patients who satisfied the inclusion criteria were admitted and a detailed history was obtained and detailed clinical and neurological assessments were done for all the patients. MRI Brain with Contrast with DTI & FMRI was done for all the patients. Cortical mapping was done with Intraoperative neurophysiological monitoring - Motor evoked Potential (MEP), Somato-sensory evoked potential (SSEP), Direct cortical stimulation and neurological assessment of Motor, Sensory, Speech, Language, and Vision was done during tumour removal. Detailed records of all the findings of Intraoperative neurophysiological monitoring were recorded and listed as per the proforma. Postoperative tumour volume was calculated and Extent of resection (EOR) was defined. Postoperatively, detailed clinical and neurological assessments and KPS assessment was done in all patients at interval of post-operative 1 week, 3 month follow up and 6 month follow up and details of postoperative clinical and radiological findings were listed as per the proforma. Kappa values computed to know the interobserver variability by 2 observers. Comparison of continuous variables between more than two categories was done by “ANOVA” (Analysis of Variance). All the “P” values <0.05 was considered as statistically significant.

Results and Data Analysis: Total 46 patients who satisfied the inclusion criteria were included in study. The mean preoperative KPS of the patients in the study was 74.57+ 9.118 with the lowest being of 50 years age and the highest being 90. The mean duration of symptoms was 8.64 years. There was no significant difference between right and left STN and red nucleus. The mean age of the patients was 55.44 years. 80%(20) were male. The mean duration of symptoms was 8.64 years. There was no significant difference between right and left STN and red nucleus. The mean volume of subthalamic nucleus was 216.36 mm³ and red nucleus is 146.82 mm³.

Conclusion: There is no significant difference between the right and left STN and RN volume. STN volume correlates negatively with age and disease duration.

FP-031: Surgical intervention in Trigeminal Neuralgia

Dr. Shailesh Kelkar*
FP-032: Fibre-Tracking (Diffusion Tensor Imaging) aided deep brain stimulation surgery for intractable Parkinson’s Disease-A single-surgeon case-series and review of literature

Dr. Anirban Deep Banerjee

Objectives: Fibre-tracking of the brain provides detailed information about specific neural-circuits and their connections. Given that the efficacy of deep brain stimulation (DBS) surgery probably depends on precise and accurate targeting of these circuits, better surgical planning using information obtained from fibre-tracking has been shown to improve surgical outcomes in intractable Parkinson's disease (PD), pertaining to certain tenacious symptoms such as freezing of gait. However, there is a distinct paucity of literature in this regard.

Methods: We prospectively assessed diffusion tensor imaging (DTI) based connectivity patterns that characterized clinically beneficial electrodes: twenty-four electrodes in twelve intractable Parkinson's disease patients, with medically refractory freezing of gait in ON-time, who underwent deep brain stimulation of the subthalamic nucleus (STN), using deterministic tractography. The Unified Parkinson’s Disease Rating Scale, Part III motor score, axial subscore, tremor subscore were analysed. Freezing of gait was assessed by a questionnaire and stand-walk-sit test. Minimum study follow-up period was 6 months.

Results: Electrode-contacts modulating white-matter tracts directed to the supplementary motor area objectively enhanced surgical efficacy, especially towards alleviating freezing of gait, in comparison to our prior conventional surgical cohort of Parkinson's disease patients of similar specifications.

Conclusion: Fibre tracking of the brain provides detailed information about specific neural-circuits and their connections. Given that the efficacy of DBS surgery probably depends on precise and accurate targeting of these circuits, better surgical planning using information obtained from fibre-tracking has been shown to improve surgical outcomes in intractable PD, pertaining to certain tenacious symptoms such as freezing of gait. However, there is a distinct paucity of literature in this regard.

FP-033: Clinical characteristics, surgical and neuropsychological outcomes in drug resistant tumoral temporal Lobe Epilepsy

Prof. Dattatraya Muzumdar, Prof. Sangeeta Prakash Ravat, Dr. Nina Sawant, Dr. Urvashi Shah

Introduction: Glioneuronal tumors are found in nearly one third patients who undergo surgery for pharmacoresistant epilepsy with temporal lobe being the most common location. Few studies, however have concentrated on the neurological and neuropsychological outcomes after surgery, hitherto none from India.

Methods: We studied 34 patients with temporal lobe tumors and drug resistant epilepsy. These patients underwent anterior temporal lobectomy or lesionectomy based on the involvement of the hippocampus and mesial temporal structures. The clinical history, EEG, neuropsychology profile and MRI were compared. Seizure outcome was categorized using Engel's classification.

Results: At a mean follow up of 62 months, 85.29% of the patients were seizure free (Engel's Class I). All 8 patients with intraoperative electrocorticography (ECoG) guided resection were seizure free. Presence of a residual lesion was significantly associated with persistence of seizures post surgery (p=0.002). Group analysis revealed no significant shifts in IQ and memory scores postoperatively. There was a significant improvement in the quality of life scores (total and across all subdomains) in all patients (p<0.001). Postoperative EEG abnormalities predicted unfavourable seizure outcome.

Conclusion: Surgery for temporal lobe tumors and refractory epilepsy offers complete seizure freedom. Complete surgical excision of the epileptogenic zone is of paramount. Intraoperative electrocorticography (ECoG) is a useful adjunct to ensure complete removal of epileptogenic zone. There is a significant improvement in the quality of life scores (p<0.001) with no negative impact of surgery on memory and intelligence. Even the patients who are not seizure free can attain a worthwhile improvement post surgery.

FP-034: Trigeminal Neuralgia with pain at cranial nerve V.2 Maxillary branch and V.3 Mandibular branch nerve distribution which induced by light in a 58-year-old woman

Mr. Ivan Pradhan, Dr. Setyowidhi Nugroho, Dr. Abdi Reza, Mr. Putra Riza

Introduction: A 56-year-old woman came to the hospital with a chief complaint of left facial pain. The pain was induced by light touch, brushing teeth, chewing, and bright light. The patient had to use sunglasses to prevent contact with bright light. All neurological examinations were within normal limits, except on cranial nerve examination, hypealgesia was found on the V.2 and V.3 nerve distribution. Magnetic Resonance Imaging was performed, on Three Dimensional (3D) Constructive
Interference in Steady State (CISS) sequence, the root entry zone of trigeminal nerve was compressed by offending vessel (suspect of left superior cerebellar artery). After 1.5 years being diagnosed with trigeminal neuralgia and not getting better after receiving medical treatment, her neurologist referred to neurosurgery department. She underwent a microvascular decompression surgery, done by left rectosigmoid approach. The surgery went successfully, no neurological abnormalities found after surgery. Photophobia complaint was also resolved.

**FP-036: Robotic guided surgery in the management of Pediatric Epilepsy**

Dr. Ramesh S Doddamani*, Dr. P. Sarat Chandra1, Dr. Shabari Girishan1, Dr. Raghu Samala1, Dr. Mohit Agganval1, Dr. Manjari Tripathi1, Dr. Bhargavi Ramanujam1
1) AllIMS, New Delhi, India

**Introduction:** Drug Refractory Epilepsy constitutes 20–40 percent of all patients suffering from epilepsy. Surgery remains the only hope in this patient population. Epilepsy surgery has gained momentum in the recent years due to better understanding of the disease process. Incessant refinements in imaging combined with technological innovations in the field of stereotactic surgery, management of complex DRE cases has become less challenging. The outcomes have similarly matched the expertise gained in the surgical techniques. The addition of Neuro-robots in the armamentarium, have made surgeries increasingly safe, precise and minimally invasive. We present here our experience in the management of complex pediatric DRE cases using robot assistance.

**Materials and Methods:** We retrospectively analysed epilepsy surgeries performed at AllIMS Delhi, between 2015 -2018 using Robotic Stereotactic Assistance (ROSA). Data was retrieved from the discharge summaries, inpatient files, PACS, ROSA software.

**Results:** Total number of 49 cases were operated using robotic guidance. There were 20 cases of Robot assisted Endoscopic Hemispherotomy, 6 Corpus Callosotomies, 13 Hypothalamic hamartomas undergoing robotic guided radiofrequency thermoablation (RFT), 8 cases underwent Stereo-Electro-Encephalography (SEEG), 3 cases of Endoscopic Multilobar Disconnections and One case of intraventricular heterotopia undergoing Radiofrequency Thermoablation (RFT). The seizure outcomes were comparable to non-robotic open surgeries. Blood loss and hospital stay were significantly less compared to similar non-robotic surgeries in the past. There were no major unexpected complications encountered.

**Conclusion:** Robotic guidance has made epilepsy surgery safe, effective, precise and more importantly minimally invasive. Robotic surgery has become an integral part epilepsy surgery.

---

**FP-037: Use of Intrathecal Baclofen pump for spasticity management-Our experience**

Dr. Vikas Maheshwari*, Dr. Sanjay Kumar1, Dr. Arun Kumar1
1) AFMC, Pune, India

Spasticity is defined as motor disorder characterised by velocity dependent increase in muscle tone with exaggerated tendon reflexes. This occurs in individuals following brain or spinal cord injury (SCI). This spasticity results in pain, discomfort, contracts, hampers gait and breathing, compromises safety and thus further adds on to the morbidity.

The treatment of spasticity is multi-fold: ranging from oral medication to physiotherapy to surgical procedures like Dorsal Rhizotomy (DREZ) and Intrathecal Baclofen Pump Insertion. A total of 5 cases of Intrathecal Baclofen Pump Insertion have been done in our institute so far. Patients were worked up on the basis of Penn Spasm Frequency Scale and other selection criteria. The follow up of these patients ranges from 6 months to 3 years. Post procedure 4 patients have shown significant reduction in spasticity and Penn Spasm Frequency Score and in the remaining case, it has remained the same. There has been no procedure related morbidity or mortality.

The advantage of Intrathecal Baclofen Pump is that it delivers precise and continuous drug dose throughout the day, thereby eliminating fluctuation and spasticity related pain without any loss of postural tone. There is no requirement of extensive surgery and thus can be useful tool in relieving spasticity in SCI patients.

---

**FP-038: Subthalamic Nucleus deep brain stimulation: Accuracy of electrode placement and its relation to immediate motor outcomes**

Dr. Kolpakwar Swapnil Vijay*, Dr. Rajesh Alugolu1, Dr. Rukmini Mrudula Kandadai1, Dr. Mudumba Vijayasaradhi1, Dr. Abhishek J. Arora1
1) NIMS Hyderabad, India

**Background:** Deep brain stimulation (DBS) involves placing of electrodes inside the brain to deliver electrical current to target nuclei. Outcome of DBS is dependent on the accuracy by which the target structures deep inside brain are reached. This study aimed at measuring the accuracy of electrode targeting and relationship between the accuracy of electrode placement and immediate motor outcome.

**Methods:** 26 patients of Parkinson’s disease were included in study. Location of electrode were recorded in all three dimensions (X-, Y-, and Z-) coordinates. Relation of Post DBS electrode position were analyzed in relation to planned target point. Effect on motor outcomes was done by evaluation of UPDRS III postoperatively after 1 month in OFF state.

**Results:** 19 patients (73.08 %) were male and 7 (26.92 %) were...
female. Median age was 57 years. Mean of Baseline UPRDS III was 56.19 in OFF phase and 14.42 in ON phase. Actual target was anteromedial in 42.31% cases on left side and posteromedial in 38.46% cases on right side in relation to planned target. Patients with final target in anterolateral and posterolateral position in relation to left and right subthalamic nucleus planned target respectively had least mean UPDRS III Score after 1 month.

Conclusion: Final electrode position in dorsolateral and anterolateral position has more favourable outcome in Subthalamic nucleus DBS. However further research on long term motor outcomes is also warranted to identify optimal stimulation site.

* * * * *

**FP-039:** Surgical and functional outcomes of Migraine surgery-A pilot study

Dr. Jitin Bajaj1,2, Dr. Ramesh Doddamani2, Prof. Y. R. Yadav1, Prof. Dhananjaya Sharma3, Prof. Sarat P. Chandra3, Dr. Mallika Sinha4, Dr. V. V. Parihar5, Dr. Ambuj Kumar1, Dr. Ketan Hedoo5, Dr. Shailendra Ratre1, Prof. Narayan Swamy6, Dr. Ankur Shrivastav1,2,3

1) NSCB Medical College, Jabalpur, Madhya Pradesh, India
2) AIIMS, Delhi, India

**Introduction:** Migraine is a common primary neurologic headache. Many patients have a significant disability and adverse effects of drugs. This study aimed to compare the peripheral branch neurectomies of trigeminal and/or occipital nerves with conservatively treated chronic migraine cases.

**Methods:** Chronic migraine patients (symptoms > 3 months) were given local bupivacaine block, and those who were relieved were given the surgical option. In the operative group, the peripheral nerve of the trigger site was avulsed. The conservative group included the patients who denied intervention. An evaluation with a baseline and six months VAS score, MHI, MIDAS, and PSEQ scores were done.

**Results:** 25 adults were included, of which 13 underwent surgery. At baseline, the VAS, MHI, PSEQ, and MIDAS scores (P > 0.05 for all) were similar in both the groups, but significantly improved at six months in the operative group (P <0.001 for all). The MHI decreased from 342.08 ± 55.14 to 16.07 ± 6.66, the VAS from 8.15 ± 0.68 to 2.07 ± 0.75, the PSEQ scores increased from 4.84 ± 0.80 to 55.14 ± 2.57, and the MIDAS decreased from 21.92 ± 4.66 to 4.53 ± 2.29 (P <0.001 for all) in the operative arm, while remaining the same in the conservative one.

All patients got free from prophylactic migraine treatment. 11 out of 13 operated patients still need SOS use of analgesics. There was one complication of temporal numbness.

**Conclusion:** Peripheral branch neurectomies of trigeminal and/or occipital nerves were found safe and effective for relieving pain and disability in appropriately selected chronic migraine cases.

* * * * *

**FP-040:** Complication avoidance in Deep Brain Stimulation (DBS) - Beginners perspective

Dr. Vemula Venkata Ramesh Chandra1,2, Dr. B. C. M. Prasad1, Dr. Srikanth1
1) SVIMS, Tirupati, Andhra Pradesh, India

**Introduction:** Deep brain stimulation (DBS) is now an established therapy for the treatment of various movement disorders like Parkinson’s disease, essential tremor and dystonia. The success of DBS depends on the neurosurgeon’s ability to implant electrodes into strategic intracranial targets with extreme precision. We analyse the initial 40 cases of DBS done at our institute highlighting the incidence of complications and the steps taken to avoid them.

**Methods:** All the patients who underwent DBS for various disorders were included in the study. The demographic profile and the outcomes including complications were tabulated.

**Results:** A total of 40 patients were operated for various movement disorders with DBS. Indications were Parkinson’s disease in 35 cases, dystonia in 4 cases and essential tremor in one case. Complications were noted in 7 cases (wound erosions in 3, lead malpositioning in 4). The management and avoidance of complications is discussed with special emphasis on the key surgical steps.

**Conclusion:** DBS is a very gratifying surgery and the results are excellent in a properly selected patient if the lead placement is accurate. The surgery should be performed with meticulousness at each and every step.

* * * * *

**FP-041:** Patient selection for deep brain stimulation for Parkinson’s disease-A very convenient tool

Dr. Amit Kumar Ghosh1,2, Prof. Milind Deogaonkar3
1) Institute Of Neurosciences Kolkata, India
2) Ohio State University, Columbus

Deep brain stimulation for Parkinson’s disease is performed on medically intractable cases. Deep brain stimulation has been shown to consistently benefit patients of medically intractable idiopathic Parkinson’s disease. Selection of patients requires a multidisciplinary team that includes a neurosurgeon trained in functional neurosurgery,a movement disorders neurologist, a neuropsychologist, psychiatrist and neurophysiologist. This is a very convenient list of 10-points criteria to identify patients who are the candidate for DBS surgery in Parkinson’s disease.

* * * * *

**FP-043:** MRI predictors of outcome after surgical intervention for Cervical Spondylotic Myelopathy

Dr. Bhogawar Sushil Dattatray1,2, Dr. Anil P.3
1) Medical College, Thiruvananthapuram, Kerala, India
Background & Rationale: Cervical spondylotic myelopathy is the most common cause of spinal cord dysfunction in older individuals. Controversy remains in terms of optimal timing and indications for surgical intervention. In this context it would be of benefit to define clinical and magnetic resonance imaging predictors of outcome after intervention of CSM.

Method: A consecutive series of all patients with functional disability secondary to cervical degenerative myelopathy and radiculopathy underwent surgery for decompression of the spinal cord with or without spinal stabilization in one year were studied. Pre-operative clinical findings and MRI abnormalities on T1 (T1WI) and T2 (T2WI) images were correlated with outcomes (Nuricks score, odoïms criteria) following surgical intervention. Postoperative MRIs performed 3 months post-surgery. The pattern of spinal cord signal intensity was classified as Group A (MRI N/N) - no SI T1WI or T2WI. Group B (MRI N/Hi) - no SI T1WI and high SI on T2WI. Group C (MRI Lo/Hi) - Low SI T1WI and high SI on T2WI. CSM clinical outcomes were evaluated using Nurick’s grading system, which was used pre- and postoperatively, and Odom’s criteria at final follow up.

Conclusion: Patients with high intramedullary signal intensity on T2WI who do not have clonus or spasticity may experience a good surgical outcome and may have reversal of MRI abnormality. A less favourable surgical outcome is predicted by the presence of low intramedullary signal on T1WI, clonus or spasticity.

* * * * *

FP-044: Cervical Corpectomy with fusion-A comparison of fusion techniques
Dr. Srikant Balasubramaniam*1

1)  , -, C 139, CSRE Quarters, Hill Side, IIT Bombay, Powai, Mumbai, Maharashtra, India-400076

Corpectomy or Vertebrectomy is removal of most or all vertebral body.

Material and methods: Study period from Jan 2015 to Dec 2017 at a tertiary institute
40 patients (Titanium implants)
i)  Corpectomy and fusion with standalone expandable cage - 22
ii) Corpectomy and fusion with autograft and cervical plate - 14
iii) Corpectomy and fusion with expandable cage and screws - 4

Minimum follow up of 6 months and a maximum of 2 year 8 months
These sub groups were compared on the following

A) Clinical Scores:
   Neurologic Disability Index (Nurick score)
   Visual Anallog scale
   Neck disability index

B) Radiologic Scores:
   Fusion Rate
   Decrease in vertebral body height

Conclusion: Safe procedure with minimal morbidity and good results. Fusion with titanium cages avoids donor site morbidity with comparable fusion rates. Stand alone cage is as good as cage with screws if there is no cervical instability.

* * * * *

FP-045: Transforaminal Lumbar Interbody Fusion (Tlif) For Spondylolisthesis of Lumbar Spine and its functional outcome
Dr. Melkundi Sateesh*1

1)  M. R. Medical College, Kalaburagi, Karnataka, India

Objective: Interbody fusion techniques have been developed to provide solid fixation of spinal segments while maintaining proper disc height. This study was conducted to assess the functional outcome of TLIF as a modality of treatment for degenerative spondylolisthesis of the lumbar spine at single/multiple level of lumber vertebra in our hospital.

Material and Methods: 56 of 60 cases operated during 2009-19 were available for follow up. Patients underwent TLIF using disc cage, pedicle screws fixation and autologous bone graft. Results were classified into three categories (excellent and good, fair, and poor) using the Parker et al criteria. Pain was recorded by using VAS.

Results: There were 20(36%) male and 36 (64%) female patients. Mean age at time of surgery was 51 years (range 20-70 years). Mean follow up was 36 months (range 8 -60 months). The overall clinical outcome according to the Parker et al scale was as follows: 42 (75%) patients were rated as excellent/good, while 11 (20%) patients fair; 3 (5%) poor.

Pain level on a 10-point VAS improved from a preoperative mean value of 7.13 ± 0.743 to 2.13 ± 0.915 (paired t test, p < 0.0001) at latest follow-up. 3 patients reported postoperative pain greater than their preoperative level.

3 (5%) patient had superficial infection; 2 (3.5%) had deep infection. 2 (3.5%) patients had foot drop.

Conclusion: TLIF is safe and reliable in patients with degenerative disc disease and with low grade spondylolisthesis in whom conservative measures fail.

Disclosure: NIL
Conflict of Interest: NIL

* * * * *

FP-046: Biomechanics - Relevance in Spine Surgery & Neurosurgery
Dr. Ram Kumar Menon, Dr. Jacob Godzik, Dr. Jennifer Lehrmann, Dr. Anna Newcomb, Dr. Brian Kelly, Dr. Laura Snyder

To understand the intricacies especially with advancement in implantology for both spinal and cranial applications lab studies are
inevitable. The major role players are the theorist involved in Finite Element Analysis (FEA), experimentalist involved in lab studies (could be biomedical engineer or researcher) and the clinician (neurosurgeon / spine surgeon). Computational biomechanics seeks to apply the principals of biomechanics to living tissues. Using FEA, the CT images are converted to 3D images and modelling is done. Validation of mathematical simulation of these models are done to compare with the experimental studies in the lab.

FP-047: Brucellar Spondylodiscitis–Lumbar Spine a rare case report
Dr. Dhirendra Kirtansinh Hada

1) Pushpagiri Medical College and Hospital, Thiruvalla, Kerala, India

Brucellosis is a systemic infectious disease caused by gram negative bacteria-Brucella. It is a zoonosis and transmitted direct/indirect contact of animals or consumption of unpasteurized products. It is a major health problem in certain parts of world like Mediterranean regions, Middle East countries, Latin American and South European countries. In India 80% of the population live in villages and have close contact with domestic animals owing to their occupation. Brucellosis is a significant and increasing public health problem in India but exact incidence is not yet available.

Spondylodiscitis is one of the serious complication of brucellosis, with reported incidence ranges from 2% to 60%. Lumbar spine is the most common site followed by thoracic and cervical spine. Clinical findings may mimic other causes of spondylodiscitis but diagnosis is usually confirmed by history, Serological tests and radiological findings. Here we are presenting a case report of 45 years old male patient from Kerala who was working in Saudi Arabia. He presented with back pain and difficulty in walking. He diagnosed to have brucellar spondylodiscitis through positive history of animal contact and consumption of unpasteurized milk, positive serology tests and through imaging findings. He was treated with two drugs regimen according to WHO guideline and improved significantly.

FP-048: Importance of navigation in Dorsal Spine stabilization in terms of margin of safety
Dr. Giridharan K*, Prof. Anil Pandey1, Prof. Selva Pandian1, Dr. Sadan Palande1, Dr. Siddhartha Ghosh1, Dr. Anbu Selvam1

1) Apollo Hospitals, Chennai, India

Objective: With widespread utilization and remarkable results, Navigation is becoming as indispensable as the surgical microscope. It’s especially true in pedicle screw placement in dorsal spine. Retrospective analysis and Grading of dorsal spine pedicle screws by Gertzbein-Robbin classification in 36 patients and 195 consecutive screws from post-operative axial CT images and compare accuracy between Flouroscopy guided Free hand technique and Navigation guided technique.

Methods: Total 36 patients from single institute between 2014 to 2019, who underwent Dorsal stabilization with pedicle screws for degenerative, traumatic, neoplastic and inflammatory pathologies included and divided to Flouroscopy guided free hand technique group(Group I) and Navigation guided technique group(Group II). Post operative axial section images showing pedicle screw position in CT were studied and classified according to Gertzbein-Robbin classification. Accuracy of screw placement compared between the two groups in terms of deviation from the pedicle.

Results: Group I: 2014 to 2017, Total 22 with 15 males and 7 females and 129 screws, age 21 to 79 years, 26 upper, 38 middle and 65 lower dorsal screws. 112(87%) were Grade A and B(Ideal) and 17(13%) were Grade C(Acceptable)
Group II: 2017 to 2019, Total 14 with 10 males and 4 females and 66 screws, age 21 to 70, 11 upper, 19 middle and 35 lower dorsal screws. 62(95%) were Grade A and B(Ideal) and 4(5%) Grade C(Acceptable).

Conclusion: Navigation guided dorsal pedicle screw placement had better accuracy(95%) than free hand placement(87%) in our study, which corroborates with available literature.

FP-049: Halo Brace in Cervical pathologies-A versatile tool
Dr. Amit Kapoor*, Dr. Rajendra Prasad1

1) Indraprastha Apollo Hospital, New Delhi, India

Introduction: Halo brace is a versatile tool used for various cervical pathologies for peri-operative usage.

Aim: To describe various indications, usage patterns for Halo brace along with complications.

Method: All patients who underwent Halo application for various indications in a single surgeon series was reviewed.

Observations: A total of 91 patients with age range 10-75 years with mean age of 43.5 yrs. were included. Indications were Trauma (45), Congenital AAD (15), Rheumatoid arthritis (9), Ankylosing spondylosis (6), Infection (13), Calcium pyrophosphate dihydrate crystal deposition disease (1) and Tumours (2). Complications included pin loosening (2), pin site infection (1), pressure sores (2), skull penetration (1) and implant failure (3).

Conclusion: Halo brace provides external rigid immobilization and is a useful tool in peri-operative management of unstable cervical spine due to various underlying pathologies.

FP-050: Autologous bone graft from adjacent vertebral body in Anterior cervical discectomy and fusion- (1 year follow up of 16 cases)
Dr. Sheena Ali*, Dr. JKBC Parthiban2
Lumbar canal and foraminal stenosis decompression was done from since July 2018. In all cases tubular retractor system was used. In study which includes all patients who have undergone MIS discectomy.

**Materials and Methods:** This is both a retrospective and prospective outcomes associated with MIS discectomy.

**Introduction:** Anterior cervical discectomy with fusion (ACDF) is a standard surgical procedure for cervical disc prolapses, refractory to conservative management. While patient's tricortical iliac crest is the gold standard with high fusion rate (83-99%), patient's morbidity at harvest site is bothersome. To promote fusion and maintain foraminal height, interbody grafts are implanted, packed with bone grafts. A novel technique of harvesting the bone graft from adjacent vertebral bodies was developed as a unique method to achieve good fusion while avoiding a donor site morbidity.

**Aim:** To study efficacy of adjacent bone graft (ABG) in ACDF and to radiologically analyze degrees of fusion, settlement of intervertebral space and degree of lordosis in 16 patients with 1 year followup.

**Methodology:** This was a retrospective study of 16 patients operated by a single surgeon between 2015-17 with 1 year followup. Modified Smith Robinson technique + interbody counter sink cage was done. The cages were packed with cancellous bones from adjacent vertebral bodies with osteophytes and Tricalcium phosphate granules (TCP) were packed in the harvested site. Study was conducted on pre and postoperative lateral view X-rays of cervical spine with 3 months intervals, level of settlement of intervertebral body and Cobb's Kyphotic angle.

**Conclusion:** This study confirmed technical feasibility of the adjacent vertebral body autologous bone grafts. While obviating the necessity of iliac crest grafts it also reduces operative time. The average preoperative lordosis of 26.7° to 1 year lordosis of 27.7° was observed in single level fusions. Though there was marginal vertebral body height reduction and settlement (16.9%) the radiological changes were not clinically relevant as preoperative lordosis was maintained at end of 1 year. Cage settlement and vertebral body collapse was observed in osteoporotic case, hence this technique is contraindicated in osteoporotic patients.

**FP-051: MIS Discectomy and MIS Decompression - Outcomes and learning curve in a tertiary care university hospital**

Dr. V. Arvind Kumar, Dr. Vamsikrishna Yeramneni, Dr. Ramanath Reddy, Dr. Thirumal Yerragunta

1) NIMS, Hyderabad, India

**Introduction:** The minimally invasive technique was introduced to address the drawbacks associated with open technique for lumbar disc herniation. This study aims to throw light on the learning curve and outcomes associated with MIS discectomy.

**Materials and Methods:** This is both a retrospective and prospective study which includes all patients who have undergone MIS discectomy since July 2018. In all cases tubular retractor system was used. In Lumbar canal and foraminal stenosis decompression was done from opposite side. Operating time, intraoperative blood loss, pre-op and post-op VAS scores, pre-op and post-op Oswestry disability index, duration of hospital stay, complications and need for re-do surgery were analysed.

**Results:** Of 28 patients who underwent MIS discectomy, 10 (35.6%) were male and 18 (64.4%) were female. Mean age of presentation was 43.5 years. Most common presenting symptoms were back pain (96.5%), radiculopathy (78.5%), paraesthesia (39.5%), weakness (3.5%). Mean duration of symptoms was 10.1 months.

Average duration of surgery was 98 minutes. Mean volume of blood loss was 110.89 ml. Mean Pre-op VAS score was 6.62 and mean post-op was VAS score 2.85. Mean pre-op Oswestry disability index was 67.2% and mean post-op Oswestry disability index was 46.7%. Average length of hospital stay was 2.2 days.

**Conclusion:** MIS discectomy has a significant learning curve but in due course of time it offers distinct advantages like reduced operative time, minimal blood loss, reduced hospital stay and early return to work.
FP-053: Clinical and radiological comparison between unilateral and bilateral Facetectomies in Transforaminal Lumbar Interbody Fusion (TLIF): Is additional Facetectomy required?

Dr. Himanshu Soni¹, Dr. Sudhir Dubey¹

1) Medanta - the Medicity, Gurgaon, Haryana, India

Objective: To compare clinical and radiological outcomes in unilateral vs bilateral facetectomy groups in TLIF surgery for degenerative spondylolisthesis.

Methods: In a prospective cohort study, 40 patients with Grade I or II lumbar spondylolisthesis were enrolled, out of which 20 underwent unilateral and 20 underwent bilateral facetectomies as a part of TLIF procedure. Pre and post-operative scores for clinical parameters were: VAS (Visual Analogue Score) for back pain, VAS for leg pain and Oswestry Disability Index (ODI). Radiological parameters for canal dimensions, sagittal balance, coronal balance and pelvic parameters were measured from pre and post-operative radiographs and intraoperative CT using O-arm. Differences between the pre and postoperative parameters were calculated in each group and compared to establish significant difference.

Results: Postoperative data shows significant improvement in clinical and radiological parameters in each group. When comparing both the groups, it was noted that the VAS scores and ODI improvement was not significantly different between unilateral and bilateral facetectomy groups. In the radiological parameters, corrections in disc height, foraminal height, disc angle, sagittal adjacent level angle and pelvic parameters were significantly better in bilateral facetectomy group. However, no significant difference was noted in extent of correction of listhesis, sagittal or coronal balance, canal cross-sectional area. Differences between the pre and postoperative parameters were calculated in each group and compared to establish significant difference.

Conclusion: The correction in radiological parameters like foraminal height, disc height, disc angle and pelvic measurements was significantly better while performing bilateral facetectomy. There was no significant difference in the correction of sagittal balance, coronal balance or disc cross sectional area in unilateral versus bilateral facetectomies. The improvement of VAS and ODI also did not show any significant difference between unilateral and bilateral facetectomy groups. Hence, the better radiological correction achieved in bilateral facetectomy did not result in better improvement of clinical outcome.

Adequate decompression and interbody fusion is recommended for the treatment of spondylolisthesis. Addition of bilateral facetectomy does not add any advantage with respect to the clinical improvement.

Keywords: spondylolisthesis, TLIF, canal stenosis, facetectomy

FP-054: Impact of post operative ABG analysis and ICU weaning protocol in surgical outcome of Atlanto-axial dislocation: It’s not the towering sail, but the unseen wind that moves the ship

Dr. Raghavendra M.¹, Dr. Suyash Singh¹, Dr. Sanjay Behari¹

1) SGPGIMS, Lucknow, India

Objective: To find the association of postoperative arterial blood gas (ABG) analysis and respiratory reserve in patients of AAD with clinical outcome.

Methods and Materials: Preoperative pulmonary function test (PFT) and the postoperative ABG analysis was noted. Timing of extubation, duration of intensive care unit (ICU) stays, and clinical outcomes (Nurick grade) were noted from the inpatient record and the last outpatient follow up. An independent t-test and analysis of variance were used to find significance.

Results: In total, 41% (n = 27) patients had body mass index of less than 18.5, and 50% (n = 33) had breath holding time of less than 20 minutes. There was improvement in mean Nurick grade from 3.17 ± 0.8 to 2.76 ± 0.7 in follow up. A trend suggesting that patients with poor preoperative PFT has more ICU duration and worse outcome. In patients with mild acid-base disorders, extubation was possible within 24 hours. Out of 26 patients with ICU duration less than 2 days, 23 patients had “good” outcome, whereas ten out of 40 patients with ICU duration of more than or equal to 2 days had “bad” outcome (P = 0.00).

Conclusion: Patients having moderate to severe primary or mixed acid-base disorder have a probability of re-intubation or delayed extubation. A strong correlation was seen with the novel grading system (grade > 6 had worse outcome).

Keywords: Arterial Bood Gas, Atlanto-axial Dislocation (AAD), Intensive Care Unit (ICU) weaning protocol, Pulmonary Function Test (PFT)

Key Message:

1. Patients having moderate to severe primary or mixed acid-base disorder have a higher probability of reintubation or delayed extubation.
2. In a well-optimized patient, preoperative respiratory reserve does not affect intensive care unit (ICU) duration, timing of extubation, or even outcome.
3. Independent breathing effort or arterial blood gas values may not be significant, but a strong correlation was seen with the novel grading system (grade > 6 had worse outcome).
4. An algorithm for the postoperative ICU protocol has been proposed depending upon parameters used in our grading system.

**FP-055: Comparison of clinical outcome of Anterior Cervical Discectomy and Fusion (ACDF) with plate and without plate**

Dr. Achal Gupta, Dr. Premanand S. Ramani

1) Lilavati Hospital and Research Centre, Mumbai, India

**Introduction:** Anterior cervical discectomy and fusion (ACDF) represents one of the most commonly performed cervical spine procedures. It is the treatment of choice in symptomatic cervical radiculopathy and myelopathy patients if medical management fails. Cervical myelo-radiculopathy is a result of disc herniation or an acute injury causing foramina impingement of an exiting nerve causing dysfunction of nerve root of the cervical spine.

**Objective:** To assess and compare clinical outcome in scale of visual analogue scale, Oswestry neck disability index, and SF36 scale for patients operated for ACDF with plate and without plate with follow-up.

**Material and Methods:** A prospective and non-randomized clinical case series of 90 patients operated at single centre by a single surgeon for symptomatic cervical myelo-radiculopathy, non-responsive to conservative management from the period April 2010 to March 2019 with follow up.

**Results and Conclusion:** Patients in both groups: ACDF with plate and without plate, improved in symptoms immediately after surgery. None patient required revision surgery. The mean duration of follow-up was 22 months (range 12-124 months). Focal kyphosis is noted in 3 patients with ACDF without plate but had no symptoms. There are no significant difference in clinical outcome of two groups.

**FP-056: Management of Odontoid Fractures - An institutional experience**

Dr. Nikhil Tadwalkar

1) King George Hospital, Visakhapatnam, India

**Introduction:** Odontoid fractures occur as a result of trauma to the cervical spine. The most common mechanism of injury is hyperextension of the cervical spine, pushing the head and C1 vertebrae backward. Odontoid fractures account for 10% to 15% of all cervical spine fractures. Fracture of the odontoid process is classified into one of three types which are type I, type II, or type III fractures. Of all the types of odontoid fractures, type II is the most common and accounts for over 50% of all odontoid fractures.

**Materials & Methods:** It is a prospective study of odontoid fractures presented to our institute. A total of 8 cases were operated between August 2015 to August 2019. All 8 were operated with Transoral-odontoidectomy with posterior occipito-cervical fixation. One case presented with EDH with type II odontoid fracture, for which EDH was operated first and later transoral odontoidectomy with occipitocervical fixation done.

**Result:** Total 8 cases were operated between age group 16-54. 7 cases were type II and 1 was type III fracture. 6 cases presented with quadriaparesis while two patients were neurologically intact. 3 cases presented with AAD and odontoid fracture. One case was initially operated for EDH. There was improvement in the neurological symptoms of 7 patients out of 8.

**Conclusion:** Conventionally odontoid screw is the procedure of choice for odontoid fracture. However in this study it has been observed that Transoral odontoidectomy with posterior occipitocervical fixation is a safe procedure for traumatic odontoid fracture with good results.

**FP-057: Predicting the tumor grade of Glioma using cognitive assessment tools**

Dr. Sandhya Cherkil, Ms. Liza Mary Cherian, Ms. Betsy Baby, Dr. Dilip Panikar, Mr. Deepak Kuttikkattu Soman, Dr. Deepasree Tharakkan, Dr. Nanda Kachare

1) Aster Medcity, Cochin, Kerala, India
2) Biostatistics, Government Medical College, Palakkad

Though radiological imaging and histopathological reports give a clear understanding of the grade of the tumor, we hypothesize that cognitive tests help to realise the grade of the tumor preoperatively. This study aims to explore whether cognitive variables can predict the tumor-grade.

**Method:** A retrospective analysis of prospectively collected preoperative cognitive data of 236 patients in the period of 2014-2017 was done. Mean age was 45.04 years in a sample of 67.4% males & 32.1% females. Patients were assessed with standardized neurocognitive assessment tools. Univariate and multivariate analyses were done. Significance assumed at p<0.05.

**Results:** On univariate analysis, verbal learning and memory, verbal fluency, mental sequencing, executive function, visuospatial construction and its immediate and delayed memory, and information processing were found to be significant. On subjecting these cognitive measures for multivariate analysis, visuospatial construction alone was found to have significance (p=0.02). Patients with deficits in visuospatial construction have 7.36 (1.31-41.52) times risk of having a high grade tumor. A large effect size of 0.4 was obtained.

Age was another factor with significance (p<0.001). With every unit of change in the patient age, there is 1.11 (1.06-1.17) times risk of having a high grade glioma.

**Conclusion:** The cognitive measure of Rey’s Complex Figure Test...
which assesses the visuospatial constructive ability can predict the grade of the glioma. This finding becomes relevant in the cases where the patients may defer treatment. This could be used as a strong point to discuss on the treatment options so as to help the patient make up the mind.

FP-058: Extra-axial Third Ventriculostomy a rescue procedure for failed Hydrocephalus treatment

Dr. Vernon Leo Velho*

1) Grant GMC and Sir JJ Group of Hospitals, Mumbai, India

Extra axial third ventriculostomy-a rescue procedure for failed hydrocephalus treatment

Aims and objectives: To study the utility of “Extra axial Third Ventriculostomy” in the treatment of failed hydrocephalus procedures and assess its advantages, disadvantages, technical difficulties and patient outcome

Materials and Method: 76 patients with hydrocephalus were operated for “Alternative CSF diversion procedure” from January 2017 to AUG 2019

- Patients were followed up for minimum 6 months with serial CT scans and clinical monitoring.
- Patients Included - Shunt failures/Dysfunction
- Not suitable for shunt/ETV
- Obstructive spectrum
- Compatible CSF/Clinical presentation
- Exclusions- Brain Tumors/Posterior fossa tumors
- High CSF protein counts
- Acute hydrocephalus with altered sensorium
- All necessary ethical approvals and patient consent taken

Conclusion:

- Is a feasible and safe procedure.
- Preliminary experience suggests that it can be preferred over conventional VP shunt and ETV for hydrocephalus treatment.
- It can be conveniently used in all the forms of hydrocephalus.
- No significant complications directly attributable to this procedure were observed in our cases.
- Thus this procedure would be a step towards shunt free neurosurgery.

FP-059: Adverse events, errors and outcomes in Neurosurgery - A proposed new classification

Dr. George C. Vilanilam*1, Dr. Mathew Abraham1

1) Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala, India

Objectives: Despite conscientious and careful efforts, neurosurgical care has its fair share of adverse events and surgical errors. A plethora of definitions and unclear standards makes the metrics of adverse events, errors and surgical outcomes, unstandardized and intangible. We aimed to evaluate the existing worldwide standards of care with reference to the definitions, classification and measurement of neurosurgical adverse events and errors, with an objective of creating a new standardized classification.

Methods: We analysed the existing literature (1999-2019) and our own experience to evaluate the definitions, incidence and classifications for adverse events and errors in neurosurgical practice. Published neurosurgical outcome data, both procedure specific and general, from high volume centres, were included in the analysis.

Results: Adverse event rates in large series across elective neurosurgical procedures range from 6-10% with an error rate of 8-15%. Neurological sequelae of eloquent brain resections are also grouped incorrectly as adverse events. Surgeon errors that may not result in adverse events, often go unrecorded. Variations in standards of care, inspire the need for a standardized lingua-franca for documentation of outcomes, neurosurgical adverse events and surgeon errors. We therefore describe a proposed classification system for neurosurgical adverse events, incorporating multiple factors like neurological deficits, their duration, surgical sequelae, errors, surgical site problems, systemic events, anaesthetic issues, indirect complications, hospital stay duration, return to pre-morbid functional status.

Conclusion: A standardized classification for adverse events and outcomes in neurosurgical operations is essential for enhancing standards of surgical care and for creating medico legal bench marks. Our proposed classification is a simple, easily standardizable mechanism for effective recording and inter-observer communication of adverse events, for measuring training standards and outcome audits.

FP-060: Proposal of criteria to determine the extent of resection of: craniopharyngiomas - Study based on analysis of functional outcome with evolving surgical strategies

Dr. Binoy Kumar Singh*, Dr. Arindom Kakoti1, Dr. Zakir Hussain1, Dr. Shammem Ahmed1, Dr. B. K. Baishya1

1) NEIGRIHMS

Craniopharyngiomas has always baffled neurosurgeons with high morbidity and mortality inspite of being a benign tumour (WHO GR I). The exact surgical strategy regarding the extent of resection of Craniopharyngiomas is still blur and there is no clear cut criteria to
**FP-061: Vascular Neurosurgery in private practice**

Dr. Vivek Kumar Vaid**, Dr. Sankalp Bhartiya¹, Dr. Hemant Bhartiya
1) Fortis Escorts Hospital, Jaipur, Rajasthan, India

**Title:** Vascular Neurosurgery in private practice

**Aim:** To compare Coiling v/s Clipping in a single institution by the same operating surgeon.

**Material and Methods:** 336 patients with SAH due to ruptured intracranial Aneurysm underlying either Clipping (314) or coiling (22) in our institution by same surgeon.

**Results:** 83% of patients in Hunt and Hess grade 1 & 2undergoing clipping had good recovery while 79% patients undergoing coiling had good recovery.

In Hunt and Hess grade 3, 4 & 5 clipping had 63% good recovery while 79% patients undergoing coiling had 83% of patients in Hunt and Hess grade 1 & 2 undergoing surgery had good recovery.

**Conclusion:** both modalities have comparable results in same hand resection and at the same time no harm is done to the patient.

**Key words:** Craniopharyngioma, Resection, Karnofsky Performance scale, Morbidity, Mortality.

---

**FP-062: Technology based learning for the young neurosurgeons**

Dr. Mohammed Imran**, Dr. Naga Raju Reddycherla²
1) Prathima Hospitals, Hyderabad, Telangana, India
2) Gandhi Medical College, Hyderabad, Telangana, India

**Introduction:** E-learning is defined as learning using electronic technologies to access educational curriculum outside of a traditional classroom. Medicine is an ever-changing subject and so the doctors are required to constantly update their knowledge. Due to lack of time, practising neurosurgeons find it difficult to refer the books on a regular basis. However, gadgets like mobiles, tablets are handy and available at all times. In this article, we review different ways we can make use of gadgets to enhance learning with respect to neurosurgery.

**Materials and methods:** A search was made using the keywords neurosurgery, e-learning, atlas, neurosurgical, webinar, microneurosurgery and operative. The websites of different neurosurgical societies were searched for educational content. Among the results, websites or content related to neurosurgery were reviewed for the kind of educational material.

**Results:** Among the various internet pages, the neurosurgical atlas, the internet rhoton database, NSI webinars and Medline neurosurgery were rich in educational material. The Neurosurgical atlas offers exhaustive learning material which includes grand rounds, operative videos, text materials and 3D models. Congress of Neurological surgeons offers latest updates and various online courses and the case studies. NSI offers case of the month, webinars and newsletters. Among the apps, neurosurgical atlas, essential skeleton were found useful.

**Future directions:** E-learning is useful for young neurosurgeons to review the basics, update their knowledge and to learn new skills. Technology offers a wide scope to present educational content in an innovative and intuitive way which would not be possible with books alone. Hence, e-learning should be inculcated within educational curriculum as a compliment to the standard textbooks in Neurosurgery.

---

**FP-063: Morphometric analysis of Axis Vertebra in Craniovertebral Junction anomalies**

Dr. Ritu Gaur
1) G. B. Pant Hospital, Delhi, India

**Introduction:** among various advances of CVJ anomalies C1 lateral mass and C2 pedicle screw has gained popularity due to the advantage that it does not require prior anatomical alignment of C1-C2 complex.

**Aims:** Axis vertebra is involved in various pathologies leading to instability at the craniovertebral junction. Detailed morphometric study of C2 vertebral parameters is necessary to understand the anatomy and biomechanics in CVJ anomalies, helping in decision making for surgical approach and the type of fixation required in particular case

**Methods:** we analysed different radiological parameters of C2 vertebra on CT scan of 25 patients namely: antero-posterior and transverse diameters of dens, pedicle height, width and thickness and orientation of C1-C2 facet joint on coronal and sagittal plane.

**Results:** mean AP and transvers diameters of dens were 10.50mm and 10. 20mm respectively (compared with 10.82mm and 9.8mm
respectively in normal population), mean height, width and thickness of C2 were 9.10mm, 7.7mm and 20.7mm respectively (compared with 7.86mm, 7.06 and 18.9mm respectively in normal population), mean angle of c1-c2 facet joints in coronal sagittal plane were 50.10 degrees and 41.3 degrees respectively.

Conclusion: morphometric analysis of the axis vertebra is of utmost importance prior to any craniovertebral junction intervention since there is significant variation in its anatomical parameters.

FP-064: Frequency of contusion associated with skull fracture in children
Dr. Dr.Niqad Ahmad
1) Lady Reading Hospital, Peshawar, Pakistan

Introduction: Skull injuries to infant children are an important health concern. The most common cause of head trauma in children is fall, while more severe head injuries are connected with traffic accidents. In children with inflicted skeletal trauma, the fractured bones that most frequently have associated bruising are the skull bones. Rationale of this study is to estimate the frequency of skull trauma in children of our local population with brain contusions. Limited local data is available on this topic.

Objective: To determine the frequency of skull fracture in children presenting with brain contusion at Lady Reading Hospital Peshawar.

Main Outcome Measures: Frequency of skull fracture in children presenting with brain contusion

Study Design: Descriptive Cross-Sectional Study

Duration of Study: Six months (14-01-2019 to 14-07-2019)

Setting: Neurosurgery Department, Lady Reading Hospital, Peshawar

Subjects: One hundred (n=100) children with head trauma irrespective of gender between age 3 months-14 years who presented within 24 hours of onset of trauma.

Methods: Children presenting with brain contusions and fulfilling the inclusion criteria were enrolled, after taking written consent from their parents/caretakers. All the demographic details and required laboratory and radiologic investigations were performed. GCS was calculated for all the patients. Skull fracture diagnosed as per defined in operational definition. Results were analyzed using SPSS 20.0 and effect modifiers were controlled by the stratification. Post stratification Chi-square test was applied and P value < 0.05 was considered significant.

Results: 72% of patients were males with the mean age of 77.49±54.2 SD months and 28% of patients were females with mean age of 62.75±43.4 SD months. Mean duration of trauma found to be 1.9±1.1SD hours, while mean GCS was 13.5 ±1.3 SD. Skull fracture was present in the 89.0% (n=89) of children. Linear skull fracture was present in 68.5% and depressed skull fracture was noted in 31.5% of the patients. No significant association (i.e. P<0.05) was noted for any of the effect modifier such as age, gender, GCS, size and site of contusion, mode of trauma, and duration of trauma etc.

Conclusions: Frequency of skull fracture found to be 89.0% in the pediatric patients presented with brain contusions. Linear skull fracture is most prevalent type of skull fracture in children while Fall and RTA were among the most frequent cause of trauma associated with skull fracture in these children

FP-065: Endoscopic evacuation of spontaneous Intracerebral Hamatoma-An institutional experience
Dr. Rajeshwari Kondabathini*, Dr. Laxman Rao Akyam1
1) Osmania General Hospital/Osmania Medical College, Hyderabad, India

Introduction: SpontaneousICH affects ~ 20 in 100,000 people/Yr. Although outcome is mainly determined by the patient’s initial presentation, early surgical intervention is crucial. Patients with hematomas < 1 cm from cortical surface have favorable outcome than those with deeper. With the evolution of the neuroendoscope and hemostatic agents surgical evacuation of ICH in deeper is safer & less invasive. Here, we present our series of patients with SpontaneousICH who underwent Endoscopic evacuation.

Aims & Objectives:
• To Evaluate Safety and Outcomes following Endoscopic Evacuation of SpontaneousICH.
• To compare with Open Craniotomy and Evacuation of SpontaneousICH.

Materials and Methods: This is prospective study done from Sept 2016-Oct 2018 patients with spontaneousICH managed by endoscopic evacuation, in Neurosurgery dept. Without randomizing a group of patients who underwent open craniotomy and evacuation were chosen for comparison. Patients were evaluated with Age/Sex, Clinical, Radiological, GCS at presentation and after surgery, Length of surgery(time), blood loss, residual hematoma was compared. Surgical mortality, complications, outcomes were noted.

Results: The Median operative time 110minutes (90-200), Mean blood loss 160mL (80-300mL) & Median hematoma evacuation ratio was 90%(60-99%). Two Pts had rebleeding, Five Pts needed permanent VPshunt and Mortality rate was 9.5% (2 pts). The Median GCS improved from 8 to 11 and the Median Glasgow Outcome Scale score was 3 after 2 and 6 months follow-up.

Conclusion: With introduction of neuroendoscope and hemostatic agents, the median operative time and blood loss significantly decreased. The hematoma evacuation rates were similar between the Endoscope(90%) & Open (85%) groups. This is an important advancement and provides a measured preview of the promising results expected in future.

FP-066: Retrospective analytic study of cases
who underwent unanticipated CSF diversion procedures after definitive treatment of primary neurosurgical pathologies not associated with CSF obstruction in pre-operative stage

Dr. Kunal Kumar\textsuperscript{1,4}, Dr. Ramesh Chandra V. V. \textsuperscript{1,}, Dr. B. C. M. Prasad\textsuperscript{1}

\textsuperscript{1} Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India

\textbf{Introduction:} Hydrocephalus has been one of the most common pathologies in neurosurgical practice. Till now traditionally classified as primary and secondary, another subgroup of patients exists who develop hydrocephalus after treatment of their of primary neurosurgical pathology which was not associated with CSF obstruction at presentation and after various studies many precipitating factors and primary neurosurgical pathology for which patient got operated have been identified which can lead to development of hydrocephalus or CSF obstruction in post-op neurosurgical patients.

\textbf{Aims and Objective:} The objective of this study is to discuss the cause, primary pathologies, management and prognosis of patients who required CSF diversion procedures in patients who underwent definitive surgery for various neurosurgical pathologies and in whom development of hydrocephalus was not anticipated. The outcome will be evaluated to further rectify our approach for these subset of patients

\textbf{Materials and Methods:} Retrospective data collection was done from department OT database and patient records were obtained for those patients who first got operated for their primary neurosurgical disease which was not associated with hydrocephalus or CSF pathology at surgery but they landed up in CSF flow obstruction and required some form of temporary or permanent CSF diversion procedure for their management.

\textbf{Results:} A total number of 80 cases were found eligible for the study, their results were prepared for their primary pathology, management, time after which they developed CSF obstruction, presentation, decision to do CSF diversion - temporary or permanent, their outcome and prognosis and possible factors leading for CSF obstruction.

\textbf{FP-067: Advantages of Neuroendoscopy over Open Craniotomy in the management of Spontaneous Intra Cerebral Hemorrhage (SICH) - A randomized control study}

Dr. Uday Goutam Nookathota\textsuperscript{1,4}, Dr. Neeraja Alluri\textsuperscript{1}

\textsuperscript{1} Goutam Neuro Care / Gandhi Medical College & Hospital, Hyderabad, India

\textsuperscript{2} Goutam Neuro Care, Hyderabad, India

\textbf{Background:} Spontaneous intra cerebral hemorrhage (SICH) is an emergency case related to high morbidity, high mortality and high disability which need prompt neurosurgical intervention. In case of a massive hematoma, surgical drainage is a crucial treatment. Neuroendoscopy is one of several methods in neurosurgery field which recently emerge as a promising method. Compared from conventional craniotomy method, neuroendoscopy offers several advantages in certain conditions. The aim of the present study was to assess the efficacy and usefulness of the endoscope-assisted keyhole evacuation of hemorrhage in elderly patients with intracerebral hematoma who needed a flap craniotomy as traditional treatment.

\textbf{Materials and Methods:} One hundred-eighty-four elderly patients with SICH, who had craniotomy indications after conservative treatment for 6-24 hours after onset, were randomly divided into two groups. In the craniotomy group, traditional hematoma drainage was performed. In the Neuroendoscopic group, an endoscope-assisted keyhole technique was used. Anesthesia time, blood loss, hematoma drainage rate, and complications were compared.

\textbf{Results:} Anesthesia time was longer in the craniotomy group (3.43±0.65 vs. 1.53±0.52 h, P<0.01), and blood losses were more important (256±129 vs. 96±39 ml P<0.01). There was significant difference in hematoma drainage rate between the two groups (77.25±13.44 vs. 83.52±27.51% P>0.05). Complications, including tracheotomy (P<0.01), pulmonary infection (P<0.01) and hypoproteinemia (P<0.05) were more frequent in craniotomy group. Proportion of patients with good prognosis was larger in keyhole group (P<0.05).

\textbf{Conclusion:} In elderly SICH patients with an indication for hematoma drainage, better outcomes were achieved using an endoscope-assisted keyhole technique.

\textbf{FP-068: A comparative study between Minicraniotomy and Burr-Hole Evacuation for Chronic Subdural Haematoma}

Dr. Pranoy Hegde\textsuperscript{4,}, Dr. Kiran Khanapure\textsuperscript{1}

\textsuperscript{1} MS Ramaiah Medical College, Bangalore, India

\textbf{Introduction:} In our study we have compared the efficacy of both the procedures in the treatment of CSDH and also study the specific requirement of Minicraniotomy in cases of Septated CSDH.

\textbf{Materials & Methods:} All the patients who underwent surgery for Chronic subdural haematoma between November 2017 and April 2019. Patients with recurrent SDH on the same side, post-procedure SDH, patients who underwent different procedures on either side (in case of bilateral haematomas), presence of other intracranial conditions like aneurysm were excluded from the study. Preoperative status and postoperative status was analysed.

\textbf{Results:} During the study period a total of 65 patients collectively underwent 27 burr-hole procedures (each hemisphere treated was considered a separate procedure) and 48 minicraniotomy procedures. In the burr hole group, among a total of 19 patients, 27 procedures were done. In the minicraniotomy group, 42 patients underwent a total of 48 minicraniotomies. Our study gave impetus on re-surgery rates,
length of stay, mortality and morbidity. The average follow-up for each treatment group was 6 months. Recurrence was noted in 1 patient of burr-hole (3.7%) and 4 minicraniotomies (8.33%). Patients who underwent burr hole spent a mean of 75.4 minutes in the OT while the patients undergoing minicranietomy spent 124.2 minutes. The mean length of stay after surgical intervention was 3 days longer for the minicranietomy group.

Conclusion: Based on this prospective study, burr hole washout is superior for both patient’s clinical and financial outcome; however, long-term multicenter clinical studies are required to verify these findings.

---

**FP-069: Safety and efficacy of Gamma Knife Radiosurgery for management of Trigeminal Neuralgia - A retrospective study**

Dr. Karishma Kini*, Dr. Abidun Okunolua1, Dr. Basant K. Misra1
1) P. D. Hinduja National Hospital and MRC, Mumbai, India

**Background:** Medical management is the first line of care for patients with trigeminal neuralgia (TN) and carbamazepine is the drug of choice used alone or in combination with other drugs. Gamma knife radiosurgery (GKRS) has been an established option in the management of medically refractory trigeminal neuralgia based on its non-invasiveness and with minimal risk of injury to the surrounding structures.

**Aim:** To assess the safety and efficacy of GKRS in the management of Trigeminal neuralgia.

**Patients and methods:** A retrospective review of the patients with medically refractory TN treated with GKRS from 1997 to March 2019 by the senior author in a single institution was carried out. Out of the 194 patients of TN treated with GKRS, 41 case files were not available, the remaining 153 case files were reviewed and statistically analyzed. The results were presented using tables and categorical data were summarized by frequencies, proportions and percentages and continuous data was summarized using means and standard deviations.

**Results:** 96.1% of our patients received radiation dose of 80 Gy while the rest received 70 Gy. 8 patients (5.2%) had no satisfactory response to GKRS in our study. The recurrence rate was 9.2% and complication rate was 4.6%, facial numbness being the commonest complication. 4 patients (2.6%) had bilateral TN in our study. There was no mortality related to GKRS in our study.

**Conclusion:** GKRS is a safe and effective modality of treatment for trigeminal neuralgia. Bilateral TN is a rare but known entity.

---

**FP-071: Nuances and complications of Endonasal Endoscopic Transsphenoidal Pituitary surgery - Less is More**

Dr. Deepak Bhangale*, Dr. Sudhir Dubey2, Dr. V. P. Singh3
1) Medanta - The Medicity Hospital, Haryana, India
2) Medanta - The Medicity Hopspital, Delhi NCR, India
3) Medanta - The Medicity, Delhi NCR, India

**Objectives:** To assess the role of intraoperative mri in endoscopic transsphenoidal pituitary surgery with regards to efficacy and volumetric completeness of resection in pituitary adenoma using semiautomatic segmentation software and detail study of both early and delayed complications done

**Methods:** A 522 Total patients were operated from Nov 2013 to July 2018 for pituitary macro adenomas. After initial resection a volumetric assessment analysis was done and decision to re-operate was taken intraoperative on of contrast enhancement of residual lesion. Radiological and clinical data from a prospective database were retrospectively analysed. All complications noted. Details study done on requirement of hormonal supplement.
**Results:** Mean adenoma diameter and volume were 24.1 mm (range 5-47 mm) and 5.23 cm (range 0.09-22.14 cm (3)), respectively. Complication rate was 5.6%; transient DI seen in 20%, one patient had carotid injury. The overall median hospital stay was 3.5 days. Surgical complications included postoperative cerebrospinal fluid leak (5.6%), epistaxis, postoperative hematoma, meningitis, cranial nerve paresis, hydrocephalus (0.8%), vision loss, vasospasm, stroke, abdominal hematoma or infection, carotid artery injury and Endocrine complications were the most frequent, including transient diabetes insipidus, symptomatic hyponatremia, new hypopituitarism (any axis), permanent diabetes insipidus and adrenal insufficiency.

**Conclusion:** Perisellar infiltration may be responsible for incomplete removal of pituitary tumors. Since intraoperative visualization of parasellar structures is difficult during transsphenoidal surgery, introm rnr helps in removal of these lesion. Generous bone exposure especially inferior, dissecting along diaphragma sel la respecting the arachnoid to the last portion removed is the key maneuver when handling tumors that frequently resist the descent of their suprasellar capsule into the sella. When performed at experienced pituitary centers, endoscopic transsphenoidal surgery for PAs may be performed with a high degree of safety.
FREE PAPERS

DECEMBER 6, 2019
**FP-072:** Hydrocephalus following aneurysmal subarachnoid haemorrhage - Incidence, timing & predictors of ventricular shunting  
Dr. Rakesh Das¹*, Dr. Suchanda Bhattacharjee¹, Dr. Kiran K. Sugali¹  
1) Nizam’s Institute of Medical Sciences, Hyderabad, India  
2) Medanta Institute of Neurosciences, Medanta Hospital, Indore, India  

Hydrocephalus is a common complication of aneurysmal subarachnoid haemorrhage, in most studies the incidence is 20-30%. It can be acute, within 48 hours or chronic, weeks or months after the haemorrhage. In 90% of cases hydrocephalus occurs in early course of SAH (1st 2 weeks), while chronic hydrocephalus occurs in 10-20% of cases later in the course of SAH (after 2 weeks). We have studied 96 patients of aneurysmal SAH operated between January, 2018 to July,2019 in Dept. of Neurosurgery, Nizam’s Institute of Medical Sciences. Out of 96 patients, 10.41% cases developed hydrocephalus, in 6.25% in early course, 3.12% needed pre-op CSF diversion, 3.12% required CSF diversion in immediate post-op period, 6.25% required VP shunt, 2.08% developed hydrocephalus 3 months after discharge from hospital. This study is aimed at finding the incidence, timing and predictors of ventriculostomy & ventricular shunting in hydrocephalus following subarachnoid haemorrhage.

**FP-073:** Quantitative assessment of Flow Dynamics Using ICG/Flow 800 Video Angiography in resection of Cerebral Arteriovenous Malformations  
Dr. M. J. Arunkumar²*, Dr. Karunamoorthy Senthilkumar², Dr. Rajamani Veerapandian²  
1) Hannah Joseph Hospital, Tamilnadu, India  
2) Neurosurgeon, Madural, India  

**Objectives:** ICG/Flow 800 software is used for colour visualisation and evaluation of fluorescence videos by microscope integrated ICG angiography in cerebrovascular surgery. Quantitative assessment of flow dynamics in surgeries of intracranial arteriovenous malformation is done in our study.  

**Methods:** Patients undergone surgery for cerebral AVMs from January 2017 till June 2019 using Zeiss Pentero 900 OPM at Hannah Joseph Hospital, Madurai has been included. ICG (Indocyanine green) 0.5 ml/kg bolus given 3 to 4 times during surgery. Demarcation of feeding arteries and arterialised veins using the infrared Flow 800 software is done. Maximum intensity (AI), transit time (s) and cerebral blood flow index (mCBF) showed good perfusion to surrounding parenchyma post-resection of AVMs(6/7)

**Conclusion:** ICG/Flow 800 video angiography for cerebral AVMs is useful demarcating arteries from veins and preserving cerebral perfusion to eloquent areas using quantitative flow dynamics.

**FP-074:** Carotid Endarterectomy - An experience of 140 cases  
Prof. Trimurti Dattatraya Nadkarni*  
1) Topiwala National Medical College and B.Y.L. Nair Ch. Hospital, Mumbai, India  

Carotid endarterectomy (CEA) is an established surgical procedure to treat carotid artery atherosclerotic disease. The present series of 140 patients were diagnosed to have either unilateral or bilateral, symptomatic or asymptomatic carotid artery stenosis that caused neurological symptoms or deficits. These patients underwent CEA after evaluation of extent of carotid disease and fitness for general anesthesia. The mean age of the patients was 64 years. All patients had an uneventful perioperative recovery. 4 patients (2.8%) had complications that included 2 deaths; one patient succumbed to myocardial infarction and another had respiratory complications. 2 patients had mild strokes in the perioperative period. Post-operatively all patients were confirmed angiographically to have a complete resolution of their carotid stenosis and an improvement in the ipsilateral cerebral circulation. Several patients had a subjective clinical improvement in higher and sensori-motor functions. Thus CEA is a safe and standard therapy for treatment of carotid atherosclerotic disease.

**FP-076:** Microsurgical clipping techniques for Ophthalmic Segment Aneurysms (OSA)  
Dr. Rajneesh Kachhara*  
1) Medanta Institute of Neurosciences, Medanta Hospital, Indore, India  

**Objective:** Aneurysms originating from ICA - ophthalmic segment are complex, technically demanding and carries high risk for safe clipping. We would display various clipping techniques for aneurysms in this location.  

**Methods:** Author presents his experience of operating 35 OSAs in 34 patients, out of 388 cases of total aneurysms operated, of these last 25 cases were done at a peripheral city hospital. Female outnumbered male and mean age was 45 years. Twenty six patients presented with subarachnoid haemorrhage, one with visual deficits and 7 aneurysms were incidentally detected. All patients were in WFNS grade 1-2 except flow 800 software. 5/7 cases had total excision, 1 had partial excision and one with thalamic/midbrain AVM was inoperable underwent SR-S. Maximum intensity (AI), transit time (s) and cerebral blood flow index (mCBF) showed good perfusion to surrounding parenchyma post-resection of AVMs(6/7)
one was in grade 5. Sixteen aneurysms originated from dorsal wall of ophthalmic segment where as 19 were from ventral wall. Aneurysms were classified as small (17), large (16), and giant (2). Thirty patients underwent microsurgical clipping where as 4 were wrapped and one trapped. Neck carotid exposure for proximal control and drilling of clinoid process for optimal exposure of proximal neck were essential steps.

**Results:** Twenty three patients resumed normal life following treatment and 3 patients were moderately disabled but independent for daily life activities. There were two mortalities. Follow up varies from 3 months to 12 years with excellent neurological status. In conclusion, microsurgical clipping techniques for OSA are safe and can be exercised for durable long term outcome.

* * * * *

**FP-077: Surgical outcome of 110 consecutive patients operated for ICA communicating segment aneurysm**

Dr. Mathew Abraham*1

1) Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala, India

**Objectives:** ICA communicating segment aneurysms are easily accessible but can pose great challenges to the vascular neurosurgeon due to restricted space variable length of the ICA and critical perforators associated with the neck. Surgical outcome these aneurysms are studied.

**Methods:** A retrospective study was done on 110 consecutive good grade patients with bled communicating segment ICA artery aneurysms operated and followed up for 1 year.

**Results:** All the aneurysms were operatively clipped. 31.7% 44.2%, 24% of patients were operated in the 1st 2nd and subsequent weeks respectively 31% of patients had intraoperative rupture. 11% patients had postoperative vasospasm. 6 patients had early postoperative infarcts while 2 patients had late infarcts. Mortality was 3 in the series. mRs score was good (1 and 2) in 93.3% % of 100 patients at 3 months followup. Vasospasm was the only significant factor affecting surgical outcome.

**Discussion:** ICA Communicating segment aneurysms are surgically challenging aneurysms requiring skilled surgical management. Intraoperative rupture and temporary clipping did not affect the outcome of surgery. 10-12 % symptomatic vasospasm can be expected and is the main cause of poor outcome. An overall good outcome approximating 92% can be expected within a followup period of 1 year in good grade ruptured aneurysms.

**Conclusions:** Good grade Communicating segment ICA aneurysms have an excellent surgical outcome, and vasospasm is the only significant pathophysiological correlate.

* * * * *

**FP-078: Rebleeding following Aneurysmal Clipping**

Dr. Manas Panigrahi*, Dr. Vikrant Kesari1, Dr. Y. V. B. K. Chandrasekar1

1) Krishna Institute of Medical Sciences, Hyderabad, Telangana, India

**Introduction:** Intraparenchymal hemorrhage after clipping of a ruptured aneurysm is rare. ISAT studies had reported 0.016% (n=1070) and 0.04% (n=1073) postoperative bleed following clipping and coiling respectively whereas BRAT study reported 0.7% incidence of postoperative bleed. The pathogenesis is variable, and the therapeutic strategies remain controversial, because the natural history is unclear.

**Methods:** 354 patients who underwent surgery for clipping of aneurysm from 2007 to 2019 at KIMS, Hyderabad a tertiary care center in south India were evaluated and included in the study.

**Results:** We analyzed 354 patients undergoing clipping for various aneurysm. Four patients (0.01%) out of 354 had postoperative bleed. Out of four patients who had rebleeding three were having MCA and one had Pcom aneurysm. Three patients (having MCA aneurysm) had rebleeding on 3rd postoperative day and 1 patient (Pcom aneurysm) had rebleeding on 24th postoperative day. One of the patients with rebleeding was found to be having coagulation disorder (rare factor XIII deficiency) and other was diagnosed to be having- ?slippage of clip or residual neck on repeat angiogram. In other two patients no cause could be identified. Two patients with identifiable cause (? clip slippage and factor XIII deficiency) had good recovery and are doing well. One patient with unidentifiable cause of hematoma presented with rebleed after 6 months and died during treatment. Other patient with unidentifiable cause of hematoma presented with status epileptics & sepsis after two months and had poor outcome. Conclusions: Although this study confirmed the long-term efficacy of clipping of aneurysms, there is a risk of hematoma after successful treatment which is associated with high morbidity and mortality. Post-clipping rebleeding might result from hypertensive therapy for vasospasm treatment, iatrogenic trauma, abnormal blood coagulation and occult vascular malformation.

* * * * *

**FP-079: Multimodality management of complex and giant aneurysms**

Dr. Abhidha Harshad Shah*, Prof. Atul Goel1

1) Seth G. S. Medical College & K.E.M Hospital, Mumbai, India

**Aim:** We report our experience with multimodality management of complex and giant aneurysms. The role and indications of clipping, surgical bypass and endovascular management in treating these difficult neurosurgical problems is discussed.

**Material & Methods:** Thirty nine cases of giant aneurysms treated at the authors institute over the last four years were reviewed and the
management strategy analyzed. The sites of the aneurysms were the cavernous segment of the internal carotid artery, the posterior communicating artery, the middle cerebral artery, the superior hypophyseal artery, the anterior communicating artery, the supraclinoid internal carotid artery, the basilar artery and the posterior cerebral artery. All the patients were investigated with four vessel digital subtraction angiography and/or CT angiography. Six of these giant aneurysms grew during the period of observation. The posterior circulation aneurysms were treated by endovascular methods.

Results: Nineteen patients were treated by direct clipping or a high flow surgical bypass. Twenty patients were treated with endovascular methods using either coils, stent assisted coiling or flow diversion. Post-operative four vessel angiography showed total exclusion of the aneurysms from the circulation. The strategy for selection of the optimum treatment modality depending on the site and morphology of the aneurysm is presented. The outcome of management of the three modalities of treatment is discussed.

Conclusions: Complex and giant aneurysms are formidable neurosurgical problems. Apart from direct surgical clipping, cerebral revascularization strategies form an important armamentarium in management. Flow redirection techniques may alter hemodynamics of aneurysms and cause thrombosis.

** FP-081: Ruptured Cerebral Aneurysm - Surgical outcome of a Low Volume Non-subspecialized Neurosurgical unit in India

Dr. Siddhartha Shankar Sahoo

1) Kalinga Hospital / Care Hospital, Bhubaneswar, Odisha, India

Introduction: Outcome of ruptured cerebral aneurysm surgery is optimal at centers of high volume surgery. Due to limited number of centres and subspeciality-trained neurosurgeons in India, aneurysm surgery is sometimes done by neurosurgeons with exposure to microvascular surgery. These are low volume centres in average equipped hospitals. This study analyses surgical outcomes at such a setup.

Method: All ruptured aneurysms operated by a single neurosurgeon from Aug 2013 to July 2019 were analyzed retrospectively. Surgical outcome and complications were studied.

Result: Total 26 aneurysms were clipped in 25 patients. 21 patients were in grade 1-3 (H&H) and 4 patients were in grade 4&5 (H&H). Mortality was 3/4 in poor grade SAH and 1/21 (0.04%) in Good grade SAH. mRS 0-1 was attended by 19/21 (90.5%) patients. Intraoperative rupture developed in 4/26 aneurysms. Vasospasm was seen in 3/25 patients in whom 2 were poor grade and 1 good grade SAH. Hydrocephalus developed in 6/25 patients who required VP shunt.

Conclusion: Surgical Outcome at non-subspecialized low volume neurosurgical unit is comparable to high volume counterparts in good grade SAH patients. More data needs to be analyzed from multiple such centres.

** FP-080: Hyponatremia affecting outcome in surgically clipped ruptured Anterior Communicating Artery Aneurysm

Dr. Abdul Rahim Shaan*, Dr. Jyothish L. S.1

1) Trivandrum Medical College, Kerala, India

Hyponatremia (S.Na< 135mEq/l) is a known clinical complication seen in Subarachnoid Haemorrhage following ruptured Anterior communicating artery aneurysm. Hyponatremia is also found to be associated with cerebral vasospasm and hydrocephalus. Even though it is most commonly caused by SIADH, other causes like acute cortisol deficiency, cerebral salt wasting syndrome and diuretic therapy also do play a role. Timely diagnosis and adequate corrective measures is necessary to reduce morbidity and mortality. This is a retrospective study of 106 patients admitted with ruptured Anterior communicating artery aneurysm who underwent clipping in a tertiary care setting. Various factors pertaining to the aneurysm, patient demographics, neurological status at presentaion & complications like hydrocephalus, symptomatic vasospasm, those secondary to prolonged immobilisation like DVT and pulmonary embolism were assessed. Sodium levels were assessed daily during in patient stay. Outcomes were measured as number of days that required ventilation, days in ICU and Modified Rankin Scale at discharge and at 3 months post procedure. Prolonged hyponatremia was significantly associated with increased no of days spent in ICU and poor Score in Modified Rankin scale at 3 months.

** FP-082: Our experience of clipping 150 aneurysms in rural peripheral centre - Difficulties and dilemmas

Dr. Shivashankar Marajakke

1) Siddhagiri Hospital and Research Centre, Kolhapur, Maharashtra, India

Background: Endovascular techniques (EVT) are considered a mainstay of treatment for intracranial aneurysms. However, for patients with anatomically complex aneurysms, associated intracranial hematomas requiring evacuation still need an open surgical clipping as the first line of treatment.

Objectives: Our experience in clipping of intracranial aneurysms performed by single surgeon. This study recommends microsurgical clipping as a viable and cost effective option for symptomatic intracranial aneurysms.

Patients and Methods: Its a retrospective analysis of patients who had been treated for intracranial aneurysms, including both ruptured and unruptured from August 2015 to August 2019. A total of 269 patients, who had clinical and radiological evidence of symptomatic intracranial aneurysms, were admitted. Of the total number of patients, 150
aneurysms had been managed with microsurgical clipping. The patient’s demographics, the features of the aneurysms, clinical grades, cost effectiveness, and outcomes were analyzed.

Results: Out of total 269 patients with aneurysms encountered 121 patients with ruptured aneurysms underwent microsurgical clipping; 26 patients had multiple aneurysms 87-coiling/intervention, 20-grade V, 22-deferred Rx (poor grade, elderly).

19–Higher centre
The reasons for clipping in our patients were complex aneurysmal anatomy, difficulty accessing the aneurysm and MCA/DACA location in 49 patients, associated hematoma requiring evacuation in 19 patients, cost factor in rest of the patients.

Regarding outcomes, 109/124 of patients experienced a good outcome and 15/124 experienced a bad outcome.

Conclusions: These observations suggested that microsurgical clipping is a viable and cost effective alternative in the management of intracranial aneurysms in this endovascular era.

**FP-083:** STA-MCA bypass for symptomatic Moya Moya disease - Lessons learnt from 89 revascularisations

Dr. Amol Raheja¹, Dr. Sanjeev A. Sreenivasan², Prof. Ashish Suri³, Prof. Mannohan Singh¹, Dr. Shashwat Mishra³
1) AIIMS, New Delhi, India

Objective: To comprehensively evaluate clinical and angiographic outcome in symptomatic MoyaMoya-disease (MMD) patients undergoing STA-MCA bypass.

Methods: We analysed consecutive MMD patients who underwent direct-revascularisation (DR) via STA-MCA bypass. Primary outcome measures were mRS scale and stroke risk reduction. Secondary outcome measure was angiographic outcome score (AOS).

Results: 70 patients (89 DR procedures), including 37.9% adults (>18yr), were operated over a duration of 8 years and followed up for 2 years (mean). Long-term bypass-patency rates were deemed 83.3% and 88.8% in children and adults respectively. In pediatric age group, median mRS scores improved from 3 to 2 (p=0.001), 97.3% were free of recurrent strokes and AOS scores improved significantly (p=0.002). Amongst adult MMD patients, median mRS score marginally improved from 3 to 2 (p=0.25), 100% were free of recurrent strokes and AOS improved significantly (p=0.02). On comparing pediatric and adult patients, improvement in mRS scores (p=0.14) and AOS scores (p=0.65) were similar across the two age groups. Overall late stage MMD patients (Suzuki stages IV-VI) showed better improvement in mRS scores when compared with early stage MMD patients (Suzuki stages I-III; p=0.04). Recurrent stroke rates were similar in both groups (p=0.26). AOS scores improved significantly in both early and late stage MMD (p<0.001 in both), though the improvement amongst the two groups was similar (p=0.88).

Conclusions: Using meticulous surgical technique, excellent long-term bypass patency rates can be achieved to facilitate optimal clinical and angiographic outcome in symptomatic MMD patients, irrespective of the age group and stage of disease.

**FP-084:** Giant aneurysms - Not so “Giant” in behavior!!

Dr. Debajyoti Pathak¹, Dr. Parthasarathi Datta¹
1) N.R.S. Medical College, Kolkata, India

Objectives: The purpose of this study is to review our experience with per-operative behavior of giant aneurysms and to correlate aneurysm size with their clinical presentation, intra-operative course and post-operative complications.

Methods: 7 patients of anterior circulation aneurysm were operated in our series by micro-neurosurgical technique. All patients were assessed pre-operatively and post-operatively by CT angiography and DSA. Patency of proximal vessels, distal vessels and aneurysm refilling was assessed intra-operatively by micro-vascular Doppler. Intra-operative assessment of complete occlusion of aneurysm neck could not be done due to the lack of ICG facility in our institute.

Results: There were 3 middle cerebral artery and 4 anterior communicating artery complex giant aneurysm in our series. Patients were operated by pterional ± orbitozygomatic approach. Special techniques, including temporary clipping, evacuation of intraluminal thrombus, tandem and/or fenestrated clipping, and clip reconstruction were often required. Aneurysm neck clipping was possible in all cases. We did not encounter any intra-operative aneurysm rupture in our series. Post-operative imaging revealed complete aneurysm occlusion with patency of proximal and distal vasculature in all cases.

Conclusions: Giant aneurysms are ‘giant’ in their size. However, their intra-operative behavior need not be necessarily aggressive. Proper pre-operative planning regarding the type of craniotomy, vascular control, clipping technique and requirement of bypass procedures can prevent major catastrophe.

**FP-085:** Different strokes for difficult folks - Paediatric syndromic cranio-vertebral anomalies (sCVA) - Surgical nuances and pattern of recovery

Dr. Ashutosh Kumar¹, Dr. Jayesh Sardhara¹, Dr. Suyash Singh¹, Dr. Ashutosh Kumar², Dr. Kamelesh Bhaishora¹, Dr. Kuntal K. Das¹, Dr. Anant Mehrotra¹, Dr. Arun K. Srivastav¹, Dr. Awadhesh Jaiswal¹, Dr. Sanjay Behari¹

Results:
- 70 patients (89 DR procedures), including 37.9% adults (>18yr), were operated over a duration of 8 years and followed up for 2 years (mean).
- Long-term bypass-patency rates were deemed 83.3% and 88.8% in children and adults respectively. In pediatric age group, median mRS scores improved from 3 to 2 (p=0.001), 97.3% were free of recurrent strokes and AOS scores improved significantly (p=0.002).
- Amongst adult MMD patients, median mRS score marginally improved from 3 to 2 (p=0.25), 100% were free of recurrent strokes and AOS improved significantly (p=0.02).
- On comparing pediatric and adult patients, improvement in mRS scores (p=0.14) and AOS scores (p=0.65) were similar across the two age groups. Overall late stage MMD patients (Suzuki stages IV-VI) showed better improvement in mRS scores when compared with early stage MMD patients (Suzuki stages I-III; p=0.04).
- Recurrent stroke rates were similar in both groups (p=0.26). AOS scores improved significantly in both early and late stage MMD (p<0.001 in both), though the improvement amongst the two groups was similar (p=0.88).

Conclusions: Using meticulous surgical technique, excellent long-term bypass patency rates can be achieved to facilitate optimal clinical and angiographic outcome in symptomatic MMD patients, irrespective of the age group and stage of disease.

**FP-084:** Giant aneurysms - Not so “Giant” in behavior!!

Dr. Debajyoti Pathak¹, Dr. Parthasarathi Datta¹
1) N.R.S. Medical College, Kolkata, India

Objectives: The purpose of this study is to review our experience with per-operative behavior of giant aneurysms and to correlate aneurysm size with their clinical presentation, intra-operative course and post-operative complications.

Methods: 7 patients of anterior circulation aneurysm were operated in our series by micro-neurosurgical technique. All patients were assessed pre-operatively and post-operatively by CT angiography and DSA. Patency of proximal vessels, distal vessels and aneurysm refilling was assessed intra-operatively by micro-vascular Doppler. Intra-operative assessment of complete occlusion of aneurysm neck could not be done due to the lack of ICG facility in our institute.

Results: There were 3 middle cerebral artery and 4 anterior communicating artery complex giant aneurysm in our series. Patients were operated by pterional ± orbitozygomatic approach. Special techniques, including temporary clipping, evacuation of intraluminal thrombus, tandem and/or fenestrated clipping, and clip reconstruction were often required. Aneurysm neck clipping was possible in all cases. We did not encounter any intra-operative aneurysm rupture in our series. Post-operative imaging revealed complete aneurysm occlusion with patency of proximal and distal vasculature in all cases.

Conclusions: Giant aneurysms are ‘giant’ in their size. However, their intra-operative behavior need not be necessarily aggressive. Proper pre-operative planning regarding the type of craniotomy, vascular control, clipping technique and requirement of bypass procedures can prevent major catastrophe.

**FP-085:** Different strokes for difficult folks - Paediatric syndromic cranio-vertebral anomalies (sCVA) - Surgical nuances and pattern of recovery

Dr. Ashutosh Kumar¹, Dr. Jayesh Sardhara¹, Dr. Suyash Singh¹, Dr. Ashutosh Kumar², Dr. Kamelesh Bhaishora¹, Dr. Kuntal K. Das¹, Dr. Anant Mehrotra¹, Dr. Arun K. Srivastav¹, Dr. Awadhesh Jaiswal¹, Dr. Sanjay Behari¹
**FP-087:** Endoscopic experience of first 20 cases of Spinal intradural extramedullary tumors

Dr. Somil Jaiswal\(^1\)

1) King George’s Medical University, Lucknow, Uttar Pradesh, India

**Introduction:** Spinal intradural extramedullary (IDEM) tumors are the most surgically amenable spinal tumors. Over the years open technique has given space to minimally invasive microscopic and endoscopic techniques. Endoscopy provides minimal invasiveness and panoramic surgical view. In this study we intend to share our experience with endoscopic removal of spinal IDEM tumors.

**Methods:** This retrospective study included 20 IDEM tumor patients (13 female and 7 male), treated with endoscopic technique. Clinico-radiological features, technique and intraoperative difficulties were studied. Further clinical and radiological outcome were analyzed. Destandau technique was used. Hemi laminectomy with the help of endoscopic drills and kerrison rongeur was performed. Dura was incised at the maximum bulge and removal of tumor was performed. Dural closure was done with mini titanium clips. Closure was done in layers.

**Results:** Out of 20 patients, 15 were neurofibroma and rest was meningioma. 16 patients had tumors in dorsal spinal region and 4 in cervical region. Endoscopy facilitated viewing of sides and angles intrudurally and ensured total tumor removal and immaculate hemostasis. No CSF leak was reported in any case. Clinical and radiological resolutions were seen in all cases.

**Conclusion:** Endoscopy is safe and effective in spinal IDEM tumors. It helps in better visualization of angles, tidy hemostasis and dural closure.

* * * * *

**FP-088:** The anatomy of intravertebral disc herniations and the role of vertebroplasty in their treatment

Mr. Dominik Taterra\(^1\), Mr. Bendik Skinningsrud\(^1\), Mr. Pawel Pasieka\(^1\), Prof. Jerzy Walocha\(^1\), Mr. Kamil Krupa\(^1\), Dr. Przemyslaw Pekala\(^1\), Prof. Krzysztof Tomaszewski\(^2\)

1) Jagiellonian University Medical College, Poland

**Introduction:** Intravertebral disc herniations or Schmorl’s nodes (SN) refer to protrusions of the intervertebral disc through the vertebral body of the adjacent vertebra. While most of SN are asymptomatic, some SN contact the marrow of the vertebra, leading to inflammation. Vertebroplasty has been used to treat symptomatic SN refractory to conservative treatment. However, its long-term effectiveness and safety is uncertain. This study aimed to establish the anatomical characteristics of SN and analyze the treatment options for symptomatic SN.

**Methods:** We pooled studies reporting data on the prevalence and anatomy of SN into a meta-analysis using a random-effects model. Secondary outcomes included studies that assessed the efficacy of vertebroplasty in the treatment of painful SN.

**Results:** A total of 19 studies (n=13,005 patients) were included in the analysis on the prevalence of SN in lumbar spine. Pooled prevalence
estimate (PPE) in the general population was 24.3% (95% CI: 14.9-35.2). Three studies (n=86 patients) were included in the analysis of the efficacy of vertebroplasty in the treatment of painful SN. A meta-analysis showed alleviation of pain in 94.5% (95% CI: 77.0-100.0; p=0.002) of patients. A subgroup analysis showed significant decrease of the pooled mean VAS (visual analog scale) score from 7.6 (95% CI: 6.9-8.3) before surgery to 2.1 (95% CI: 1.9-2.3), 2.4 (95% CI: 2.1-2.7), 2.3 (95% CI: 1.9-2.6) and 2.1 (95% CI: 1.8-2.4) on the day of surgery, 1 month, 6 months and 12 months after surgery, respectively.

Conclusions: Our findings show that SN are present in about one fourth of the population and that vertebroplasty effectively alleviates pain in patients with symptomatic SN.

* * * * *

**FP-089: Outcome predictor after surgical treatment of Intramedullary Spinal Tumours**

Dr. Hukum Singh1, Dr. Rahul Ingalan1, Dr. Anurag Rana1, Dr. Piyush Panchanayya1, Dr. Wazid Nair2, Dr. Daljit Singh3

1) G. B. Pant Hospital, New Delhi, India

Introduction: Surgical outcome of patient with intramedullary spinal cord tumors (IMSCST) have improved due to advances of Micro Surgical Technique, operative equipment, Neuroimaging and Neurophysiological monitoring. Intramedullary Spinal Cord Tumors comprise about 2-4% of all central nerves system Neoplasms and about 20-25% of all spinal Tumors. Surgery of Intramedullary is very challenging to Neurosurgeon which may result in devastating Neurological deficit.

Aims & Objectives: The ultimate goal in Intramedullary Tumors treatment is progression free survival (PFS) with good functional outcome. The Aim of this study was to determine functional outcome and surgical predictors in intramedullary Tumor treated at single institute.

Material & Methods: We retro spectively revived 60 patients who underwent surgical treatment for IMSCT in our institute between July 2003 to July 2019. Total 60 patients were there in age group of 5-60 yrs with male and female ratio 36:24 presenting with complaints of pain, weakness, sensory disturbance and bladder bowel involvement symptoms. Patient were investigated with MRI spine with contrast study and CT scan spine. We study the outcome predictors as preoperative neurological status, location of tumor, Tumor extension, and extent of Tumor resection and Histology of Tumor.

Result: Good recovery was seen in 36 cases, Fair in 17 cases and poor in 5 cases.

Conclusion: Long Duration of symptoms was associated directly with poor outcome, early diagnosis and treatment shown better results. Use of CUSA had shown better result.

* * * * *

**FP-090: 360 degree minimally invasive surgical approaches for lumbar degenerative diseases. Transforaminal Lumbar Interbody Fusion (TLIF), Oblique Lumbar interbody fusion (OLIF) and Anterior Lumbar interbody fusion (ALIF) - An Institutional experience**

Dr. Vamsi Krishna Yerramneni1, Dr. Ramanadha Reddy K.1, Dr. Thirumal Y.1

1) Nizam’s Institute of Medical Sciences, Hyderabad, India

Introduction: Minimally invasive surgical techniques (MIS) have distinct advantages over open procedures for lumbar spine.

Materials and Methods: It is an ongoing study. All patient who underwent MIS TLIF for grade 1 and grade 2 degenerative spondylolisthesis, MIS OLIF&ALIF for degenerative lumbar scoliosis, from June 2018 to till date were included. Post operative CT lumbar spine was done in all cases to verify screw and cage alignment. Intraoperatively we measured operating time for all and radiation exposure for Exclusively for TLIF patients (number of C-arm shots). Outcomes were measured using VAS scores and Oswestry disability index.

Results: 38 patients with mean age of 43.2+ 9yr, Male:Female ratio is 1:3. were included in the study. TLIF cases include 24 patients with grade 1 listhesis and 11 patients with had grade 2 listhesis. Facetal resection was done using Two level OLIF was done in 2 patients with scoliosis. One patient had ALIF. Average Operative time was 2.5hrs. Blood loss 75 to 100ml. One patient had intraoperative dural tear but had no postop CSF leak from wound. Post operative VAS scores were significantly better compared to preop. Postoperative Hospital duration on average was 2 days in TLIF, 4 days in OLIF. Average follow up period is 32 weeks.

Conclusion: MIS TLIF,OLIF,ALIF are novel techniques for degenerative lumbar conditions, with distinct advantage in terms of less postoperative back pain, blood loss, hospital stay, recovery time. However long learning curve, more radiation and higher cost remain major concerns.

* * * * *

**FP-091: Management of Craniovertebral Junction Disorders in children less than 8 years - An institutional experience**

Dr. Chandan B. Mohanty1, Dr. Chandrashekhar Deopujari2

1) Bombay Hospital Institute of Medical Sciences, Mumbai, India

Introduction & Aim: Craniovertebral junction (CVJ) diseases poses a unique challenge to the surgeon owing to its complex anatomy and biomechanical characteristics. CVJ not only performs majority of the cervical flexion, extension and axial rotation but also accommodates key vascular and neural structures. Hence it is not surprising that it may
present with myriad clinical and radiological features. Ossification of CVJ is usually complete by 8-10 years. However, there are extremely limited number of papers in literature focusing on pediatric CVJ diseases in children younger than 8 years.

The aim of this paper is to highlight the presentation of CVJ diseases in young children and discuss their management.

**Materials & Methods:** A retrospective chart review of all pediatric patients of CVJ diseases less than 8 years of age, treated in our department from September 2015 – Jan 2019 was carried out. Preoperative and postoperative clinical, radiological, surgical data and outcomes were analyzed in detail.

**Results:** Out of a total 77 patients of CVJ diseases treated during this time, 29 patients were less than 8 years of age. The youngest child in the series is 14 months old. Surgical tips and potential pitfalls in the management of these rare entities are discussed in detail.

**Conclusions:** Surgery for CVJ has to be tailored as per the age, clinical and radiological peculiarities of the patient to avoid catastrophic complications from a “one surgery fits all” approach. Awareness of the ossification milestones of cvj is necessary in the management of pediatric CVJ diseases.

* * * *

**FP-092: Surgery for CVJ anomalies using customised 3d printed models - Making the operation Safe**

Dr. Rashim Kataria*, Dr. Pawan Varma1, Dr. Prashant Agarwal1, Dr. Mudit Mehrotra1, Dr. V. D. Sinha1

1) SMS Medical College, Jaipur, India

**Objective:** Surgery for the CV Junction Anomalies is one of the most difficult neurosurgical procedures because of the the vital structures such as lower medulla & vertebral artery lying very close in a deformed complex bony anatomy. Simulation models of the patients using 3D printing technology can help in better surgical orientation of the pathology & hence can help performing the surgery in lesser duration as well as more precisely

**Method:** We started studying the 3D simulation model of the patients with CVJ anomalies & observed the various parameters such as ADI, effective canal diameter, entry point & trajectory of the screws etc. These were compared with the post operative neurological outcome.

**Conclusions:** The 3D models of the patients with CVJ anomalies are helpful in terms of understanding a complex anatomy. It also add to the confidence of the surgeon in screw placement & can predict a compromised effective canal diameter in the model after manipulations so that these very manipulations could be avoided during the actual surgery thus preventing neurological deficits.

* * * *

**FP-093: The Cauda Equina Syndrome.. Not that rare**

Dr. Tapas Chatterjee*

1) The Calcutta Medical Research Institute, Kolkata, India

Back pain and leg pain are neglected in our country. Though uncommon development of Cauda Equina Syndrome can be disastrous. Complete CES presents with bladder retention and incomplete CES with bladder symptoms but no retention. Both the groups have other features of CES like bilateral leg pain saddle anesthesia and various grades of limb weakness.

**Materials and Methods:** We operated on 73 lumbar disc cases in our institute in the last 2 years. We found 2 of those came with Complete CES and 9 with Incomplete CES. Post surgery features did not improve that had complete CES and improved remarkably those presenting with incomplete CES. Those presented with complete CES had a long duration of symptoms but presented to a hospital for the first time. Incomplete CES had previous nagging symptoms and all were advised surgery earlier.

**Conclusion:** Development of complete CES can be disastrous. Ignorance about persistent back and leg pain was the primary cause.

It is our recommendation that in cases with low back pain with radiculopathy a very detailed history and clinical examination be done. Leading questions on saddle anesthesia and early bladder signs sphincter disturbances should be sought. Pre and post void bladder scans should be done at the slightest doubt. All cases of impending CES should be advised surgery immediately. Those refusing should be forewarned. People with no features of impending CES should be aware of the red flag signs and clearly printed. None should be allowed to progress to disaster from a seemingly innocuous disease.

* * * *

**FP-094: Morphometric analysis of Atlas in Down Syndrome patients**

Dr. Abdullah A. Alatar*, Dr. Amro F. Al-Habib1, Dr. Fahad Albadr1, Dr. Abdullah Abu Jamea1, Dr. Essam Alshail1, Dr. Ahmed Alahmari2

1) King Saud University Medical City, Riyadh, Saudi Arabia

5) King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia

**Objective:** Atlantoaxial Instability (AAI) is considered the most prevalent cervical abnormality in patients with Down Syndrome (DS). No previous study has described the anatomy of Atlas lateral mass (ALM) in DS comparative to non-DS patients. This study aimed to provide a quantitative analysis of ALM morphology in DS patients to identify differences that might be relevant for safe instrumentation.

**Methods:** A retrospective study. DS cases were identified. A control group included age-and sex-matched patients without DS who had cervical CT scan were included. CT images reconstructions were made
to adjust for any rotated images of C1. Neuroradiologist performed the measurements of anatomic details of ALM. Included radiologic measurements were anterior height (AH); posterior height (PH); posterior height inferior to arch (PHIA); anteroposterior diameter (APD), and Mid-width (MW) were measured bilaterally. Posterior-to-anterior height ratio (PH/AH*100) was calculated. Measurements of patients with/without DS were compared.

**Results:** Total of 301 patients with DS have been identified. 11 met our criteria, 3 of them were excluded due to poor CT quality. A total of 8 patients with and without DS were included in the analysis. The median age for DS and non-DS was 14 years and 13 years respectively. Four measurements were significantly smaller in patients with DS; Anterior-height (p=0.014), Posterior-height (p<0.0001), PHIA (p=0.032), and Posterior-anterior height ratio (p=0.001).

**Conclusions:** Patients with DS had trapezoid-like geometry of their ALM with smaller heights of posterior wall compared anterior wall. The distance available for screw insertion (below posterior arch of ALM) is significantly smaller in DS patients. These variations should be considered during surgical planning for safe placement of instrumentation.

* * * * *

**FP-095: Surgical management of Pott’s spine - A single centre experience**

Dr. Arun Kumar MA*, Dr. Anantha Kishan1, Dr. Sandeep BV2, Dr. Manpreet Singh Banga1

1) Vydehi Institute of Medical Sciences, Bangalore, India

**Introduction:** India has infamy of being World’s Tuberculosis Capital with quarter of all cases worldwide. Pott’s Spine accounts for 3% of these & assumes importance due to its chronic morbidity. Even with adjunctive use of anti-tubercular chemotherapy (ATT), surgical intervention plays major role.

**Methods:** Retrospective study conducted at our institute, data collected from medical records between 2011-2019. Clinical history, neurological status, imaging & blood investigations, operative records & condition at discharge were recorded and followed-up.

**Results:** Fifty-two patients were included, average age of 39.4 years. Most patients presented with backache and paraparesis. Dorsal spine was most commonly involved (54%) followed by lumbar (38.5%) and cervical (7.5%). 85% patients had two or more levels of involvement and 71% patients had pre & paravertebral collection. ESR was elevated in 2/3rd of patients (average 55mm/Hr).

Of the 28 cases with dorsal involvement, 22 were approached posteriorly, rest by transthoracic or anterolateral approach. In patients with lumbar involvement, 16 were approached posteriorly & remaining by anterolateral retroperitoneal approach. In posterior approach, transpedicular screws and rods construct was used in >50% patients. All patients were started on ATT. However, only 21 patients had proof of granulomas & only one patient showed AFB positivity. Rest were started empirically on clinical suspicion and radiological findings. Average hospital stay was 11 days.

Most patients (94.3%) had improvement in symptoms at discharge with 50% patients having improvement in motor power. Of the 8 patients presenting with paraplegia, 50% improved within 1 week of surgery.

**Conclusion:** Early diagnosis & intervention showed good neurological outcomes, even in patients with paraplegia. Hence, surgery plays major role in Spinal Tuberculosis. However, the resurgence of tuberculosis with multi-drug resistance and increased association with HIV pose fresh challenges.

* * * * *

**FP-096: Anterior Single Screw Fixation of Type II Odontoid Fractures - An Institutional Experience**

Dr. Anurag1, Dr. A. Mastan Reddy2

1) Osmania Medical College & Hospital, Hyderabad, India

Fractures of the odontoid process of axis vertebrae are common, accounting for 10% to 20% of all cervical spine fractures. Almost two thirds of all dens fractures are type II according to Anderson and D’Alonso classification system. Odontoid screw fixation is the preferred method for stabilization of acute, unstable Type II odontoid fractures. This is the only spinal fixation technique for fractures that restores spinal stability yet completely preserves normal spinal motion. We achieved 100% correct trajectory and screw placement in our study. There were no instances of screw break out, pull out or non-union. Hard cervical collar was applied for 3 months after surgery and we had 100% fusion rate.

**Material & Methods:** We included 8 patients in our study who were managed with anterior single odontoid screw placement from 2017 to 2019 in the Department of Neurosurgery, Osmania Medical College & Hospital, Hyderabad.

**Results:** Out of 9 patients 8 were male and one was female. 8 out of 9 patients improved neurologically after screw fixation but one patient, who had cord contusion was neither improved nor deteriorated. We had experienced no mortality and no implant failure or failed trajectory.

**Conclusion:** Most odontoid type II fractures warrant surgical fixation and with proper utilization of our technique, such challenging cases can be conquered with great success at centers in developing countries where all new equipments are not available. Modification of technique are

1. Alignment of the anatomical landmarks during positioning
2. Controlled neck manipulation.
3. Gutter on the C3 body

* * * * *

**FP-097: Anterior Cervical Discectomy and fusion with Iliac Crest Bone Graft and Titanium Cage for treatment of patients with single level cervical degenerative disc disease - Experience of single institute**
Aims & Objectives: Anterior cervical discectomy and fusion is challenging with respect both patient selection and choice of surgical procedure. The aim of this study is to evaluate the clinical and radiological outcomes of using titanium cage and autologous iliac crest bone graft fusion after anterior cervical discectomy for single level degenerative cervical disc disease.

Material & Methods: This is a prospective study of 48 patients conducted from January 2016 to December 2018 in a single institute who underwent anterior cervical discectomy and fusion for single level degenerative cervical disc disease. Fusion was attained with either iliac crest bone graft or titanium cage without additional plating. Postoperative outcomes were evaluated at 2 weeks, 3 months and 6 months. Radicular pain, neck pain and patient satisfaction were evaluated using the visual analogue scale.

Results: Bone graft group showed significantly lower clinical outcomes at 2 weeks but showed similar outcomes at 3 months and 6 months postoperatively. The rate of interbody fusion was similar between both groups. There was no significant correlation between pain relief and age, sex and disc level fused.

Conclusion: Anterior cervical discectomy is an effective treatment for radicular pain in degenerative cervical disc disease. Because of similar clinical and radiological outcomes and lack of donor site morbidity, titanium cage is preferred over autologous bone graft. The only constraint in titanium cage group was the cost of surgery.

Aims/Study-Design: To prognosticate the POST-ITSNP effect by AL-TENS in thoracolumbar sacral paraplegia cases. Prospective study.

Material/Methods: 13 paraplegia patients (11 male and 2 females, 3 complete paraplegia and 10 partial paraplegia with ZPP (zone of partial preservation) cases taken in which PRE-ITSNP AL-TENS and POST-ITSNP TENS has been done. Mean time was 9.69 months. ITSNP administered at a dosage of 0.2 mg/kg bo wt at L3/4 level by 20G LP needle. Pre and post ITSNP was monitored by AL-TENS.

Results: POST-ITSNP AL-TENS showed 23.84% benefit and 23.32% in ASIA grading in thoracolumbar sacral paraplegics. Complete paraplegia cases didn’t show any change. Partial paraplegics (with ZPP) showed 31% recovery in POST-ITSNP TENS and 33.34%. Thus AL-TENS showed a favorable modality to predict the ITSNP feasibility in thoracolumbar sacral paraplegia cases also no response with 8 mAmp or more.

Conclusions: ITSNP with AL-TENS helps us to prognosticate the future outcome.

---

FP-098: Acupuncture-like TENS (AL-TENS) as a quantitative measure for the feasibility of intrathecal sodium nitroprusside superfusion in paraplegics for physiological recovery (the 10,000 fold effect) in 13 cases (pilot study)

Dr. Vinod Kumar* 1) Advance Neuro & General Hospital, Lucknow, Uttar Pradesh, India

Introduction: Intrathecal sodium Nitroprusside (ITSNP) has shown marked recovery in various causes of paraplegias after proper surgical decompression of spinal cord and stabilization of vertebra. To measure paraplegias’ recovery bedside effectively here is done by ACUPUNCTURE-LIKE TENS (AL-TENS) with ITSNP in various thoracolumbarsacral cases.

AL-TENS caused pain relief by well known gate theory at spinal cord by activating A-ALPHA nerve fibers which activates A-Delta fibers for muscle spindle then pain fibers are inhibited by RENSHAW cells at spinal cord. The present work uses this cascade of various transmissions of nerves via a normal or damaged (complete or partial) spinal cord.
FP-100: To compare open and endoscopic surgery for Spinal Intradural Extramedullary (IDEM) lesions

Dr. Kamlesh Vasant Rangari*, Dr. Anant Mehrotra1, Dr. Sanjay Behari1
1) SGPIMS, Lucknow, Uttar Pradesh, India

Objective: The present study aims to compare open and endoscopic surgery for Spinal Intradural Extramedullary (IDEM) lesions.

Materials & methods: All cases of spinal IDEMs operated in the past one year were included in the study and clinicoradiological features, techniques, perioperative course and follow up was noted. Spinal IDEMs extending to more than two vertebral level were excluded from the study. These cases were operated by either the conventional "open microscopic" techniques or by using endoscopic Destandau’s interlaminar technique. Follow up was by the OPD records or through telephonic contacts. A minimum follow up of 3 months was considered for inclusion. Fisher exact test and chi square test were used for finding out the significance.

Results: Among 58 patients (female:27; male:31) studied, the initial 46 cases underwent “open microscopic” surgery and 12 underwent endoscopic surgery (female: male-1:1.5). The average age of presentation in open microscopic group was 41 years and in endoscopic group was 39 years (p=0.78). The mean duration of symptoms in open group was 20 months and 21 months in endoscopic group (p=0.86). Clinical improvement and radiological resolution could be achieved in all. Average hospital stay in open group was 6 days and was significantly less in endoscopic group i.e 2 days (p=0.023). Average blood loss was less in endoscopic group i.e 15 ml compared to open group i.e 155 ml (p=0.02).

Conclusions: Endoscopic excision of IDEMs provides a minimally invasive approach (less blood loss and duration of stay) without compromising the outcome.

FP-101: Thoracic Outlet Syndrome: Our Experience

Dr. Ujwal Yeole*, Dr. Ketan Desai1
1) P. D. Hinduja Hospital & MRC, Mumbai, India

Introduction: Thoracic outlet syndrome (TOS) is a rare problem and diagnosing it requires certain expertise and vigilance for the problem. It involves meticulous history taking, clinical examination and supportive radiological and electrophysiological assessment. Here, we analyze our experience in management of the TOS.

Methods: We performed a retrospective analysis of 28 patients with TOS treated surgically from 2002 to 2019 at our center. The data for clinical features, radiological and electrophysiological evaluation was analyzed along with management options.

Results: The mean age of the cohort was 38.4 years with female predominance. The duration of clinical features varied from 9 months to 5 years. The commonest presenting features were pain and paresthesia along the upper limb which was aggravated by shoulder abduction universally. The motor weakness and vascular symptoms were noted in 26 and 8 cases, respectively. MRI and CT dynamic angiography revealed neurovascular compression due to cervical rib, tight fibrous band and hypertrophied scalenus anterior in 16, 12 and 2 cases, respectively. Aneurysm of subclavian artery was noted in 3 cases. Electrophysiological evaluation revealed C8-T1 root or lower trunk neuropathy in all cases. All cases underwent surgical decompression by anterior supraclavicular approach. The sensory and vascular symptoms improved in 100% of cases and motor deficits improved in 76.9% (20) cases.

Conclusion: TOS is a rare clinical entity with incidence of ~1%. In symptomatic cases, surgical decompression of the neurovascular bundle is the gold standard with excellent neurological outcomes.

FP-102: Management of cubital tunnel syndrome by anterior trans-muscular transposition of the ulnar nerve

Dr. Mohamed Ahmed Eltable*, Dr. Dalia Salah Self1, Dr. Ahmed Shawky Ammar1
1) Menoufia University, Menofia, Egypt

Various surgical options are used for treatment of ulnar nerve entrapment at the elbow. In this study, anterior trans-muscular transposition of the ulnar nerve was used for treatment of cubital tunnel syndrome.

We aim to evaluate the surgical results of anterior trans-muscular transposition technique for treatment of cubital tunnel syndrome with particular emphasis on clinical outcome.

Forty patients of cubital tunnel syndrome were operated using anterior trans-muscular transposition technique. Patients were classified into post-operative clinical outcome grades according to the Wilson & Krout criteria, and they were followed up by visual analogue scale (VAS), the disability of arm shoulder and hand (DASH) questionnaire, electrophysiological study and post-operative clinical evaluation.

Forty patients of cubital tunnel syndrome whose went to anterior transmuscular transposition of ulnar nerve shows a significant clinical improvement at 24 months post surgery regarding visual analogue scale (VAS), the disability of arm shoulder and hand (DASH) questionnaire, electrophysiological study and by Wilson & Krout grading as 87.5% of the patients recorded excellent and good.

This study documented that the anterior transmuscular transposition of the ulnar nerve is a safe, effective treatment for ulnar nerve entrapment at the elbow.

Key words: ulnar nerve - trans-muscular transposition- cubital tunnel syndrome-DASH-VAS.
FP-103: Complete Brachial Plexus Injury! Is the outcome gloomy?
Dr. Ketan I. Desai
1) P.D. Hinduja Hospital & MRC, Mumbai, India
Brachial plexus injuries are not uncommon problem. Over last decade, the incidence is of brachial plexus injuries is on a rise. It occurs predominantly following motorbike accident and younger population are more commonly affected. The management of complete/total brachial plexus injury affecting all roots of brachial plexus with monoplegia of the upper limb poses a surgical challenge when compared with partial, less severe incomplete brachial plexus injury.
We share our experience of 18-years managing this complex & severe injury affecting brachial plexus. Based on our experience the outcome is not as poor and gloomy as projected. The key factor to achieve good outcome is timely intervention in form of brachial plexus repair if it fails to recover after 2-3 months of observation or conservative treatment. We present our experience of managing patients with complete/total brachial plexus injury from 2000-2017 at Department of Neurosurgery, P D Hinduja Hospital and K E M Hospital, Mumbai. The results were analysed based on the relief of sensory symptoms and motor functional recovery. The management protocol of brachial plexus injury, various treatment options available and problems faced by us in management of these patients are highlighted.

FP-104: Peripheral Nerve Sheath Tumors: A retrospective analysis of 25 patients
Dr. Anshul Goel1, Dr. Dattaraj Sawarkar1, Dr. Pankaj Singh1, Dr. Ramesh Doddamani1, Dr. Sarat Chandra1, Dr. Ashish Suri1, Dr. Shashank Kale1
1) All India Institute of Medical Sciences, New Delhi, India
Background: Peripheral nerve sheath tumors are rare tumors, which can be either benign or malignant.
Methods: In this retrospective analysis, peripheral nerve sheath tumors (PNST) diagnosed and treated between May 2014 to Dec 2018 were reviewed. Demographical and clinical data tabulated and analyzed.
Results: Of the 25 patients, 17 (68%) were males and 8 (32%) were females with a mean age at diagnosis of 34.33 years, 4 patients being younger than 20 years, including 3 (12%) patients with neurofibromatosis. The mean duration of hospital stay was 7.6 days. One patient’s biopsy was malignant which recurred after first surgery. There were no added new deficits after surgical excision. Rest of the tumors were benign and there was no recurrence till last follow up.
Conclusions: Surgical excision of benign nerve sheath tumors is associated with good outcome if proper surgical principles are followed. Risk of recurrence is more with malignant tumors.

FP-105: Benign Neurogenic Lumbo- Sacral plexus tumours: An experience of 16 cases
Dr. Rohan Ratan Roy1, Dr. Rohan Ratan Roy1, Dr. Ketan I. Desai1
1) P. D. HINDUJA HOSPITAL & MRC, Mumbai India
Objectives: Benign neurogenic tumors originating from Lumbo-sacral plexus are rare. The objective was to analyze the clinical features, radiological findings and discuss the management options of this benign rare problem.
Methods: A retrospective study of 16 patients with lumbo-sacral benign neurogenic tumors surgically treated from 2004-2019 was performed. The data was analyzed and discussed. All patients had benign neurogenic tumors - neurofibromas or schwannomas. The mean age was 38-years (range 22-58 yrs.). Male to female ratio was 1:2. Duration of clinical features ranged from 6 to 36 months (mean 16 months).
Results: The common clinical features were radiating pain & paresthesia in the lower limb. In 3 patients there was associated weakness in the affected lower limb. 6 patients had straining while passing urine and stool. In 11 patients, there was involvement of lumbar roots and in 5 there was involvement of sacral roots. 14 patients underwent anterior transabdominal excision of the tumour. In 2 patients, the excision was done by posterior approach. The histo pathological examination revealed neurofibroma in 7 patients and schwannoma in 9 patients. The pre-operative pain and paresthesia improved significantly in all 16 patients. The pre-operative weakness improved in one patient. The mean follow-up was 4.5 yrs and follow-up MRI scan showed no recurrence of tumor.
Conclusion: Benign neurogenic tumors of lumbo-sacral plexus are rare. Symptomatic lesions needs surgical excision. The results of surgical excision are excellent. Prior proper planning and help of general surgeon is mandatory to have good outcome.

FP-106: Facial nerve regeneration: An experience of 27 cases
Dr. Rabi N. Sahu1, Dr. Smit Bansal1
1) AIIMS Bhubaneswar, Odisha, India
Introduction: Facial nerve is the 7th cranial nerve supplying the muscles of facial expression in face. This is involved clinically with various skull base intracranial tumors most commonly with vestibular schwannomas. However other tumors like glomus jugular & temporal bone tumors also affect this nerve. There are high chances of postoperative deficits associated with the surgery of the skull-base.
Material & Methods: We present a retrospective study of 27 cases of post-operative facial nerves regeneration following various skull-base surgery, where the facial nerve is anatomically & neurophysiologically preserved. The clinical presentation and the postoperative follow-ups are collected from the in-patients’ records and analyzed. Facial nerve paresis was graded according to the House-Brackmann Classification.
FP-107: Safety and Efficacy of Primary Multisession Gamma Knife Radiosurgery for Large Volume Paraganglioma

Dr. Manjul Tripathi**
1) PGIMER, Chandigarh, India

Objective: To define the efficacy, safety, and complication profile of dose-fractionated-GKS in 2/3 consecutive sessions for the treatment of a cohort of 10 cases of JP.

Methods: Between 2012-2017, ten patients of JP were treated with dose-fractionated GKS in 2/3 sessions, as it was not safe to treat the lesion in a single session because of the large volume or proximity to organs at risk. The small to medium sized JP are treated with 16-22 Gy radiation, but the large volume JP were treated with 23-25 Gy radiation dose. The Leksell-G frame was kept in situ during the whole procedure. The tumor volumes on pre- and post-treatment imaging were compared, utilizing the Leksell Gamma Plan treatment plan software to assess tumor progression. The patients were regularly evaluated for their clinical outcome with radiologic correlation.

Results: The mean age of the presentation was 37 years (range: 15 to 65 years). The male to female sex ratio of the patients was 0.3 (5/13). There are various grades of facial palsy following surgery where the facial nerve was both anatomically & neurophysiologically preserved. Around 11% had delayed palsy followed by recovery of the functions. Three cases (11%) in our series has abnormal regeneration syndrome (like Crocodile teal syndrome etc.). At follow up of six months 70% of patients with postoperative facial paresis improved up to H& B grade 3. Five patients (18%) had herpes infection following surgery in our series.

Conclusion: Postoperative facial nerve function following cranial surgery is variable where the nerve was both anatomically & neurophysiologically preserved. Although most cases recover some regenerate abnormality in various modalities of functions.

FP-108: Post trigeminal Frameless Radiosurgery - Identifying shot accuracy in euclidean space through Serial MR Imaging

Dr. Vangipuram Radha Krishna Gowri Shankar**, Dr. Ashish Bhanje¹, Dr. Hirak Vyas¹, Dr. Bhavya Patneedi¹
1) HCG Cancer Center, Mumbai, India

Purpose/Objective(s): To evaluate imaging changes at DREZ target zone post image guided radiosurgery for medically refractory trigeminal neuralgia (TN).

Materials & Methods: 15 pts. with medically refractory primary TN having BNI class III B & Class IV pain level & underwent frameless trigeminal radiosurgery using stereotactic cones. All patients underwent serial MR imaging at time points 72 hrs, 1 week, 1 mo, 3 mo, 6 mo, & 12 mo post SRS. Targeting accuracy was assessed from deviation of the coordinates of the intended target compared with the center of enhancement on 1 month post SRS MRI. Radiation dose delivered at the borders of contrast enhancement were evaluated.

Results: The actuarial rate of obtaining complete pain relief was 93.3%. Imaging changes were same in all the patients post radiosurgery. Nerve edema is seen at 72 hrs post treatment, minimal brainstem edema (nearby DREZ) is noted at 7 days post treatment. Focal enhancement corresponding to SRS shot is seen at 1 month. The median deviation of the coordinates between the intended target and the center of contrast enhancement was 0.5 mm (0.3-0.7 mm) in Euclidean space. The median radiation doses fitting within the borders of the contrast enhancement of the shot ranged from 78Gy.

Conclusion: Warping original treatment doses on the 1 month post SRS postcontrast MRI gives the clinical team an idea about the accuracy of the treatment and accordingly the errors in treatment.

FP-109: Outcome of Gamma Knife Radiosurgery for Meningiomas: An Retrospective Institutional Review of 441 cases

Dr. Nishanth Sadashiva¹**, Dr. Sandeep Kadregula², Dr. Subhas Konar³, Dr. Arivazhagan Arima⁴, Dr. Kannepalli Narasingha Rao⁵, Dr. Dhananjaya Bhat⁶, Dr. Dwarakanath Srinivas⁷, Dr. Sampath Somanna⁸
1) National Institute of Mental Health and Neurosciences, Bengaluru, India

Introduction: Surgical excision remains a standard of care for larger meningiomas. Gamma Knife Radiosurgery (GKRS) has evolved as a proven alternative to surgery for smaller as well as residual meningiomas.

Methods: We retrospectively reviewed our GKRS database from 2009-
FP-110: An electrical kindling model of epilepsy results in cell type-specific changes to inhibitory neurons in the primary olfactory cortex

Dr. Jennifer Robertson," Dr. John Bekkers," Dr. Jennifer Joy Robertson
1) The Canberra Hospital, Australia
2) John Curtin School of Medical Research, Australian National University, Canberra, Australia

The primary olfactory cortex has been shown to be involved in the generalisation of epileptic seizures, but the mechanism is unclear. Previous work in our laboratory has identified different classes of inhibitory neurons in the primary olfactory cortex that can be identified using immunohistochemical markers. However, the effect of epilepsy on these different classes has not previously been investigated. The current study aimed to compare the effect of electrical kindling on different inhibitory cell types in the primary olfactory cortex. Mice (P24-26) were kindled using an olfactory bulb electrical stimulation protocol, and seizures were confirmed using electrocorticograms (ECoGs) with video verification. Kindled mice were compared to age-matched control and sham mice. Animals were perfusion-fixed and 100µm thick slices prepared. Slices were immunohistochemically processed to allow for identification of different classes of interneurons. We found a 13% overall reduction in the number of inhibitory neurons in the primary olfactory cortex in the kindled mice compared to the sham and control (p < 0.01, n = 22614 neurons, n = 216 slices, n = 12 mice) with some cell types affected more than others. This study provides the first rigorous characterisation of the effect of epilepsy on inhibitory cell types in the primary olfactory cortex, and demonstrates that the effect of kindling appears to be cell type-specific. Our results may provide mechanistic insight into seizure generalization through the primary olfactory cortex and suggest therapeutic targets.

FP-111: The active function of Venous Brain System on Hemodynamic Brain Circulation

Dr. Jan Hemza
1) Faculty Hospital at Saint Ann, Czech Republic

Based on anatomical and biomechanical studies, creating models of brain venous system and studies of biomechanical and histological quality of dura mater with ascertainment of lymphatic system in dura mater, a hypothesis, and then theory about active function of venous brain system on hemodynamic brain circulation and more functions of outflow vessels structures of the brain, was stepwise created. A study, which proved influence of angiosynizesis, self-oscillation of vessel’s wall, on active outflow of brain vessels, was made. Further away, we studied physiology of cavernous sinus together with the whole sinuses brain system and immunology function, and influence of venous and lymphatic systems on liquorodynamic function.

Venous physiology aspects: hemodynamic regulation - Starling resistor, combination of bridging veins, venous brain system and venous brain sinuses - primarily cavernous sinus (“physiological jewelry box”) as a pulsing pump, thermodynamic part of brain, influencing brain liquorodynamic functions (liquor production, absorption and flow). The important influence is so-called “movement of brain” on bridging veins system, another important effect is electromagnetic continuum on bridging brain veins as muscular type of veins.

The studies of dura mater show physiological quality of this structure of brain wrappers as not only protective structures, but also structures influencing liquorodynamic, hemodynamic, immunologic and electrophysiologic functions, farther participating together on brain thermodynamic function. The system of lymphatic dura mater structures is important, both from liquorodynamic aspect and immunologic functions.

The whole study brings a new view on brain vessel system physiology, and its outflow part as a greatly active constituent.

FP-112: 3D printing in neurosurgery: A comparative analysis of fused deposition modeling technique with 2D/3D computational imaging

Dr. Ranjit Devidas Rangnekar, Dr. Ranjit Rangnekar, Dr. Vivek Agrawal
1) Sir H. N. Reliance Foundation Hospital, Mumbai, India

Aims & Objectives: To create and validate a method for making...
Materials & Methods: A set of 10 3D printed models using fused deposition modeling of varied pathologies were made. The pathologies included models of aneurysm, AVMs, degenerative spine disease and skull based lesions. Analysis and evaluation of statistical measurements relative to 2D and 3D computational imaging was done along with visual comparison of models to operative anatomy. An extensive search of PubMed and Scopus databases was conducted using relevant keywords for 3D printing in neurosurgery for literature review.

Results: There was no statistically significant difference in measurements of 3D printed models in comparison with 2D multiplanar imaging and 3D computational models. 9 out of the 10 3D models were judged to have a precise representation and visual correlation with intraoperative scenarios. Review of literature showed comparable studies. The paper also reports on advances in 3D printing in numerous subspecialties of the field like neuro-oncology, cerebrovascular, functional, spinal, endoscopic neurosurgery.

Conclusion: 3D printed models are fairly accurate when compared with imaging and aid in complex operative scenarios. These models increase the depth perception, improve haptic skills and feedback thereby increasing operative competency. They can be used as personalized teaching models and are disease specific, accounting for pathological variations. Newer advances in printing have decreased the cost and ensured reproducibility for availability in everyday practice.

* * * * *

FP-113: Immunologically tolerable Biofabricated functional human neurological conduits for treating spinal cord injury

Dr. Syed Ameer Basha Paspala1, Dr. Sandeep Kumar Vishwakarma2, Dr. Aleem Ahmed Khan3
1) Care Hospitals, Hyderabad, India
2) Deccan College of Medical Sciences, Hyderabad
3) Dr. Habeebullah Lifesciences, Hyderabad

Objective: The present study has been aimed to develop a suitable bio/immune tolerable tissue specific functional neuronal conduit to provide mechanical and biological support for long-term survival and function of neurological cells within natural biological niche for their applications in spinal cord injury (SCI) regeneration.

Methods: Decellularized meningeal scaffolds (DMS) were prepared using simple and highly efficient protocol within 240 min ex vivo. Mechanical and biological properties of DMS were determined using fluorescence staining of ECM proteins, electron microscopy and molecular analysis. Human neuronal cells differentiated on DMS were compared for their structural and functional significance as compared to 2D-culture conditions. Neuronal signalling was also determined by analyzing pre and post-synaptic markers. Furthermore, immunocompatibility of the engineered construct was identified by transplanting them within the rat omentum through assessment of anti-inflammatory, blood and ECM deposition on or around the graft.

Results: This particular tissue specific biological construct is immunologically tolerable and provides precisely orchestral three-dimensional platform to choreograph the long-distance axonal guidance and more organized neuronal cell growth. It passes sufficient mechanical and biological support enriched with several crucial neurotrophins required for long-term survival and function of neurological cells which is required to form proper axonal bridge to regenerate the damaged axonal connectomes at lesion-site.

Conclusion: This strategy imitates a precisely orchestral platform to support tissue specific neuronal construct for organized neuronal cell growth which is required to form proper axonal bridge to complete the damaged neuroconnectomes in SCI and could overcome on certain limitations of earlier developed synthetic biomaterials.

* * * * *

FP-114: Clinical grade neurogenic cells generated under xeno-free conditions for neuro-regenerative applications

Dr. Aleem Ahmed Khan1, Dr. Sandeep Kumar Vishwakarma2, Dr. Syed Ameer Basha Paspala3
1) Dr. Habeebullah Lifesciences, Hyderabad, India
2) Deccan College of Medical Sciences, Hyderabad
3) Care Hospitals, Hyderabad

Background and Aim: Lack of less ethical and approved sources for isolation of stem cells represents major hurdles towards their clinical applicability. Another major challenge is faced due to lack of xeno-free systems to maintain isolated cells and differentiate them into neurogenic lineages for opting regenerative strategies in central nervous system disorders. Hence, the present study was aimed to establish an ex vivo xeno-free method of trans-differentiating human neuronal cells from umbilical cord blood (UCB) for neuro-regenerative applications.

Method: We established a unique method for trans-differentiating human UCB derived stem cells into neurogenic lineage under xeno-free condition. Briefly; human UCB stem cells were isolated using Ficoll-paque density gradient centrifugation and enriched by ex vivo culturing in heat inactivated UCB serum prepared in-house. Neurogenic differentiation was triggered using xeno-free Retinoic acid induction medium. Immunophenotypic, immunofluorescence and molecular characterization was done to ensure the percentage of neurogenic lineage cells after trans-differentiation.

Result: Our results suggest that the expanded UCB-derived MSCs harbor a small unique population of cells that express pluripotent stem cell markers along with MSC markers and possess an inherent neurogenic potential. The percentage of cells expressing neural
markers is consistent in different experiments with similar conditions. Our findings therefore form the basis for developing better neuronal differentiation xeno-free protocols from UCB-MSCs, which can be used for therapeutic applications.

**Conclusion:** Xeno-free neuronal differentiation of human UCB-derived stem cells provides an enriched source for neuro-regenerative applications.

* * * * *

**FP-115: Lessons Learnt in doing Endoscopic Third Ventriculostomy in children - The Beginner's experience**

Dr. Ankur Bajaj**, Dr. Bal Krishna Ojha¹, Dr. Chhitij Srivastava¹

1) King George's Medical University, Lucknow, India

**Objective:** Endoscopic third ventriculostomy (ETV) is becoming an effective treatment for CSF diversion in hydrocephalus in children of various etiologies and technique has to be expertise. Objective is to study the beginners prospective of ETV outcome.

**Material and Method:** All children (Age <18 years) undergoing ETV from January 2017 till date were included in the study and followed up for a minimum of 6 months. Demographic data, symptoms and signs of raised ICP, radiological and detailed intraoperative finding were noted. Patient followed it at least 6 months and postoperative complication, resolution of sign of raised ICP, ETV failure noted.

**Result:** Total no of 72 patients were studied with mean age at ETV was 3.2 years and common etiologies were aqueductal stenosis (42%), infective(32%). Severe and minute haemorrhage is seen in 1.4% and 13.8% respectively. Most common postoperative complications were CSF leak (12.5%), pseudomeningocele (6.9%), subdural effusion (6.9%). ETV success rate is 66.6%. post-operative CSF leak, pseudomeningocele, age less than 1 year, tubercular etiology is (6.9%). ETV success rate is 32%. post-operative CSF leak, pseudomeningocele, age less than 1 year, tubercular etiology is associated with increase failure of ETV.

**Conclusion:** ETV can be done safely and effectively in children with few precautions that the perforation of the floor should be made by blunt probe without applying much pressure, stoma size should be adequate and enlarge with Fogarty balloon catheter and care should be taken so that all membranes are perforated and dilated. Clinical correlation is more important than radiological correlation to determine patient outcome.

* * * * *

**FP-116: Endoscopic Third Ventriculostomy and Shunt Dependency**

Dr. Khoo Yee Hwa¹**, Dr. Nishanthi Apparow¹, Dr. Vinodh Vayara Perumal¹, Dr. Pulivendhan Sellamuthu¹, Dr. Prabu Rau Siram¹

1) Queen Elizabeth Hospital, Sabah, Malaysia

**Introduction:** Neuroendoscopic surgery is gaining popularity as a minimally invasive procedure. Adequate training and knowledge ensures that it is related to lesser morbidity. Endoscopic third ventriculostomy (ETV) is a routinely performed surgery these days.

**Objective:** To evaluate various etiologies, surgical indications and patient outcome in relation to ETV and post operative ventriculoperitoneal shunt (VPS) dependency.

**Methods:** We reviewed all pediatric patients’ records who were aged between newborn and up to the age of 12 years and admitted to our centre from 2015 to 2019. We analyzed clinical records along with surgical and radiological images.

**Results:** A total of 43 patients were included in this study that underwent ETV alone or ETV along with other intraventricular surgeries. The various aetiologies were 25 tumoural lesions, 9 infective lesions or ventriculitis, 8 with congenital developmental anomaly and 1 case of post-traumatic hydrocephalus. 34.8 percent of patients needed VPS indicating ETV failure. Out of these failures, 66 percent were tumour lesion cases and another 33 percent of congenital anomaly. Failure was also commoner with younger aged patients aged less than 2 year old.

**Conclusion:** ETV if properly done for the correct indication becomes a valuable asset in reducing the requirement of VPS. Our data is also in accordance with the ‘ETV Success Score’ results.

* * * * *

**FP-117: Study of rates and timing of functional worsening in 259 patients with different forms of Closed Spinal Dysraphism**

Dr. Rajshekhar Vedantam¹**, Prof. Lakshmanan Jeyaseelan¹

1) Christian Medical College and Hospital, Vellore, India

**Objective:** Rates of functional worsening and age at which it occurred were studied in 259 surgery naive children and young adults, who were diagnosed with different forms of closed spinal dysraphism.

**Methods:** Functional worsening was defined as the onset of any new neurological dysfunction or progressive scoliosis. Kaplan Meier curves were plotted to determine the rate of worsening and multivariate analysis was used to determine the risk factors for functional worsening.

**Results:** The diagnosis was as follows: Lipomyelomeningocele (LMMC), 93; Limited dorsal myeloschisis (LDM), 9; Terminal myelocystocele, 10; Split cord malformation type 1 (SCM1), 31; SCM type 2, 28; Fatty filum, 31; Dermal sinus with or without an intradural dermoid, 45; and miscellaneous, 12. Functional worsening was present in 154 (59.5%) patients at the time of surgery. Overall, the rates of functional worsening were as follows: at 1 year of age, 20.4%; at 5 years, 52.5%; and 10 years, 72.8%. On multivariate analysis, those with SCM1 had a significantly higher rate of worsening compared to LMMC (reference group) (p = 0.049). Interestingly, patients without any deficits at birth had a higher rate of deterioration compared to those with fixed deficits (p = 0.02).
FP-118: Intraoperative neuromonitoring for tethered cord surgery in infants - Feasibility, nuances and prognostication: How close can we get?

Dr. Suhas Udayakumaran*, Ms. Niveditha S. Nair†, Ms. K. S. Karthika‡, Dr. Mathew George*, Dr. Siby Gopinath†
1) Amrita Institute of Medical Sciences & Research Centre, Kochi, Kerala, India

Objective: To evaluate the efficacy and safety of Intraoperative Neuromonitoring (IONM) in surgery for tethered cord in infants.

Materials and methods: An infant cohort consisting of sixty-six patients who underwent surgery for spinal dysraphism under IONM were included. Their preoperative neurological and urological status were compared with postoperative status clinically. The study design was prospective, and the duration of the study was from January 2011 to February 2019. IONM (MEP and direct stimulation) was done with Xeltex Protektor 32 IOM system, Natus Neurology/medical inc. Middleton, USA. Statistical analysis in the form of Chi-square is conducted using SPSS.

Results: Overall, among 66 patient, clinical improvement was seen in 18 (18/23) patients with motor deficits, 16 (16/22) with bladder deficits and 15 (15/16) with bowel deficits. The monitorability for motor and sphincter was 98.48% and 91.83% respectively. The sensitivity of IONM in predicting new neurological deficit was 80%, whereas the specificity was 98.3%. The positive predictive value was 80%, with the negative predictive value of 98.36%. The diagnostic accuracy was 96.97%. There were no complications in this cohort directly related to the IONM procedure.

Conclusions: The study has highlighted that the use of IONM in infants is efficacious and safe. However, the Intraoperative monitoring is specific but not very sensitive in diagnosing neural injury during detethering of tethered cord in very young patients. IONM has a good diagnostic accuracy even in very young for any potential deficit.

FP-119: Endoluminal Shuntscope-Guided Ventricular Catheter Placement: Early experience

Dr. Vivek Agrawal**, Dr. Ranjit Rangnekar†
1) Sir H. N. Reliance Foundation Hospital & Research Center, Mumbai, India

Background: Placement of ventricular catheter in an optimal position is the most important factor in determining the outcome of shunt surgery. Ventricular catheter obstruction due to shunt tube placement in brain parenchyma, across the septa, tangled in the choroid plexuses and clogging of VC due to brain matter or other debris are commonest reasons resulting in shunt complete or partial dysfunction. To resolve these hurdles many technical advancement has been made including navigation, stereotaxy, sonography and ventriculoscope guided ventricular catheter placement.

Objective: To report of early experience, technique and result of placing ventricular catheter with shuntscope.

Methods: We are presenting our experience of shuntscope guided ventriculoperitoneal shunt in 32 cases done from June 2015 to July 2019. Shuntscope is a 1 mm outer diameter semi rigid scope from karl storz with 10000 pixel of magnification. It has a fibre optic lens system with Camera and light source attachment away from the scope to make it light weight and easily manoeuvrable.

Result: In all cases, VC was placed in the ipsilateral frontal horn away from choroid plexuses, septae or membranes. In none of the cases did the catheter perforate the septum pellucidum or cross to the opposite ventricle.

Conclusion: Though our initial results are encouraging, larger case series would be helpful. Complications and cost due to shunt dysfunction can thus be reduced to a great extent.

FP-120: Management of Cranial Vault Encephaloceles - An Institutional Experience

Dr. Giri Sachin Ashokrao*, Dr. Sachin Ashok Giri†, Dr. Vernon Leo Velho†
1) GGMC & Sir J. J. Hospital, Mumbai, India

Aims & Objectives: Encephalocele is defined as herniation of cranial contents beyond the normal confines of the skull through a defect in the calvarium either along the midline or at the base of skull. The aim of the surgery is water tight dural closure at the level of internal defect, closure of skull defect, and reconstruction of external bony deformity.

Materials and Methods: Fifty-four cases of encephaloceles were studied in our hospital over a 7-year period from 2013 to 2019. Computed tomography (CT) and magnetic resonance imaging (MRI) brain were performed to delineate the bony defect and associated anomalies. Reconstruction of the bony defect was done using autologous calvarial bone graft, Osteopore polyacaprolactone (PCL) bone scaffold filler and titanium mesh.

Results: In our study, 60 patients (37 boys and 23 girls) whose age varied between 2 months and 14 years were evaluated. Frontoethmoidal (47.5%) and occipital encephaloceles (23%) were the most frequently seen varieties. Repair of the dural defect either primarily or using pericranium was done in all cases. Closure of the bony defect was done using autologous calvarial bone graft in 15 (25%) patients. Cerebrospinal fluid leak was the most frequent postoperative complication, noted in five patients.
**FP-121: Role of Intra Op Nerve Monitoring (IONM) in tethered cord surgery our early experience: A case series**

Dr. Shighakoli Ramesh*, Dr. M. A. Jaleel¹, Dr. Konanki Ramesh²

1) Kamineni Hospital, Hyderabad, India  
2) Rainbow Hospital, Hyderabad, India

Tethered cord results in progressive anomaly in neurological, orthopaedic and urological dysfunction due to anchoring of the spinal cord by different pathologies. Detethering of cord has inherent risk of immediate neurological, urological complications. Long term outcomes in cohort in which electrophysiology were used for untethering were good with less redo operations. We would like to share our early experience in 7 infants with electrophysiology. 4 children with lipo myelomeningocele, 1 dermal sinus tract, 1 complex spinal dysraphism (diastematomyelia, with one of the cord ending as a myelomeningocele) and 1 intra spinal lipoma. Preoperatively all infants are neurologically intact except infant with intra spinal lipoma had right lower limb monoparesis with bladder involvement. Results: Satisfactory untethering was achieved in 5 infants. In case of complex spinal dysraphism, with one of the cord ending as a myelomeningocele where untethering could not be complete, as there was significant stimulation in lower limb when attempted for untethering. CSF leak was seen in 2 out of 7 patients. One child had wound issues with culture positive growth, antibiotics were started according to sensitivity and wound improved.

**Conclusion:** Our initial experience showed intra op nerve monitoring helps in distinguishing motor, sensory roots from scar tissue and fibrous bands. IONM allow safe transaction of fibrous tethering structures while ensuring that optimal untethering is accomplished. Newer studies also showed long term improvement with less redos. Standard use of IONM is recommended to improve safety. A potential positive effect of IONM on the efficacy of surgery is present.

* * * * *

**FP-122: Material of Choice in Paediatric Cranioplasty**

Dr. Anooja Abdul Salam¹*, Dr. Anooja Abdul Salam², Dr. Imogen Ibbett³, Dr. Nova Thani⁴

1) Royal Hobart Hospital, Australia  
2) University of Tasmania, Hobart, Australia

**Introduction:** Encephaloceles pose a technical challenge to the neurosurgeon. A multidisciplinary approach is necessary to manage these cases. Repair of dural defect and reconstruction of skull defect results in a good long-term outcome. We present our experience on 60 cases of cranial encephaloceles managed surgically over a period of only 7 years.

**Methodology:** The online tool SurveyMonkey was used to survey 244 neurosurgeons in Australasia. The survey consisted of five questions concerning preference of material for paediatric cranioplasty.

**Results:** 22 neurosurgeons (9%) participated, which was the expected number of responses. The results indicate that with small skull defects (<3cm) in patients aged 0-2 years, conservative management with observation alone is the preferred option (65%). In patients aged 3 to 10 years, autologous donor bone was the most popular option, whereas for 11+ years, hydroxyapatite (HA) was the material of choice, followed by titanium. For defects more than 3cm, autologous donor bone was preferred in under 11 years. In older than 11 years, titanium was the preferred choice (46.67%). The preferred donor origin for autologous cranioplasty in small skull defects (<3cm), was split calvarial grafts for all age groups. However, 68.42% of respondents managed under 2-year old’s conservatively. In large skull defects (>3cm), the preferred donor origin was split calvarial grafts for patients older than 3 years (48.3%). In patients aged 0-2 years, exchange cranioplasty was the preferred option when cranioplasty was performed.

**Conclusion:** Autologous donor bone is used in preference to synthetic materials for cranioplasty in children under 11 years in current practice. In children older than 11 years, hydroxyapatite and titanium are the materials of choice.

* * * * *

**FP-123: Role of Secondary Endoscopic Third Ventriculostomy in children - Review of an institutional experience**

Dr. Salman T. Shaikh*, Dr. Chandrashekar E. Deopujari¹

1) Bombay Hospital, Mumbai, India

**Background:** Endoscopic third ventriculostomy (ETV) has become a standard procedure for management of obstructive hydrocephalus. ETV may also play an important role in children presenting with primary ET stoma closure or shunt malfunction with an added advantage of shunt freedom if successful. Such procedures can be termed as secondary ETV.

**Objective:** To evaluate the role of secondary ETV in pediatric age group patients over the last 14 years.

**Methods:** This is a retrospective analysis of 36 children (<18 years) who underwent ETV after shunt malfunction and 4 children with ETV done after previous ETV stoma closure from 2004 until 2018. In all patients, the obstructive pattern suggesting aqueduct outflow block or 4th ventricular outlet obstruction was observed on MRI. Patients were followed up for a mean period of 4.25 years (Ranging from 4 months to 14 years).
**FP-124: Central Neurocytoma**

Dr. Debish Anand\(^*\), Dr. Raghavendra Nayak\(^1\), Dr. Girish Menon\(^1\)

1) KMC, Manipal, Karnataka, India

**Objective:** Central neurocytomas (CNs) are rare, benign neoplasms arising from a neuronal lineage and account for 0.1-0.5% of all central nervous system tumours. Typical location of CNS is the lateral ventricle touching the foramen of Munro. Occurrence of the tumour in the posterior fossa is extremely rare; till now only seven cases have been reported to the best of our knowledge.

**Case report:** An 8-year old girl was presented to us for progressive early morning headache and blurring of vision for more than a month. She also had a history of vomiting for 3-days. Neurological examinations showed mild papilledema indicating raised intracranial pressure. Magnetic resonance imaging (MRI) demonstrated an inhomogeneous, heterogeneously enhancing vermian mass with few cystic areas with supra-tentorial obstructive hydrocephalus. The patient underwent a midline sub-occipital craniotomy and complete excision of the tumour. Histopathology showed the isomorphic cells with clear cytoplasm, speckled chromatin and fibrillary matrix suggesting oligodendroglioma or ependymoma. But, immunohistochemical (IHC) study was positive for synaptophysin, neuron-specific enolase and negative for glial fibrillary acidic protein suggesting the central neurocytoma.

**Analysis and result:** Our case was unique because of two reasons. One, it was a central neurocytoma of the fourth ventricle; two, our patient was a child of 8 years as CNs are uncommon in the pediatric age group.

**Conclusion:** CNs should be considered in differential diagnosis of fourth ventricle mass even in pediatric age group although they are extremely rare. Surgical excision is the primary modality of treatment.

* * * * *

**FP-125: Tethered Cord Syndrome - Detethering improves outcome even in delayed presentations**

Dr. Hemant Kumar Beniwal\(^*\), Dr. Prakash G. Rao\(^1\)

1) Gandhi Medical College, Secunderabad, India

**Background:** Tethered Cord Syndrome (TCS) is a progressive form of neurological deterioration resulting from thickened filum terminale or due to scar which causing tethering of the cord.

**Aims & Objectives:** Study is designed to assess improvement in neuro-urological deficits after detethering. The goal of surgery is to improve or stabilize the neurological deficits.

**Materials & Methods:** 16 patients with TCS analysed prospectively. MRI, and Ultrasound KUB were performed in all and Urodynamic studies were performed in 8 patients pre and post operatively. Detethering of the cord done in all patients and followed up to 3 years.

**Results:** Most common presenting symptom was neurogenic bladder(n=14). Other associated symptoms were asymmetric weakness(n=3), trophic ulcers(n=4), sensory deficits(n=5), limb length discrepancy(n=3), kyphoscoliosis(n=3), club foot(n=3), and axial and radicular pain(2). Postoperatively, improvement of urinary symptoms(n=14) were 100% in 7 patients(50%), 80% in 1 patient, and 50% in 3 patients(21.4%). No change of the urinary symptoms in 3 patients(21.4%). Bowel dysfunction(n=3) was improved in all the patients, new onset bowel dysfunction was noted in 1 patient postoperatively, which was improved at 1 year of follow up. Asymmetric weakness(n=3) was improved in all. Trophic ulcers(n=4) were started healing in all. Sensory deficits(n=5) showed 50% improvement in 3 patients, no improvement in 2 patients. Limb length discrepancy(n=3) was improved in two patients. Improvement of kyphoscoliosis(n=3) was observed in 1 patient. Axial and radicular pain(n=2) was subsided in immediate postoperative week.

**Conclusion:** Detethering of the cord has a positive impact on postoperative neurological and urological functions even in delayed presentation.

* * * * *

**FP-126: Developmental and Scholastic differences among Grade-schooler and Teen age meningioma - Clinic-pathological and neuro-radiological study of Paediatric Meningioma (1999-2019)**

Dr. Bhawan Nangarwal\(^*\), Dr. Arun Kumar Srivastava\(^1\), Dr. Suyash Singh\(^1\)

1) SGPGI, Lucknow, India

**Introduction:** Paediatric meningiomas are rare intracranial neoplasms representing 0.4% to 4.1% of tumours in paediatric patients and 1.5% to 1.8% of all intracranial meningiomas. Though paediatric patients with meningioma may show intact intellectual functioning, the deficits have been noted with sustained attention, processing speed and learning/memory. The goal of this study was to investigate the impact of patient-, disease-, and treatment-related variables upon neurocognitive outcomes in paediatric patients and compare the same among patients presenting in Grade-schooler and Teen ages.

**Methods:** All evaluable reports of meningioma in children from January 1999 to 31 July 2019 were retrieved from the database and...
were assessed retrospectively. The age and sex distribution, presenting symptoms, neurological findings, location, neuro-radiological, histopathological findings and long term follow up, with respect to Scholastic performance (Wechsler Individual Achievement Test II) and developmental scale (Academic Performance Questionnaire (APQ)), were analysed.

Results: This study describes 24 patients (14M:10F; age range, 4-18 years; mean, 11.8 years). Atypical and malignant meningiomas seem to be more common in childhood and adolescence. Intraventricular and skull base locations were common. Total tumor excision was achieved in 21 cases. By using these 2 questions in APQ, the area under the ROC curve was 0.834, and the optimal combination of sensitivity and specificity occurred when the total score for the 2 items was >4.

Conclusion: This study demonstrated that Grade-school meningioma show weaker performance in comparison to the Teen age population resulting from histopathological finding, site of tumour, and early surgical intervention.

**FP-127: Pediatric Chronic Sub-Dural Hematoma - How are they different from Adult Chronic Sub-Durals?**

Dr. Ajit Mishra**, Dr. Ajit Mishra¹, Dr. Harsh Deora¹, Dr. Dwarakanath Srinivas¹, Dr. Dhaval Shukla¹, Dr. Mallu Bhashkar Rao¹, Dr. B. Indira Devi¹

1) NIMHANS, Bengaluru, India

Introduction: In much of our practice, chronic sub-dural hematomas constitute a forsaken entity. So much so that pediatric chronic subdural hematomas have not been studied in much detail, ever. Medline literature search reveals 4 such series with none of them comparing the presentation, outcome, and treatment with the adults. Much remains to be learnt about this distinct entity.

Material & Methods: We retrospectively reviewed our institute data from 2008-2018 and collected data on the demography, clinical features, mode of treatment, recurrence rates, predisposing factors, laterality, hematoma characteristics and factors associated with recurrence in cases with age <=18 years. The same was compared to adults in terms of incidence, recurrence, laterality, and mode of treatment during the same period.

Results: Thirty such cases were found; burr hole and evacuation was the most frequently used primary modality of treatment. Predisposing conditions were present in almost half of the cases (46.47%) and included shunts and ETV, mucopolysaccharidosis, forceps delivery, seropositivity with tuberculosis. Child abuse was not reported in our series. Most of the skeletal surveys were normal. Recurrence rate was 54% cases and needed either craniotomies or subdural shunt placements. When compared to the adult cases of the same time period, it was higher but the difference was non-significant. 53% cases were bilateral at presentation.

Conclusion: Chronic subdural hematoma in children is a distinct entity and deserves differentiation from adults as they have higher recurrence rates and more predisposing factors.

**FP-128: Analysis of the determinants of failure and efficacy of pre tumor resection endoscopic third ventriculostomy in children with posterior fossa tumors**

Dr. Shah Rushabh Ajay**, Dr. Suhas Udayakumaran¹

1) Amrita Institute of Medical Sciences, Kochi, Kerala, India

Aim: To study the determinants causing the failure of emergency pre tumour resection endoscopic third ventriculostomy (ETV) in children with posterior fossa tumours and to predict the patients who will eventually require alternative CSF diversion procedure in permanently relieving hydrocephalus.

Introduction: Preoperative obstructive hydrocephalus is reported in 70%-80% of children with a posterior fossa tumour and it is often the presenting clinical symptomatology which leads to performing the radiologic investigations resulting in recognition of the tumour. In several cases, a preliminary treatment to control the abnormally high intracranial pressure (ICP) is necessary. Although ETV is considered a good option for emergency treatment of hydrocephalus, it may not be successful in all patients.

Material and Methods: Out of 40 pediatric patients with posterior fossa tumours and associated triventricular obstructive hydrocephalus, 22 underwent emergency ETV before definitive tumour resection, and further CSF diversion procedure was done after tumour resection if hydrocephalus persisted or recurred. The medical records, operative notes and imaging studies were retrospectively reviewed. All the procedures were performed by a single experienced neurosurgeon (S.U.).

Results: 22 ETV procedures were performed on an emergency basis, consisting of 11 males and 11 females, age range (2 months to 17 years; mean 6.5 +/- 5.6 years). The follow-up period for at least six months. ETV was successful in avoiding hydrocephalus during the follow-up period in 17 out of 22 patients (77.27%). Before surgical excision of the posterior fossa tumours, 2 patients did not show adequate response to ETV (n=2/22) and all other patients showed marked clinical improvement with radiological disappearance of signs of active hydrocephalus. Of the 5 ETV failures on follow up (5/22), 4 (57.15%)were infants (n=4/7). All the five (100%) patients of ETV failure had high-grade tumours, and 4(80%) (n=4/5) had the leptomeningeal disease.

Conclusions: Presence of leptomeningeal disease is an absolute contraindication for ETV at any stage. Pre-operative contrast MRI is thus mandatory to rule out leptomeningeal disease.
Failure of emergency ETV pretumor resection can be predicted in infants and patients with high-grade tumors.

**Keywords:** Hydrocephalus, Endoscopic third ventriculostomy, Posterior fossa tumor.

---

**FP-129:** Role of Dynamic Extension Reserve (DER) and T1 Slope (T1S) in determining the loss of cervical lordosis following cervical laminoplasty: A proposal for a novel classification system

**Dr. Sachin A. Borkar**<sup>6</sup>, Dr. Ravi Sharma<sup>5</sup>, Prof. Shashank S. Kale<sup>1</sup>

1. All India Institute of Medical Sciences, New Delhi, India

**Introduction:** Laminoplasty is a safe and effective surgical technique for treating disorders of the cervical spine causing compressive myelopathy. However, it results in significant loss of cervical lordosis (LOCL) post-operatively which affects the quality of life of the patient. For the said purpose we intend to assess a new variable, the Dynamic Extension Reserve (DER) that may help in indirect assessment of the power reserve of PMLC of a patient. The main purpose of this study was to evaluate the role of these above mentioned preoperative radiological parameters in predicting LOCL/kyphosis as well as functional outcomes in the form of change in Oswestry Disability Index (ODI) score following laminoplasty.

**Materials and Methods:** All the patients included in the study underwent pre-operative magnetic resonance imaging (MRI) cervical spine using a 3T MRI. All the patients underwent standard procedure of 2-level to 4-level hinge door laminoplasty under general anesthesia. Post-operatively, patients were followed for a minimum period of 1 year. Clinical outcome evaluation was done using modified Japanese Orthopedic Association score (mJOA) and Oswestry Disability Index (ODI). The cervical sagittal alignment parameters were measured before surgery and at follow-up visit one year after surgery with lateral x-ray images. Threshold for good agreement was considered to be >0.90. The various radiological parameters were analyzed both as continuous variables as well as after dichotomizing them at cutoffs established by previous studies (T1S at 20°; SVA at 20 mm; significant LOCL at 10°; and significant change in ODI at 10 points).

**Results:** On univariate analysis, preoperative Cobb’s Angle (CA), sagittal vertical axis (SVA), T1 slope (T1S) and dynamic extension reserve (DER) were found to predict a significant loss of cervical lordosis (>10°) after laminoplasty. In the final model, preoperative CA (p=0.001), T1S (p=0.001) and DER (p<0.001) were found to be significant while preoperative SVA (p=0.456) was not found to have an independent effect on loss of cervical lordosis. Logistic regression model including preoperative CA, T1S and DER to predict the risk of significant LOCL following laminoplasty yielded the following relation ‘\( \log (p/(1-p)) = 4.917 - 0.079(\text{preT1S}) - 0.120(\text{preSVA}) \)’. It was observed that these categories made on the basis of preoperative radiological parameters were able to significantly predict clinical improvement. The patients with low T1S and a balanced alignment had the best functional outcome while those with high T1S and an unbalanced alignment had the poorest outcome. The other two groups had an intermediate performance.

**Conclusions:** In our study, we have found for the first time that the chances of significant LOCL is determined by an interplay of preoperative CA, T1S and DER. We have also put forth our hypothesis regarding the nature of that interplay that needs to be studied further. Similarly, we have also found that even the functional improvement in terms of significant change in ODI can be predicted on the basis of radiological parameters, T1S and SVA. Based on the above findings, classification and scoring systems with good accuracy have been proposed for prediction of significant LOCL and change in ODI after laminoplasty.

---

**FP-130:** Controversies in the Management of Colloid Cyst

**Dr. Hemant Kumar Bhartiya**<sup>1</sup>, Dr. Vivek Kumar Vaid<sup>1</sup>

1. Fortis Escorts Hospital, Jaipur, India

**Aim:** To evaluate different surgical approaches and compare Endoscopic v/s Microsurgical excision.

**Material and Methods:** The study includes 38 cases of colloid cyst in which endoscopic excision was done. In 5 cases it was converted to microsurgical excision.

**Results:** Total excision was done in 60.52% of cases. In 26.31% (10 cases) cases residual was left. There was no mortality. Recurrence was not observed in any of the residual cases.

**Conclusion:** Although transcallosal approach is said to be too gold standard in the management of colloid cyst. Endoscopic surgery in experienced hands may be considered as first line of treatment as the incidence of systematic recurrence is very low even if some residual is left.

---

**FP-131:** Recent Advances in Neurosurgery

**Endoscopic management of chronic subdural hematoma**

**Dr. Y. R. Yadav**<sup>6</sup>, Dr. N. Swami<sup>5</sup>, Dr. Vijay Parihar<sup>5</sup>, Dr. Shailendra Ratre<sup>5</sup>, Dr. Mallika Sinha<sup>5</sup>, Dr. Jitin Bajaj<sup>5</sup>, Dr. Ambuj Kumar<sup>5</sup>, Dr. Ketan Hadoo<sup>5</sup>

1. NSCB Medical College, Jabalpur, Madhya Pradesh, India

**Background:** Burr-hole aspiration, twist drill evacuation, mini-craniotomy and craniotomy removal are surgical methods to treat chronic subdural hematoma (CSDH). Endoscopic management has been found to be useful in recent years. Methods: A prospective study of 100 hematomas in 86 patients was done. Endoscopic surgery was performed in all CSDH patients.

**Surgical procedure:** Skin incision of about 4 cm at the most curved...
part of skull having CSDH was given. The mini-cranietomy or enlarged burr hole was made. Enlarged burr hole was made to provide straight trajectory to hematoma cavity. Endoscope supported by telescope holder was used. Modified silicone brain retractor was used in 8 cases. Sub-galeal drain was left in all cases for 3-5 days.

**Results:** There were 58 male patients. Age ranged from 44 : 81 years (average 69 years). History of head trauma was observed in majority of patients. Pre-operative average GCS was 14. Procedure was effective in hematoma evacuation and good visualization of whole cavity in all patients. Endoscopic technique helped in complete hematoma removal in organized/solid clot, septations, and bridging vessel in 23, 3, and 2 cases respectively. Duration of surgery ranged from 35 to 80 minutes. There was 1 death. There was no recurrence, infection, fresh bleed, and injury to brain or membrane.

**Conclusion:** Endoscopic technique is an effective alternative technique in CSDH. Thick and vascular membrane, septations, organized and solid clot can be removed effectively using this technique.

* * * * *

**FP-132: Dural Repair – A focused review on few materials & our clinical experience with special reference to Collagen Matrix Duraplasty**

Dr. Shameem Ahmed**, Dr. Deep Dutta1

1) Apollo Hospital, Guwahati, India

The dura mater, the outermost layer of the meninges covering the brain and spinal cord, is a collagenous connective tissue consisting of numerous collagen fibers, fibroblasts, and few elastic fibers arranged in a parallel form. The dura mater may be damaged by trauma or excised / incised during intracranial or spinal surgery. To date, cerebrospinal fluid leakage followed by dural damage is still an intractable complication due to its various secondary complications, dural repair has always gathered increased attention with the progress of the brain & spinal surgery. In this study, we have discussed the commonly used methods including the addition of sealants, the use of various substitutes and few effective materials; keeping in mind that the optimal standard is the primary dural closure or else autologous graft augmented dural closure, subject to feasibility (due to various constrains - either alone or in combinations).

* * * * *

**FP-133: Second Opinion in Neurosurgery Practice**

Dr. Rakesh Gupta, M.G.M. Medical College, Indore, India

In Neurosurgery practice many a time’s second opinion is asked for, why, how, from whom and many other Various aspects of this important issue is discussed in this talk.

* * * * *

**FP-134: Step Ladder Expansive Cranioplasty: A Concept**

Dr. Sudipkumar Sengupta1#

1) Command Hospital (Eastern Command), Kolkata, India

**Objectives:** Decompressive Hemicraniectomy is often resorted to in cases of cerebral insults of different aetiologies to deal with, and sometimes in anticipation of, a refractory raised intracranial pressure (ICP). Along with the concerns regarding trephination syndrome and injury to the unprotected brain, there always remains the necessity of bone flap preservation and a second surgery with its monetary and logistic implications that some patients can ill afford. We propose Expansive cranioplasty as a surgical technique as an answer.

**Methods:** The concept, as worked out on different models, surgical technique with its possible variations, and our experience in a patient operated by this technique and the areas requiring further research to perfect the technique have been discussed.

**Results:** Step ladder expansive cranioplasty has been performed on a case of head injury with Acute SDH with a satisfactory outcome in achieving adequate intracranial volume expansion by the cranioplasty construct itself.

**Conclusions:** Extensive research is required to establish various parameters and technique requires to be offered to more patients with refractory raised ICP to validate this technique that appears so appealing theoretically and on the single case performed so far.

* * * * *

**FP-135: Working with limited resources in armed conflict country for transportation & prehospital management of traumatic cervical spinal cord injured patients**

Dr. Hamed Shir Shinwari

1) Jamhuryte Hospital, Kabul, Afghanistan

**Introduction:** Traumatic cervical spinal injury (SCI) is one of the most devastating conditions with high rates of morbidity and mortality. First aid, transportation and on time management of such disorder play a vital role for favorable outcome and prognosis. The aim of this study to review the prehospital, immobilization, transportation and management of traumatic cervical spinal injury and its outcome.

**Materials & Methods:** The department of Neurosurgery of Jamhuryte Hospital, Kabul Afghanistan, carried out this one year prospective case series from March 2017 to Mach 2018 to evaluate the pre-hospital management of SCI and its outcome.

**Results:** Eighty-nine cases were reported over period of one year. The SCI cases were more common among male (78.6%) compare to female gender. The main age group were 20 to 45 year of age which were affected (73.8%). The main causes of morbidity and mortality were high amongst those who were involved in motor vehicle accident (45.8%) fall from height (41.9%). Twenty percent (20%) of patients
transported from the accident scene to hospital who has had cervical collar stabilization. An average patient’s admission time to the emergency department of hospital was 16–72 hours past-accident, accounted for 22.9%. The most popular mode of transportation from the scene to the hospital was Private cars (59.2%). Associated injuries with SCI among these patients were long bone fractures (6.8%), traumatic brain injury (45.8%), and abdominal trauma (1.9%). Among cervical injury the sub-axial injury at the level of C3/C7 (76.7%) were the commonest. During admission, the complete and incomplete spinal cord injuries rates were 43.1% and 64.9% of patients, respectively. Surgical procedures for SCI management performed in (25%) of the patients. With favorable outcome, who had regained motor and sensory recovery with no post-operative complications.

Conclusion: In Afghanistan, traumatic cervical spinal cord injury is still one of the most catastrophic with high rates of morbidity and mortality safe and rapid transportation of the cervical spinal cord injured patients to the medical facilities for definitive care has been a fundamental concept to improve the treatment outcome and to reduce the complications as whole.

Key words: Traumatic cervical spinal injury (SCI), Traumatic brain injury(TBI), MRI

FP-136: Analyzing the utility and radiation dose following cranial surgery

Dr. Chinmaya Dash*, Dr. Amir Khan†, Dr. Suprava Naik‡, Dr. Ayusman Satapathy§, Dr. Rabi Narayan Sahu

1) AllMS Bhubaneswar, Bhubaneswar, India

Aim of the study: To study the number, utility and radiation dose following craniotomy in a tertiary centre

Materials & Methods: Patients who underwent cranial surgery from November 2018 to March 2019 were included in the study. The following parameters were studied

1) Age
2) Unexpected finding in CT
3) Intervention required as a result of unexpected finding
4) Average time for shifting patient from ICU to CT scan room and back and any adverse events during this period
5) Total number of CT scans done for patients
6) Total effective dose to brain in the post-operative period (due to CT scan)

Results: Total 103 patients were studied during this period. 3 patients(2.9%) had unexpected finding in the CT scan in the immediate post operative period.2 patients(1.9%), required surgical intervention for the same. Three patients had some sort of adverse event during shifting the patient for scan. The average time required for shifting the patient was 30.73 minutes. The mean radiation received in this study was 3.702 mSv(range 1.52mSv- 10.93 mSv). There were 12 patients who were 15 years or less (pediatric population). The mean radiation received in the pediatric age group was 4.45mSv(range 1.87mSv-9.05mSv).

Conclusion: Pediatric patients receive high effective dose of radiation in case of multiple CT head. Approximately 3% of patients had an unexpected finding in the immediate post operative period and 2% of the study group required some surgical intervention due to the above finding. Judicious use of post-operative scan can avoid radiation to brain in many cases.

FP-137: A 3 Dimensional CT Angiography Study to help in surgical planning for Retrosigmoid Craniotomies

Dr. S. Pradeep*, Dr. Veerapandian R.†, Dr. Rajasekaran G.‡
1) Madurai Medical College & Govt. Rajaji Hospital, Madurai, India

Objective: It is impossible to precisely anticipate the course of the transverse and sigmoid sinuses and their individual relationship to superficial landmarks such as the asterion during retrosigmoid approaches. This study was done to determine the position of the asterion and the relationship between asterion and the transverse sigmoid sinus junction (TSSJ) in making precise burr hole without damaging sinuses during retrosigmoid craniotomies.

Methods: CT angiography was performed in 50 patients to obtain 3D-CT volume rendering images of cranial bone and dural sinuses. After delineating the sinuses, by simple restructuring using software and opacity modulation bone image is reinforced. Asterion type, distance from tip of mastoid process (TMP) to asterion & root of zygoma(ROZ) to asterion, location of asterion in relation to Transverse Sigmoid Sinus Junction (TSSJ), distance between asterion and TSSJ were analysed and measured.

Results: Our study revealed type 1 asterion (absence of sutureal bones) common than type 2(presence). Average distance from asterion to TMP is 5.6cm±0.58 & from asterion to ROZ is 5.3cm±0.7 which is more in males & more on right side. Location of asterion in relation to TSSJ is most common at the level of TSSJ followed by below the level of TSSJ.Average distance from the asterion to TSSJ is 1.9cm±0.33.

Conclusion: 3D-CT volume rendering imaging is capable of accurately visualizing the bony landmark and dural sinuses. A easy simple restructured image provides precision and safety for the patient by ready and easy localization of Asterion & TSSJ. This helps in making precise burr hole without damaging sinuses during retrosigmoid craniotomies.

FP-138: Role of D-dimer in post-operative recurrence of chronic subdural hematoma

Dr. Sangeetha Adhikesavan*, Dr. Ganesh K.†, Dr. Vivek Visweswaran*, Dr. Visvanathan K.†

Objective: To study the number, utility and radiation dose following cranial surgery
The cysts in two patients were discovered accidentally, during the evaluation of seizures in one patient and other in evaluation of traumatic head injury. One elderly patient had presented with psychiatric symptoms, drop attacks along with the features of normal pressure hydrocephalus. One teenage patient presented with sudden deterioration and went in to cardiac arrest even after emergency decompression of ventricles done. Six of them underwent surgery and one of them succumbed.

**Conclusion:** Colloid cysts may present with wide range of neurological manifestations. The severity or rapid clinical deterioration doesn’t exactly correlate on depend on the site, size of the cyst. Leaking cysts with chemical meningitis may complicate the diagnosis. Hence early diagnosis and surgery with complete removal of cysts offer better clinical outcome in those patients.

**FP-141:** Factors affecting the facial nerve outcome after Retromastoid suboccipital excision of Vestibular schwannomas

Dr. Dilip Kumar Macharla¹*, Manas Panigrahi¹

1) Krishna Institute of Medical Sciences, Hyderabad, India

**Background:** Vestibular schwannomas constitute about 6-10% of all intracranial tumors and 80% of all Cerebellopontine (CP) angle tumors. They pose a great challenge in achieving complete excision with preservation of facial nerve function, hearing and other cranial nerves. With the advent of imaging and microsurgical techniques, Intraoperative electrophysiological monitoring significant improvement achieved in the surgical outcomes of vestibular schwannoma.

**Objective:** To study facial nerve outcome following after retromastoid suboccipital excision of vestibular schwannoma and to study factors associated with dysfunction of facial nerve after vestibular schwannoma microsurgery.

**Methods:** 322 patients had undergone surgery for VS during the study period; of which 259 patients satisfying the inclusion criteria were selected for the study. In all these patients, tumor was excised through retromastoid suboccipital approach, using a facial nerve monitor.

**Results:** Vestibular schwannomas constituted 71.86 % of all CP angle tumors. Anatomical preservation of Facial nerve was achieved in 98% patients. Functional preservation during the short term follow-up was seen in 227 (87.64%) patients, which is improved to 240 (92.66%) in the long term follow up; i.e. 40.6% (13 of 32) patients with immediate post op facial weakness have improved on long term follow up. Size of the tumor is found to be significantly associated with facial nerve outcome. Tumor size 39 mm is a strong predictor for post-operative facial dysfunction.

**Conclusion:** Good anatomical and functional preservation of facial nerve can be achieved even with gross total and near total resections.
when resection is monitored by intraoperative cranial nerve monitoring system and facial nerve stimulator. Age, gender, symptom duration, laterality of tumor, presence of hydrocephalus, extent of resection and nature of tumor are not influencing facial outcome. Tumor size and preoperative facial nerve function are directly related to post op facial outcome. Tumor size 39 mm is an independent predictor of post op facial nerve dysfunction.

* * * * *

FP-142: Microsurgical management of Cavernous Sinus Tumours in the era of Radiosurgery - A case series

Dr. Rajasekhar Rekapalli1, Dr. Pravin Salunke2
1) All India Institute of Medical Sciences, Rishikesh, India
2) Postgraduate Institute of Medical Education and Research, Chandigarh, India

Objective: Microsurgery of Cavernous sinus tumours (CST) is challenging due to the potential morbidity while dealing with multiple cranial nerves (CN), ICA and venous bleeding. Surgeons have become increasingly conservative with the advent of stereotactic radiosurgery (SRS). We report out experience in the microsurgical excision of CST not amenable for SRS.

Materials and methods: This was a retrospective analysis of 22 consecutive patients who underwent microsurgery for CST between 2016 and 2019. Their preoperative and follow-up clinic-radiological details were reviewed.

Results: The study cohort consisted of CS hemangiomas (6), Meningiomas (5), Schwannomas (3), Pituitary adenomas (3), Chordomas (2), Fungal granulomas (2) and dysgerminoma (1). CN 6 palsy (54%) and headache (50%) are the common presentations. Frontotemporal-orbitozygomatic craniotomy with extradural clinoectomy was done in all patients to access the CST extradurally with the addition of anterior petrosectomy (2 cases) or transsylvian approach (2 cases). Total resection was achieved in 66% and subtotal resection in 32% of cases. At the last follow up, CN (3, 4, V1, V2, V3 and 6) function was the same as it was before surgery in 54%, improved in 14% and worsened in 31% of cases. Transient CSF rhinorrhea occurred in two patients. There was no cerebral infarction or mortality.

Conclusions: Microsurgical excision of the CST can be accomplished with acceptable morbidity. The large size of the tumour, failure of radiation therapy, tumours poorly responsive to radiation and diagnostic dilemma are the main indications for the surgery of CST in the current era of multimodality treatment.

* * * * *

FP-144: Unplanned readmissions in unknown patients with head injury - A surrogate marker of rehabilitation services in Developing Country?

Dr. Manoj Phalak1, Dr. Deepak Gupta2, Dr. Shashank Sharad Kale1, Dr. Deepak Agrawal3
1) All India Institute of Medical Sciences, New Delhi, India

Introduction: Continuous care and rehabilitation after discharge is required especially in head injuries. Unplanned readmissions of unknown patients with previous head injury from rehabilitation homes can be hypothesized as a surrogate marker of care in these setups.

Methods: Retrospective review of hospital records of all consecutive unknown head injury patients with unplanned readmissions at Department of Neurosurgery, JPNATC AIIMS during January 2012 to December 2016. All planned admissions requiring any interventions were excluded. Demographic profile, readmission GCS, associated conditions, duration of hospital stay and reason for readmission causes were subcategorized as preventable like respiratory infections, bedsores etc. and nonpreventable causes like hydrocephalus/rebleed.

Results: Out of 245 patients sent to rehabilitation homes, 47 patients (19%) were readmitted, after 175 days (7-758 days) of discharge. Hydrocephalus (17%) was commonest non-preventable cause, followed by rebleed and seizures while respiratory distress (36%), followed by bedsores (30%) were commonest preventable causes. A high mortality (32%) was observed, hydrocephalus was the commonest cause. The OR of mortality from non preventable causes of death was 35.4. GCS at discharge and GCS at readmission were independent predictors of increased mortality (ORs- 1.07 & 1.46). The rest of the patients were discharged with an average hospital stay of 9 days (1-49 days).

Conclusions: There is a high rate of readmission mortality in unknown head injury patients. A high incidence of bedsores and chest infections in these patients warrants vigilant nursing care. A drop in GCS should be viewed with strong suspicion, especially after 30 days of discharge.

* * * * *

FP-145: Complications in surgical management of Cranio-vertebral Junction Trauma

Dr. Dattaraj P. Sawarkar1, Dr. Pankaj Singh1, Dr. Satish Verma1, Dr. Deepak Agrawal1, Dr. Deepak Gupta1, Dr. Gurudatta Satyarthee1, Dr. Sarat Chandra1, Dr. Shashank Kale1
1) All India Institute of Medical Sciences, New Delhi, India

Introduction: The craniovertebral junction (CVJ) area is a very special, intricate, and complex region of the spine and about half of all cervical fractures occur in this area.

Material and methods: In this retrospective study (Jan 2008- Dec 2016), we enrolled all surgically treated odontoid fractures, hangman’s fracture and traumatic atlanto-axial dislocations (AAD) and analyzed them for surgery related complications.

Results: We have identified total 313 surgically treated patients of CVJ trauma (Odontoid # - 197; Hangman’s # - 56; AAD-60). In odontoid #, total 111 patients underwent anterior odontoid screw (OS) fixation which had 10 % overall morbidity and 0.9% mortality. Failure of fixation due to screw cut through and nonunion occurred in 3.6% patients each. Overall 6.3 % patients underwent second surgery.
FP-146: Predictors of Severe Head Injury in Tertiary Center

Dr. Rajendra Shrestha

Introduction: Severe traumatic brain injury (TBI) is associated with a high mortality and morbidity rate and is one of the leading causes of death in the intensive care units. The aim of this study was to identify predictors of hospital outcome/ mortality in ICU admitted severe TBI patients and to estimate their impact.

Methods: A retrospective analysis was carried on patients (n=321) with severe head injury, defined as Glasgow Coma Scale (GCS) ≤ 8 who were admitted to the ICU neurosurgical department of National Trauma Center between 2017/5-2019/2. Both clinical and radiological predictors of hospitalized patients were identified.

Results: Total mortality rate was 5.9%. 243 (75.7%) of the patients were male and 78 (24.3%) were female. 55 % of cases were due to traffic accidents. Patients Middle Ages group was 60%. Coexisting injuries, found in 25% of the patients aggravated prognosis. Blood grouping pattern in SHI were B+, A+ and O+ 36.1, 28 and 24.3% respectively. 45% of the patients had Tattoo which was aggravating factors. Outcome is highly correlated with GCS’ values. CT scan findings revealed that patients with subdural hygroma after few days of admission CT scan which was very important prognostic factors in TBI.

Conclusions: Severe TBI has a high mortality and morbidity in today world as it has a high negative impact on young people, especially men with blood group B+. The age of the patient, presence of Tattoo, GCS at admission, the CT scanning at admission and CT scanning after week of admission were significant predictors of outcome.

FP-147: Cognitive and Functional Outcomes of Early Versus Delayed Cranioplasty after Decompressive Craniectomy

Dr. Biswaranjan Nayak, Dr. Arun Kumar

Objective: The aim of the study was to assess cognitive and functional outcomes of early versus delayed cranioplasty (DCP) after DC.

Methodology: This was a prospective observational study on 42 patients aged over 16 years and up to 70 years, who had undergone CP after DC for severe traumatic brain injury in in-patient and outpatient department of neurosurgery at a tertiary care hospital in Bhubaneswar, Odisha, India from the period of March 01, 2016 to December 31, 2017. Cognitive and functional outcomes were compared in early and DCP groups in preoperative and follow-up period at 1 month, 3 months, and 6 months. Early cranioplasty (ECP) was within 2 months, and DCP was beyond 2 months.

Results: Total sample size under this study was 42; 21 in ECP and 21 in DCP group. Mean age was 41.40 ± 15.95 years. The age distribution was quite young with 38.1% in 30 to 49 age group and had very high proportion of males (85.7%). This analysis revealed that both the ECP and DCP groups have resulted in significant improvement in mini-mental state examination (MMSE) and Glasgow Outcome Scale Extended (GOSE) score after CP. But in the ECP group, there has been steady and significant improvement in MMSE and GOSE score at different follow-ups starting from postoperative 1 month in MMSE score and from 3 months up to 6 months in GOSE score.

Conclusion: Neurosurgeon should evaluate and carefully monitor each individual case and take up CP as early as possible with suitable indication.

FP-148: GRASP- A Novel Prognostication Tool in Traumatic Brain Injury

Dr. Sai Sriram, S., Prof. Balasubramanian D., Dr. Swarnarekha N.

Introduction: Trauma is the leading cause of mortality and morbidity in the otherwise healthy working population of the country. It becomes mandatory to have a tool for predicting outcome in patients with traumatic brain injury.

Methodology: 150 patients admitted to our institute with moderate to severe TBI were prospectively assessed based on their GCS score, Radiological features, time to arrive at the center for definitive therapy, systemic injuries and pupillary response. Score was compiled and compared with existing prediction patterns and results were analysed.

Review of literature: While several scoring patterns exist, the more comprehensive ones tend to be cumbersome and the easily reproducible ones are too simple. Ramesh et al proposed the Madras Head Injury Prognostic score to predict outcome in patients with TBI.

Results: We found that the individual components as well as the combined score could predict the mortality with accuracy and were able to establish a statistically significant correlation(p value < 0.01). Also, the inter observer variation in the score was minimal, meaning the scoring system was both comprehensive as well as simple to reproduce.

Posterior fixation was performed in 202 patients (86 odontoid #, 56 Hangman’s # and 60 AAD patients). Posterior fixation includes variety of procedures like traditional occipito-cervical fixation and C1-C2 wiring to more challenging C1-C2 transarterial screw and Goel-Harms technique. Overall there was vertebral artery injury in 1%, CSF leak in 3%, wound infection in 3.5%, meningitis in 0.5% and procedure related death in 0.5% patient. 8 patients (4%) required revision surgery for either fixation failure or non-union. In surgery for hangman’s fracture, 2 patients also had distal junctional kyphosis requiring revision surgery.

Conclusion: So in conclusion, treatment of CV junction fracture is challenging and one should have knowledge of all the nuances of anterior and posterior CVJ fixation to avoid complications.

* * * * *
FP-149: Epidemiology of Traumatic CSF Rhinorrhea in our institution
Dr. Sathyanarayana L. D., Dr. Komal Prasad, Dr. Kiran M., Dr. Shibu Pillai, Dr. Vishwas H. V.
1) Narayana Hrudayalaya, Bengaluru, India
Objective: To evaluate the epidemiology of traumatic CSF rhinorrhea in our hospital
Methods: All traumatic head injury patients with CSF rhinorrhea admitted in our hospital between January 2016 and July 2019 were included in this study. Their mechanism of injury, GCS on admission, underlying contusion, type of fracture, timing of leak, their management were noted.
Results: 66 cases were included in this study. Youngest patient being 19 year old and oldest being 65 year old. Majority were due to two wheeler road traffic accident. Delayed leak was noted in 3 patients. Bifrontal ACF base repair was done in most patients.
Conclusion: Young male patients involved in road traffic accidents with anterior skull base fractures have CSF rhinorrhea. Good control of leak is achieved by anterior skull base repair with pericranium.

FP-150: Prediction of outcomes in Traumatic Brain Injury: The IMPACT and CRASH Prognostic Models experience in a single neurosurgical centre, Sabah
Dr. Lim Mei Sin, Dr. Pulivendhan Sellamuthu, Prof. Abdul Rahman Izani Ghani
1) Hospital Queen Elizabeth, Malaysia
2) Hospital Universiti Sains Malaysia, Kubang Kerian
Background: Traumatic brain injury (TBI) is the leading cause of disability and mortality in high income countries and it is a rising public health issue in low-income countries. Hence, we formulate a study to perform an external validation of the IMPACT and CRASH prognostic models; the CRASH models (base and CT) predict 14-day mortality and 6-month unfavourable outcome and the IMPACT models (core, extended and laboratory) estimate 6-month mortality and unfavourable outcome in a single centre cohort of TBI patients in Sabah, Malaysia.
Methods: All patients with traumatic brain injury who were admitted to Hospital Queen Elizabeth from 1st November 2017 to 31st January 2019, were prospectively analysed. The discriminatory power of the models was assessed as area under the receiver operating characteristic curve and calibration was assessed using the Hosmer-Lemeshow (H-L) goodness-of-fit test and Cox calibration regression analysis.
Results: We analysed 281 patients with significant TBI treated in a single neurosurgical centre in Sabah, Malaysia over a 2-year period. The overall observed 14-day mortality was 9.6%, a 6-month unfavourable outcome of 23.5%, and a 6-month mortality of 13.2%. Overall, both the CRASH and IMPACT models showed good discrimination with AUCs ranging from 0.88 to 0.94 and both models calibrating satisfactorily although IMPACT seemed to be slightly more superior compared to the CRASH model.
Conclusion: The CRASH and IMPACT prognostic models displayed satisfactory overall performance in our cohort of TBI patients, but further investigations on factors contributing to TBI outcomes and continuous updating on both models remain crucial.

FP-151: Tranexamic acid in symptomatic Chronic Subdural Hematoma in the absence of surgical intervention
Dr. Raghavendra Nayak
1) Kasturba Medical College, Manipal, India
Objective: Standard treatment for symptomatic chronic subdural hematoma (CSDH) is a burr-hole evacuation. However, in patients in whom surgical evacuation carries a very high risk, we do not have an established practice guideline. So, the objective of our study is to analyze the outcome of symptomatic CSDH treated only by tranexamic acid.
Patients and Methods: Total of 14 patients with symptomatic chronic subdural hematoma admitted at Kasturba Medical College Hospital, Manipal from 2017 to 2019 were included. All patients were managed conservatively with oral tablet tranexamic acid 250 mg thrice daily till the resolution of hematoma. Patients were followed up every month with CT scan brain. Data were analyzed retrospectively.
Results: All patients were managed conservatively with tranexamic acid and none were treated by surgery. The median duration of treatment was 62 days (Range 33-98). Median volume of hematoma before the initiation of the therapy was 74 ml (range 66-96) and it was reduced to 2 ml after the therapy with tranexamic acid. Median midline shift before the initiation of the therapy was 15mm and it was zero in all patients following the treatment. No progression or recurrence of hematoma in any one of the patients. No major side effects of tranexamic acid were found during the study period.
Conclusion: Even symptomatic patients with chronic subdural hematoma can be effectively managed with tranexamic acid when the surgical drainage is risky or not possible. It can be used as an alternative to surgery when there is no immediate threat to life.

FP-152: Cerebral infarction and angioarchitecture associated with traumatic brain injury, incidence and risk factor - An institutional study
Dr. Vikas Chandra Jha, Dr. Krishn Kumar Sharma, Dr. Anil Kumar
1) All India Institute of Medical Sciences, Patna, Bihar, India
**Introduction:** Post-traumatic cerebral infarction (PTCI) is one of the most severe secondary injury with a frequency ranging from 1.9% to 10.4% and understanding associated angioarchitecture may help in improving posttraumatic outcome together with other factors.

**Aims and objectives:** We assessed the practical incidence and risk factors for the development of PTCI together with angiography on digital subtraction angiography (DSA) in cases with documented evidence of vasospasm on Transcranial doppler TCD.

**Material and methods:** We conducted retrospective study on 500 consecutive patients with TBI from the period August 2018 to April 2019 at our institution (All India Institute of Medical Sciences AIIMS, Patna). The definition of PTCI was made on non-enhanced CT scan based on a well-demarcated or fairly discernible region of low attenuation following specific vascular territory insult.

**Results:** PTCI was observed in 35 (13.6%) patients. Of various parameters, age (p=0.037), initial Glasgow coma scale score (p<0.01), brain hemiation (p=0.044), and decompressive craniectomy (p=0.012) were significantly higher in patients with PTCI than patients who do not have PTCI. Patterns of TBI and vascular territory of PTCI were not specific. Duration between accident and PTCI was not specific. The mortality rates were significantly higher in patients with PTCI in distribution of deep perforator of brain than in superficial vascular distribution (p=0.043), posterior circulation territory infarct was more common and fatal.

**Conclusion:** The development of PTCI is rare after TBI, but it usually results in serious outcome and high mortality. Early recognition with specific patterns on CT, TCD and DSA to assess for risks and aggressive management is mandatory to prevent PTCI.

---


Prof. M. Narayana Swamy1, Dr. Ketan Hedao2
1) NSCB Medical College, Jabalpur, Madhya Pradesh, India
2) MPMSU, Jabalpur, Madhya Pradesh, India

**Introduction:** Anterior approach though is the shortest route and more physiological its not often performed because unfamiliarity and increased incidence of complications and often diaphragm needs to cut open and failure of construct is common. Authors innovative approach of diaphragm sparing miniopen thoracotomy with reconstruction of anterior and middle column with wide footed standalone expandable cage addresses all these issues.

**Aim:** To study the efficacy of standalone expandable cage in preventing the late failure of construct by diaphragm sparing miniopen thoracotomy

**Material & Methods:** 37 consecutive patients with TLICS of 4 and above were operated by above method. Post operatively they were observed for VAS score, requirement of analgesics, alteration in the pulmonary function tests, movements of diaphragm, deterioration of kyphotic correction and implant failure.

**Results:** VAS score was less than w 10th POD.), Diaphragmatic movements and pulmonary function tests were 80% of the normal range by 14th day. There was significant decrease in Cobb’s angle at immediate period compared to Pre Op. There was no significant deterioration in mean Cobb’s angle on follow up. Subsidence was found in 2 cases. No complications listed in literature while performing anterior approaches were noted.

**Conclusion:** Miniopen diaphragm sparing approach and reconstruction of anterior column is very effective method of decompression of cord. Deterioration of kyphotic correction by wide footed expandable cage is negligible even when used standalone treatment.

---

**FP-154:** Surgical Experience of Acute Odontoid Fractures with Single Screw Anterior Fixation

Dr. D. Mukhopadhyay*, Dr. Asha Bakshi*
1) Kailash Health Care, Noida, India

**Introduction:** Management of Type II Odontoid (Anderson, Lonso) fracture is still debated. It is considered to be relatively unstable and requires active management.

**Methods:** A total of ten Type II fracture patients, all male between 18-27 years underwent AOSF from January 2016 to 2018. All of them sustained high velocity trauma. Primary management of trauma, neurological assessment, radiology and imaging was performed for all patients. Preoperatively skull pin traction was applied. Bedside X-ray CV junction was done to assess’ reduction of fracture. Once reduction is achieved then surgery was performed. Surgical approach same as anterior cervical discectomy. Neck kept extended. On traction; once ventral spine is reached a cephalad dissection is done to reach C2-3 disc space. No discectomy was performed. Cannulation of fracture starts with opening of C2-3 at the pilot hole. A drill guide system is used under fluoroscopy. A K-wire is used in the anterior lip of C2 in the sagittal plane such that it is angled posteriorly and exits the posterior tip of Odontoid maintaining midline. The K wire and the drill pass through the fracture line. Finally the cannulated screw inserted along the trajectory. Follow ups with X-ray in 1 week, 1 month, 6 months and then yearly.

**Results:** No Mortality. 3/10 improved progressively. 3/10 mild dysphagia postoperatively. We achieved 100 % fracture union.

**Conclusion:** AOSF is a safe procedure. Union rate is high. Preserves atlanto axial movements. However requires intact transverse ligament and a reduced fracture.
FP-155: Atalanto Axial Dislocation - Management strategies and technical difficulties

Dr. Hrishikesh Umakant Kharosekar
1) Grant GMC & Sir JJ Group of Hospitals, Mumbai, India

Aims: To enumerate surgical techniques and difficulties in management of AAD. To discuss role of 3D CT with Angiography and advances in anaesthesia in management of AAD.

Materials & Methods: Retrospective evaluation of patients operated for AAD from August 2006 till July 2019 was done. Patients were evaluated for demographic distribution, presentation, Surgical and anaesthesia management and difficulties in encountered.

Conclusion: Polyaxial screw rod fixation techniques have resulted in a paradigm shift in management of AAD, however the older techniques may come handy when this fails. Role of CT angio and us of operating microscope during exposure helps avoid injury to vertebral plexus and artery thus decreasing morbidity and mortality.

FP-156: Role of serial CT Brain in management of Mild Traumatic brain injury

Dr. M. Vijay Anand, Dr. R. Veerapandian
1) MADURAI MEDICAL COLLEGE, Tamilnadu, India

Introduction: Mild traumatic brain injury is one among the most common cause of emergency admissions. Continuous clinico-radiological monitoring is essential in management of head injury patients. Timing and frequency of repeat CT brain in patients with stable neurological status needs to be established. CT exposes patients to potentially damaging radiations and can increase the cost of healthcare.

Materials & Methods: We analyzed 250 patients with mild traumatic brain injury with initial positive CT finding, serial CT Brain was taken at 24hrs, 48hrs, 72hrs post 1st CT Brain irrespective of their neurological status. These films were analyzed for progression of th lesion, appearence of fresh lesions, need for neurosurgical intervention, resolution of the lesion. None of these patients had clinical deterioration.

Results: Out of 250, 32 Patients had EDH, 78 patients had SDH, 140 had multiple contusions. Without neurological deterioration, progression of the lesion radiologically found in 9 patients (3.6 %), Appearance of fresh lesions found in 30 patients (12%), need for neurosurgical intervention in 4 patients(1.6%), resolution of the lesion in 89 patients (35.6%) within 72 hrs.

Conclusion: Repeated CT scans are not necessary in emergency room if the patients neurological status is stable. However special attention should be given in patients with skull fracture in initial scan, with chronic disease or those taking anticoagulant drugs. Follow up serial imaging does not provide any guideline in managing mild head injury patients.
injuries), but have worse outcome than supratentorial injuries. These injuries are also considered as silent killers.

**Aims and objectives:** The study was conducted to know various epidemiological factors, natural course, and outcome of the posterior fossa injury with prognostic factors.

**Material and methods:** The study was prospective, time bound study. The patients of traumatic brain injury were subjects of the study.

**Observations:** There are no specific signs and symptoms for posterior fossa hematomas (PFH). Usually these patients present in good condition (GCS=15) with non-specific complaints. These patients remain stable for some time and then rapidly deteriorate. Due to this type of presentation, many patients skip CT scan. Therefore, these injuries remain undiagnosed and prove fatal. Along with finding the epidemiological and prognostic factors we observed that majority of the patients of PFH have site of impact at occipital region. So the patients with site of impact on occipital region must be evaluated with CT scan whatever their GCS is to avoid the chance of missing PFH. The study data were compared with available literature and presented as results in this paper.

* * * * *
FP-159: Observational study on clinical presentation, management and outcome in patients with Cerebello-Pontine angle lesions at a tertiary care centre

Dr. Abhirama Chandra Gabbita1, Dr. V. Vivek1, Dr. K. Ganesh1  
1) SriHER, Tamil Nadu, India

Objective: To analyse the clinical presentation, management, and results of cerebello-pontine angle (CPA) lesions treated by the sub-occipital retrosigmoid approach in a series of 42 patients, with special emphasis on the analysis of the preoperative and postoperative facial nerve function. METHODS: Prospective and retrospective analysis was done for 42 patients with CPA lesions between August 2014 and October 2018. Data collected included clinical presentation, imaging, surgical and discharge records, histopathology. Data on pre and postoperative facial nerve function were available in all patients. Audiometric analysis was conducted in 21 patients with Vestibular Schwannoma (VS).

Results: Amongst the 42 cases, majority was women (52.4%). The mean age of the cohort was 43.85 yrs (16 ; 76 yrs). Of these, 26 (61.9%) were vestibular schwannoma, 6 (14.2%) meningiomas, 6 (14.2%) epidermoid, 3 (7.1%) jugular foramen schwannoma, and 1(2.6%) malignant melanotic schwannoma. Most patients presented with eighth cranial nerve dysfunction. All patients underwent suboccipital-retrosigmoid craniotomy with endoscopy/ microsurgical excision under intraoperative facial nerve monitoring. Deliberate subtotal resection (STR) was done in 17 cases (65.3%) of VS, 3 cases (100%) of jugular foramen schwannoma and a case of malignant melanotic schwannoma. Near total resection (NTR) was done in 4 cases (15.4%) of VS, 6 (100%) meningioma and 3 (50%) epidermoid. Gross total resection was achieved in 5 cases (19.3%) of VS and 3 (50%) epidermoid. Re-surgery was done for two patients with VS (4.2%). Two patients of VS (4.2%) underwent post-operative gamma knife radiosurgery. Anatomic preservation of the facial nerve was achieved in 95.2% of the patients. On long-term follow-up, favourable facial nerve function (House-Brackmann Grade I-III) was observed in 76.2% of patients. In 10 patients (23.8%) post operatively facial nerve function deteriorated. There were no early postoperative surgical complications. Six patients (14.2%) developed pseudomeningocele, in 5 patients it resolved with tight compression bandage and 1 patient required lumbar the co-peritoneal shunt. No mortality was noted in the series.

Conclusion: The use of endoscope and intraoperative facial nerve monitoring helps in preservation of facial nerve function in majority of patients. Favourable (Gradel-III) facial nerve function was seen in 76.2% of patients.

FP-160: Elderly Patients with Intracranial Meningioma - Surgical Considerations in 228 patients with a comprehensive analysis of the Literature

Dr. Murat Sakir Eksi1, Dr. Cagri Canbolat1, Dr. Ahmet Akbas1, Dr. Berk Baris Ozmen1, Dr. Ebubekir Akpinar3, Dr. Murat Imre Usseli1, Dr. Abuzer Gungor1, Dr. Mustafa Guduk3, Dr. Mehmet Hachanefooglu1, Dr. Ayca Ersen Danyeli1, Dr. Koray Ozduman1, Dr. M. Necmettin Pamir1
1) Acibadem MAA University, Istanbul, Turkey 2) Vezirkopru State Hospital, Samsun, Turkey 3) Bakirkoy Psychiatri Hospital, Istanbul, Turkey

Background: Improved life expectancy and advanced diagnostic tools including computed tomography and magnetic resonance imaging increased the awareness and diagnosis of intracranial meningiomas in elderly population. The risk-benefit ratio of surgery in elderly patients with intracranial meningioma has not been clearly defined due to the lack of objective measurement tools. We aimed to understand the risk factors associated with post-surgical outcomes, and how these risk factors affected post-surgical outcomes in elderly patients with intracranial meningioma.

Methods: We retrospectively evaluated 1372 patients, who were operated for intracranial meningioma, using our prospectively collected database. The same senior author operated all patients at two different tertiary clinics. Patients’ clinical charts, pre-surgical post-contrast T1-weighted magnetic resonance images, operative reports, and pathology reports were reviewed. The relevant literature was also reviewed.

Results: Higher ASA class, presence of co-morbidities, larger initial tumor size and presence of peritumoral edema were all associated with post-surgical complications in elderly patients with intracranial meningioma. Age of at or above 50 years was the strongest predictor of post-surgical neurological complications, whereas higher ASA class was the strongest predictor of post-surgical neurological complications. Literature review showed higher morbidity and mortality rates of elderly patients with intracranial meningioma. Initial tumor size and post-surgical MIB-1 labeling index were higher in the elderly patients, all of which were predictors of tumor growth.

Conclusions: Even though elderly patients operated for intracranial meningioma had higher morbidity and mortality rates compared to younger patients, surgery is still much more beneficial than wait-and-see strategy in elderly patients.

FP-161: Identifying and Preventing Cavernous Carotid Injury in Invasive Pituitary Adenoma

Dr. Deepu Banerji1*, Dr. Renuka Bradoo2
1) 1 1
2) 2 3

Literature review showed higher morbidity and mortality rates of elderly patients with intracranial meningioma. Initial tumor size and post-surgical MIB-1 labeling index were higher in the elderly patients, all of which were predictors of tumor growth.

Conclusions: Even though elderly patients operated for intracranial meningioma had higher morbidity and mortality rates compared to younger patients, surgery is still much more beneficial than wait-and-see strategy in elderly patients.
FP-162: Experience of sitting position in neurosurgery

Dr. Bipin Chaurasia
1) BSMMU, Dhaka, Bangladesh

Objective: Sitting position for operation of Posterior fossa lesions, Occipital and posterior parietal lesions, foramen magnum, upper cervical spinal lesions provides an excellent visualization because of slack of brain due to gravity drainage of CSF and blood. Hence gross total tumor removal becomes relatively easy and less complicative.

Method: In past 5 years total 30 cases underwent neurosurgical procedure in sitting position. Physical characteristics including patient age, sex, size of the tumor and histological diagnosis were collected. The post operative image were studied to see the extent of tumor removal and early detection of complications. All most all patients required C,V. line or peripheral inserted central venous line, precordial doppler sound, ETCO2, PO2 and close monitoring of blood pressure.

Result: Venous air embolism were detected in two cases (6.6%). Total tumor removal was possible in 17 (56.6%) cases and subtotal in 11 (36.6%) cases. There is 3 (10%) mortality in thirty cases, Two case from CP angle tumor and another case from petroclival meningioma. There were pneumocephalus in all most all cases and post operative new facial paresis in 10 (33.3%) cases. 5th nerve palsy developed in 3 (10%) cases. Post operative tumor bed haematoma developed in 4 (13.3%) cases. Most of the patient have good outcome (GOS 5).

Conclusion: Sitting position can be safely done with good preoperative physiological, peroperative close monitoring of the patient regarding blood pressure, ETCO2 and oxygen saturation. However postoperative complication like tumor bed haematoma, pneumocephalus, cranial nerve palsy have to be bring in mind.

* * * * *

FP-163: Endoscopic anatomy of Sella and Cavernous Sinus Triangles in 3D - A cadaveric study

Dr. Sukhdeep Singh Jhawar
1) SPS Apollo Hospital, Ludhiana, India

Objective: The objectives of this study were to understand the endoscopic anatomy of the sella, cavernous sinus and neurovascular anatomy related to this critical area. The knowledge of various structures is paramount to understand, purely endoscopic endonasal approaches to this area.

Materials & Methods: Six fresh frozen silicon injected adult cadavers were studied bilaterally (n = 12). We used Karl Storz 0 and 30 degree, 4 mm, 18 cm and 30 cm rod lens rigid endoscope in our dissections. After cadaver preparation, extended endoscopic endonasal approaches were performed to access the cavernous sinus.

Results: In the six cadavers, the cavernous sinus and superior orbital fissure, on both sides, were widely exposed with extended endoscopic endonasal approach. The anteroinferior portion of the cavernous sinus was exposed by removing the superior and the middle turbinates and the posterior ethmoidal cells (extended endoscopic endonasal transsphenoidal approach); the whole lateral wall of the cavernous sinus was exposed by removing the anterior and the posterior ethmoidal cells. This division can facilitate understanding of the anatomic relations of the cavernous sinus from the endoscopic view.

Conclusion: Knowledge of the anatomy of the sella and cavernous sinus obtained with an endoscopic view of cadaver dissections is an essential step in the learning curve of endoscopic skull base surgery, and is important for endoscopic treatment of various pathologies in this region. In this anatomic study, we reviewed the approaches to the cavernous sinus with an endoscopic view and identified the neurovascular landmarks.

* * * * *

FP-164: The Chiasmal Compression Index - An integrative assessment tool for visual disturbances in patients with Pituitary Macroadenomas
**FP-165: Safety of Ventriculostomy at modified Paines point for intraoperative brain relaxation during pterional craniotomy**

Dr. Hitesh Kumar Gurjar¹,²

**Objectives:** Intraoperative brain relaxation is essential for good surgical outcomes after cranial surgery. Aim of this study was to assess safety of ventriculostomy at modified Paines point.

**Material & Methods:** It’s a retrospective study of patients in whom ventriculostomy at modified Paines point (4.5 x 2.5 cm) was used for intraoperative brain relaxation during cranial surgery. In all patients satisfactory brain relaxation could be achieved. Average of 40 ml CSF was required to be drained for relaxation. It was used in 9 cases of ruptured aneurysms with subarachnoid hemorrhage and in 7 patients of skull base tumors.

**Results:** None of the patient had ventriculostomy related complication like hemorrhage or hematoma or malposition of catheter tip.

**Conclusion:** Our study shows that ventriculostomy at modified Paines point can be done safely without any complications.

---

**FP-166: Use of Intrathecal fluorescein as a guide for Endoscopic CSF Rhinorrhoea repair in spontaneous CSF leaks**

Dr. Nirmala S., Dr. Harish C., Dr. Akshay Hari, Dr. Yadhu Lokanath, Dr. Santhosh N. U., Dr. Umesh S., Dr. Ravi Gopal Varma, Dr. Prateek Nayak

**Objective:** The aim of this study is to analyze the results of 15 cases of Spontaneous CSF Rhinorrhoea. Methodology: All the cases that underwent Endoscopic CSF Rhinorrhoea Repair under fluorescein guidance from December 2016 to July 2018 were included in the study. The clinical details, Preoperative MRI and Thin cut CT, operative findings, postoperative recurrence rates were studied. Patients were followed for 1 month, 6 months and 1 year.

**Results:** Total of 15 cases was studied. 9 were females and 6 males. In 10 of our cases preoperative MRI cisternography / CT did not define the defect clearly. Fluorescein leak was seen in the sphenoid sinus in 8 patients, anterior ethmoid in 2 cases, posterior ethmoid in 2. One patient had no fluorescein leak and 2 patients had more than one defect detected intraoperatively. Follow up data of the patients did not show any recurrence of CSF leak.

**Conclusion:** In cases of spontaneous CSF Rhinorrhoea without any obvious defects on MRI intrathecal fluorescein aids in identifying the defect. It not only helps detect the defect seen on MRI but also unidentified defects. It also obviates the need for CT cisternography preoperatively.

---

**FP-167: Endoscopic Endonasal approach to the Petroclival Synchondrosis - A case series**

Dr. Prakash Nair¹

Dept. of Neurosurgery, Sree Chitra Institute for Medical Science and Technology, Trivandrum, India

**Introduction:** The petroclival synchondrosis is a cartilaginous junction between the basiocciput and the petrous temporal bone. It is a common location for petroclival chondrosarcomas, however, clival chordomas also tend to extend into the petroclival regions. Surgical access into this region is needed to manage number of lesions like the cholesteotoma, chordoma and the chondrosarcoma. The internal carotid artery lies anterior to the synchondrosis while the jugular foramen lies posterior and lateral to it. The location is difficult to access due this anatomical arrangement. Various transcranial approaches have been described to access this region which include the anterior transpetrosal approach, subtemporal approach with an infra temporal extension and the transcoclear approach. These approaches, while
necessitating manoeuvres like mobilising the facial nerve and retracting the temporal lobe, are limited by their ability to reach the clivus and the inferior aspect of the petroclival synchondrosis. The endoscopic transpterygoid approach provides a direct trajectory to the petroclival synchondrosis. We present our experience with the extended endoscopic approach for management of tumours that either arise at the petrous apex or extend to the region.

Materials & Methods: Retrospective study carried out at a tertiary centre between Jan 2016 and Jul 2019. All patients who underwent extended endoscopic approach for tumours extending into the petrous apex were included in the study. The indication of surgery, surgical outcomes and long term follow up was studied.

Results: A total of 6 patients (male=2, female=4) underwent extended endoscopic transpterygoid approach to access the petrous apex. The most common clinical finding at presentation was diplopia due to 6th nerve palsy. The EEA procedure was performed as the first procedure in 4 patients. In 2 patients an earlier EEA approach had been performed. No patient developed a new onset cranial nerve palsy following surgery. One patient developed post-operative CSF rhinorrhea which was repaired through the endonasal route. The histopathology of the tumours included Chordoma= 2, chondrosarcoma =3 Pituitary adenomas=1. Gross total resection was achieved in 4 cases and a small residue was noted in one case. In the patient with a recurrent pituitary adenoma, subtotal excision was achieved due to multi compartment involvement. There was no mortality in the series. Conclusion: The extended endoscopic approach enables access to the petrous with minimal morbidity. The approach provides excellent exposure of the petrous apex and the retrocarotid space.

* * * *

FP-168: Excision of Intracranial Epidermoids using a keyhole endoscopic approach - Seeing is believing

Dr. Pawan Kumar Verma *, Dr. Awadhesh Kumar Jaiswal¹, Dr. Sanjay Behari¹
1) SGPIMS, Lucknow, India

Introduction: Intracranial epidermoids are unique tumors in that they can assume very big sizes without many symptoms. They often encircle neurovascular structures and evade complete visualization during conventional microscopic surgeries. Many surgeons utilize endoscopes to visualize conventional blind areas in the later parts of microscopic tumor excision. Herein we present our experience of complete endoscope assisted excision of intracranial epidermoid and the lessons we learned.

Material and method: It document retrospective data of excision of intracranial epidermoid using endoscopic assistance via a keyhole craniotomy. The extent of tumor excision, operative nuances, postoperative complications, long term outcome including aesthetic results was analyzed. The paper includes representative operative

video as well.

Results: We treated 28 patients (mean age: 29.3 years, M:F-15:13). The common locations were the CP angle (60.7%), followed by interhemispheric, prepontine cisterns, etc. Post-op MRI confirming the extent of excision and long-term aesthetic outcome on the scale categorizing happy and acceptable, unhappy but acceptable and unacceptable has been used. The advantages of approach were better illumination and a panoramic view of the surgical field, minimal retraction of tissue and a greater extent of resection.

Conclusion: Endoscope assisted excision of epidermoid is feasible and a viable alternative to conventional microscopic excision with good oncologic and aesthetic results. The successful outcome depends on factors like patient selection for approach, meticulous preoperative planning, customized craniotomy site for each patient and ability to use the angled lens shaft to visualize the hidden areas.

* * * *

FP-169: Trigeminal Schwannomas - A case series of six cases

Dr. Debadutta Senapati *, Prof. Sanjib Mishra¹
1) S. C. B. Medical College and Hospital, Odisha, India

Introduction: Schwannomas are benign tumors of nerve sheath of Schwann cell origin. Trigeminal schwannomas (TS) constitute 0.2 - 0.4 % of all intracranial tumors. They primarily arise from Gasserian ganglion and cause widening of Meckel’s cave and press upon the trigeminal nerve. They involve the adjoining cranial nerves, blood vessels and brain by displacement. The Aim of the study was to analyze clinical and radiological features and to evaluate appropriate surgical route depending on tumor location and assess long-term outcomes.

Materials and Methods: We performed a retrospective analysis of six patients treated surgically for Trigeminal Schwannoma in our department from June 2015 to April 2019. The tumors were classified using Ramina classification based on their location.

Results: The age of presentation was 15-49 years with equal gender predilection. Headache was the most common symptom in 5/6 (83.3%) patients. Facial hypesthesia was seen in 4/6 patients. Symptoms of involvement of adjacent cranial nerves in the cavernous sinus and in the CP angle reported in two patients. Three patients had contralateral hemiparesis due to brainstem compression. Type E, involving both middle and posterior cranial fossa, was the most common variety. Five patients had tumors involving multiple compartments. Complete tumor resection was done in two patients. Two patients developed post-operative complications.

Discussion: Although multi-compartmental TS are rare, but found to be very common in our experience. A variety of surgical approaches can be used to excise the tumor with minimal morbidity. The choice of approach needs to be individualized with total excision providing excellent results.

* * * *
**FP-170: Triple layer reconstruction technique of Cribiform defects after resection of anterior skull base tumors**

Dr. Abhishek H. Jain¹,², Dr. Parasuraman A.¹

1) Amrita Institute of Medical Sciences, Kochi, Kerala, India

**Objectives:** The goal of this study was to demonstrate the efficacy of a simple and reliable technique for anterior skull base defect reconstruction using pericranial, temporalis fascia or fascia lata graft in patients who have undergone craniofacial resection of the tumors with intracranial extension.

**Methods:** There were 7 patients who had undergone anterior skull base resections of tumors via the aforementioned approach. All the cases had malignant tumors. Reconstruction of the anterior skull base was performed by a single team who used triple layer fascial graft. Limited dural defects were reconstructed using the temporalis fascia, whereas large anterior skull base defects were reconstructed using a fascia lata sheath. Reconstruction was achieved without the support of bone graft or titanium mesh or microvascular free flap muscle transfer. The incidence of cerebrospinal fluid leakage, intracranial infection was studied.

**Conclusions:** The use of a triple layer fascial graft alone was adequate for prevention of CSF leakage, menigitis, tension pneumocephalus and brain hernition. The triple layer fascial flap provided a simple and reliable means of anterior skull base reconstruction after resection of both malignant and benign tumors.

---

**FP-171: The Straight road to Meckel’s Cave - Endoscopic approach to giant trigeminal schwannomas**

Dr. Sandeep Kandregula¹,², Dr. Vikas Vazhayil¹, Dr. Manish Beniwal³, Dr. Narasinga Rao K. V. L.¹, Dr. Dwarakanath Srinivas¹, Dr. Sampath Somanna¹

1) NIMHANS, Karnataka, India

**Introduction:** Trigeminal schwannoma are the most common non vestibular schwannomas accounting of 0.36% of all intracranial tumors. These tumors occur along the root of trigeminal nerve, ganglion, and other branches. Subtotal resection has a higher chance of recurrence rates than complete resection. Hence complete resection often provides cure. Microsurgical approaches especially in ventral areas, may not achieve complete resection. Endoscopic approach to the lesions in Meckel’s cave offers a straight path / ventral trajectory lateral to the ICA6. Course of internal carotid artery (ICA) along the skull base is crucial for these approaches. Safety and efficacy of the procedure is of utmost importance. Here in this study we aimed to describe our experience with trans pterygoid approach to Meckel’s cave and outcomes of giant trigeminal schwannomas operated through EEA.

**Materials and Methods:** We performed retrospective review of all the patients who underwent extended endoscopic endonasal surgery for various skull base pathologies after informed consent with ethics board approval. The prospective group of patients were between 2014 and 2018. A total of 48 skull base pathologies were operated through EEA, out of which six cases of trigeminal schwannomas are operated through trans pterygoid approach. The demographics of the patients including age, sex, clinical symptoms and signs were analysed. Radiological data was analysed based on pre-operative and post-operative CT/MRI imaging. Complications related to the operative procedure were analysed. Post-operatively radiological imaging was performed to look for resection achieved. Patients were followed up at serial intervals at 3 months, 6 months and 1 year following the surgery.

**Results:** The age ranged from 26-54 years with male to female ratios 1:2. The mean maximal dimension of the tumor was 4.71 cms. Two patients are recurrent/residual cases. Paranasal sinuses involvesment was present in 2 cases (ethmoid and maxillary sinuses). Five patients had preoperative trigeminal nerve dysfunction. Two patients had proptosis and three patients had vision dimension. All patients underwent endoscopic endonasal trans pterygoid approach, gross total resection was achieved in five out of six patients. Proptosis improved in two patients. No csf leak was present in our series. None of our patients had meningitis. Follow up ranged from 6 months to 36 months with mean follow up of 16 months. No recurrence was found till last follow up.

**Conclusion:** Extended endoscopic approaches to middle cranial fossa made lesions amenable to complete resection with lesser morbidity, although case selection is of utmost important making it more selective in its approach and choosing the indications. Endoscopic extended endonasal approaches provides a technically challenging but a viable median approach to resect the pathological lesions of the skull base. This corridor can be combined with traditional approaches to get complete access and resection. The learning curve and increasing expertise, with the instrumentation skills currently reached acceptable safety profile compared to traditional approaches.

---

**FP-173: Digital Subtraction Angiography - Starting from scratch- Single Neurosurgeon’s experience at AIIMS Rishikesh**

Dr. Aditya Patil¹, Dr. Nishant Goyal¹

1) AllIMS, Rishikesh, Uttrakhand, India

**Aims & Objectives:** Most Neurosurgical training centers in India provide no or very limited exposure of neuro-intervention. The senior author with limited prior experience of doing DSA aimed at performing diagnostic DSA.

**Material & Methods:** Two senior colleagues (Dr GR and Dr PK) who were well experienced in neuro-intervention, were invited separately on three different occasions (Dr PK once and Dr GR twice). With these senior colleagues, a total of seven cases were done, first observing them and then doing under their supervision. After this, the senior author started performing four vessel cerebral angiography with a
trained nurse (who had prior experience in neuro-intervention). All cases of DSA performed by the senior author between January 2017 till July 2019 were included in the study. All the cases were done on Phillips Allura creative biplanar DSA machine.

Results: During the study period, a total of 23 DSAs (15 males, 8 females; mean age 50 years; age range 12-68 years) were performed by the senior author. Of these, 13 were check angiography for post-operative cases of aneurysm clipping, five cases were diagnostic DSA in cases of subarachnoid hemorrhage, three cases of arterio-venous malformations (AVM) and one case was a post-operative case of Moya Moya disease. In one case of Acom aneurysm, intra-arterial nimodipine was injected for cerebral vasospasm. No DSA related complications were observed in any case.

Conclusion: One needs to learn to do DSA before starting with more complicated cases of neuro-intervention. A good support from the administration and experienced colleagues is vital before venturing into this field.

* * * * *

FP-174: Electrocardiograph abnormalities in intracranial hemorrhage, Prognosis and outcomes - A retrospective cohort study, at king Abdulaziz University Hospital, Jeddah 2010-2018

Ms. Maryam Zuhair Enani1, 2, Dr. Bassam E. Yaghmoor1, Dr. Hussam AlQudsi1, 2, Dr. Fatimah M. Hisan1, 2, Dr. Naeem Alshoaibi1, 2, Dr. Ghaida J. Sindil, 2, Dr. Masaher A. Aljehani1, 3, Dr. Mishari H. Althomali1, 2, Dr. Shayma M. Alotaibi2, Dr. Abdulrahman J. Sabbagh1

1) King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia
2) Taif University, Jeddah

Background: Electrocardiographic (ECG) abnormalities following intracranial hemorrhage (ICH) have been well documented and evidence suggests that it’s associated with a worse outcome; we aim to further investigate ICH characteristics, outcomes and the prognostic value of abnormal ECG changes.

Methodology: We reviewed clinical markers, initial laboratory and radiological findings within 24 hours of admission for 229 patients older than 18 years of age diagnosed with traumatic or non-traumatic ICH. A total of 87 initial ECGs were analyzed by one experienced cardiologist blinded to clinical and follow-up data. Chi-Square, One-Way ANOVA and bivariate statistical analyses were carried out.

Results: Survival observed in 183 patients with a median 10-day length of stay (range 0-294). Death was observed in 44 (20.1%), with a median survival of 12 days (range 0-283); a vegetative state in 2 patients.

Risk factors for death were female gender (P=.008), pre-existing renal disease (P=.03), non-traumatic ICH (P=.001), Glasgow Coma Scale <13 (P=.001), and hospital-acquired infection (P=.037).

ECG abnormalities were observed among 62.24% of patients, significantly associated with the age group ≥ 60 years of age (P=.032), 32.56% had ST-segment changes. Results revealed that subdural hemorrhage is associated with third-degree AV block (P=0.034), epidural hemorrhage with tachycardia (P=.027), pre-existing neurological disease with AV block (P<.05) and QTc prolongation (P=.046). ECG abnormalities were not significantly associated with ICH’s final outcome (P=.616).

Conclusion: Abnormal ECG changes are not an independent predictor of poor survival in ICH patients. However, we believe close observation to detect ECG abnormalities might better patient care.

* * * * *

FP-175: Carotid Endarterectomy, without shunt under GA & Continuous Scalp EEG Monitoring

Dr. Ravi Mohan Rao1, 2, Dr. Ravi Mohan Rao1, Dr. Sujit Kumar1,
Dr. Karthik Malepathi1, Dr. Karthikeyan V1, Dr. Sivanna V1,
Dr. Santosh C. K.1, Dr. Manoj S. P1, Dr. Bharath Dubey1,
Dr. Anand Subramanyam1, Dr. Ajith Kumar1
1) Apollo Hospitals, Bangalore, India

Objective: To assess the efficacy of intraoperative scalp EEG monitoring to predict the occurrence of neurologic adverse event during carotid endarterectomy (CEA) performed under GA

Material & Methods: Thirty-Two patients underwent carotid endarterectomy under GA in the period from May 2012 to June 2019. The age of patients ranged from 33 to 84 years. Five patients underwent surgery for asymptomatic high grade 80-90% carotid stenosis. Five patients with coronary disease underwent simultaneous CEA & Coronary artery bypass grafting. Twenty-Two patients had CEA for symptomatic carotid stenosis with either recurrent TIA’s or minor strokes. Two patients had bilateral carotid stenosis. All patients had continuous scalp EEG monitoring. Before carotid cross-clamping, 1gm of levetiracetam, 4mg Dexamethasone & 20gm of mannitol were given along with 5000 units of IV Heparin. Carotid cross-clamping times were recorded. All patients had postop neuroimaging & angiograms.

Results: The carotid cross-clamping times in 32 patients ranged from 26 minutes to 49 minutes with an average of 35 minutes. No intraoperative EEG changes were noted in 31 patients. One patient who had bilateral cervical ICA occlusions and underwent ST-MCA anastomosis for recurrent TIA’s needed external carotid endarterectomy on the side of EC-IC bypass had reduction of EEG amplitude which resolved on removing the cross-clamp after CEA. No patient required insertion of carotid shunt during the cross-clamping time. No patients had fresh postoperative strokes/infarcts.

Conclusions: Intraoperative EEG monitoring predicts the safety of CEA under GA. Meticulous CEA technique & not the cross-clamping time is the key.

* * * * *
FP-176: Analysis of data of 136 operated cases of brain aneurysms - An institutional experience
Prof. Nemi Chand Poonia*  
1) Neurocare Hospital, Jaipur, Rajasthan, India

136 operated cases of brain aneurysms (from May 2013 to till date) were analyzed in reference to age, sex, SAH grade and comorbid diseases. Development of vasospasms were analyzed in reference to grading of SAH and time interval from ictus to surgery. Better outcome of these patients were dependent upon good pre-operative neurological status, early surgery and hemodynamic stability post-operatively. The hospital stay and cost of treatment was also depends upon the pre-operative clinical neurological status.

Conclusion: Vasospasm and poor outcome was also in the better SAH grade. Because of pre-operative hemodynamic stability in higher SAH grade the chances of vasospasm were less in these cases.

* * * * *

FP-177: Cost effective treatment of Vasospasm with Intracisternal Papaverine
Dr. Kumar*, Dr. Kiran Karamthoat Sugali†, Dr. Rakesh Kumar Das‡, Dr. V. Arvind Kumar Kumar§, Dr. Suchanda Bhattacharjee¶  
1) Nizam’s Institute of Medical Sciences, Hyderabad, India

Introduction: Cerebral vasospasm after subarachnoid hemorrhage remains a major source of morbidity and mortality. Various agents have come in vogue to deal with this complication, but none has shown any absolute results.

We report an easy cost-effective technique of combating vasospasm in the post-operative clipping of aneurysm.

Methods & Material: We did retrospective analysis of patients who were admitted and operated for anterior circulation aneurysmal bleed. All these cases were subjected to microsurgical clipping only. 24 consecutive cases where Papaverine was given intracisternally, were analysed. Our protocol is Hypertension and Nimodipine orally. The later is given for 21 days if there is no Hypotension. In addition to this, we gave Intracisternal Papaverine also.

This Study was done at Nizam’s Institute of Medical Sciences (NIMS). Patients were treated with prophylactic hypertension and therapeutic papaverine. Therapeutic means instillation of Papaverine in reservoir. The protocol for prophylactic papaverine followed was injection of papaverine twice daily at 12 hours interval from post-operative day 1 to post-operative day 5. Papaverine injected percutaneously with hypodermic needle at 1:2 dilution into cisternal space.

Results: Study consisted of 24 patients. In those patients 2 developed clinical symptoms of vasospasm, 2 of them developed Aphasia which gradually improved. Rest of the patients had an uneventful post op recovery phase. The mortality related to vasospasm, in our patients was 12%.

Discussion & Conclusions: Intracisternal lavage with papaverine prophylactically can reverse and prevent vasospasm. This remains a quick, cost effective, bedside and easy way of dealing with vasospasm.

* * * * *

FP-178: Clinical, radiological profile and outcomes in the management of Spetzler-Martin grades I-III arteriovenous malformations at a tertiary care institute
Dr. Goutham Hanu Tammireddy*, Dr. B. C. M. Prasad†, Dr. V. V. Ramesh Chandra‡  
1) Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India

Background: Treatment of arteriovenous malformations (AVMs) is always a challenge considering their hemorrhagic presentation, associated morbidity and mortality. Spetzler–Martin grades I–III are the grey zones as far as the treatment options are concerned. With a generous multimodality approach, one can reduce the morbidity and mortality to a considerable extent.

Objective: To analyze the demographic and clinico-radiological profile of intracranial AVMs belonging to Spetzler–Martin grades I–III and their outcome following microsurgical excision.

Methods: All patients who underwent excision of AVM at Sri Venkateswara Institute of Medical Sciences from a period of January 2007–January 2019 were included in the study. Patients with associated aneurysms or tumors were excluded from the study. Post-operative CT angiography was done within 6 weeks after surgery. Outcome was analysed in terms of neurological improvement according to Medical Research Council Grade (MRC), obliteration of the AVM in post-operative angiography and Modified Rankin score. Outcome based on Modified Rankin score was favorable with a score of 0–2 and unfavourable when the score was 3–6.

Results: A total of 20 patients with a mean follow-up of 12 months were identified. Their clinical presentation, intraop, postop complications and overall outcomes have been discussed.

Conclusion: The aim of treating AVMs should be complete obliteration of the AVM considering the high risk of hemorrhage and the morbidity and mortality associated with hemorrhage.

* * * * *

FP-179: Intramedullary Spinal Cavernoma - Clinical presentation, microsurgical approach, and long-term outcome
Dr. Anamalia Vishnu Vardhan*, Dr. Syed Ameer Basha Paspala†, Dr. Venkata Ramakrishna Murthy Thenneti‡  
1) Care Hospitals, Hyderabad, India

Objective: Intramedullary spinal cavernoma (ISC) is a rare entity and
Aneurysmal wall motion analysis (WMA) was performed using 3D morphological characteristics including bifurcation, shape, size, presence of daughter sacs, maximum size, depth, neck, flow angle, parent vessel diameter, aspect ratio (AR), bottleneck factor, and size ratio (SR) were studied. P values were significant (<0.05) for AR and SR and AR (>) and SR (>) are better predictors for aneurysmal rupture. P values were not significant for WMA to predict aneurysmal rupture. P values were significant for altered flow patterns on the side of rupture of aneurysm.

Conclusions:
- AR and SR are better morphological predictors for rupture of IA

**FP-180:** Factors predicting rupture of an Aneurysm in Multiple Intracranial Aneurysms

**Dr. Harshal Agrawal**, **Dr. Balamurugan Mangaleshwaran**, **Dr. Joy Varghese**
1) Apollo Hospitals, Chennai, India

**Aims & Objectives:**
- To determine factors predicting rupture of intracranial aneurysms in patients with multiple aneurysms.
- To study morphological factors, wall motion and flow patterns in cerebral circulation that may be related to rupture of aneurysms.

**Materials & Methods:**
- Between Jan 2016 and Dec 2018, 20 patients with multiple IA and subarachnoid hemorrhage as diagnosed by CT and DSA.
- Morphological characteristics including bifurcation, shape, presence of daughter sacs, maximum size, depth, neck, flow angle, parent vessel diameter, Aspect Ratio (AR), Bottleneck factor, and Size Ratio (SR) were studied.
- Aneurysmal wall motion analysis (WMA) was performed using 3D Rotational Angiography and classified into focal or global aneurysmal wall motion.

**Results:**
- Preoperatively, 17.8% progressive decline in neurological function and 23.3% acute neurological deterioration. Moreover, 16.7% sudden onset of a severe neurological deficit, 35% sudden onset with a subsequent gradually progressive decline in neurological function. On long-term follow-up after treatment (mean ±SD, 35.2±15.2 months), 70.8% no change in neurological function, 6.3% suffered from a decline, and 22.9% improved neurologically. Thoracoolumbar localization (p = 0.043), low preoperative Epstein and Cooper grade for the lower extremities (p < 0.001), and a low preoperative ASIA grade (p < 0.001) were identified as factors associated with an unfavorable outcome (ASIA Grade A–C). The rate of spinal ataxia 14.7%.

**Conclusions:** Postoperative neurological function is determined by the preoperative neurological status. On long-term follow-up 93.7% of patients presented with a stable or improved condition (ASIA grade). Definite microsurgical treatment should be considered.

**Key words:** spinal cavernoma; microsurgery; spinal cord; vascular malformation

**FP-181:** An institutional experience of intracerebral aneurysm clipping - Looking for factors affecting outcome

**Dr. Tanusree Chakraborty**, **Prof. A. Mastan Reddy**
1) Osmania Medical College, Hyderabad, India

**Objective:** Aim of this study is to analyse all patients undergoing intracerebral aneurysm clipping during the period from June 2017-May 2019 and to assess the factors involved in favorable or unfavorable outcomes.

**Methods:** In this study all cases of intracerebral aneurysms admitted in Department of Neurosurgery, Osmania General Hospital, Hyderabad from June 2017 - May 2019 were analyzed and studied based on patient factors like age, sex, co morbidities, aneurysm characteristics such as size, location. Patients were graded clinically according to WFNS grading and Hess and Hunt scale and by Fisher’s grade based on CT scan findings. End point of study was recovery/discharge from hospital to death.

**Observation and results:** 48 patients underwent clipping of cerebral aneurysms. Age ranged from 25 to 75 years. 14 patients were hypertensive. Day of ictus at time of surgery ranged from 4 to 32 days. Anterior circulation aneurysms were in maximum number. Half of patients were admitted in WFNS grade I. 2 patients needed pre operative CSF diversion.

10 patients expired post operatively, out of which 5 patients were in age group 30 to 50 yrs, 5 patients were hypertensive, 9 were in WFNS grade 4, 6 patients in higher Fisher’s grade, 7 were operated in 2nd post ictal week and 2 patients had pre operative EVD.

**Conclusion:** Age, poor clinical grade, poor radiological grade, hypertension, pre operative hydrocephalus were found to be adversely affecting outcome.

**FP-183:** Endovascular therapy in complex posterior circulation atherosclerotic disease

**Dr. Raj Agarbattiwala**, **Dr. Nitin Narayan Dange**
1) Seth G S Medical College and KEM Hospital, Mumbai, India

Stroke is one of the leading cause of morbidity and death. The annual mortality rate has been found to be 6.8% for middle cerebral artery.
stenosis, 11.6% for vertebrobasilar stenosis, and 12.4% per year for intracranial internal carotid artery stenosis. Despite maximal medical therapy, more than 50% of patients with severe ICAD experience recurrent ischemic symptoms, usually within the first month after the initial event. Endovascular treatment is being considered a viable option in refractory patients because of the very high rate of stroke in these patients at 1 year. Stenting is reserved for patients in whom maximal medical therapy (defined as having 2 or more strokes, not TIA) fails or who have strokes despite submaximal angioplasty. Here, we present case series of posterior circulation atherosclerotic disease with acute and chronic presentations and their management, outcome and follow up.

FP-184: Vascular Lesions of the Scalp - “Our Experience”

Dr. Siddharth Gautam1, Dr. Shradha Maheshwari1
1) Dr. R. N. Cooper Hospital & HBT Medical College, Mumbai, India

Objective:
1. Vascular malformations of the scalp are relatively rare vascular lesions
2. They present as an innocuous looking subcutaneous scalp lump or a large, grotesque, pulsatile mass with a propensity to massive haemorrhage
3. The location of scalp vascular malformations is roughly evenly distributed among the frontal, temporal and parietal regions
4. We present our experience with vascular malformations of the scalp with a series of 10 such cases along with its management

Methods:
1. Our series total cases 10 from 2014 - 2019 age: 1 day old to 60 years m: f ratio- 4:6 7 vascular tumours and 3 vascular malformations
2. All cases were worked up with relevant investigations and imaging and planned for surgical management

Results:
1. All cases underwent surgical excision as curative treatment
2. Management of scalp vascular malformation is difficult because of its complex vascular anatomy, high shunt flow and cosmetic problems
3. The indication of treatment includes cosmetic relief of the pulsatile mass, prevention of hemorrhage and other symptoms such as headache and tinnitus
4. Post-operative period is all cases were uneventful

Conclusions:
1. Surgical excision is the most common and successful method for scalp vascular malformation.
2. Percutaneous direct-puncture embolization of cirsoid aneurysms is a safe and effective procedure.
3. It can be effectively used as an alternative or adjunct to surgery.
4. However, before excision of these lesions one must rule out if there is an intracranial component.

FP-185: Endovascular Thrombectomy in Acute Ischemic Stroke - Our experience and importance of Golden Hours

Dr. Deevi Sasank1, Dr. Vikas Gupta1
1) Manipal Hospitals, India

Introduction: The incidence of acute stroke in Indian population is 119-145/100,000 based on recent population based studies leading to considerable mortality, morbidity and disability. Timely diagnosis and intervention makes a huge difference in prognosis of these patients. The present study analyses varied presentations and treatment modalities of acute stroke.

Aims & Objectives:
1) To study various presentations of acute stroke.
2) To study success rate of different treatment modalities in acute stroke.

Materials & Methods: Patients (20) presenting with large vessel occlusions (ICA, MCA, PCA, BA) proven on MRI based stroke protocols- Eligible and consented for neurointervention were enrolled in this prospective study.

Results: Mean age of patients presenting with acute stroke in the present study is 55 yrs. Females outnumbered males in the present study. Earliest time of onset to intervention was 85 minutes and late was upto 8 hrs. Endovascular thrombectomies yielded good results in most of the cases. Success rate of combined procedures (suction+ stentriever) were relatively better to either of procedures alone.

Conclusion: The importance of golden hour and early intervention are re-emphasised in this study. Despite the availability of wide range of interventional modalities, mechanical thrombectomy is a promising option and more awareness among public, medical fraternity is needed about its availability and safety.

FP-186: Reconstructive versus Deconstructive endovascular approach to Intradural Vertebral Artery Aneurysms - A multicenter cohort study

Dr. Ashish Kumar1, Dr. Adam A. Dmytriw2, Dr. Mohamed M. Salem3, Dr. Anna L. Kuhn4, Dr. Kevin Phan1, Dr. Aditya Bharatha1, Dr. Julian Spears3, Dr. Ajith Thomas3, Dr. Ajit Puri3, Dr. Thomas R. Marotta2
1) Medicover Hospitals, Hyderabad, Telangana, India
2) St. Michael’s Hospital, Toronto, Canada
3) Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, United States
**Background:** Parent vessel sacrifice (PVS) has been a traditional way of treating complex aneurysms of the intradural vertebral artery. Flow diversion (FD) has emerged as a viable alternative where vessel reconstruction is desired.

**Objective:** To compare the long term clinical and radiographic outcomes of intradural vertebral artery (V4) aneurysms following treatment by PVS or FD.

**Methods:** We retrospectively reviewed and evaluated 43 consecutive patients between year 2009 and 2018 with ruptured and unruptured intradural vertebral artery aneurysms treated by PVS or FD.

**Results:** A total of 43 intradural vertebral artery aneurysms were treated during this period. In the 14 PVS patients, mean follow-up was 19.5 months and 71.4% of cases achieved mRS \(< 2\) at last follow-up. 100% of cases achieved complete occlusion. There was a 14.3% (2 cases) mortality rate, 14.3% (2 cases) post-operative ischemic complication rate and 0% post-operative hemorrhaging rate. Retreatment was required in 1 case (7.1%). In the 29 FD patients, mean follow-up was 21.8 months and 89.7% of cases achieved mRS \(< 2\) at final follow-up. There was a 3.2% (1 case) mortality rate, 19.4% (6 cases) of post-operative ischemic complications and 6.5% (2 cases) of post-operative hemorrhagic complications. Mortality and complication rates were not significantly different between PVS vs PED groups.

**Conclusion:** Parent vessel sacrifice was associated with comparable intra-procedural complications for VA aneurysms as compared to flow diversion in the largest multicenter study to-date. Both procedures have good (mRS \(< 2\)) long term clinical and radiological outcomes.

---

**FP-188: Biofabrication of bio-artificial humanized functional neuronal constructs using cryopreserved tissues for spinal cord injury**

Dr. Sandeep Kumar Vishwakarma¹, Dr. Chandrakala Lakkireddy², Dr. Avinash Bardia², Dr. Syed Ameer Basha Pasapala³, Dr. Aleem Ahmed Khan⁴

1) Central Laboratory for Stem Cell Research & Translational Medicine, Owaisi Hospital & Research Centre, Deccan College of Medical Sciences, Telangana, India
2) Deccan College of Medical Sciences, Hyderabad, India
3) Care Hospitals, Hyderabad, India

**Background and Aim:** Spinal cord injury (SCI) is one of the most precarious conditions which have been one of the major reasons for continuous increasing mortality rate of SCI patients. Currently, there is no effective treatment modality for SCI patients. The available strategies don’t mimic with the natural processes of nervous tissues repair/regeneration and majority of the approaches may induce the additional fibrotic or immunological response at the injury site and are not readily available on demand. Hence, the present study was aimed to develop ready to use biofabricated humanized functional neurological construct (BHNC) for regenerative applications in SCI defects to overcome the current hurdles.

**Methods:** Cryopreserved meningeal tissues (CMT) were used for bioengineering neurological constructs using acellularization and repopulation technology. Neurogenic cells were differentiated on DMS prepared from CMT. The cellular arrangements and functional behaviour of the engineered neurological construct was evaluated to explore its further applicability in pre-clinical and clinical settings.

**Results:** The technology generated intact neurological scaffolds from CMT and retains several crucial structural, biochemical and mechanical cues to enhance the regenerative mechanisms. The neurogenic differentiation on CMT scaffolds mimics with the natural nervous tissue developmental mechanisms. Functional assessments of Synapsis-1 along with MAP-2 antibody with punctuate distribution in axonal regions of the neuronal cells which was well supported by the gene expression analysis of functional transcripts.

**Conclusion:** Given the significant improvement in the field it may enable to generate more such ready to use functional BHNC for wider applicability in SCI repair/regeneration.

---

**FP-189: Chhabra Medium Pressure Valve in Thecoperitoneal Shunt - An effective & cheap solution to prevent low pressure headache in Benign Intracranial Hypertension**

Dr. Jayunkumar Maheshchandra Shah, Dr. Parimal D. Tripathi

1) Sterling Hospital, Ahmedabad, Gujarat, India

**Aim:** To study the effectiveness of chhabra medium pressure valve in Thecoperitoneal shunt to prevent low pressure headache in Benign Intracranial Hypertension.

**Methods:** A retrospective study carried out at tertiary care center from 2015 to 2018. Total 16 patients were operated for benign intracranial hypertension and thecoperitoneal shunt included in study.

**Observation:** All patients had severe headache, 7 had blurring of vision, 4 had CSF rhinorrhrea, 3 had meningitis. 11 patients had papilloedema preoperatively. Mean CSF pressure was 28 mmof hg. All the patients were operated for Thecoperitoneal shunt with chhabra medium pressure valve with or without CSF rhinorrhea repair. None of our patient developed low pressure headache till 1 year follow up. and all the patients were symptomatically significantly improved as well as papilloedema improved.

**Conclusion:** As medium pressure valve is an effective method for prevention of low pressure headache which is a major concern, we advocate routine placement of medium pressure valve for thecoperitoneal shunt especially instead of costly programmable shunt.
**FP-190: Comparative study of Open versus Endoscopic Discectomy (Destandau technique) in Lumbar Disc Herniation**

Dr. Kamesh Konchada*, Dr. Jagadeesh Babu K.1

1) Mamata Medical College, Khammam, Telangana, India

**Aims & Objectives:**

The aims and objectives were to study the efficacy, advantages, and associated limitations and complications of DED in lumbar disc herniations.

**Materials & Methods:**

A total of 42 patients were enrolled in the study. All the details pertaining to the history, clinical examination, surgical procedure, postoperative recovery are noted. Visual analogue score (VAS) was noted preoperatively, immediate postop and at follow up.

**Results:**

- 17 patients were males and 24 patients were females and a majority of patients were in the age group of 31-40 years. 26 patients had disc prolapsed at L4-L5 level followed by 12 patients at L3-L4 level. The mean operative time was 82 min and the mean hospital stay was 5.3 days in DED group compared to 126 mins and 8.5 days of OD group. Average blood loss is 30 ml in DED group and 257 ml in OD group. One patient had dural tear in DED group. Mean preoperative VAS score was 8.7 and the mean postoperative VAS scores at postoperative day 7 and at 6 months were 2.25 and 1.12, respectively in DED group. 2 patients had surgical site infection in OD group. 89.5% of DED group had good to excellent outcome according to modified macnab criteria.

**Conclusion:**

DED is a novel, safe and effective technique that minimizes invasiveness of the surgical approach. It offers decreased blood loss, shorter operative time, shorter in-hospital stay, decreased need for pain medication, decreased rate of infection, and a shorter return to work time.

* * * * *

**FP-191: Comparative study of Endoscopic vs Open Craniotomy in treatment of Suprasellar bleed - Which one is the best option to choose?**

Dr. VSSK Chaitanya Juluru*, Dr. Chaitanya Juluru

1) Mamata Medical College, Khammam, Telangana, India

**Introduction:**

Spontaneous supratentorial intracerebral hemorrhage (ICH) affects ~20 in 100,000 people annually and the mortality is >40%. For the most part, survivors are left handicapped. Although the clinical outcome is mainly determined by the patient’s initial presentation, early surgical intervention is crucial and urgent in selected patients. Literature, patients with hematomas _1 cm from the cortical surface were more likely to have a favorable outcome from early surgery than those with deep hematomas. However, with the evolution of the neuroendoscope and hemostatic agents, the surgical evacuation of ICH in deep location is now safer and less invasive than before. Here, we present our series of patients with spontaneous supratentorial ICH who underwent endoscopic hematoma evacuation. Surgical evacuation of spontaneous supratentorial intracerebral hematoma is controversial because the traditional surgical approach sometimes causes further brain injury. The introduction of neuroendoscope has brought with it, the new idea of minimal invasiveness, which may improve the surgical results of ICH. In our study we are going to discuss neuroendoscopic hematoma evacuation vs decompressive craniotomy (DC) merits and demerits of each procedure and the outcome of the patients.

**Aims & Objectives:**

The goal of the study is to evaluate the effectiveness and safety of NE group vs craniotomy group and to analyze the influence of their surgical outcomes by using Glasgow outcome scale, modified rankins scoring systems and Glasgow coma scale and functional outcome scores.

**Inclusion criteria:**

- Patients <70 yrs.
- Supratentorial bleeds
- Glasgow coma scale >6.
- Clot volume >30 ml
- Exclusion criteria:
  - Patient age >70 years.
  - Infratentorial bleeds.
  - Intraventricular bleeds.
  - Glasgow coma scale <6.

**Results:**

- 51 patients were randomly divided into 2 groups. All the patients had undergone neurological examination at the time of admission and after the discharge. Gcs on third postop day and at the time of discharge GOS was analyzed at the time of follow up after 3 months mRS at the time of admission, discharge and followup after 3 months.

**Conclusion:**

In conclusion, endoscopic hematoma evacuation for spontaneous supratentorial hemorrhage is becoming a standard surgical procedure, and promising clinical results can be expected. We have found that using the endoscope can create an improved view, reduce bleeding and enhance time efficiency. Therefore, being familiar with the endoscope and related instrumentation is the best way to create a better result and fewer complications. In case of poor GCS with >70 ml blood it is better to go with Decompressive craniotomy compared to endoscopy for promising results.

* * * * *

**FP-192: Changing trends in the Epidemiology of Severe TBI in Singapore**

Dr. Mak Siu Kei David*, Dr. Julian Xinguang Han1.

Ms. Angela An Qi See’, Dr. Jai Rao Prashanth6, Dr. Nicolas Kon Kam King1

1) National Neuroscience Institute, Singapore

**Introduction:**

Use of electric scooters have experienced rapid growth in recent years in many countries. There are several studies describing the rising incidence of injury from these devices. The aim of this study is to evaluate the injury burden, specifically traumatic brain injury (TBI), associated with the use of electric scooters in Singapore. We also sought to compare this injury burden to that associated with the use of bicycles, the conventional method of transportation for short trips and leisure. A retrospective study was conducted on patients who were admitted between January 2015 and December 2017 to Department
of Neurosurgery, Changi General Hospital, for TBI related to electric scooter and bicycle use. There was an increasing yearly trend (2 to 5 to 12, total of 19) in the number of cases admitted due to electric scooter use. In contrast, there was a yearly decrease (20 to 15 to 13, total of 48) in the number of cases admitted due to bicycle use. The large majority, 84.2% (16/19), were the riders of electric scooters themselves, with the remainder being pillion riders. 21% (4/19) of electric scooter related accidents presented with moderate to severe TBI, as compared to 14.6% (7/48) related to bicycle use. All these patients underwent surgical intervention. In conclusion, there has been a significant increase in the incidence of electric scooter related TBI in Singapore, and worryingly, this may only be a fraction of the true magnitude of the problem, with the affected not only being riders, but also non-riders.

***

**FP-193: The impact of body habitus on outcomes after aneurysmal subarachnoid hemorrhage treated by microsurgical aneurysmal repair**

Dr. Anil Chhabrao JadHAV
1) GIPMER, New Delhi, India

**Objective:** Although the prevalence of obesity is increasing rapidly, few studies have analyzed outcomes among obese patients undergoing cranial neurosurgery. The goal of this study, was to evaluate the association of both obesity and morbid obesity with treatment outcomes among patients with aneurysmal subarachnoid hemorrhage treated by microsurgical aneurysmal repair

**Methods:** Prospective study conducted in Department of Neurosurgery from October 2017- June 2019 in aSAH patients managed by microsurgical clipping with minimum follow up of 6 months. The body habitus of patients was classified as nonobese (BMI < 30 kg/m2), obese (BMI > 30 kg/m2 and < 40 kg/m2), or morbidly obese (BMI > 40 kg/m2). Multivariable logistic regression analyzed the association of body habitus with in-hospital mortality rate and complications. Covariates included patient demographics(age, sex), comorbidities (including hypertension and diabetes), and associated systemic diseases (including cardiac, respiratory and other).

**Results:** In total, 100 patients were included in this. Obese and morbidly obese patients had a greater number of comorbidities than nonobese patients (p < 0.001). Mortality rates for obese (20.0 %) and morbidly obese patients (16.66%) did not significantly differ from those for nonobese patients (19.04%); likewise, no differences in neurological complications or poor outcome were observed among these 3 groups. Morbid obesity was associated with significantly increased odds of several medical complications, including venous thromboembolic (p = 0.046) and pulmonary and cardiac (p = 0.01) complications and infections (p = 0.009, attributable to greater odds of urinary tract and surgical site infections). Moreover, morbidly obese patients had higher odds of a nonroutine hospital discharge (p = 0.03).

**Conclusions:** In our study, milder obesity was not significantly associated with increased mortality rates, neurological complications, or poor outcomes after SAH. Morbid obesity, however, was associated with increased odds of venous thromboembolic, pulmonary and cardiac complications, and infectious complications, as well as of a nonroutine hospital discharge. Notably, milder obesity was associated with decreased odds of some medical complications in patients treated with microsurgical clipping.

***

**FP-194: Use of 3D printer generated polylactic acid mold for cranioplasty with customized polymethyl methacrylate implants: An institutional experience**

Dr. Ashim K. R. Boro 1*, Dr. Sanjeev Chopra 1, Dr. Prashant Agarwal 1, Dr. Virendra Deo Sinha 1
1) SMS Medical College & Hospital, Jaipur, India

**Background:** Cranioplasty is a surgical procedure to restore skull defects or deformities. There is still no consensus about the best material for cranioplasty. Native bone flap is universally accepted as the preferred option but may be unavailable in cases of bone fragmentation or due to infection or bone resorption. The authors present their experience with custom made low cost implant mold using three-dimensional (3D) printers and polymethyl-methacrylate (PMMA) casting.

**Methods:** A total of 22 patients with skull defects underwent cranioplasty between March 2017 and August 2019 at tertiary care centre in India. Preoperative data included indication for craniectomy, date of injury, complexity of the defect. Intraoperative data included operating time and contour of the mold. Postoperative data included cosmetic outcome in the form of cranial contour, margins and complications.

**Results:** In this patient series, mean age was 32.85 years. The mean operating time was 146.67 minutes (range 110-190 minutes) and the mean follow up period was 8 months. Postoperative wound dehiscence developed in one case (4.5%). Cranial contour and margin approximation were excellent and aesthetic appearance improved in all patients.

**Conclusion:** In this patient series, PMMA implants based on customized 3D printer generated mold was associated with accurate reconstruction of the original skull contour giving satisfactory results, at a minimal cost compared to other. This could be an effective alternative option to patients requiring cranioplasty.

***
FP-195: Management of multiloculated hydrocephalus in children with emphasis on role of CT ventriculography

Dr. Siddharth Vankipuram1, Dr. Chhitij Srivastava1, Dr. Bal Krishna Ojha1, Dr. Anil Chandra1, Dr. Sunil K. Singh1, Dr. Somil Jaiswal1, Dr. Manish Jaiswal1, Dr. Ankur Bajaj1
1) King George’s Medical University, Lucknow, India

Objective: The authors performed a retrospective review of children diagnosed with multiloculated hydrocephalus (MLH) in our institute. The goal was to analyze the different diagnostic and therapeutic modalities utilized with special emphasis on CT ventriculography (CTV).

Methods: Male and female patients below the age of 18 years diagnosed with MLH were included. Cases of uniloculated hydrocephalus like entrapped temporal horn or fourth ventricle were excluded. We used iohexol for CTV and Gadodiamide for MR ventriculography. Neuroendoscopic procedures performed were endoscopic fenestration, endoscopic third ventriculostomy (ETV), endoscopic septostomy, endoscopic aqueductoplasty or a combination of the above. The cohort was divided into two groups (endoscopic or shunt) based on initial surgical intervention.

Results: A total of 52 patients were included, with 43 boys and 9 girls. The average age of presentation was 7.7 months. The most common predisposing factor for MLH was neonatal meningitis seen in 30 patients. Mean duration of follow up was 39 months. CTV was used in 26 patients and MR ventriculography was used in three patients. In one patient, the diagnosis of MLH was ruled out after ventriculography. Patients who underwent ETV only had the best outcome with 71.4% success rate. At the end of follow up, 14 patients (27%) were shunt independent.

Conclusions: The present study indicates that neuroendoscopy should be the first line of management in these patients. CTV helps in accurately defining the anatomy of the ventricles and determines the site of physiological CSF obstruction. This helps in therapeutic planning and avoid misdiagnoses.

Keywords: Multiloculated hydrocephalus, neuroendoscopy, endoscopic aqueductoplasty, CT ventriculography, endoscopic fenestration.

* * * *

FP-196: To compare results of Subgaleal Pouch vs Subdural Drain in cases of Chronic SDH

Dr. Arunav Sharma1, Dr. Ashis Pathnaik1
1) AIIMS Bhubaneswar, Orissa, India

Aims: To compare the post-operative outcomes and follow-up of Chronic subdural hematoma patients undergoing subdural drain placement or subgaleal pocket formation.

Primary Objective: To evaluate for recurrence within 6 months.

Secondary Objective: To compare the morbidity and mortality rates in both groups.

Materials and Methods: A retrospective observational study conducted from July 2017 to July 2019 where a total of 64 patients underwent surgery for chronic SDH. Patients operated outside and coming with recurrence were excluded. All age groups were included. All patients received prophylactic antibiotic and anti-epileptic, following which either frontal or parietal or both frontal and parietal burr holes were made. The duromater was opened in cruciate fashion and coagulated. Warm saline irrigation was done till egress of clear fluid. In SD group a soft catheter drain was placed through the burrhole and a gelfoam piece was used to occlude the burrholes. The drains were removed after 24 hours of surgery in all cases. In the SG group the subgaleal space was bluntly dissected approximately 8 to 10 cm circumferentially around the burr holes. Here post evacuation of chronic SDH, the burr holes were not occluded and skin margins were subsequently closed in layers without placement of any drain. In bilateral cases either drains were placed on both sides or subgaleal pockets were created.

Results: Primary outcome was recurrence of chronic SDH within 6 months of surgery. A total of 64 cases were operated amongst which in 42 patients subdural drain (SD) was placed and in 22 a subgaleal pocket (SG) was created. The mean age in both groups were 62.7 years and 61.2 years respectively. In the SD group there were 3 recurrences at a gap of 1 to 2 months, where as there was 1 case of recurrence in SG group at 1 month. In the subdural drain group there was 1 case of migration of drain into the brain parenchyma. There was 1 mortality in SD group due to illness unrelated to the primary disease. Also a lesser complication rate in the subgaleal pocket group. Length of stay and surgical infections were comparable in both groups.

Conclusion: We conclude that the subgaleal pouch after burr-hole drainage of cSDH is an efficient and safe alternative to the insertion of a subdural drain. Both these surgical techniques have a satisfactory cure rates and a lower risk of recurrences when compared to other methods. However, subgaleal pocket is a novel innovation and is less invasive, safe, and technically easy.

FP-197: Spinal Tumour Syndrome of Tuberculous origin

Dr. D. Elangovan1
1) Sri Manakula Vinayagar Medical College and Hospital, Pondicherry, India

Tuberculosis and its neural complications still remains a monster in developing countries. Operative management scores over the conservative medical treatment and later is a must adjuvant. CT guided aspiration was the mainstay in early TB spine without a neurological deficit. We have treated 28 cases of spinal Tuberculosis. The manifestations of spinal Tuberculosis mimicked any neurological spinal condition, from pain to paralysis with a suspicion of a Spinal Tumour. The clinical presentations of the patients were local pain, Root
FP-198: Endoscopic third Ventriculostomy for hydrocephalus in infants - A single center experience

Dr. Krishna Govind Lodha\(^1\), Dr. Tarun Kumar Gupta\(^1\), Dr. Gaurav Jaiswal\(^1\), Dr. Yogendra Singh\(^1\)

1) RNT Medical College, Udaipur, India

Introduction: Hydrocephalus remains one of the more common pathologies managed in pediatric neurosurgery. Endoscopic third ventriculostomy has become the procedure of choice for the treatment of hydrocephalus due to aqueductal stenosis with high success rate. It has an advantage over ventriculoperitoneal shunting as it enables patients to remain device free.

Objective: The purpose of this study is to assess the role of endoscopic third ventriculostomy (ETV) in the treatment of hydrocephalus in children under one year of age.

Materials and Methods: A prospective study of 30 infants undergoing ETV in our institution between January 2014 to December 2018 was carried out. There were 25 cases of congenital hydrocephalus with aqueductal stenosis, 2 cases of Dandy walker cyst, 2 cases of Cerebellopontine angle arachnoid cyst and one case of post Tubercular meningitis.

Results: The overall success rate was 76.66% (23) with highest success rate 84% in aqueductal stenosis. The mean age was 6.75 month (range 1.5-12month). Five infants were born preterm; four of them required a permanent ventriculoperitoneal shunt. There were 2 cases of intraoperative bleeding, 4 cases of CSF leak from wound and one case of meningitis.

Conclusion: Endoscopic third ventriculostomy can be considered a safe and effective for treatment of hydrocephalus in full term normal birth weight infants while the results in preterm low birth weight were poor.

FP-199: Study to identify prevalence of pituitary gland injury in severe traumatic brain injury.

Dr. Jitendra M. Tadhgare\(^1\), Dr. Shrikant Rege\(^1\)

1) SAMC & PGI, Indore, India

Introduction: Traumatic brain injury (TBI) is a worldwide health problem, a major cause of disability and death among young adults, and a cause of neuroendocrine dysfunction. Recent data have demonstrated that TBI-mediated pituitary dysfunction could be more frequent than previously expected, and a high prevalence of neuroendocrine dysfunction in patients with severe TBI has been reported.

Aims & Objectives: To identify prevalence of pituitary injury in severe traumatic head injury.

Materials & Methods: This study was done in the Department of Neurosurgery at SAMC & PGI, Indore, in which cases included from 1st January, 2016 to 15th November, 2017. A total of 183 patients of severe TBI were included in this study. MRI brain with pituitary sequences was done to look for pituitary gland injury.

Results & Analysis: Pituitary gland injury was found in around 40% of cases which is significantly high.

Conclusion: Pituitary dysfunction is common after severe TBI. MRI pituitary sequences should be included while performing MRI brain in severe TBI, There is pituitary dysfunction which should be diagnosed and treated accordingly.

Keywords: Severe Traumatic, Brain Injury, Pituitary.

FP-200: Primary Thalamic Haemorrhage - Clinical Profile and Prognostic Predictors from a Series of 117 Cases

Dr. Sandesh Onkarappa\(^1\), Dr. Girish Menon\(^1\)

1) Kasturba Medical College, Manipal, Karnataka, India

Introduction: Studies on isolated primary thalamic hematomas are limited. This study analyses 117 patients with primary thalamic hematomas and attempts to identify the various prognostic factors influencing the outcome.

Materials & Methods: A retrospective analysis of the case records was carried out to analyse the following prognostic parameters - GCS on admission, comorbidities like systemic hypertension and diabetes mellitus, side and site of hematoma, volume of the clot, presence of intraventricular haemorrhage (IVH), development of hydrocephalus, and the role of surgical intervention. Chi-square test, Student test, Mann Whitney test, Binary Logistic regression was used for statistical analysis.

Results & Discussion: Of the 117 patients, 3 had anterior thalamic clots, 19 had posterior thalamic clots, 13 had medial clots, 53 had lateral thalamic bleeds and 29 had global clots. The overall three-month mortality with thalamic bleeds was 28.2%. On univariate
Neurosurgical Oncology - Lessons learnt

**FP-202: Intraoperative Ultrasound in**

1) Tata Memorial Centre, Mumbai, India

- Microsurgical gross total or near total excision was possible in 54 cases, it was subtotal in 20 and partial excision in 7 cases. Mostly tumours were retro-or subchiasmatic. Although all the possible corridors were utilized to remove maximum possible tumour but it was only thru lamina terminals in 30 cases. There were 15 patients with recurrent tumours, of which 5 were operated by first author earlier. Seventeen patients were subjected to radiotherapy. Transient diabetes insipidus was noted in majority of the patients. Mortality in this series was 1 case (1.25%). Remaining all patients (79) maintained on replacement therapy.

**Conclusion:** Isolated thalamic hemorrhages are generally small in volume preferentially located in the lateral thalamus. Patients with right-sided bleeds and small clot volume perform well. Male sex, poor GCS on admission, clot volume above 20 ml, intraventricular extension and a need for EVD adversely influence the outcome.

* * * * *

**FP-201: Surgical results of Craniopharyngioma - Experience with 81 cases**

Dr. Naresh Dhamesha, Dr. Rajneesh Kachhara

1) Medanta Superspeciality Hospital, Indore, India

**Objective:** Craniopharyngioma is a baffling problem and one of the difficult tumours to treat.

**Methods:** We present experience operating 81 consecutive cases over more than 20 years period. There were 56 males and 25 females with age ranging from 1.6 years to 75 years. 55% patients were in pediatric age (0-20 years). Raised ICP features, visual disturbances and pituitary hypo functions were predominant symptoms. Two patients had features of diencephalic syndrome. Endocrine functions, CT scan, MRI brain was the essential diagnostic tests. Apart from common tumour location in suprasellar region, they were rarely located in sella (1), Infrasellar (1), posterior fossa (2) Intra third ventricle (1). Various approaches used to remove these tumors were: pterional (71), subfrontal (2), retromastoid (2), transsphenoidal (2), Transcallosal (2) and transbasal (1).

**Results:** Microsurgical gross total or near total excision was possible in 54 cases, it was subtotal in 20 and partial excision in 7 cases. Mostly tumours were retro-or subchiasmatic. Although all the possible corridors were utilized to remove maximum possible tumour but it was only thru lamina terminals in 30 cases. There were 15 patients with recurrent tumours, of which 5 were operated by first author earlier. Seventeen patients were subjected to radiotherapy. Transient diabetes insipidus was noted in majority of the patients. Mortality in this series was 1 case (1.25%). Remaining all patients (79) maintained on replacement therapy.

**Conclusions:** Gross total removal provides favourable results in terms of recurrences. Conventional approaches achieve acceptable results with minimal mortality and morbidity

* * * * *

**FP-203: Value of Intraoperative high field 3 Tesla magnetic resonance imaging (iMRI) in assessment and improvement of extent of resection of pituitary adenomas**

Dr. Anandh Balasubramaniam, Dr. Karthik Multani, Dr. Rajesh B. J., Dr. Anjani Kumar, Dr. Nitin Manohar, Dr. Sairaj Kumar

1) Yashoda Hospital, Secunderabad, Telangana, India

**Objectives:** To assess value of Intraoperative high field 3 Tesla magnetic resonance imaging (iMRI) in assessment and improvement of extent of resection of pituitary adenomas with transnasal endoscopic transsphenoidal approach and to assess impact of iMRI guided resection in postoperative adjuvant hormonal and radiation therapy.

**Materials & Methods:** A total of 32 patients with diagnosis of pituitary adenoma were included in this study and were subjected to iMRI guided transnasal transsphenoidal resection of the adenoma. MRI findings in preoperative, intraoperative and 3 months postoperative stage were recorded and compared. Statistical analysis was carried out using SPSS software. Incremental value of iMRI in resection of adenoma was assessed.

**Introduction:** Intraoperative ultrasound has witnessed a renaissance in neurosurgery over the last decade. In neurosurgical oncology. Especially it has emerged as a very versatile and multipurpose adjunct. We describe our cumulative experience of using IOUS traversing the evolution from simple 2D ultrasound to navigated 3D ultrasound.

**Methods:** A retrospective review of a prospectively maintained surgical database at a tertiary care neurosurgical oncology centre was carried out. The demographic, radiological and clinical features of patients were recorded. Details of IOUS use were documented. Different cohorts (biopsies, non-enhancing tumors, high grade gliomas, glioblastomas, etc) and endpoints (accuracy, extent of resection, survival) were assessed over this long period.

**Results:** IOUs has emerged as a prolific, multipurpose tool. Our initial experience with 2DUS showed it to be a very useful tool during various stages of the tumor surgery. Navigated US improved the accuracy of the biopsies and tumor detection resulting in better GTRs and even extended resections and survival in a cohort of patients. With experience we were able to use navigated US to achieve these objectives, without the need for MR image guidance. It serves as an invaluable tool for non-enhancing gliomas and can complement fluorescence guidance for the enhancing tumors. It is also very convenient and effective during awake surgeries for eloquent region tumors.

**Conclusion:** Overall, our cumulative experience highlights the versatile nature of IOUS which can be a very cost-effective adjunct in tumor surgery. With advancements in technology, it is likely to see better performance and wider applications across neurosurgical procedures.

* * * * *

**FP-202: Intraoperative Ultrasound in Neurosurgical Oncology - Lessons learnt**

Dr. Aliasgar Moiyadi, Dr. Prakash Shetty

1) Tata Memorial Centre, Mumbai, India

**Introduction:** Intraoperative ultrasound has witnessed a renaissance in neurosurgery over the last decade. In neurosurgical oncology. Especially it has emerged as a very versatile and multipurpose adjunct. We describe our cumulative experience of using IOUS traversing the evolution from simple 2D ultrasound to navigated 3D ultrasound.

**Methods:** A retrospective review of a prospectively maintained surgical database at a tertiary care neurosurgical oncology centre was carried out. The demographic, radiological and clinical features of patients were recorded. Details of IOUS use were documented. Different cohorts (biopsies, non-enhancing tumors, high grade gliomas, glioblastomas, etc) and endpoints (accuracy, extent of resection, survival) were assessed over this long period.

**Results:** IOUs has emerged as a prolific, multipurpose tool. Our initial experience with 2DUS showed it to be a very useful tool during various stages of the tumor surgery. Navigated US improved the accuracy of the biopsies and tumor detection resulting in better GTRs and even extended resections and survival in a cohort of patients. With experience we were able to use navigated US to achieve these objectives, without the need for MR image guidance. It serves as an invaluable tool for non-enhancing gliomas and can complement fluorescence guidance for the enhancing tumors. It is also very convenient and effective during awake surgeries for eloquent region tumors.

**Conclusion:** Overall, our cumulative experience highlights the versatile nature of IOUS which can be a very cost-effective adjunct in tumor surgery. With advancements in technology, it is likely to see better performance and wider applications across neurosurgical procedures.

* * * * *

**FP-201: Surgical results of Craniopharyngioma - Experience with 81 cases**

Dr. Naresh Dhamesha, Dr. Rajneesh Kachhara

1) Medanta Superspeciality Hospital, Indore, India

**Objective:** Craniopharyngioma is a baffling problem and one of the difficult tumours to treat.

**Methods:** We present experience operating 81 consecutive cases over more than 20 years period. There were 56 males and 25 females with age ranging from 1.6 years to 75 years. 55% patients were in pediatric age (0-20 years). Raised ICP features, visual disturbances and pituitary hypo functions were predominant symptoms. Two patients had features of diencephalic syndrome. Endocrine functions, CT scan, MRI brain was the essential diagnostic tests. Apart from common tumour location in suprasellar region, they were rarely located in sella (1), Infrasellar (1), posterior fossa (2) Intra third ventricle (1). Various approaches used to remove these tumors were: pterional (71), subfrontal (2), retromastoid (2), transsphenoidal (2), Transcallosal (2) and transbasal (1).

**Results:** Microsurgical gross total or near total excision was possible in 54 cases, it was subtotal in 20 and partial excision in 7 cases. Mostly tumours were retro-or subchiasmatic. Although all the possible corridors were utilized to remove maximum possible tumour but it was only thru lamina terminals in 30 cases. There were 15 patients with recurrent tumours, of which 5 were operated by first author earlier. Seventeen patients were subjected to radiotherapy. Transient diabetes insipidus was noted in majority of the patients. Mortality in this series was 1 case (1.25%). Remaining all patients (79) maintained on replacement therapy.

**Conclusions:** Gross total removal provides favourable results in terms of recurrences. Conventional approaches achieve acceptable results with minimal mortality and morbidity

* * * * *

**FP-203: Value of Intraoperative high field 3 Tesla magnetic resonance imaging (iMRI) in assessment and improvement of extent of resection of pituitary adenomas**

Dr. Anandh Balasubramaniam, Dr. Karthik Multani, Dr. Rajesh B. J., Dr. Anjani Kumar, Dr. Nitin Manohar, Dr. Sairaj Kumar

1) Yashoda Hospital, Secunderabad, Telangana, India

**Objectives:** To assess value of Intraoperative high field 3 Tesla magnetic resonance imaging (iMRI) in assessment and improvement of extent of resection of pituitary adenomas with transnasal endoscopic transsphenoidal approach and to assess impact of iMRI guided resection in postoperative adjuvant hormonal and radiation therapy.

**Materials & Methods:** A total of 32 patients with diagnosis of pituitary adenoma were included in this study and were subjected to iMRI guided transnasal transsphenoidal resection of the adenoma. MRI findings in preoperative, intraoperative and 3 months postoperative stage were recorded and compared. Statistical analysis was carried out using SPSS software. Incremental value of iMRI in resection of adenoma was assessed.

**Introduction:** Intraoperative ultrasound has witnessed a renaissance in neurosurgery over the last decade. In neurosurgical oncology. Especially it has emerged as a very versatile and multipurpose adjunct. We describe our cumulative experience of using IOUS traversing the evolution from simple 2D ultrasound to navigated 3D ultrasound.

**Methods:** A retrospective review of a prospectively maintained surgical database at a tertiary care neurosurgical oncology centre was carried out. The demographic, radiological and clinical features of patients were recorded. Details of IOUS use were documented. Different cohorts (biopsies, non-enhancing tumors, high grade gliomas, glioblastomas, etc) and endpoints (accuracy, extent of resection, survival) were assessed over this long period.

**Results:** IOUs has emerged as a prolific, multipurpose tool. Our initial experience with 2DUS showed it to be a very useful tool during various stages of the tumor surgery. Navigated US improved the accuracy of the biopsies and tumor detection resulting in better GTRs and even extended resections and survival in a cohort of patients. With experience we were able to use navigated US to achieve these objectives, without the need for MR image guidance. It serves as an invaluable tool for non-enhancing gliomas and can complement fluorescence guidance for the enhancing tumors. It is also very convenient and effective during awake surgeries for eloquent region tumors.

**Conclusion:** Overall, our cumulative experience highlights the versatile nature of IOUS which can be a very cost-effective adjunct in tumor surgery. With advancements in technology, it is likely to see better performance and wider applications across neurosurgical procedures.

* * * * *
Results: 3T iMRI helped us to detect residues in 15 (46.87%) patients and to achieve secondary GTR in 9 (28.12%) patients, thus increasing our GTR rates from 53.12% to 81.25%. We also found a significant association between use of iMRI with number of GTR achieved. On comparing results of intraoperative imaging with 3 months postoperative MRI we found that there was only one false negative GTR. Average increase in surgical time with use of iMRI was 38.78 minutes and there was a correlation of iMRI guided resection with lesser need for postoperative adjuvant therapy.

Conclusion: High field iMRI is a useful adjunct in assessment and improvement of extent of resection of pituitary adenoma by endoscopic transsphenoidal surgery. Also it was found beneficial in preserving normal anatomical gland and thus, reducing the need for postoperative adjuvant hormonal and radiation therapy.

FP-204: Intracranial Tumors - Correlation of Ki-67 proliferation index, biological behavior and survival rate

Ms. Azra Zejnelagic,
1) University of Malta, Malta-Msd
2) Medical School and Clinical Center, Sarajevo

Introduction: The biological behavior and survival rate of primary intracranial tumors are associated with different influences and tissue characteristics including Ki-67 proliferative index.

Methods & Materials: Two hypotheses have been put forward: Ki-67 proliferation index indicates the recurrence tendency in benign intracranial extrinsic tumors after radical microsurgical resection and Ki-67 proliferation index is an indicator of survival rate for the patients with malignant intracranial intrinsic tumors. The retrospective study was performed from November 2015 to May 2016. A total of 40 patients with intracranial tumors were included which had been operated by senior author. It was established the immunohistological profile and percentage of Ki-67 in all cases. The Ki-67 immunoreactivity was recorded as continuous variable, based on the proportion of positive tumor cells (0-100%) regardless of staining intensity. Associations between clinicopathologic parameters and laboratory data were studied using Chi-square test. Survival analysis was performed by the method of statistical significance (P < 0.05) evaluated by long-rank testing.

Conclusion: The Ki-67 labeling index higher than 5 % indicates the recurrence tendency of benign meningoima after radical microsurgical resection. Malignant gliomas with proliferative index less than 25 % showed better outcome and longer survival.

Keywords: Intracranial extrinsic and intrinsic tumors, Ki-67 LI, recurrence, survival rate

FP-205: Micro-RNA’s in surveillance of high grade Glioma

Dr. Komal Prasad C., Dr. Nameeta Shah, Dr. Ravi Sirdeshmukh
1) Mazumdar Shaw Medical Center, Bangaluru, India
2) Narayana Health, Bengaluru, India
3) Mazumdar Shaw Center for Translational Research, Bengaluru, India

Objective: Despite major advances in high-throughput technologies and multi-dimensional profiling in the last decade, management of Glioblastoma Multiforme (GBM), one of the most malignant and aggressive forms of primary brain tumors, remains a clinical challenge. 1) These aggressive tumors are highly heterogenous regarding their cellular architecture, molecular profile and clinical behaviour. Most of them are IDH1 wild type with poor prognosis. They survive for about 15 months, with the IDH1 mutant cases surviving longer up to 3 years
2) Thus, they are generally resistant to current modalities of treatment, resulting in tumor recurrence / progression and death. Given this heterogeneity and poor survival rates, effective methods for post-treatment surveillance of GBM is an unmet clinical need.

Methods and Results: The present practice generally employs clinical follow-up and MRI imaging to evaluate treatment response of the patients. However, there are challenges in the neuroimaging evaluation of patients undergoing treatment such as difficulty in measurement of irregularly shaped tumors and consistent interpretation of treatment-related radiographic changes.
3) Hence, there is a critical need of alternate minimally invasive molecular biomarkers for post-treatment surveillance of GBM patients. Minimally-invasive blood-based tests for tumor relevant, circulatory biomarkers (miRNAs or proteins) would therefore be more useful, affordable as well as convenient. Extracellular vesicles (EVs) have recently emerged as a novel source of circulatory biomarkers for cancer in general. EVs serve multiple biological functions, including cellular remodeling, intracellular communication, modulation of the tumor microenvironment and regulation of immune function. These are 30-2000 nm microvesicles, secreted by all cell types and contain various bioactive molecules - miRNA, mRNA, DNA, proteins, lipids
4) Tumor cells have been shown to secrete EVs, in increased amounts compared to normal cells, and carry genomic and proteomic signatures representative of the neoplastic condition
5) EVs are also reported to be remarkably stable in biological fluids such as blood plasma, urine etc. and considered to be an excellent source for biomarkers for cancer detection and post-treatment surveillance.

Conclusions: The potential role of micro-RNA’s in surveillance of high grade gliomas is reviewed in this study. Further studies to identify blood plasma and extracellular vesicle (EV)-derived circulatory miRNA biomarkers useful for developing assays for post treatment
surveillance of GBM patients are in progress. The preliminary findings of study and systematic review of role of mi-RNA's in high grade gliomas and their potential in surveillance are analysed in this study.

References:

FP-206: Technical aspects of Stereotactic brainstem biopsy - Emphasising on frame fixation and awake monitoring in adults
Dr. Ramanadha Reddy Kanala¹, Dr. Vamsi Krishna Yerramneni¹, Dr. Vamsi Krishna Yerramneni¹
1) Nizam's Institute of Medical Sciences, Telangana, India

Introduction: The role of frame based stereotactic biopsy in brainstem lesions has been well established in literature. Transfrontal, transstentorial and transcerebellar routes are used to access various targets within the brainstem. While the transfrontal approach is preferable in midbrain lesions, a transcerebellar approach via the middle cerebellar peduncle forms the shortest possible trajectory for pontine and medullary lesions.

Objective: To highlight the technical nuances of frame-based stereotactic biopsy of lower brainstem lesions in order to increase the procedural safety and efficacy.

Materials and Methods: This is a prospective ongoing study with 5 patients included so far. Modifications to the standard frame fixation have been made in each case and awake monitoring was undertaken while passing needle through brain stem to increase the safety of the procedure in each case.

Results: 2 patients in the pediatric age group and 3 adults underwent biopsies. Age ranged from 14 to 35 years. No complications were encountered. 2 of the biopsies showed demyelination and the other three turned out to be medulloblastoma, pilocytic astrocytoma and lymphoma respectively.

Conclusions: Despite obvious inherent risks, the transcerebellar biopsy in semi sitting position is a well-tolerated and effective method of obtaining a diagnostic tissue sample in brainstem lesions. We have noted that adoption of the technical modifications described in this paper has aided in improving the safety and ease of the procedure.

* * * * *

FP-207: Institutional analysis of patients with posterior fossa Meningiomas
Dr. Gokanapudi Sreeram¹*, Dr. V.V. Ramesh Chandra¹
1) SVIMS, Tirupati, Andhra Pradesh, India

Introduction: Meningioma, common tumor represents about 30 % of all intracranial tumors. Posterior location of the tumor is uncommon. It is classified according to the location in the posterior fossa into cerebellopontine angle, clival, petroclival, convexity, tentorial and foramen magnum. Different approaches are used for surgical excision.

Aims: To study different aspects of posterior fossa meningiomas regarding clinical features, location, surgical approaches, histology, and outcomes.

Methods: Retrospectively 40 patients diagnosed with posterior fossa meningioma were included in the study. Data obtained from the files of the patient was analyzed. All the patients underwent preoperative complete general and neurological examination, MRI of the brain with and without Gadolinium and postoperative CT scan of the brain. The clinical features, diagnostic approach, operative approach, postoperative complications and outcomes of the patients were analysed.

Results: Twenty six of the patients were females and 14 were males. Age ranged from 16 to76 years. Symptoms included Headache (75%), cerebellar manifestations (60%) cranial nerve affection (30%) hearing disturbances (15%). Foramen magnum meningioma constituted 5 % of the cases. Retrosigmoid retromastoid craniectomy is the preferred procedure. Morbidity included decreased level of consciousness, cranial nerve palsyes and wound infection. Mortality was nil.

* * * * *
FP-209: Relative role of monitoring and mapping in Awake craniotomies - A Comparative analysis of Awake craniotomy with clinical monitoring versus DES mapping and monitoring with emphasis on influence on perioperative outcomes and extent of resection

Dr. Prakash M. Shetty1, Dr. Aliasgar Moiyadi1, Dr. Vikas Singh1, Dr. Partibhan V.1, Dr. Shubhi D.1, Dr. Harshal C.1, Dr. Keerthi R.1, Dr. Robin J.1

Introduction: Mapping using direct electrical stimulation (DES), and monitoring are 2 components of awake craniotomy (AC). AC though preferably performed with DES, can also be done with only monitoring. We analysed our experience to compare the two techniques.

Methods: We compare our experience in 120 cases (76 with no mapping - Group A, and 44 with DES Group B). Retrospective review of charts, radiology and EMR was done to retrieve data.

Results: The 2 groups (A &B) did not differ in terms of demographics, proximity to (involvement of) eloquent areas, or tumor histology. Significantly more tumors in B were on the left side and involved language areas. Intraoperative seizures were commoner in group B (20% vs 5%). Postoperative neurological outcomes were similar in the two groups. Intraoperative deficits were noted in 30.8% overall (34.2% in Gr and 25% in Gr B) leading to premature stoppage of the planned resection (70% vs 72% respectively, p= ns) and postoperative worsening. When there was no such event, in group (A) the surgeon was almost always likely to go ahead with the resection (92%) whereas in group (B) this only happened in 64% cases. Postoperative neurological worsening occurred in 16 cases in Group B (36.4%) vs 23 in Group A (30.3%). This was commoner in the positively mapped cases. At discharge deficits were still persistent in 11 (25%) and 13 (21%) in Group A and B respectively (not significant). GTRs were more often achieved in Group B (57.9%) than group A (45.8% [p=0.30] regardless of histological class. In the mapped cohort, the best outcomes were achieved when there was negative mapping and no intraoperative deficits.

Conclusion: Monitoring and DES mapping are complementary components of AC. AC without DES (only monitoring) provides useful intraoperative information and strongly influences surgical decision making and ensures postoperative outcomes almost at par with AC with DES. DES additionally permits more extended radical surgeries (more GTRs) especially when negatively mapped.

FP-210: Epidemiological study of pediatric brain tumour patients presenting at tertiary neurosurgical oncology centre

Dr. Vikas Singh1, Dr. Prakash Shetty1, Dr. Aliasgar Moiyadi1

1) Tata Memorial Hospital, Mumbai, India

Introduction: Brain tumour in pediatric age group are the most common solid tumour. Commonly occurring tumours include astrocytomas, medulloblastoma and ependymoma. Astrocytoma and medulloblastoma are relatively frequent in Europe compared to the Asian countries.

Aim: To study the epidemiological factors of the pediatric brain tumour patients being seen by a neurosurgical oncology unit at a tertiary cancer centre.
Materials & Methods: It is a retrospective audit of a prospective neurosurgical database from January 2007 to December 2018. All pediatric cases (< 18 years) operated by the neurosurgical oncology unit during the study period were included for analysis. Demographic, surgical, pathological and pattern of referral data of these patients were analyzed from the database and electronic medical records.

Results: During the study period, 585 pediatric patients underwent surgery. There was a male preponderance (62.6%) and 36% of children were in the age group of 5-11 years. Hospital received maximum referral from the parent city and state (46%) followed by North India (24.2%), supratentorial tumours (43.9%) were seen more commonly as compared to infratentorial tumours (33.3%). Most common histologic types were astrocytoma (25.6%) and embryonal tumours (25.6%). On subset analysis, embryonal tumours were noted to be common in 1-3 years age group while astrocytic tumours were common in 11-18 years age group.

Conclusion: This analysis gives us a demographic outlook of pediatric patients presenting at a tertiary care neurosurgical oncology centre. The histological distribution of cases in this study is also intermediate between European and other Asian countries.

**FP-211:** Postoperative Central Diabetes Insipidus with Normal Urine Output - A relatively undiscussed entity

Dr. Sanesh Khandelwal*, Dr. S. Balaji Pai1
1) Bangalore Medical College & Research Institute, Bengaluru, India

Introduction: Central diabetes insipidus (CDI) a complication of sellar-supra sellar tumor surgeries, usually presents with increased urine output and hypernatremia. There is decreased urine osmolality with increased serum osmolality, which is distinguishing feature. CDI associated with complications of sellar-supra sellar tumor surgery may present with normal urine output or oliguria, altered renal function and hypernatremia which may pose a diagnostic dilemma.

Materials & Methods: Five patients (four craniopharyngioma and one large pituitary adenoma) ranging from ages 12-40 years underwent radical excision through pterional approach. The preoperative endocrinological status was normal in all patients except one who had an elevated serum prolactin level not suggestive of a prolactinoma. Postoperatively they developed hypernatremia, increased plasma osmolality and decreased urine osmolality in the presence of normal to decreased urine output. All were treated with half NS and later 5% dextrose.

Results: In the first three cases the renal function became altered and they expired between the 6th and 11th day. In the last two cases, desmopressin (DDAVP) in oral form was administered and this led to speedy and remarkable recovery. Hypernatremia was corrected and the urine output stabilized. Both these patients were discharged with a small dose of desmopressin and hormonal replacement doses.

Conclusion: CDI is common in patients with craniopharyngioma undergoing radical surgery. The clinical picture may be confusing in absence of polyuria. It is important to recognize this situation and institute appropriate therapy with DDAVP which may be life saving in these patients.

Key words: craniopharyngioma, central diabetes insipidus, desmopressin, hypernatremia

* * * *

**FP-212:** Role of P53, BRAF and EGFR gene mutations in glioma tumorigenesis and their correlation with tumor histopathological grading

Dr. Deep Dutta, Dr. Shameem Ahmed, Dr. Kandarpa Saikia

Background & Objectives: Glioma is the most common primary brain tumour associated with the central nervous system. Molecular analysis in recent times has revealed many characteristic genetic alterations in various biomarkers of Glioma such as gene mutation of tumour suppressor p53, BRAF, over expression of EGFR which provide insight into its pathogenesis and tumour biology. This study is aimed to evaluate the role of molecular markers and their prevalence associated with different grades of Glioma.

Materials & Methods: It is a prospective hospital based study done at Gauhati Medical College. Patients diagnosed to be having glioma both clinically and Radiologically were operated. Tumour samples were sent for histopathological examination and also were further processed in the Department of Bioengineering & Technology, Gauhati University, where molecular tests were performed. All the samples were subjected to DNA, RNA isolation and other related downstream processes. Qualitative PCR was performed to check the deletion of exon 5 to 9 of p53 gene and exon 11 and 15 of BRAF genes by using genomic DNA. Quantitative PCR was done to check the alterations in EGFR gene Copy Number and over expression.

Results: Histopathological grading of the biopsy samples showed Grade I (11.1%), Grade II (27.78%), Grade.

* * * *

**FP-213:** Excising Large Cranial Meningiomas with minimal resources with cost benefit to the patients

Dr. Dushyant Thaman
1) KD Hospital, Amritsar, Punjab, India

Introduction: Lesions larger than 4 cms in brain are formidable lesions. Advanced neurosurgical centres are very well equipped to handle large tumours (> 4cm). Centres where facilities such as state of art microscopes, CUSA, are unavailable, have to innovate ways to deal with large tumours.

Methods: Retrospective analysis of 25 cases done since 2004, by a single operating neurosurgeon in tumours larger than 4cms. All the cases examined were histologically diagnosed as meningiomas.

Results: Meningiomas mostly greater than 4cm in any single
Patients developed hydrocephalus in follow up and underwent VP shunting. In all patients ETV was done followed by biopsy. In 1 case biopsy could not be done due to intraoperative bleeding from choroid plexus. In 1 case tumor was not accessed. In 2 of the cases initial biopsy came out insufficient and repeat procedure had positive results. Conclusion: Endoscopic biopsy is safe, minimally invasive procedure that enables histopathological verification of intra and paraventricular tumors. In the same setting ETV and septostomy can be done and with added advantage of direct visualization of tumor tissue.

FP-214: Efficacy of simultaneous endoscopic tumor biopsy and endoscopic cerebrospinal fluid diversion procedures in intra and paraventricular tumors

Dr. Gagandeep1, Dr. Awadesh Kumar Jaiswal1, Dr. Sanjay Behari1, Dr. Arun Kumar Srivastava1, Dr. Anant Mehrotra1, Dr. Kuntal Kanti Das1, Dr. Jayesh Sarthara1, Dr. Kamlesh Singh Bhaisor1, Dr. Pawan Kumar Verma1, Dr. Ved Prakash Maurya1, Dr. Jaskaran Singh Gosai1

Introduction: Intraventricular and paraventricular tumors resulting in hydrocephalus commonly require a CSF diversion procedure. These tumors resulting in hydrocephalus commonly require a CSF diversion procedure. Although the tissue samples obtained during endoscopic biopsy procedures are small, a diagnosis can be made in most cases. Treatment of the tumor can be planned afterwards, such as chemotherapy, radiotherapy or surgical excision. Surgery can be avoided in cases of some tumors which have good response to radiotherapy and chemotherapy or in patients which are not fit for surgery.

Aims & Objectives: The aim of this study is to present the efficacy of simultaneous endoscopic tumor biopsy in the cases of intraventricular and paraventricular tumors in which ETV was done for CSF diversion.

Methods: Patients with intraventricular and paraventricular tumors were treated with endoscopic biopsy and CSF diversion procedures during last 10-year period in department of neurosurgery at SGPGI Lucknow were included in this study. All patients underwent a tumor biopsy and an endoscopic third ventriculostomy (ETV).

Results: Maximum tumors which were operated were posterior third ventricular tumor. In all the patients who underwent ETV and biopsy 11 patients developed hydrocephalus in follow up and underwent VP shunting. In all patients ETV was done followed by biopsy. In 1 case biopsy could not be done due to intraoperative bleeding from choroid plexus. In 1 case tumor was not accessed. In 2 of the cases initial biopsy came out insufficient and repeat procedure had positive results.

Conclusion: Endoscopic biopsy is safe, minimally invasive procedure that enables histopathological verification of intra and paraventricular tumors. In the same setting ETV and septostomy can be done and with added advantage of direct visualization of tumor tissue.

* * * * *

FP-215: Minimal invasive surgery in Thoracolumbar Fractures using SEXTANT and LONGITUDE system - A single centre experience

Dr. Mohana Murali Krishna N.1, Dr. V. V. Ramesh Chandra2, Dr. B. C. M. Prasad2

1) S. V. I. M. S., Tirupati, Andhra Pradesh, India

Introduction: Dorsolumbar (DL) fractures forms the second most common fractures, first being hip fractures. DL fractures forms two third of the total spine fractures, majority occurring at the level of T11-L2 which is a biomechanically weaker area. The etiology ranges from high speed motor vehicle accidents in younger group of patients to trivial fall in elderly patients. The primary aim of the surgical treatment is to provide mechanical stability, to prevent progressive neurological injury, to prevent the deformity formation, to provide early mobilisation and early return to work. The evolution of the minimally invasive spine surgery showed many advantages when compared to the traditional open techniques in terms of post op pain, amount of blood loss, operating time, mechanical stability and rate of infection. DL fractures treated with Minimal invasive dorsal and lumbar fixation using SEXTANT and LONGITUDE rod insertion systems were studied retrospectively.

Materials & Methods: A retrospective study of all the patients who were diagnosed with dorsolumbar spine fractures and underwent minimally invasive spine fixation using Sextant Rod Insertion system and Longitude rod insertion system at SVIMS Tirupati were studied. Preoperative and post-operative outcomes were measured in the form of amount of blood loss, degree of freedom from the pain, mean age of presentation, local and systemic complications. Results and conclusion Out of the 35 patients with Dorsolumbar spine fractures 13 were operated with Sextant and 12 cases with longitude systems. The most common indication for surgery is back ache and the causes for the fractures are fall from the height, road traffic accidents and Tuberculosis in one case. The amount of blood loss, operating time and degree of freedom from pain were in par with the other studies and minimal invasive surgery provides many advantages than conventional open surgical fixation.

* * * * *
FP-216: Study of the mechanism, severity and outcome of traumatic head injury in elderly population

Dr. Maruti Nandan*, Dr. Rabi Narayan Sahu 1
1) AIIMS, BHUBNESWAR, Orissa, India

Introduction: Although traumatic head injury is most common between 15 to 30 years, no age group is exempted. With increasing life expectancy, advances in healthcare, associated co-morbidities and increased susceptibility to fall, head injury is turning to be a major problem among elderly population.

Objectives: To study the epidemiological determinants, types, modes and outcome of traumatic head injury among elderly (> 60 years) patients. Methodology: The study is hospital based prospective, observational study. Elderly over 60 years of age with traumatic head injury presenting to the hospital were our study population. Patients satisfying the eligibility criteria were enrolled into the study. A semi-structured questionnaire was used to collect socio-demographic characteristics, mode and type of head injury of the patients. Each patient was followed up for a period of 6 months to assess the outcome by the Glasgow outcome rating scale.

Results: A total of 249 patients included in the study. Mean age of the patients was 67.9 ± 8.9 years with a male predominance (63%). Fall was the major cause of head injury (44%) followed by road traffic accidents (38%). Majority of patients (69%) were presented with loss of consciousness and other presenting symptoms were vomiting (62%), nose bleeds (23%) and seizures (8%). During the follow up, 55% had good recovery, 23% had moderate disability, 14% had severe disability and 8% had died.

Conclusions: Our findings suggest that elderly population are more vulnerable to head injury and prognosis among them is poor.

Disclosure: There is no conflict of interests.

* * * * *

FP-217: Institutional study of different aspects of Posterior Fossa Meningiomas

Dr. Sanjeev Kumar Meher*, Dr. Sudhansu Sekhar Mishra 1
1) SCB Medical College & Hospital, Cuttack, Odisha, India

Objectives: We reviewed and correlated the different aspects of posterior fossa meningiomas operated in our institution like clinical presentations, risk factors, surgical procedures and outcomes, post-operative complications, and the histopathological reports. Methods: Retrospective study of 22 patients with posterior fossa meningiomas was done. Data of relevant history, clinical examination, imaging, surgical procedures, complications and histological gradings were obtained from the hospital records. Results: Mean age was found to be 46.5 years with female preponderance of 63.6%. Most common presenting symptom was headache followed by head reeling, instability of gait and cranial nerves affection. Most of the patients were cerebello-pontine angle tumours (45.45%) and one patient had meningioma located at anterior foramen magnum (4.54%). Surgical approaches were most commonly done by retrosigmoid approaches. Total resection was done in majority of patients (59%) of which most were cerebellopontine angle tumours and for the rest of the patients, subtotal or partial resection was done. Post-operative mortality was seen in 1 patient (4.45%).

Conclusion: The operative difficulties faced were very challenging in terms of reducing morbidity and mortality. In this era of focussing in good functional outcome, an acceptable balanced approach should be followed in relation to the extent of resection and in conjunction with a good follow up.

* * * * *

FP-218: Comparative study of expandable cage versus non expandable cage in cervical spine

Dr. Nakul Pahwa, Dr. Suniti Kumar Saha, Dr. Kaushik Roy

Objectives: To study the benefits of expandable cage with incorporated anterior cervical plate over non expandable cage in cervical spine corpectomies Methods- Ten cases of two level corpectomy were operated in each group and compared for intraoperative time, postoperative fusion rates and complications. Results - Intraoperative time was less in the expandable cage group. Fusion rates were comparable at 6 month follow up. No reported long term complication in both groups

Conclusion: Expandable cages are less frequently used in cervical spine due to their significantly higher cost but there are advantages such as decreased intraoperative manipulation and operative time and also in cases of poor bone quality.

* * * * *

FP-219: Cost effective 3D printed Polymethylmethacrylate (PMMA) Cranioplasty Flaps - A cosmetic comparison with other low cost methods of cranioplasty

Dr. Manish Baldia*, Dr. Mathew Joseph 1
1) Christian Medical College, Vellore, India

Background: Intraoperative hand moulded cranioplasty and PMMA flaps made from bone impressions do not yield good cosmetic results, and commercially available customised flaps are prohibitively expensive. We evaluate the performance of a locally developed low cost 3D printed PMMA flap for cranioplasty.

Objective: To compare the performance of the 3 types of cranioplasty with regard to cosmetic outcome as well as with objective measurements on postoperative CT scans. Methods: This study includes 70 patients who underwent cranioplasty between March 2015 and June 2019. In the initial period all cranioplasties were done with intraoperative hand moulded flaps (HM). The technique of 3D printing was developed in March 2016, and subsequently patients who
were in possession of the removed bone had their flaps made from bone impressions (BI) and those who did not had flaps made by 3D printing using measurements from a preoperative CT scan. Cosmetic outcomes were assessed by the patient and the operating surgeon on an 8 point scale. The degree of measured anthropometric asymmetry was correlated with the cosmetic outcome.

Results: There was a statistically significant difference between cosmetic scores of HM and BI flaps when compared with 3D flaps (p value < 0.001). CT anthropometric measurements significantly correlated with cosmetic outcome (p value 0.01).

Conclusion: 3D printed PMMA flaps had better cosmetic outcomes than HM and BI flaps, and our technique is able to produce them at 10% of the cost of the currently available commercial customised flaps.

FP-220: Impact of Functional Imaging, Neuro Monitoring and Awake craniotomy in Glioma resection

Dr. Vivek Tandona, Dr. Simranjeet Singh1, Dr. Ashish Suri1, Dr. P. Sarat Chandra1, Dr. Shashank S. Kale1
1) AIIMS, New Delhi, India

Objectives: This study was undertaken to study the impact of use of adjuncts like neuromonitoring (IONM), awake craniotomy (AC), image guidance (IGS), functional MRI (fMRI) and neuromonitoring (IONM) on extent of resection (EOR) in glioma cases.

Materials & Methods: Preoperative and post-operative imaging’s of 442 out of 560 cases of supratentorial glioma operated between 2015-18 were available. Their clinico-radiological and surgical details were analysed, using Chi-square, ANOVA, Mann Whitney and Kruskall tests. EOR was calculated by iPlan software (Brainlab inc). Univariate and multivariate analysis were done. Results 315 (71%) were males, mean age and tumor volume were 38 years (range 1 to 74 years) and 81.5 cc (range 4 -296 cc). Glioblastoma was the commonest tumour (35%). IGS was utilized in 206 cases, IONM in 99, fMRI in 83, IOMRI 69, and AC in 55 cases. Gross total resection (GTR) could be achieved in 29% cases. GTR rates improved with the use of IOMRI (35% vs 27%) but statistical significance could not be established. 6% lower speech deficits were noted in group where AC was utilized. IONM use improved EOR (p=0.014) and caused lower incidence of post-operative neurological deficits (p =0.02). Use of fMRI, IGS and experience of surgeons did not correlate with improvement in residual tumour volume or outcomes of patients (p>0.05 for each). Negative correlation between surgeon’s experience and duration of surgery was documented (p=0.04).

Conclusions: Adjuncts are not substitutes for good surgical technique. However, their judicial use can help in improving EOR and preserving function.

FP-221: Clinico-Radiological Outcome Analysis in Craniovertebral Junction Diseases in paediatric patients: An Institutional Experience of 35 Patients in a Tertiary Care Centre

Dr. Mohd. Faheem*a
1) UPUMS, SAIFAI, Uttar Pradesh, India

Background: Craniovertebral junction diseases, although considered rare, are common in northern parts of India. This study was conducted to evaluate the clinico-radiologic and surgical outcome of paediatric patients with a minimum follow-up of 1 year. Our study also compared bony fusion among various techniques of posterior fusion.

Methods: This retrospective study was performed with 35 paediatric patients who met the inclusion criteria for analysis. These patients were contacted by telephone and letters, and their clinical examination and radiologic investigations were performed at a follow-up visit. The preoperative, post-operative and follow-up clinical evaluations of the patients were done using the Nurick grading system.

Results: The age range was 4-18 years with an average of 12.5 years. There were 25 male and 10 female patients, with a male : female ratio of 2.5:1. There were 11 cases of fixed atlantoaxial dislocation (AAD), 16 cases of mobile AAD, 6 cases of traumatic AAD, and 2 cases of post infective AAD. The majority of these patients (n =29; 82.86%) had motor complaints and cerebellovestibular disturbances (n =27; 77.14%). Sphincter disturbances were observed in 9 patients. An increase in craniovertebral angle was observed in postoperative period in all patients. Initially, 84% of the patients had a poor Nurick grade; this was reduced to 20% after the surgical intervention. One hundred percent bony fusion was attained in patients who underwent rigid fixation technique, and 80% was attained using a semirigid fixation technique.

Conclusions: The key to successful management of craniovertebral junction disease is individualized selection of judicious surgical intervention from various available techniques.

FP-222: Bifrontal vs Pterional Craniotomy for Cranioopharyngiomas

Dr. Ghanshyam Das Singhal*a, Prof. Dr. Anita Jagetia1
1) GIPMER, New Delhi, India

Introduction: Cranioopharyngiomas usually grow on the cisternal surface of the hypothalamic region. They can also grow from the infundibulum or tuber cinereum on the floor of the third ventricle or developing exclusively into the third ventricle. Subfrontal approach is a versatile approach as it provides both anterior (Bifrontal / unifrontal) and lateral sub-frontal corridors. AIMS We assessed- 1. Surgeon comfort during surgery. 2. Surgical Outcome. 3. Surgical anatomy

because of 1. optic chiasma is post fixed, 2. HCP, 3. small tumor size & 4. In 3 cases tumor was intraventricular Ant.S.F.A. used in 4 pt. because of 1. large size 2. Bilateral extension : In 10 cases optic chiasma is post fixed & only 2 cases having prefixed. Only 3 cases pituitary stalk is not identified & In 9 cases pituitary stalk is well preserved.

**Conclusion:** If lesion present in interopto (prechiasmal) space & no HCP best A. is Ant. subfrontal. If lesion present in retrochiasmatic space, small & HCP or intraventricular best A. is Lat. Subfrontal In paramedian extension of lesions Lat. Subfrontal A. is better. In sella + suprasellar extension Ant. Sub Frontal A. is better The olfactory tract is very high risk in ant. Subfrontal A.

*****

**FP-223:** A study on modification of Goel’s technique of C1-C2 fixation for Atlanto Axial Dislocation

Dr. Nishant Kumar Shukla, Dr. S. K. Behera, Dr. S. S. Mishra, Dr. M. K. Dhir, Dr. S. Mishra

1) SCB Medical College, Cuttack, India

**Introduction:** The Goel’s technique of C1-C2 fixation has revolutionised the management of atlantoaxial dislocation. The technique involves reduction of AAD upon mobilization of C1C2 joints using specially designed spacers with bone graft and C1-C2 plating. We studied an adaptation which relies on mechanical distraction over titanium rods, over C1 C2 screws, followed by fixation over titanium rods and intra-articular bone graft.

**Objectives:** To study the C1C2 joint fusion obtained by modification of Goel’s technique of C1C2 fixation in a series of 12 adult individuals with AAD treated at SCB Medical College, Cuttack.

**Methods:** A total of 12 selected AAD patients with appropriate anatomy were treated surgically with C1C2 fixation using modified Goel’s technique with polyaxial screws and titanium rods, distraction over rods, joint capsule excision, surface ablation (+/-surface modification) and bone graft. The fixation over polyaxial screws is somewhat loosened for optimal distraction/compression.

**Results:** Very good to excellent bony fusion, with good clinical recovery was seen in 10 out of 12 patients as evidenced by post operative CT scan at 6 months. Two patients had good joint fusion at 6 months of follow up. Ten of 12 patients improved neurologically, as against their status at presentation by at least one grade on Goels’ clinical assessment scale for AAD.

**Conclusion:** Our modification of Goel’s technique abrogates the need for titanium spacers in the surgery. This technique when applied in appropriately selected individuals gives excellent results in terms of joint fusion with significant cost advantage. No specific technique related complication was observed.

*****

**FP-224:** Homemade simulators for neurosurgical skill training - A frugal solution to economic challenges in resource limited scenario.

Dr. Manbanchan Singh Bedi, Dr. Tanmay Bhavthankar, Dr. G. Malleswara Rao, Dr. K. Jagadeesh Babu

1) Mamata Medical College and Superspeciality Hospital, Khammam, Telangana, India

**Introduction:** The art of surgery is becoming perpetually complex and dependent on scopes, screens and technology, inviting a complex learning curve and development of hand eye coordination and dexterity amongst other skills. We present a collection of DIY surgical trainers developed by the Neurosurgical department of our institute for skill training in microsurgery and endoscopy using affordable and easy to procure items.

**Materials and methods:** A microsurgical simulator designed using a pair of reflective glasses and using a smartphone and a cardboard box. We statistically validated the utility of the trainer by analyzing the recorded times of two residents in performing microsurgical suturing for 3 three months. An endospine system built using a pair of proctoscopes and a dental sucker, with portable light source and endoscope ordered online while a smartphone was used as a camera device. We performed serial interlaminalar / translaminar approach simulations on indigenously designed anatomical training models.

**Results and Conclusion:** Serial microsurgical exercise including arachnoid dissections on goat brain models and microvascular anastomoses were completed successfully using the module. A paired t test between baseline times and times at the end of 3 months reveal overall significant reduction in operating times with p values of 0.004 and 0.002 for resident 1 & 2 which is significant. Using the indigenous endospine system, residents could perform endoscopic simulations at the ease of their homes. The cost to build the microsurgical simulator is as low as 350 INR, while an endospine simulator may cost up to 20000 INR. Owing to the unavailability of training labs in a majority of institutions and the decreasing hands on experience of the resident on living patients, affordable simulator training holds great promise in resource challenged environments.

*****

**FP-225:** ACM with syrinx - Management, clinical and radiological outcome analysis

Dr. Hanuma Naik Banavath, Dr. V. V. Ramesh Chandra, Dr. B. C. M. Prasad

1) SVIMS, Tirupati, Andhra Pradesh, India

**Introduction:** Chiari malformations are a group of complex brain abnormalities that affect the area in lower posterior skull where the brain and spinal cord connect. Many cases may not become clinically apparent until adulthood. Traditionally, Chiari malformations have been defined and classified by how much of the cerebellar tonsils protrude
through the foramen magnum. Length of tonsil descent in a Chiari malformation does not always correspond to the severity of symptoms or to the response to treatment. Abnormal CSF flow and velocity play a role in development of symptoms and signs.

**Aims & Objectives:** To compare the demographic data, preoperative clinical manifestations and radiological features with post-operative clinical outcomes, complications and radiological findings.

**Materials and Methods:** 57 patients with ACM with syrinx were studied. They were evaluated clinically and with MRI. Surgeries performed were foramen magnum decompression with duroplasty, syringostomy, occipito cervical fusion and c1-c2 fusion. They were evaluated clinically and radiologically in postoperative period and in follow up after 6 months of surgery.

**Results:** Out of the 57 patients, 44 patients underwent Foramen magnum decompression (FMD), 9 underwent FMD with syringostomy, 3 FMD with C1-C2 fusion and 1 occipito cervical fusion. All these patient’s clinical and radiological findings compared postoperatively.

52 patients showed improvement in clinical and radiologically, in 4 patients symptoms remained same and in 1 patient symptom were worsened.

**Conclusions:** Chiari malformation were described more than hundred years ago. But the concepts regarding pathogenesis, clinical features and management options have not yet conclusively evolved. Considering this a variety of treatment methods are being adopted to treat Chiari malformation. The goal of surgery is to restore normal CSF dynamics to craniocervical junction. As a single standard approach does not exist, it is recommended to tailoring the surgical approach to treat the dominant clinical problem.

**FP-226:** Role of preoperative SSEP as postoperative outcome indicator in IDEM patients

Dr. Piyush Kumar Panchariya

1) GIPMER, Delhi, India

**Background:** Intradural extramedullary tumours are usually benign tumours and commonly presents as a cause of neurological deficit as per the level of presentation of tumours. Being benign nature a usual good outcome is expected in patients of IDEM after surgery.

Many factors have been studied to predict the outcome indicators for IDEM tumours after surgery and with advances in objective electrophysiological monitoring, it seems that we can objectively define the prognosis of IDEM tumour patients.

**Materials and Methods:** A prospective analytical study done at our Department Of Neurosurgery from June 2018 to May 2019 after clearance from institute ethical committee. Consecutive patients admitting with diagnosis of IDEM were included in study with exclusion of patients who have recurrent lesions and with coexisting peripheral neuropathy. Patients were evaluated clinically, neurologically including farenkel’s grading for functional assessment of patient and VAS for pain component, radiologically with MRI plane with contrast images with preoperative SSEP assessment in all patients. Overall 18 patients were evaluated.

SSEP monitoring intraoperatively is used to prevent intraoperative injury to exiting nerve roots according to the location of level of tumour.

We in our study for factors predicting outcome in intradural extramedullary tumours of spinal cord, objectively studied the amplitude of SSEP after stimulation in preoperative assessment along with study of other factors including functional status of patient as per farenkel’s grade, location of tumour, histopathological characteristics of tumour.

**Results:** It was found that for 18 of our farenkel’s grade D (11) and E (3) patients SSEP peak latency values corroborated with functional outcome of surgery with no deficit in postoperative period and relief of pain apart from one farenkel’s D patient who was farenkel’s C on 12 weeks follow up and also had increased peak latency of SSEP. Out of 4 bedridden patients with Frenkel’s grade B and C, all four patients had increased peak latency, one Frankel’s C patient landed into Frankel’s B category on follow up while rest three had no change in their functional grade.

**Conclusions:** Frankel’s functional grading in preoperative status is significantly related to postoperative outcome of patient after IDEM surgery and preoperative SSEP values may give an idea for prognostication of functional grading after the surgery in patients of IDEM.

**FP-227:** C1 Lateral Mass Reduction Screws For Treating Atalanto-axial Dislocation (AAD): Bringing Ease By Modifying Existing Lateral Mass System

Dr. Vipul Vilas Pathak*, Dr. Deepak Kumar Singh

1) Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

**Background:** Craniovertebral junction anomalies like AAD managed presently by posterior only approach with C1 lateral mass and C2 pedicle screw fixation with joint distraction and manipulation.

**Objective:** We describe a modification of presently used C1-C2 fixation technique with use of C1 lateral mass “Reduction” screw in C1- C2 fixation with C1-C2 joint distraction and manipulation in patients of AAD. Use of reduction screw in C1 lateral mass have benefit of ease in rod fixation and controlled reduction of AAD.

**Materials and methods:** It is a retrospective observational study. Data collected from 18 patients operated at our institute for congenital AAD with C1 lateral mass, C2 pedicle screw and rod fixation with or without joint spacer. Patients evaluated clinically with mJOA score before and after surgery. Radiological outcome analysis done comparing ADI, distance of odontoid tip from weckenhiem’s and McRae’s lines.

**Results:** We noticed reduction of AAD with realignment of C1-C2 joint and symptomatic relief in all 18 patients. 16 out of 18 (89%) patients
showed clinical improvement in mJOA score during follow up. No any major neural or vascular complications observed in any case.

**Conclusion:** Use of C1 lateral mass reduction screw in C1-C2 fixations is safe, easy and effective method for C1-C2 joint distraction, manipulation and rod fixation in management of atlantoaxial dislocation.

**Key words:** Atlanto-axial dislocation, Reduction screw, C1 lateral mass, C1-C2 Fixation.

* * * * *

**FP-228: MINI Craniotomy - A valid option for management of chronic Sub dural hematoma**

Dr. Sai Kalyan Savarapu¹, Prof. Chandra Shekar Kalyan Naidu²

1) KIMS Hospital, Secunderabad, India

**Introduction:** Chronic subdural hematoma is one of the most commonest conditions encountered in the General neurosurgical practice. Surgical modalities like burr hole evacuation, twist drill evacuation, mini craniotomy and craniotomy are practised in the management of chronic SDH. Mini craniotomy with meticulous manipulation of membranes may help to achieve best results with decreased complication rates and recurrence.

**Materials and Methods:** The patients with chronic SDH operated from December 2017 to June 2018 were included in the study. Mini craniotomy (around 5cm) with the removal of the exposed portion of outer membrane was done. Dura was left wide open by reflecting and suturing the cut edges of the dural leaflets to the craniotomy edge. A drain was placed between the inner membrane and the bone flap. Preoperative and postoperative clinical and radiological parameters were recorded. Complications, recurrence and residual collections were noted.

**Results:** 41 patients were included in the study. Mean age was 55 years. Median GCS at presentation was 11 while median GCS at discharge was 15. Improvement in Markwalder grade was seen in all the patients. One patient had recurrence. 4 patients had residual collections which resolved by 4 weeks. No major complications were noted.

**Conclusions:** Mini craniotomy is a better option for surgical evacuation of chronic SDH as it allows better evacuation of chronic SDH and is not associated with increased complications rate. Multi Institutional studies with large sample size are necessary for providing promising results in near future by advocating this procedure.

* * * * *
**FP-229: Use of assessment tools in Cervical Spondylotic Myelopathy - Results of an anonymised survey among spine surgeons**

Dr. Kanwaljeet Garg*, Dr. Shashwat Mishra†, Dr. Shashank S. Kale†

1) All India Institute of Medical Sciences, New Delhi, India

**Objectives:** Cervical Spondylotic Myelopathy (CSM) is the commonest cause of cervical myelopathy. Many assessment tools like JOA, Nuricks have been described for patients with CSM to quantify the disease severity. It is helpful to have assessment tools to offer surgical treatment in time, which is not possible with non-standardized and subjective assessment. The purpose of this survey was to assess the awareness of the spine surgeons regarding the use of these assessment scales.

**Methods:** We designed an online questionnaire using the application Google Forms, which was widely circulated among spine surgeons using email and social media groups.

**Results:** We received 162 responses. More than three-fourth of respondents were neurosurgeons, while one fifth of them were orthopaedic spine surgeons. About 45% of the respondents had more than 10 years of experience in treating patients with CSM. About 90% of the respondents reported that they are aware of the use of the assessment scales. About 60% of the respondents reported the use of assessment tools in evaluation and management of these patients. Respondents with more than 10 years’ experience were most likely to use an assessment tool as were the spine surgeons with orthopaedic background. Nuricks scale is the commonest assessment scale used by the spine surgeons.

**Conclusions:** Assessment scales make management of CSM patients more objective and it becomes easier to detect any slight change in the clinical status of the patient following surgical intervention. We need to create awareness among the spine surgeons regarding the use of these scales.

* * * * *

**FP-230: Analysis of clinical outcome following C2 nerve-root sectioning and the factors affecting the feasibility of its preservation in patients with congenital atlantoaxial dislocation**

Dr. Karthigeyan M. †, Dr. Salunke P. ‡, Dr. Futane S. †

1) Postgraduate Institute of Medical Education & Research (PGIMER), Chandigarh, India

**Background & Objective:** Posterior C1-C2 fusion is a widely used fixation technique for atlantoaxial dislocation (AAD). The C2 ganglion is a restricting factor to an easy access of C1-C2 joints, and placement of C1 lateral mass screws. Both intentional C2 nerve root sectioning as well as its preservation have been described and are still debatable. However, the associated complications and outcomes have been less studied, particularly in congenital AAD. We studied the clinical outcome after C2 nerve root sectioning as well as the feasibility of its preservation in these patients.

**Methods:** One hundred and ninety patients who underwent posterior C1-C2 fusion for congenital AAD using C1 lateral mass screws were retrospectively studied. The decision to cut or preserve C2 nerve root was dependent on preoperative radiology and intraoperative suitability of its preservation. Patients were followed-up at periodic intervals and assessed for C2 nerve-related dysfunction.

**Results:** Complex C1-C2 anatomy with highly deformed joints was seen in 139 (73.2%) patients. In 178 patients, the C2 nerve root was sectioned. Postoperative numbness, paresthesia and dysesthesia were present in 30.3%, 21.9% and 19.1% patients respectively. However, the symptoms were bothersome in none, and did not require any medications. Noticeably, 9 patients (5.1%) developed non-healing occipital ulcers; most needed a flap cover/ skin graft. C2 nerve root preservation is feasible with robust inferior C1 lateral mass and normal sized ganglion. In patients with C1-occipital condyle hypoplasia, highly oblique joints, incurved occiput, pseudofacets and anomalous vertebral artery, its preservation is difficult.

**Conclusions:** Though the quality of life is largely unaffected in many patients following the C2 nerve root sectioning, a subset was prone for neuropathic ulcers. Hence, its preservation should be attempted whenever feasible. It may be possible to preserve it in less complex anomalies with favourable anatomy.

* * * * *

**FP-231: Pain relief satisfaction in patients with lumbar canal stenosis who’s operated with classic laminectomy alone versus laminectomy with fixation**

Dr. Mohamed Ahmed Eltabi*, Dr. Yasser Bahgat Elsisi†, Dr. Saeed Esmael Alemany‡, Dr. Mohamed Adel Hussien†

1) Menofia University, Shebin Elkom, Menofia, Egypt

This retrospective study targets to evaluate the neurological outcome of patients with lumbar canal stenosis (LCS) who underwent wide laminectomy, foraminotomy, discectomy and medial facetectomy if needed, with or without spinal fixation using transpedicular screws.

Data of 184 patients of the study groups were divided into group A (data from patients underwent laminectomy and foraminotomy only) and group B (data from patients underwent laminectomy and foraminotomy with spinal fixation). Preoperative, operative, postoperative (PO) and follow-up data were extracted and analyzed from files of patients fulfilling the inclusion criteria. Primary outcome
was at least 50% improvement of pain severity regarding numeric rating scale (NRS) and Oswestry Disability Index (ODI) score at 6-months PO compared to preoperative scores.

Operative time was significantly longer in group B than group A. Immediate PO data regarding PO analgesic requirement, amount of wound drainage and PO hospital stay showed non-significant difference between both groups. There were a statically significant improvement of EHL muscle strength regarding Odom’s scoring in group B in which the success rate for pain improvement was 81.8% and for disability was 66.8%.

The present study documented the efficacy and safety of the laminectomy, foraminotomy, discectomy and medial facetectomy with spinal fixation using transpedicular screws for management of patients with spinal canal stenosis.

**Keywords:** Lumber spinal stenosis, Spinal fixation, Pain improvement, Disability improvement.

---

**FP-232: The Role of Endoscopic Lumbar canal decompression in Severe Lumbar canal stenosis**

Dr. L. Feroz Ahamed1*, Dr. Natarajan2

1) Neurofoundation, Salem / Govt. Medical College, Salem, Tamilnadu, India

2) Neurofoundation Hospital, Salem, Tamilnadu, India

**Objectives:** The lumbar canal stenosis is a chronic progressive degenerative disorder and the main cause for spinal surgery after the age of 65yrs. The surgical management includes classical open decompressive laminectomy, microlumbar laminectomy and Endoscopic Decompressive Laminectomy. In our study, the results of endoscopic decompression compared with open lumbar laminectomy.

**Materials and methods:** The study was conducted in single institution. The study was prospective and about 70 patients of severe lumbar canal stenosis included in this study. They were divided into 35 in each group. The patients admitted from August 2016 to December 2018 were studied. The operative time, intraoperative blood loss, post op analgesic requirements and stay and return to their routine activity and at the end of 1 year improvement were compared in both studies.

**Results:** The results were compared and statistically analysed. The operative time of both group was similar and not significant. The intraoperative blood loss was lower in endoscopic decompression and statistically significant. The post op analgesic requirement and stay was also very low in Endoscopic procedure and statistically significant. At the end of one year, both groups had similar percentage of recovery and doesn’t shown any significance. Conclusion - The Endoscopic procedure is a safe and alternative procedure for lumbar canal stenosis and has wide advantages over open decompressive laminectomy. The low intraoperative blood loss and less tissue dissection, less post op analgesic requirement and reduced hospital stay were advantages for endoscopic decompression in old age group. At the end of one year both have similar results.

---

**FP-233: Combining PVCR and Ponte osteotomy in surgical management of complex thoracolumbar kyphoscoliotic deformity**

Dr. Asheesh Tandon1*, Dr. Alok Agrawal1

1) Center for Minimally Invasive Neurosurgery, Jabalpur, India

Complex deformities of the thoracolumbar area remains a major challenge for a spine surgeon dealing in deformity correction. We look into the utility of combining various vertebral osteotomy for management of complex kyphoscoliosis. Posterior vertebral column resection along with Ponte Osteotomy has the greatest advantage in achieving excellent coronal and sagittal balance.

Insertion of the long anterior reconstruction cage in lumbar area is technically demanding in view of the crowding of lumbar roots. The use of Hunt Shen Arlet technique would be discussed at length which is a simple but facilitatory technique in such situations.

We discuss our experience in management of advance thoracolumbar deformities at our centre. The cases studied were operated between June 2017 to May 2019. Ponte’s Osteotomy combined with Posterior vertebral column resection (PVCR) were the workhorse for management of such rigid spinal deformity. A total of 12 cases were operated during this period with the help of the above technique. Good to excellent correction of the deformity was achieved in all patients.

A brief discussion on the current literature would be presented on role of spinal osteotomies in management of difficult to treat deformities.

---

**FP-234: Two level Minimally Invasive Transforaminal Lumbar Interbody Fusion (MIS TLIF) - A boon in redo lumbar spine surgery**

Dr. Mazda Keki Turel1*, Dr. Vernon Velho1

1) Wockhardt Hospital, Mumbai, India

2) Sir JJ Group of Hospitals, Mumbai, India

**Objective:** To describe our experience with two levels MIS TLIF, with a special emphasis on revision spine surgery and discuss a literature review on open verses MIS TLIF.

**Methods:** Two level MIS TLIF cases operated at our institute were analyzed. Our surgical technique was described in detail. Indications for surgery, preoperative pain scores and postoperative outcomes were assessed. A pub med literature review was done comparing MIS versus the open procedure.

**Results:** All patients made a remarkable recovery from back and leg pain. Excellent fusion was seen in all patients. The patients with 2 levels MIS TLIF had lesser blood loss, shorter hospital stay and quicker recovery of pain. Results of a literature review were discussed.
**FP-235: Transclavicular approach for Upper Thoracic Spine - Our Early Experience**

Dr. P. Prahaladu1, Dr. M. V. Vijayasekhar, Dr. Mayank Agarwal1
1) Andhra Medical College, Visakhapatnam, India

**Introduction:** The upper thoracic spine may be affected by different pathologies. The prevalence of these diseases is low and not many reports are mentioned in literature. The anterior approach is commonly employed to reach upper thoracic spine for decompression and stabilization but approaches are complicated due to anatomical structures encountered during surgery.

**Material & Methods:** We operated four cases involving upper dorsal spine from D1 to D4 that includes 2 cases of traumatic subluxation, a case of disc herniation and one case of tuberculosis. All cases were operated by transclavicular approach with decompression and fixation.

**Results:** we observed improvement in symptomatology of 2 cases with tuberculosis and disc herniation, two traumatic subluxation with myelopathy cases had same neurological status and one of them had some change in voice postoperatively.

**Conclusion:** This procedure is easy and access till D4 level can be achieved without difficulty by meticulous dissection and without adding morbidity and mortality compared to other procedures like sternal splitting.

* * * * *

**FP-236: Ossification of Cervical Posterior Longitudinal Ligament - Clinico-Radiological Correlation and Surgical Outcome**

Dr. Pravesh Kumar Goyal1, Dr. A. Mastan Reddy1
1) Osmania Medical College, Hyderabad, India

**Introduction:** Now a days OPLL which is most commonly found in the cervical region is a well-known cause of cervical myelopathy and / or radiculopathy. OPLL has been found to be strongly associated with regions demarcated as fluoretic belts across the world including those in the Indian subcontinent. Surgical management of cervical OPLL has been characterized by marked unpredictability outcome. The precise contribution of the static and dynamic forces to the disease progression remains controversial. No long lasting improvement has been obtained by any of the non-operative methods. Surgical treatment should not be so delayed that irreversible cord damage occurs. The aims and objectives of the present study are 1) to correlate the radiological findings with clinical features in patients with cervical OPLL and 2) to evaluate the outcome of surgical management.

**Materials & Methods:** This is a retrospective longitudinal study carried out at the department of Neurosurgery, Osmania Medical College & Hospitals, Hyderabad. A total of 40 patients could be recruited during the 2 years study period between 2017 to 2019. Patients with proven OPLL (on CT and or MRI) having cervical radiculopathy, myelopathy or both were included in the study. Patients having the same neurological findings but due to degenerative diseases, previous surgery, trauma or neoplasm were excluded from the study. Preoperative clinical evaluation was done using modified Japanese Orthopaedic Association Score (mJOA). Decompressive laminectomy with or without posterior fusion was performed in all the patients and Hirabayashi’s recovery rate was assessed at 3 and 6 months postoperatively.

**Results:** Poor surgical outcome was correlated with age > 60 years, duration of myelopathy> 2 years, long segment OPLL, MRI cord signal changes, lower cross sectional area of the cervical spinal cord and pre-operative poor clinical status of the patient.

* * * * *

**FP-237: POSTERIOR CERVICAL DECOMPRESSION WITH SPINAL FIXATION: PRELIMINARY EXPERIENCE**

Dr. Raghavendra H.1#
1) Sree Lakshmi Gayathri Hospital & ESIC Medical College & Super Speciality Hospital, Hyderabad, India

**Background:** This study evaluates the outcome and complications of decompressive cervical Laminectomy and spinal fixation in 57 cases treated for variable cervical spine pathologies.

**Methods:** A retrospective review of 340 total cervical posterior screws was placed in 57 patient’s ages 12-72 years (13 females and 44 males). All cases were performed with a polyaxial screw-rod construct and screws were placed by single surgeon. Most patients had 14-mm length and 3.5 mm diameter screws placed for sub axial lateral mass, 16-mm length and 3.5 diameter screws for Trans articular fixation at C6-c7 and 2B-30 for C1 lateral mass.

**Results:** No patients experienced vascular injury as a result of screw position. Only two patients needed screw repositioning. Two patients experienced superficial wound infection. Eight patients had pain around the shoulder of C5 distribution that subsided over the time. One patient developed screw pull-outs within the period of follow up.

**Conclusion:** Decompressive cervical spine laminectomy and posterior spinal screw stabilization is a technique that can be used for a variety of cervical spine pathologies with safety and efficiency.

**Keywords:** Cervical myelopathy, traumatic spine injury, spinal fixation, decompressive laminectomy
**FP-238: Water-Sports Related Cervical Injuries - Our Experience**

Dr. Rajeev Sharma, Dr. Amol Raheja, Dr. Manoj Phalak, Dr. Guru Datta Satyarthee, Dr. Deepak Gupta, Dr. Shashank Sharad Kale

**Aim:** Water-sports are a recreational activity with its peak in summer season. Like any other sports, swimmer can suffer grievous injuries if standard precautionary measures are not taken. We analyzed our experience of water-sports related cervical injuries we treated at our trauma center during last 2 summer seasons. The purpose of this analysis is to study their mechanism of injury, management, and outcome; and strategize their preventive measures.

**Material and Methods:** This is a retrospective study of 8 patients treated at our trauma center during last 2 summer seasons (May 2018 to July 2019). The clinical profile, imaging, management, and outcome at discharge & follow up were reviewed. ASIA impairment scale was used to assess the serial neurological status of the patient at the time of surgery and during follow up.

**Results and Discussion:** A total of 8 patients of water-sports related cervical injuries were managed during last 2 summer season at our trauma center. All of them were males and were young (age range: 18-27 Yrs). All of them suffered cervical vertebra burst compression fractures and were managed surgically- spinal decompression and stabilization. Out of eight, only two of them showed good improvement in ASIA scale after surgery. All these injuries were preventable.

**Conclusion:** Water-sports related cervical injuries are completely preventable by following standard precautionary measures.

---

**FP-239: A study of the Prognostic Factors in Cervical Spondylotic Myelopathy**

Dr. Rajesh Pathi*, Dr. K. Satyaraprasad†

1) Dr. NTR University Of Health Sciences, Visakhapatnam, India

**Introduction:** CCM is a common degenerative disorder of the C spine. It’s caused by cervical canal narrowing due to disc protrusion, OPLL or degenerative spondylolisthesis.

**Aims:** To assess the role & effect of the following factors in the outcome of CCM:


**Materials:** A total no. of 85 patients was included in this study, which was conducted between Jan 19 to July 19 in our Institute.

**Results:** In our study of 85 patients, M:F ratio is 69:16. The avg age of the 85 patients was 49 ± 12 yrs. The range of duration of symptoms varies from 16.8 ± 7.2 months. The average Nurick grade is 2. The avg effective canal diameter was 10.0 ± 1.4mm. The avg lesional length was 2.4 ± 1.

**Conclusions:** All the cases were analysed and following conclusions have been drawn: 1. Patients with age < 40 years, duration of symptoms < 1 year, preoperative Nurick grade 0-2, effective canal diameter > 11mm, single level of compression, absence of hyperintense signal change in T2 MRI are adverse prognostic factors in CCM.

---

**FP-240: Ectopic colloid cyst in spine**

Dr. Sudarsan Agarwal, Dr. Varaprasad G.

A colloid cyst is a benign cystic lesion accounting for about 0.5-1 % of intracranial tumors. In this case report, we discuss about a usual intra dural ventrally located colloid cyst at cervico-dorsal junction in a child. A 4-year-old male child was brought with chief complaints of pain in the nape of neck for 6 months duration. Clinical examination found tenderness in cervico-dorsal area with extensor plantar reflexes and mildly exaggerated deep tendon reflexes in lower limbs. MRI showed that intra dural ventral spinal cord lesion pushed back the spinal cord. Microscopic excision of cyst was planned. Colourless, transparent gel-like fluid was extracted, and cyst wall was made and sent for biopsy. Neuro-pathologic examination showed characteristic cystic lesion lined by cuboidal epithelium to pseudo stratified ciliated columnar epithelium with bland nuclear features. Cavity is filled by eosinophilic amorphous material. The cervico-dorsal spinal colloid cyst was diagnosed, and postoperative the patients had complete remission of symptoms. As in present case, rarely colloid cyst can be seen at cervico-dorsal junction in a child, ventral to spinal cord, not classical and is different than described in literature and hence reported. The embryogenesis and literature were reviewed briefly.

---

**FP-241: Usefulness of additional Transforaminal lumbar interbody fusion (TLIF) to Posterolateral Fusion (PLF) in adult low grade degenerative lumbar spondylolisthesis - A single center retrospective study**

Dr. Sanatan Sapatpathy*, Dr. Sudhanshu Sekhar Mishra†, Dr. Sanjib Mishra†, Dr. Niranjan Nanda†

1) SCB Medical College, Cuttack, India

**Objective:** Even though surgical load of Degenerative lumbar spondylolisthesis are on rise at referral institutions , the optimal surgical procedure for same is still controversial and yet to be defined.In this study we intend to analyse usefulness of addition of Transforaminal Lumbar Interbody Fusion (TLIF) to Posterolateral Fusion (PLF) in adult low grade degenerative lumbar spondylolisthesis.

**Method:** A total of 76 patients who had undergone lumbar fusion for degenerative spondylolisthesis between February 2015 and January...
Two hundred and fifty cases of Chiari malformation were analysed in a prospective and retrospective manner in the past twenty years. During surgery many anomalies were noted, malformations in the posterior arch of C1, foramen magnum anomalies, presence of pathological band were seen. Apart from this the anatomy of the venous channels were studied, we noticed the circular sinus compression is one of the consistent findings and the severity of the compression is directly proportional to the degree of symptoms and it also a direct relationship in the post operative recovery. The bony anatomy and compression in this area was studied. Of the two hundred fifty patients hundred and ninety three patients had syringomyelia. The severity of the compression on the venous channels had a direct relation ship to the syrnix formation and the symptoms. Adequate release of the circular sinus circumferentially and excision of the pathological band is key factor in deciding the outcome. Dural opening is not done in any of our patient, nor C1 and C2 or occipital fixation and fusion done in any of our cases. Post operatively there was good resolution of the syrnix in hundred and one patients. There was also reappearance of the cisterna magna. To Conclude the venous compression over the circular sinus probably plays a key factor in the pathology of Chiari malformation.

**FP-242: Multilevel Spinal Stabilization as a treatment for Hirayama Disease - Report of an experience with Six Cases**

Dr. Kumar Abhinav¹, Dr. Atul Goel², Dr. Abhichda Shah³, Dr. Arjun Dhar⁴

1) Lilavati Hospital & Research Centre, Mumbai, India
2) KEM Hospital, Mumbai, India

**Objective:** To analyze the role of multisegmental spinal instability in the pathogenesis of Hirayama disease.

**Material & Methods:** From June 2014 to December 2017, the authors managed 6 patients with Hirayama disease. The patients were diagnosed on the basis of classical described radiologic and clinical guidelines. All 6 patients were treated with multilevel cervical fixation that included fixation of the atlantoaxial joint in 5 patients by the adoption of the facetal fixation methods. No dural or bone decompression was performed. The follow-up ranged from 7 to 48 months (average 23 months).

**Results:** The most remarkable feature was an immediate postoperative and progressive improvement in the symptoms of weakness, wasting, and deformity of hands in all patients. The other remarkable feature was an immediate postoperative reduction in extradural mass in all patients and its complete disappearance in 2 patients.

**Conclusions:** From the observations, it appears that atlantoaxial and subaxial spinal instability plays a major role in the pathogenesis of Hirayamadisease.

**FP-244: Four, quick and easy, cost-effective hacks in Neurosurgery**

Prof. Gopalakrishnan Sasidharan

1) Jawaharlal Institute of Post-graduate Medical Education and Research, Pondicherry, India

I describe four, do-it-yourself, cost-effective hacks to combat problems that many neurosurgeons face in the resource-poor setting.

1. A device is described to neutralize, highly toxic, irritant and carcinogenic formaldehyde which is still very commonly used to sterilize operating microscopes. The formaldehyde neutralizer which is based on vaporizing ammonia can be built for less than 500 INR.

2. Bite injuries to the tongue, teeth, and lips have been described during motor evoked potential (MEP) monitoring. Although commercial bite guards are available in western countries they are not easily found in India. Previous descriptions using gauze pieces and syringes covered with gauze are not reliable. I describe the method of making disposable bite guards using glove fingers and Foley catheters.

3. Warm saline or hot saline irrigation can help achieve hemostasis by accelerating the chemical reactions. A thermostat-controlled kettle and non-contact thermometer can be used in this situation in a sterile fashion. Cost is less than 2000 INR.

4. How does the surgeon control the myriad computers and navigation systems from the sterile field? Use a sterilizable mouse!
**FP-247: The Spectrum of Complex Split Cord Malformations**

Dr. N Muthukumar**, Dr. Natarajan Muthukumar**

1) Devadoss Hospital, Madurai, India

**Aim:** To highlight the spectrum of associated pathological (AP) entities that can occur with (split cord malformations) SCMs and the limitations of imaging techniques to diagnose these entities preoperatively.

**Methods:** Patients with SCMs and associated pathologies (AP) operated between Jan 2012 and Dec 2017 were included. All had neuroevaluational, plain radiographs, high resolution CT and MRI. Postoperative complications were recorded. Follow up ranged from 6 months to 3 years.

**Results:** 24 of the 30 patients treated during this period had APs. M:F-18:6. Age: 1 month – 17 years. 16 had Type II SCMs and 8 had Type I SCMs. Twenty of the 24 patients were neurologically intact. Of the remaining 4, 3 had urinary disturbances and one had weakness of one lower extremity. All patients had one or more APs in addition to SCMs. High resolution MRI and/or CT were unable to completely identify the full spectrum of the pathology in these patients in whom the diagnosis was often made intraoperatively. The associated anomalies included in the descending order of frequency included: LDMs (Limited Dorsal Myeloschisis), Lipomas; Spondylo-costal Dysostosis, spinal arachnoid cyst, spinal dermal sinus and neurenteric cyst. Complications included CSF leak and wound break down. No patient worsened neurologically either immediately following surgery or during the follow up.

**Conclusions:** 80% of SCMs have APs. Even high resolution MRI /CT cannot completely identify the full spectrum of the pathology in SCMs. A high index of suspicion and a meticulous search for associated pathology is required while operating patients with SCMs.

---

**FP-246: Ventricule to Sylvian Fissure Shunt for Obstructive Hydrocephalus**

Dr. Sushil Patkar**

1) Poona Hospital & Research Center, Pune, India

**Introduction:** Cerbrospinal fluid (CSF) pathway studies have revealed that after egressing from the fourth ventricle reaches the basal supra sellar cistern and ultimately the syilvan cisterns from where the CSF travels over the cerebral convexity subarachnoid space to reach the superior sagittal sinus and enters the blood stream. Diverting CSF from the lateral ventricle with a shunt catheter to the sylvian cistern can be an option to treat obstructive hydrocephalus. 2 patients underwent this procedure of diverting CSF from the lateral ventricle with a shunt catheter (Chabdra, India) to the syilvan cistern successfully and had immediate relief of symptoms of raised intracraniac pressure. Additional 4 patients had relief for 3mths to 6 mths and are under follow up. Though preliminary results seem logical and promising, more cases and longer follow-up is required to consider this shunt operation as an option in treatment of obstructive hydrocephalus.

---

**FP-248: Type 1A Split Cord malformation with Tethered Cord and Syringomyelia**

Dr. R. J. V. V. Prasad**, Dr. R. Manimaran**

1) Madurai Medical College, Tamilnadu, India

**Introduction:** Split cord malformations (SCMs) are relatively rare forms of occult spinal dysraphism and tethered spinal cord syndrome. The majority of these cases present in early childhood with neurocutaneous stigmata being an early presenting feature. SCM constitutes about one third cases of spinal dysraphism, where spinal cord is divided over a portion of its length into two equal or unequal halves. Here we present a case of type 1a split cord malformation with tethered cord.

**Case report:** 15yr old female presented with chronic low backache and burning sensations in both lower limbs. No history of weakness in limbs, bowel or bladder symptoms. On examination, patient had no neurological deficits, no limb length discrepancy but she had cutaneous signs like hypertrichosis, hypopigmented patches and skin dimple at lower back. On spine examination there was scoliosis.
CT spine showed scoliosis and bony spur with posterior arch defects. MRI spine showed split cord with two separate dural sleeves and there was associated tethered cord.

Patient underwent laminoplasty, removal of bony spur and the double dural sacs were converted into a single sleeve. Detethering of cord was also done under IONM.

Conclusion: Spinal cord malformation is rare form of spinal dysraphism. Patients present with cutaneous and orthopedic signs along with neurological deficits. Early surgical intervention is necessary to prevent progressive neurological deficits. IONM serves as complimentary tool for careful detethering of filum.

* * * * *

**FP-249**: Evaluation and management of myelomeningocele in children

Dr. Vishwanath Sidram1,2, Dr. Chandrakumar, PC3 1) Vijayanagar Institute of Medical Sciences (VIMS), Karnataka, India 2) RUHS, Ballari, Karnataka, India

Objective: Myelomeningoceles are the common form of open neural tube defects that are usually associated with neurological defects. Many techniques of repair and methods of prevention have been proposed with respect to the size of defect and the neurological condition of patient. The aim of this study was to report our experience on the management of lumbosacral myelomeningoceles in children.

Materials and Methods: We retrospectively analysed the data of 78 paediatric cases of surgically operated myelomeningocele treated in our department between 2015 and 2019. 30 (56%) patients were female and 43 were male, with a mean age of 4 months (ranged between 0 and 24 months). All patients had neurological deficits in the preoperative period. Computed tomography was performed in 71 (92%) patients and magnetic resonance imaging in 11 (42%) patients in the preoperative period. Repair of the myelomeningocele and closure of the skin defect were performed in all patients. The mean follow-up period was 36 months.

Results: Thirty patients were operated for hydrocephalus and. Neurological worsening was not observed in any patient while cerebrospinal fluid fistula was detected in 2 patients.

* * * * *

**FP-250**: Cost effective alternative for conduit graft in nerve regeneration rat model: A Clinico-histopathological pilot study

Dr. Suyash Singh1,2, Dr. Atul Kumar Baranwal1, Dr. Ankur Bhatnagar3, Dr. Arun Kumar Srivastava4 1) Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Objective: The peripheral nerve injury is dealt with primary end to end or side anastomosis with few exceptions where interposed grafts or cable grafts are used. The cables or stem cells are known to enhance regeneration of nerve growth. The allogenic materials may impart allergic reactions which at times can be fatal or reject the anastomosis. In our study we intend to see the effect of autologous grafts interposed between cut sciatic nerve of rat.

Methods: After animal ethical committee and IEC clearance the study done in our animal laboratory. 25 rats were observed, in whom interposed grafts or silicone conduits were used, and motor and sensory improvements were compared among rats with primary anastomosis. The healing of sciatic nerve injury was assessed by clinically (mechanical nociceptive response) and histopathologically, at terminal time (nerve biopsy was assessed by electron microscopy to confirm regeneration).

Results: 16 rats show good improvement in anastomosis homed with silicone conduits. On comparing the preoperative and post operative Votfrey hairs test, the right leg in 15 rats show increased threshold when compared to left leg. Although on rota rod analysis the coordination was similar and poor in both the legs, the open field test significantly show advantage of using multipotent interposed grafts. Electron microscopy confirmed better regeneration.

Conclusion: The short term rat model analysis showed that the both autologous graft or cost effective silicone conduit may enhance the peripheral nerve regeneration. Silicon conduits may be used as cost effective alternative.

* * * * *

**FP-252**: Can Activity Aprons for Inpatients Requiring Individual Nursing Care be Beneficial?

Dr. Jay Mandrekar1,2, Dr. James P Klaas1 1) Mayo Clinic, United States

Use of commercially available activity aprons to keep patients with dementia occupied at home or in long term care facilities is known. However, there are no studies in an inpatient hospital setting that assessed the use of activity aprons in reduction or elimination of behaviors that may result in self-harm, increased nursing supervision, and restraint use. We conducted a single center prospective randomized controlled pilot study from July 2015 to November 2016 comparing activity apron plus standard care versus standard care alone. Stratified randomization was used to ensure the balance of the 2 groups with respect to age and a preexisting diagnosis of dementia or cognitive impairment or not. Primary outcomes were safety and feasibility of apron use. Secondary outcomes included duration of hospitalization post randomization and individual nursing assignment, time in restraints, nonphysical restraints use, falls, apron-related complications, dismissal destination, and 30-day hospital readmission. Thirty patients were enrolled in this study. Although there were no statistically significant reductions in mean length of hospital stay or duration of individual nursing assignment, the findings were still clinically relevant and favored activity apron use. There were no complications secondary to apron use. The findings of the study suggests, activity aprons are a safe addition to the standard of care when managing encephalopathic patients in the inpatient setting and
can offer some cost savings. These aprons may have a role as part of a comprehensive complement of interventions to address delirium and encephalopathy in hospitalized patients.

**FP-253: Correlation and efficacy of Single-photon emission computerized tomography (SPECT) and Magnetic Resonance Imaging (MRI) in the management of backpain**

Ms. Shamaytri Ghosh¹, Dr. Shamaytri Ghosh², Dr. Kaushik Ghosh³, Dr. Anantharaju Prasad⁴, Dr. Naufel Ansar⁵, Dr. Aprajay Golash⁶, Dr. Arup Ray⁷, Dr. John Cain⁸, Dr. Ibrahim Hammoud⁹, Dr. Syed Maroof Hashmi⁹

1) Royal Preston Hospital (Lancashire Teaching Hospitals NHS Trust), United Kingdom

**Introduction:** Back pain is the leading cause of disability globally. Majority of patients do not have identifiable causes. Single-photon emission computed tomography/computed tomography (SPECT/CT), which is a combined functional and morphological imaging, may be helpful in identifying such active lesions.

**Aim:** Assess the role and efficiency of SPECT and correlation with MRI in the management of patients with backpain.

**Methods:** We have included 156 patients between March 2012 to July 2019 who underwent both MRI and SPECT. SPECT finding was correlated with MRI(+/−STIR).

**Results:** The mean age was 48 years with slightly high female preponderance (54.3%). 126 patients have shown positive uptake in SPECT, amongst which 75 % has shown positive correlation with MRI. Among 30 SPECT negative patients, 8 had positive findings in MRI. Amidst all patients who had undergone MRI(STIR), 6 were MRI STIR positive and out of which 5 were SPECT positive. Out of 5 Discogram performed, all showed positive correlation with SPECT/CT and one was MRI STIR positive. A comparison was made among different modalities of imaging regarding cost-effectiveness and it was found that SPECT was most cost-efficient.

**Conclusion:** In our series of patients, CT SPECT in conjunction with MRI helped to assess and treat the patients. Additionally, due to cost effectiveness, SPECT is considered as a superior modality in comparison to other radiological investigations.

**FP-254: Giant Occipital Meningoencephalocele in a Neonate - A Therapeutic Challenge**

Dr. Satish Balshiram Dere⁴, Dr. Raja K. K.²

1) Medical College Trivandram, Kerala, India

**Introduction:** Encephalocele is a rare lesion, being an embryological mesodermal anomaly which result in a defect in the cranium and dura, associated with herniation of meninges, CSF or brain tissues through a defect usually covered by scalp. We present a case of giant occipital encephalocele highlighting the problems encountered in its management.

**Case Report:** A 2-month-old female child presented to the neurosurgery outpatient department with complaints of large swelling over the back of head and difficulty in feeding. The swelling was small at the time of birth, but it gradually increased in size. On examination, patient large spherical swelling was present over occipital region and there was no head control. The patient was active, conscious with no focal neurological deficit. Systemic examination was unremarkable. The head circumference was 32cm and circumference of occipital swelling was 66 cm. The overlying skin was tense and without any CSF leak. Anterior fontanelle and posterior fontanelle were both open. The patient was operated in prone position. Initially decompression of sac was done with aspiration of 3.5 litre straw color fluid. A circumferential incision was given at the neck of swelling with meticulous dissection, and hemostasis sac was opened & protruded portion of cerebellum was excised and the dura closure was done. Scalp closure was done in layers.

**Conclusion:** The management of occipital encephaloceles can be complicated and should be individualized. In a tense, giant occipital meningoencephalocele problems encountered are essentially because of the large size and induced neonate handling, positioning in operation theater, intubation, and blood loss during resection of the large amount of redundant skin.

**FP-255: Cine flow magnetic resonance imaging - An important imaging tool for Arnold chiari malformation.**

Dr. Mayuresh Kumar Hinduja⁴, Dr. Vernon L. Veilo³

1) Govt. Grant Medical College & JJ Group of Hospitals, Mumbai, India

**Aim:** To assess the significance of preoperative and postoperative CINE MRI in management of Arnold-Chiari malformation.

**Materials & Methods:** In this prospective study, 20 patients with age group 15 to 57 years with Arnold-Chiari malformation were included during the period January 2017 to June 2019. All the patients were evaluated with MRI brain and spine. Length of tonsillar herniation from foramen magnum, presence or absence of syrinx and maximum diameter of syrinx were assessed. Post-operative outcome were evaluated with follow up MRI findings and relief of symptoms.

**Results:** The mean age of the study subjects was 34 years. Chiari malformation was common in females in our study. The mean duration of symptoms was 3 years. 12 patients had associated syrinx. In patients with syrinx mean maximum diameter of syrinx was 9 mm. Preoperative MRI showed the length of herniation between 6 to 8 mm in eight patients and more than 8 mm in 12 patients. Evaluation of postoperative patients for clinical recovery were done by serial follow-up at 1st, 3rd and 6th months and post op MRI at 3 months. All patients except one had clinical recovery of symptoms.
Conclusion: Cine flow magnetic resonance imaging appears to be a useful tool in the management of patients with Chiari malformations. Patients without syrinx or small diameter syrinx have better results with decompression. There was a good correlation between the clinical presentation and cine flow preoperatively, and between clinical improvement and cine flow postoperatively.

FP-256: Choroid plexus tumors in children - An institutional experience
Dr. Mihir Chawda*, Dr. Uday Andar1, Dr. Chandrashekar Deopujari1, Dr. Naresh Blyani1
1) B. J. Wadia Hospital for Children, Mumbai, India
Choroid plexus tumors are rare intra-ventricular tumors accounting for 2-4% of brain tumors in children and less than 1% of all intracranial tumors. They are commonly located in the lateral ventricle in children and in the 4th ventricle in adults. Choroid plexus tumors in children less than 1 year are more commonly choroid plexus carcinomas with an extremely poor prognosis. Management issues include tumor vascularity, blood loss during surgery, limited reserve of tolerable blood loss in children, use of adjuvant therapies to decrease tumor vascularity and treatment of hydrocephalus. We review our experience of 7 children for a single institution between January 2018 to July 2019.

FP-257: Large Brain Tumors - Tricky Terrain to Travel
Dr. Dr. Deepak Kumar Jha1*, Dr. Suryanarayanan Bhaskar2, Dr. Mayank Garg1, Dr. Pushpinder Khera1, Dr. Pradeep Kumar Bhatia1, Dr. Poonam Elhence1, Dr. Mukul Jain2, Dr. Ishita Pant2, Dr. Deepak Kumar Jha2, Dr. Rajesh Kumar Sharma2
1) All India Institute of Medical Sciences, Jodhpur, Rajasthan, India
2) Super Specialty Paediatric Hospital & Post-graduate Teaching Institute, Noida, India
Context: Large/giant Brain Tumors (LBT) pose challenges, different from smaller lesions, due to its symptomatology, clinical profile and risks of surgery. LBT (>5 cm) frequently invoke or distort normal neurovascular structures around them to make their removals more challenging. Authors present their experience of managing 97 cases of large LBT in the last 6 years.
Materials and Methods: Retrospective analysis of case records of large brain tumors were done from February 2013 to 2019 March. Patients’ records were analyzed with regard to their demographic profiles, clinical details, radiologic findings, surgical approaches, intraoperative difficulties/compllications and outcomes with a minimum follow up of 6 months.
Results: Ninety seven cases of LBT formed the study group. Eighty six (n=97) cases were larger than 6 cm. It included benign (n=6), malignant (n=91), intra-axial (n=26) and extra-axial (n=51) lesions. Difficulties were encountered in their management which included mortalities within 48 hours (n=6) and within 1 year of surgery (n=3). Malignant transformations were seen in two cases. Five patient refused second stage surgery (n=3) and post-operative adjuvant therapy (n=2) against medical advice. Overall difficulties related to (i) surgery, (ii) pathology of the lesions, (iii) healthcare infrastructure and (iv) patients’ socioeconomic status were observed in 24 patients.
Conclusion: LBT pose different challenges due to their pathologies, locations, socio-economic conditions of the patients and existing healthcare infrastructure. Outcomes of such lesions depend on all these factors and should be considered while planning their management.

FP-258: Ventricular Meningiomas - Surgical strategies and a new finding that suggest an origin from the Choroid Plexus Epithelium
Dr. Abuzer Gungor*, Dr. Ayca Ersen Danyeli1, Dr. Ahmet Akbas1, Dr. Murat Sakir Eksi1, Dr. Mustafa Guduk1, Dr. Koray Ozduman1, Dr. M. Necmettin Pamir1
1) Acibadem MAA University, Istanbul, Turkey
Aim: The aim of this study is to share our experiences on a series of 21 patients with intraventricular meningiomas (IVMs). Histopathologic examinations are reviewed in detail and the cell of origin of IVMs is discussed.
Methods: We retrospectively reviewed 1372 patients with intracranial meningioma who were surgically treated between September 1986 and July 2018. From this cohort, 21 patients with IVM were identified. The clinical, radiologic, surgical, and follow-up records were analyzed. The archival pathologic specimens were reviewed. Tissue microarray blocks were performed from the formalin-fixed, paraffin-embedded samples of all IVM cases, 2 choroid plexus tissue adjacent to the tumors, and 10 extraventricular fibrous meningioma cases selected as control randomly. Immunohistochemical staining with the antibodies S-100, SOX10, NGFR, and OTX2 was performed according to the protocols indicated by the manufacturers.
Results: Surgical complications included hemiparesis in 1 patient (5%), postoperative seizure in 1 patient (5%), sensorial aphasia in 1 patient (5%), and preexisting headache in 1 patient (5%). Seventeen (81%) of the IVMs had grade I pathology and 4 (19%) had grade II pathology. The immunoprofile of IVMs is identical to the immunoprofile of normal choroid plexus epithelium.
Conclusions: Transcortical approaches using intraoperative ultrasonography and intraoperative monitoring with avoidance of eloquent cortical areas can achieve good outcomes. Resection of the choroidal attachments should be attempted. Our results indicate that
IVMs do not show arachnoid cap cell phenotype and the findings support that IVMs originate from the choroid plexus epithelium or the progenitors of the choroid plexus epithelium.

**FP-259:** Brain tumor interface dissection technique with surgical blade from laboratory to neurosurgical operating room and its application in meningioma located in and around eloquent areas

Dr. Survendra Kumar Rajdeo Rai¹*, Dr. Cristina Mancarella², Dr. Atul H. Goel¹
1) Seth G, S. Medical College & K.E.M. Hospital, Mumbai, India
2) IRCCS Neuromed, Venafro, Italy

**Background:** Ideal tumor resection requires brain/spinal cord tumor interface separation in perfect and precise surgical planes within a few micrometers for radical tumor resection and maximum normal tissue preservation. We evaluated the feasibility and advantages of dissection using a No. 15 blade scalpel in special brain tumor surgery situations. We developed a leaf model wherein its outer layer is progressively dissected from its inner skeleton using a scalpel. An additional model used was a tomato wherein its skin was peeled off its pulp using the same technique.

**Objective:** We developed an inexpensive leaf model. A scalpel knife was used in a microneurosurgical setting, and the leaf’s outer layer is peeled off. The technique is then used in an operating room setup where surgery on extraaxial tumors like meningiomas and intra-axial brain and spinal cord tumors is done.

**Methods:** A No. 15 scalpel was used for dissection between the layers of the Peltophorum pterocarpum leaf model. This dissection method was compared with other neurosurgical dissecting tools.

**Results:** We dissected 120-mm thick leaves into 2 layers with removal of an 18- to 55-mm thick layer. Leaving behind a transparent layer was possible using a No. 15 blade scalpel. Preservation of 35- to 40-mm thick arachnoid layer separating meningioma from the brain parenchyma was accomplished in 22 cases without neurodeficit.

**Conclusion:** A scalpel with a sharp edge could be used to perform precise and fine dissection. The scalpel deserves to occupy a place of pride as a dissecting tool in neurosurgery.

---

**FP-260:** Intraventricular tumors - An institutional review

Dr. Laxmikant Anantrao Bhople¹
1) Grant GMC & Sir JJ Group of Hospitals, Mumbai, Maharashtra, India

**Introduction:** These are rare lesions, approx less than 1% of intracranial tumors. Most of these are histologically benign and curable.

**Aims:** To study demographic, management strategic and operative nuances of patients presenting with intraventricular tumors.

**Materials & Methods:** We retrospectively analysed 144 patients to highlight technical difficulties during management of the tumors.

**Conclusion:** Intraventricular tumors are difficult to approach and excise due to their dept. and location. Although neurological deterioration is common postoperatively, recovery does occur completely after total removal thus increasing the recurrence free period & improving the outcome.

---

**FP-261:** SERUM GFAP as a diagnostic and prognostic marker of Glioma

Dr. Nidhi Yadav¹
1) GB Pant Hospital, Delhi, India

**Objective:** Gliomas are the most common primary brain tumor, yet the high cost of diagnostic imaging has made early detection of asymptomatic glioma a formidable challenge and also recurrence following the treatment a rule. Henceforth development of a tumor marker in serum is necessary both for diagnosis and prognosis and also avoid expensive serial radiological investigations.

**Methods:** To evaluate the same, we prospectively examined 30 patients with histologically proven glioma inspite of grade. Serum samples of GFAP levels were evaluated both preoperatively, postoperatively and after two months postoperatively. These levels were further correlated with radiological and pathological diagnosis.

**Results:** Analysis of the results yielded a correlation of preoperative gfap levels with diagnosis of tumor, but in immediate post operative period there was no correlation with levels of gfap levels and radiological correlation. But confounding factors like radiotherapy and chemotherapy was not taken into account.

**Conclusion:** Therefore it can be concluded that serum GFAP can be a marker for diagnosis but further time period and evaluation is required for correlation with recurrence and prognostic evaluation.

---

**FP-262:** Endoscopic surgery for giant pituitary adenoma - Experience of consecutive 50 cases

Dr. Rakesh Ranjan¹**, Dr. Jaya Kochure¹
1) Aditya Birla Memorial Hospital, Pune, India

**Introduction:** Giant pituitary adenomas (GPA) account for about 10% of all pituitary tumors and are defined as tumors with maximum diameter over 4 cm. They pose many dilemmas regarding best possible surgical management and outcomes. We present our experience with such
tumors of consecutive 50 cases and discuss relevant literature.

**Material and methods:** 50 consecutive cases of GPA treated over last 10 years were included in the analysis. Majority of the tumors with non-functioning pituitary adenomas (n=46) with 2 cases of prolactinoma and one patient each with TSH and growth hormone secreting adenomas. One patient presented with hypopituitarism and two had hyponatremia. The patient’s age ranged from 15 to 68 years. Three patients had recurrent or residual tumors operated at other centres. All patients underwent pure endoscopic trans sphenoidal approach as the primary method of resection. Incomplete tumor removal was done in 12 patients. Of these two patients needed transcranial and two needed redo endoscopic surgery. Three patients underwent venriculoperitoneal shunt for hydrocephalus. Two patients developed cfs rhinorrhea and one developed meningitis. There was one death following hematoma formation at the operative site. Gross total resection was possible in 86% cases with a follow up of 5.6 years.

**Conclusion:** GPAs pose a neurosurgical challenge requiring multiple approaches to achieve safe and maximal resection. However, endoscopic trans sphenoidal approach should be the first route for resection and can help achieve maximum resection with long term results and acceptable morbidity.

---

**FP-263:** Surgical outcomes of Giant intracranial Meningiomas - An Institutional Experience of 240 cases

Dr. Prabu Raj A. R. *, Dr. Sachin Jose¹, Dr. Dhaval Shukla¹, Dr. Dhananjaya Bhat¹

1) NIMHANS, Bangalore, India

**Introduction:** The giant intracranial meningioma (GIM) constitutes a different spectrum of brain tumors that invade the vital neurovascular structures, which makes the primary mode of treatment, surgery, a technically challenging one. This study reports the experience of 240 GIM cases, the operative challenges and surgical outcome over 6 years time period.

**Methods:** A Retrospective analysis of 240 patients with histologically proven giant meningiomas (>5cm any dimension) who underwent surgery between 2012-2017 was done. The clinical and radiological data was collected from the hospital records and data base.

**Results:** A total of 240 cases with 112 men (46%) and 128(54%) women with a mean age of 44(SD+/-13.17). The most common location of giant intracranial meningioma was parasagittal/falcine 38.3%, followed by skull base 31%, convexity 22%, posterior fossa and intraventricular 3% each. Two GIM were diagnosed incidentally. 38.3%, followed by skull base 31%, convexity 22%, posterior fossa and intraventricular 3% each. Two GIM were diagnosed incidentally. 38.3%. Of these two patients needed transcranial and two needed redo endoscopic surgery. Three patients underwent venriculoperitoneal shunt for hydrocephalus. Two patients developed cfs rhinorrhea and one developed meningitis. There was one death following hematoma formation at the operative site. Gross total resection was possible in 86% cases with a follow up of 5.6 years.

**Conclusion:** GIMs are technically challenging one. This study reports the experience of 240 GIM cases, the operative challenges and surgical outcome over 6 years period. GIM resection is achievable despite the technical challenge imposed by the size of these tumors.

---

**FP-264:** Surgical outcome and complications in cases of Pituitary Adenoma

Dr. Sankaip Bhartiya *, Dr. Hemant Bhartiya¹

1) Fortis Escorts Hospital, Jaipur, Rajasthan, India

**Aim:** To assess and compare outcomes of patients undergoing surgery for Pituitary Adenoma.

**Material and Methods:** All 287 patients undergoing surgery for Pituitary Adenoma in our institution including functional and non-functional adenomas.

**Results:** Mortality rate of 1.3%, Meningitis rate of 2.8%, Transient DI in 8% and CSF Leak at 5.6.

**Conclusion:** The results are comparable to that of would literature.

---

**FP-265:** Insular Glioma - Technical pearls for maximal safe resection

Dr. Kuntal Kanti Das *, Dr. Kuntal Kanti Das¹, Dr. Awadhesh Kumar Jaiswal¹, Dr. Sanjay Behari¹

1) Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

**Background:** Insular glioma resection is considered to be one of the difficult glioma surgeries. There is a lot at stake in such surgeries and there is often a very thin line that separates success and failure in insular glioma surgeries. Intraoperative adjuncts, image guidance and awake craniotomy are often employed to ensure safe surgery but basic surgical tenets, sound anatomical knowledge still remains the cornerstone to get the job done.

**Methods:** This paper represents an early career experience of resecting insular gliomas by a single surgeon over a 5 year period. The author utilized trans sylvian or transpericrucial approach depending on the extent of the tumor. Sub cortical stimulation and intraoperative ultrasound were used for intraoperative guidance. Extent of excision was confirmed after 2 months with magnetic resonance imaging.

**Results:** 30 patients were operated. 17 patients had right sided tumor. Total excision was obtained in 9 patients while 21 patients underwent subtotal excision. Trans sylvian approach was used in 5 patients while 25 patients underwent transpericrucial approach. Histopathologically, 22 patients had low grade glioma while 8 patients had high grade gliomas. There was no operative mortality, 2 patients developed...
hemiplegia, 3 patients developed operative site hematoma. At an average follow-up of 32 months, all patients were seizure free.

Conclusion: Insular glioma can be safely resected with good long term outcomes. They key is to choose the right approach based on preoperative imaging. With increasing experience, vascular complications can be almost completely eliminated.

* * * * *

**FP-266: Microsurgical excision of Intracranial Epidermoids - A short surgical series of 26 cases**

Dr. Ashwani Kumar Mishra1, Dr. Mastan Reddy1
1) Osmania Medical College, Hyderabad, India

Introduction: Intracranial epidermoids are rare congenital cysts accounting to about 1% of all space-occupying lesions of the cranial compartment. They are generally benign lesions but total resection is often difficult resulting in recurrence from the left over capsule. However with the advent of modern microsurgical techniques and pre-op excellent imaging techniques with MRI which can define the character and exact anatomical extent of the lesion, it is quiet possible to select appropriate surgical approach and achieve complete surgical excision with minimum possible morbidity and outcome were studied prospectively.

Objective: To analyse and report, the clinical findings, imaging criteria for diagnosis, surgical management strategy to achieve radical resection.

Material & Methods: Between February 2009 to May 2019, 26 cases of intracranial epidermoids were diagnosed preoperatively with CT and MRI of brain and operated by different approaches according to their location by micro surgical techniques to achieve total resection. All patient were followed up post operatively by clinical examination and neuroimaging.

Results: Total number of patients was 26. In which 12 are females and 14 are males age range was 12 yrs to 65 years. 11 cases were CP angle tumor 1 pineal region, 9 suprasellar, 3 fourth ventricle, 2 recurrent CP angle epidermoid and 3 posterior fossa epidermoid. Imaging findings were typical suggestive of epidermoids in all cases. Single recurrence was observed in our study so far.

Conclusion: Here we report our short experience with intracranial epidermoid as whole.

* * * * *

**FP-267: Surgical approaches, technique and results of Pineal region tumors**

Dr. Arvind Kumar Srivastava1, Dr. Anita Jagetia1, Dr. Ghanshyam Das Singhal1, Dr. Shaam Bodeliwala1, Dr. Anita Jagetia1, Dr. Ghanshyam Das Singhal1, Dr. Shaam Bodeliwala1
1) G. B. Pant Institute of Postgraduate Medical Education and Research, New Delhi, India

Objective: Pineal region tumors are uncommon deep seated tumors of the brain and constitute 0.4-1% of adult and 3 to 11% of childhood brain tumors. Lesions of the pineal region are histopathologically heterogeneous and often accompanied with severe progression of clinical signs. Surgical management is difficult in view of large size and malignant nature of most of these lesions and significant hydrocephalus. Fifty seven patients with lesions in Pineal region are analyzed with respect to their spectrum, surgical observations, rational surgical approach and the outcome of the direct surgical intervention. Vascular lesions were excluded from the study.

Material and Methods: All patients presented with features of raised intracranial pressure and/or tectal involvement. The diagnosis of a Pineal region lesion was made on the basis of C. T. Scan, MRI Brain. In 37 patients the lesion was associated with significant hydrocephalus and a ventriculoperitoneal Shunt was undertaken as a first procedure. CSF and serum for tumor markers was examined.

Surgical approaches employed were Occipital transtentorial approach (n=24) and Supracerebellar infratentorial approach (n=29), Endoscopic approach (n=4)

Observations: The pathologies encountered were Pineal tumors, Arachnoid Cysts, Abscess, Epidermoid, Teratoma, Germinoma and glioma. Three Patients died in Postoperative Period. On follow up from 8 months to 17 years, there were 5 Deaths from recurrence pineocytoma (1), Pinedoblastoma (4).

Conclusion: With advances in neurosurgical techniques, safer neuro-anaesthesia and state of art monitoring, surgical management of the pineal region masses can be undertaken with low mortality and morbidity.

* * * * *

**FP-268: Intrinsic Intraventricular Craniopharyngiomas - A case series and review of literature**

Dr. Krishna Bansu Shroff1, Dr. Chandrashekhar Eknath Deopujari1
1) Bombay Hospital, Mumbai, India

Background: Craniopharyngiomas constitute 2 to 4% of intracranial neoplasms. However, the purely intraventricular variety is rare.

Objective: This article aims to study the peculiarities in presentation and management of purely intraventricular craniopharyngiomas.

Materials & Methods: A retrospective analysis of a case series of surgically managed patients by the senior author, was performed. From 2000 to July 2019, out of a total of 115 operated craniopharyngioma patients, there were 7 such patients. Four were cystic, two were solid and one was solid-cystic. Two were recurrent lesions. Six of them were operated via a frontal craniotomy (five via a transcortical route (two were endoscope-assisted), and one via an interhemispheric-transcallosal route (also endoscope-assisted)), and one via a pterional craniotomy (lamina terminalis approach).

Results: Headache, memory impairment, gait imbalance and urinary
incontinence were the common symptoms. Preoperative visual impairment was seen in only one patient. Gross-total/complete excision was performed in four, two underwent near-total excision and one underwent subtotal excision. No perioperative mortality occurred. One of the three patients with incomplete excision received radiotherapy, the other two were periodically followed-up. Two had DI preoperatively, none of the others developed transient/permanent DI. At follow up ranging from 18 to 52 months, four had recurrences of which two required surgery. One patient underwent a VP shunt.

Conclusions: Intraventricular craniopharyngiomas present mainly with raised intracranial pressure. Visual disturbances are uncommon. Careful surgical management of these intraventricular lesions, with radiotherapy and periodic follow-up as important adjuncts, is imperative in the management of these patients.

FP-269: Stereotactic Ommaya Reservoir Placement and Repeated Aspiration as a treatment modality in recurrent Cystic Craniopharyngioma

Dr. Sourabh Dixit*, Dr. Shilpi Muchhoria
1) BMHRC Bhopal, Madhya Pradesh, India

Introduction: One of the characteristics of craniopharyngiomas is the presence of single or multiple cysts. Hence the prospect of a minimally invasive intervention – such as an insertion of a catheter with a subcutaneous Ommaya reservoir – and subsequent aspiration of cystic content, seems a promising strategy.

Aims & Objectives
1. To determine the efficacy of stereotactic placement of Ommaya Reservoir System (ORS) in controlling the symptoms of craniopharyngioma.
2. To determine the morbidity and mortality associated with stereotactic placement of reservoir and repeated aspiration.

Material & Method: The study carried out on 8 patients who had been previously operated for craniopharyngioma in same centre or different centres and having recurrence.

<table>
<thead>
<tr>
<th>Patient Number</th>
<th>Intracranial Pressure Effects</th>
<th>Visual Status</th>
<th>Endocrine status</th>
<th>Mortality</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relieved</td>
<td>Stable</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>Relieved</td>
<td>Stable</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>Relieved</td>
<td>Stable</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>4</td>
<td>Relieved</td>
<td>Stable</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>5</td>
<td>Relieved</td>
<td>Improved</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Relieved</td>
<td>Improved</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>7</td>
<td>Relieved</td>
<td>Improved</td>
<td>No change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>Relieved</td>
<td>Stable</td>
<td>No Change</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Advantage are:
1. Outpatient basis.
2. Repeated aspirations possible
3. No harmful effect of radiation and chemotherapy.
4. minimal morbidity and mortality
5. Low cost.

Conclusion: Treatment of cystic craniopharyngioma, regardless of the age, sex or clinical status of the patient, by drainage through an ORS is very effective.

FP-270: Artificial Neural Network (ANN-CNN) for Rapid Diagnosis and Prognostication of Intra-operative Squash Images of Brain Tumour

Dr. Bhushan Diwaker Thombre*, Dr. A. R. Prabhuraj1, Dr. B. Nandeesh1
1) NIMHANS, Banglore, Karnataka, India

Introduction: During CNS tumour surgical management squash smear cytology is frequently used modality for rapid intra-operative diagnostics and prognostication. Typically this procedure takes around 30-60 minutes of intra-operative time in various tertiary centres or may not be available at all in peripheral hospitals. The Convolutional Neural Network(CNN) on brain histology/squash images may prove effective to circumvent these challenges. Useful in non-surety of tissue acquisitions during stereotactic biopsy procedures avoiding negative biopsies.

Methodology: Intra-operative squash smears of CNS neoplasms received in the Department of Neuropathology at our hospital are retrieved for last 18 months. These slide images are then used for training of an CNN model build by our team to test the feasibility of concept. The images obtained are divided into two sets. 4368 images are included in training set (~75%) and 1426 images in validation set (~25%) belonging to two classes of high grade and low grade glioma. CNN model was built using python programming language with Keras open-source library.

Results: The ANN-CNN model can diagnose the Squash Images with accuracy of 93.91% with test loss of 0.34 at end of training. In validation set the accuracy of 84.03% was obtained. On testing the model on new samples which were never been exposed before, it can distinguish between the low grade and high grade glioma with >90% confidence.

Conclusion: ANN-CNN model can be used successfully for evaluation of intra-operatively obtained squash images for rapid diagnosis, prognostication and surety of tissue. In future whole spectrum of CNS tumors may be diagnosed.
FP-271: Pituitary - The passion of Harvey Cushing - An Anecdote
Dr. Brig Harjinder S. Bhatoe
1) Max Superspeciality Hospital, Mohali, India

Harvey Cushing was evolving into a master Neurosurgeon in December 1901, when he met a 14-year-old chubby but nearly blind girl. He diagnosed her to be having raised intracranial pressure, and attempted decompression to drain CSF. Patient died, and autopsy revealed a cyst pressing her pituitary gland. Devastated initially, he started studies on pituitary, that were to become a lifelong passion. He was particularly intrigued by dwarfs and giants, making trips to circus to view them closely.

In 1911, a young resident reported for neurosurgery attachment, and was promptly dispatched to funeral parlor, to obtain endocrine glands and pituitary of a giant who had expired. The resident, did bring all the tissues demanded by Cushing, and was promptly fired for forgetting parathyroids. Crestfallen, he was preparing to bid adieu to his residency that barely lasted a day, when he was called by Cushing and given another task, implying reinstatement. The resident completed his training in Neurosurgery.

FP-272: Tribute to Harvey Cushing - His formative years – His travel abroad
Dr. Aadil Shaukat Chagla
1) King Edward Memorial Hospital, Parel, Mumbai, India

Tribute to Harvey Cushing: His formative years – his travel abroad.

Harvey Cushing, the father of modern neurosurgery had worked extremely hard for ten years and was keen to get married and establish as a surgeon... however he was advised to travel abroad and broaden his point of view.

The young Cushing spent 14 months abroad from the years 1900-1901 which proved to be one of the most valuable experiences of his career.

His experience with Horsley in the United Kingdom and then his stint at Berne is also highlighted with Theodor Kocher.

His travel through Italy and Germany and then finally returned to the U K and even spent a month with Sherrington. In fact he performed a craniotomy for Sherrington who thought the skull was too thick! He worked on a Chimpanzee, an Orangutan and a Gorilla.

This presentation would like to share his experiences and draw parallels.

FP-273: Stereotaxy - Tale of Sharp shooter of Brain and a man with three frontal lobes
Dr. Jitender Chaturvedi
1) AIIMS, Rishikesh, Uttarakhand, India

Introduction: Envisage of our founding neurosurgical fathers need to be recalled and mentioned; on each platform we celebrate the success of neurosurgery.

Generalizers to Localizers
Paul Broca, the Localizer, in meeting of Société d’Anthropologie on 4th april, 1861, presented his patient named Leborgne with aphasia.

Theodor Kocher, first surgeon to receive Nobel Prize (1909), developed Craniometer, published it in 1892, Textbook of Operative Surgery.

Union, Conflict and $100 Purchase wrapped in newspaper
First human stereotactic frame, by Victor Horsley and Robert Clarke was published in Brain, 1908. Soon after their joint success, both had conflict. Mussen purchased their instrument for $100. Even after improvising he was unable to use it, so wrapped it in a newspaper. It was found 4 decades later, by his family who donated it in 1980.

Man with Three Frontal lobes
Spiegel and Wycis published the first use of stereotactic devices in humans, Science, 1947 as “stereoeencephalotomy” Wycis described Spiegel as “the only man I know who must have three frontal lobes”

Stereotaxy to Stereotactic to WSSFN

Leksell frame in India, Madras the leader...

In 1960, Prof.B. Ramamurthi conducted first ever stereotactic workshop for India. Leksell apparatus and the lesion generator were gifted by Lawrence Walsh and Dennis Williams, back in Madras...the turning point.

FP-274: Neurosurgery at JPN Apex Trauma Centre - The Journey till now
Dr. Deepak Agarwal, Dr. G. D. Stayarthee, Dr. D. Gupta, Dr. P. K. Singh, Dr. S. S. Kale
1) JPN Apex Trauma Centre, All India Institute of Medical Sciences, New Delhi, India

Background: JPN Apex Trauma Centre is a unique hybrid model of stand-alone Level I Trauma Centre with attachment to mother institution, the functioning and management of which is not well known to medical community

Aims & Objectives: To review the history, management model and functioning of the department of neurosurgery at JPNATC, AIIMS

Materials &Methods: This review was carried out over a twelve year-period (Nov 2007 till Aug 2019) at JPNATC, AIIMS. Administrative and clinical data was reviewed and analyzed.

Observations: Neurosurgery department at JPNATC became fully
functional on 26 November, 2007 when emergency was opened to
general public. Being a new centre, there was acute lack of resources,
equipment and manpower. However, the faculty took it as a challenge
and presently we have two operating rooms, 20 bedded dedicated
Neurosurgery ICU (one of the largest in the world), 6 bedded HDU and
50 bedded ward. We have an ‘O’-arm (first in Asia-Pacific), two mobile
CT’s (first in North India) which have performed more than 15000 Head
CT’s bedside over 10 years and presently have the largest case load of
head, spinal and brachial plexus injuries at a single centre in the world!
Our mortality for severe head injuries is 36%.

Results: Over a period of more than 12 years since inception,
department of neurosurgery has metamorphosized into one of the
most technically advanced and largest departments dealing with head,
spinal and brachial plexus injuries in the world.

* * * * *

FP-275: Neurosciences & the extraordinary Life of
Thomas Willis

Dr. (Group Capt.) Krishan Kumar Yadav
1) Command Hospital Air Force Bangalore, Bangalore, Karnataka,
India

Objectives: Thomas Willis (1621-1675) is widely regarded as father of
neurosciences. He cleverly blended the older known hypotheses/works from Galen onward with newer clinical and
experimental observations from anatomy, neurology and psychiatry to
establish what would finally become "Neurosciences".

Methods: Willis moved from practice based on aphorisms to 'bench to
bedside' approach – a proponent of dissection covering embryology,
anatomy and pathology as basis for comprehension of medicine. He
developed innovative methods to preserve and dissect brain, inject
coloured substances and illustrated his findings.

Results: Willis first described the now well known "Circle of Willis". He
detailed ICA-BA anastomosis and explained its significance.

He coined Neurology & Mellitus in Diabetes Mellitus. He numbered
"Cranial Nerves" in the order enumerated nowadays

He described Corpus Callosum, Fornices and Cerebellum. He firmly
recognised Cerebral cortex as substrate of Cognition. He localised
painful stimuli from meninges, not from brain.

Willis published six major works. Most famous being “Cerebri anatome:
cui accessit nervorum descriptio et usus” (Anatomy of Brain with
description of Nerves and their Function), which earned him his
eponym: the “circle of Willis”.

Conclusions: “Cerebri anatome” is considered as the cornerstone of
clinical and comparative anatomy of nervous system. It marked the
transition between mediaeval and modern notions of brain functions.
He alongwith fellow experimentalists & great scientific minds of that
time, laid the foundation of the "Royal Society". His revolutionary works
influenced development of varied disciplines like endocrinology,
cardiology, gastroentorology, psychiatry & philosophy.

* * * * *

FP-276: An inspirational journey with Professor
Yasargil in 8 Minutes

Dr. Dushyant Thaman
1) KD Hospital Amritsar, Amritsar, Punjab, India

Introduction: Prof. Yasargil and Harvey Cushing occupy a 100 years
together in the history of neurosurgery. Many times it seems that their
entire life was spent in the evolution of neurosurgery as a discipline and
art.

Methods: From personal interaction with Prof Yasargil in Yeditepe
University Istanbul, beautiful biography by Larry Rogers, various
journals, pubmed, the positive vibes of the master were picked up and
jotted in a power point presentation.

Results: The presentation in many ways answers the questions which
keep on cropping in the minds of so many neurosurgeons. For
instance, how long should a neurosurgeon work ? What is the
importance of money in life ? Are innovations done for the purpose to
get rich or they are done to benefit the patients.

Conclusions: What does it mean to be a neurosurgery Jedi ? The
masters message should resonate in the minds of all neurosurgeons to
imbibe, to innovate, to practice and to evolve neurosurgery in a
humane manner.

* * * * *

FP-277: Epilepsy - As described in ancient Indian
medical texts

Dr. Satya Shiva Munjal
1) PGIMER and Dr. RML Hospital, New Delhi, India

It might sound unbelievable but neurological disorders such as
epilepsy are described in our ancient medical texts Charaka Samhita
and Susruta Samhita. These two texts form core of our ancient system
of medicine, Ayurveda. Though these texts were written more than
2500 years ago (circa 500 BC), one cannot help being impressed by
their meticuous approach in trying to describe possible etiology,semiology and possible treatment and life style modifications
that could possibly control epilepsy, a disease which remains a
challenge to neuroscientists till this day.

* * * * *

FP-278: What is History? - The Guiding light of our
Neurosurgical Practice

Dr. Anil Panda, Dr. Siddhartha Ghosh, Dr. Selvapandian S., Dr. Sadan
A. Palande, Dr. Anbuselvam S.
1) Apollo Specialty Hospitals, Chennai, Tamil Nadu, India

**Objective:** The scant frivolous interest paid to the genesis of our Speciality and its branches is reflected in the current declining interest in history of neurosciences. The trend is exceedingly disturbing as this shallow interest neither actually predicts that no original contribution is likely to emerge nor is an important school of neuroscience likely to break through the ranks of nations.

**Materials and Methods:** A retrospective study of literature and personages pertaining to the historical method and of importance paid by the pioneers to studying the past is highlighted and reviewed to explain that without a depth analysis of trends and many failed attempts to climb the wall of ignorance nothing new is possible. H Carr defined history as an unending dialogue between the present and the past. Macewen, Billroth, Broca, Cushing, Penfield, and Ramamurthi and a long chain of skillful surgeons repeatedly emphasized the importance of looking behind to see further into the future.

**Results:** All the significant contributions were by neurosurgeons who had studied thoroughly the historical chain of causation and steps of early evolution of ideas that lead to breakthroughs in technique or technology. No significant climb was possible or done without a thorough historical review and by acknowledging and criticizing the earlier percepts and preceptors. New heights were achieved by studying how and why the preceding climbers could ascend and how they fell.

**Conclusion:** Understanding the forces and flow of history of our Speciality neurosurgery in particular and neurosciences in general allows for sustaining progress into the future. Ignoring the past will lead to wasted energy in futile reinventing of the wheel or the matchbox. The intellectual neurosurgeon is the persona we should incorporate in the education of all our future practitioners.

**FP-279:** History of spinal surgery in Nepal

Dr. Krishna Sharma

1) Nepal Medical College, Kathmandu, Nepal

Spinal surgery is a new specialty for Nepal. Formal spinal surgery was started around 25 years back with very basic understanding, training and equipment. A little deformity, stiffness, some neurological deficit, loss of joint mobility, was all considered natural consequences of the trauma event, aging or expected. The challenges can be categorized into challenges of patients, manpower, socio-economy, equipment and instruments, geography, politics, institutional and medico-legal issues. For many countries, spine surgery has become safer and more precise, bringing the spine, deranged by many types of pathologies, near to its normal anatomical and functional status. However, in Nepal we still have yet to introduce specialty like minimal invasive, endoscopic, physiological monitoring and navigation and are still working on the basic problems, techniques and treatment. Research and innovations are not in the present agenda. Trauma, infection and degenerative process predominate the problems of spine. Despite all these problems and limited manpower and no trained spinal surgeons, we are determined to deliver the best possible service to our patients. We have formed a Neuro-spinal Chapter under the Nepalese Society of Neurosurgeons, to work unitedly, get trained and educate ourselves, train others, and educate our society about spinal problems. We want to deliver this service to all needy people in an affordable cost. With help of Government of Nepal and other spine societies around the globe, we are trying to develop spinal services best suited to Nepalese people.

**FP-280:** Dr. S. Balaparameshwara Rao: Neurosurgical Journey and Contributions

Dr. Mayank Agarwal, Dr. K. Satyavara Prasad, Dr. M. V. Vijayasekhar

1) Andhra Medical College, Visakhapatnam, India

He underwent training in Neurosurgery under Dr. B. Rama Murthy during 1955-56 at Madras and started first Department of Neurosurgery in Andhra Pradesh at Andhra Medical College and King George Hospital, Visakhapatnam on 2 April 1956 with meagre resources. It was the fourth Department of Neurosurgery in India after Vellore, Madras and Bombay. This department at Visakhapatnam was the first such to be started by a person trained in India, the earlier ones being started by persons after formal training abroad. He has been awarded the Dr. B. C. Roy Award for organizing and developing neurosurgery in Andhra Pradesh. In 2008, he was conferred an honorary degree of Doctor of Science by the Dr. NTR University of Health Sciences. In 2015, he was awarded Lifetime Achievement award by the Telangana government. He was president NSI 1974, lifetime achievement award by NSI 2015

**FP-281:** The Department of Neurosurgery - UCMS and Guru Teg Bahadur Hospital, New Delhi

Dr. Pragyan Sarma, Dr. Dinesh Satti, Dr. Gurubachan Singh

1) UCMS and GTB hospital

The history of the Department of Neurosurgery, University College of Medical Sciences and Guru Teg Bahadur Hospital, is presented. It is one of the leading tertiary care centres under the Govt. of Delhi and caters to a large population in the eastern part of Delhi and neighbouring states. The patients come to this hospital with the aspiration that they will have access to proper health care facilities under competent faculty. The residents also are provided with the opportunity of getting trained in high end neurosurgery. The department has made significant progress since it was established. At present we have all the modern gadgets of Neurosurgery along with necessary infrastructure and manpower to treat simple as well as complex neurosurgical cases.

**Key Words:** GTB hospital, history, University College of medical sciences, New Delhi, Neurosurgery
**FP-283: Neuroscience in Outer Space - History and Relevance**

Dr. Sundaravadhanan Shashivadhanan
1) Command Hospital, Air Force, Bangalore, India

Introduction: By December 2023 India will be taking a giant leap by ushering its Vyomanauts into outer space, the final frontier, and making history. In near future we will see & probably experience space travel and tourism. Outer Space environment throws unexpected challenges to human body especially the central nervous system. These include weightlessness, electromagnetic fields and radiation hazards. Although effect of short term exposure, have been studied, the long term consequence on the neuraxis & neural pathways is yet to be understood. Materials & Methods: Since 1961 till date more than 560 people from 40 countries have travelled to outer space. Experiences gained by them coupled with animal studies have revealed some of the alterations taking place in the neural network and physiology. Findings of these studies and their future relevance were evaluated in this study.

Observation: Physiological changes that occurred in outer space included, cephalic fluid shifts, Neurovestibular disturbances, altered sensory perception, cognitive changes & psychological disturbances. These manifest due to changes in cortical sensory, motor & vestibular, cerebellar pathways. Hypobaric exposure can lead to intracranial hypertension, memory loss, Diplopia, paresthesias, seizures, vertigo, ascending paralysis and bowel bladder incontinence. The CNS attempts to recalibrate the entire internal body system to be in synch with the external environment of outer space. The spine along with osteoporotic changes undergoes alterations in its morphology & biomechanics. Conclusion: Understanding the complex neurophysiological changes and its interplay with outer space can provide important insights to device counter measures and treatment from the deleterious effects of microgravity and radiation. As numbers of Vyomanauts increase in future, there will arise a need to provide health care in outer space. At present, seems to be a tall order but, not impossible.

**FP-284: Molecular characterisation of Adult Thalamic Glioblastoma**

Dr. Shilpa Rao, Dr. Arimappamagan Arivazhagan, Dr. Vani Santosh, Ms. Nandaki Nag Kanuri, Ms. Vidya Nimbalark
1) National Institute of Mental Health and Neurosciences, Bangalore, India

Introduction: Adult thalamic glioblastomas (GBM) are uncommon tumors with limited available molecular data. One of the reported molecular alteration in these tumors is the H3K27M mutation, which is found in a high proportion of pediatric thalamic gliomas. In this study, we have analysed the molecular alterations exclusive to adult thalamic GBM.

Materials and Methods: This is a six year retrospective study of adult thalamic GBM patients who underwent surgical decompression of the tumor. Clinical data was obtained from the case records. Immunohistochemistry (IHC) was performed using antibodies - IDH1(R132H), ATRX, p53, H3K27M, H3K27me3 and BRAF(V00E). Molecular analyses was carried out to detect rare IDH1&2 mutations, MGMT promoter methylation, EGFR amplification and TERT promoter mutations.

Results: A total of 42 cases of adult thalamic GBM were studied. Mean age of presentation was 42 years (range 19-58 years). All the tumors were IDH wildtype, BRAF (V600E) immunonegative and unmethylated for MGMT promoter. H3K27M immunopositivity was noted in 60% of tumors. Of these 33.3% were from older adults above the age of 50 years. Of the H3K27M immunopositive cases, ATRX loss of expression was noted in 20% of tumors. Of the H3K27M immunopositive cases, ATRX loss of expression was seen in 32%, p53 immunopositivity in 24% and EGFR amplification in 12%. Higher frequency of TERT promoter mutations was noted in H3K27M immunopositive cases (58.8%) compared to immunonegative cases (20%).

Conclusion: Ours is one of the few studies elucidating the molecular alterations exclusive to adult thalamic GBM. We show a high frequency of H3K27M immunopositivity, suggestive of its mutational status, in these tumors, including in older adults.

**FP-285: Neurosurgery and Neurosyphilis - An update on the Evolution of Treponema Pallidum, We Have NOT Won Our Independence from Nature**

Dr. Alexandra R Kunz, Mr. Jeffrey M. Breton
1) Harvard University, United States
2) Tufts University Medical School, Boston

Introduction: Syphilitic-gummas, masquerading as brain-tumors,
worldwide, are not prevalent enough to warrant p-value-significance; yet, there is a flashing-imperative for an update on the causative bacterial-spirochete, Treponema pallidum.

Methods: This investigation explores the evolutionary-history of the virulent/phylogenetic- ancient, Treponema pallidum, as expanding Global Neurosurgery interfaces with this recrudescence-scourge.

Results/Discussion: The treponemal-specie, infectious to humankind, Treponema pallidum, is 4-subspecies: t.p.carateum(pinta); t.p.pertenue(yaws); t.p.endemicum(bejel); t.p.pallidum (venereal-syphilis), each morphologically and antigenically indistinguishable, having early-host-dissemination, strain-variation-capacity, and stage-progressive-patterns of latency/pain/ pathogenicity/disfigurement. Differences include geographic/ecologic distributions, acquisition-age, transmission-mode, host-tissue-specificity; genome-sequence-differences are <0.2%. All have been flagrantly-ubiquitous, are currently infectious; fizzle eradication-campaigns have left persistent silently-expanding human-reservoirs.


Conclusion: Treponema pallidum has continued to cause inordinate devastation to humankind, leaving a final legacy, that we have NOT transcended our evolutionary-bond with nature.

* * * * *

FP-286: Case series of Pituitary abscess and it’s management

Dr. Lee Chun lin 1, Dr. Lee Chun Lin1, Dr. Azman Raffiq Raffiq1
1) Hospital Kuala Lumpur, Malaysia

Pituitary abscess is a rare but potentially life-threatening condition that is usually misdiagnosed as a pituitary tumor with a definite diagnosis only made postoperatively. Diagnosis can be challenging, because symptoms, signs and radiographic characteristics of pituitary abscess share many similar entities with other pituitary lesions. In this article, five cases of pituitary abscess treated in our department are reported, followed by a literature review. Only two cases patient reported with intermittent fever. The others were pituitary dysfunctions, vision impairment and headache. Imaging done for all the patients suggested tumour lesion arising from the sellar region. The preliminary diagnosis based on clinical features pointed towards pituitary tumours, however intraoperatively, all these lesion contains features that are in keeping with pituitary abscess. Findings of this article support timely diagnosis and proper treatment including transphenoidal surgery and antibiotic therapy for pituitary abscess, leading to lower mortality rates and higher probability of pituitary hormone function recovery.

Keywords: pituitary abscess, transphenoidal resection, antibiotic therapy, diagnosis

* * * * *

FP-287: Factors predicting outcome in Post Meningitic Hydrocephalus – A clinical study

Dr. Yarlagadda Srinivas Rao1, Dr. K. Satya Vara Prasad1, Dr. M. V. Vijayasekhar1
1) Dr. NTR University of Health Sciences, Visakhapatnam, Andhra Pradesh, India

Introduction: Meningitis could be due to various etiological factors like pyogenic, tuberculous, viral and fungal. Late referrals inspite of advanced diagnostic tools is one common factor for poor outcome. VP shunt is the commonest procedure for hydrocephalus. Many get discharged in good condition but significant numbers show poor outcome such as shunt malfunction, block or death. Present study aims to identify predictors that influence outcome in post meningitis hydrocephalus.

Study Design: Prospective observational study

Period of Study: September 18 to August 19 for 12 months.

Sample Size: 53

Inclusion Criteria: All patients suspected to have meningitis clinically and confirmed biochemically or radiologically. Radiologically the CT scan of these patients showed periventricular lucencies and dilated ventricles.

Exclusion Criteria: Recurrent cases, hydrocephalus secondary to tumours, Normal Pressure Hydrocephalus, patients lost for follow-up.

Procedure: The factors that were taken for analysis were divided in to five main divisions: Clinical signs and symptoms, CSF study, CT brain, Age, Interval between the onset of symptoms and surgery. All the factors were analysed for outcome. Post-surgery follow up was done at 1, 3 and 6 months interval.

Analysis of Results: Factors like age, duration between onset and treatment, severity at presentation, CSF analysis and CT scan brain have been studied. Factors resulting in poor outcome were identified
like pre term babies or low birth weight, poor GCS at presentation, dyselectrolytemia in elderly etc. Failure rate including percentage of shunt obstruction, shunt infection were calculated and analysed.

**FP-288: The Extent of Midline Shift Reversal on CT scan and its correlation on Clinical Outcome among patients who underwent craniotomy of craniectomy for Intracerebral Hemorrhage**

Dr. Allan Francisco Ocampo Ong¹#, Dr. Edgardo Te Tan¹

1) University of Santo Tomas Hospital, Philippines

**Background:** Intracerebral hemorrhage has a mortality rate of 40-50%. The objective of the study was to determine effect of midline shift reversal on CT scan among patients who underwent craniotomy or craniectomy for intracerebral hemorrhage.

**Methodology:** This is a retrospective study where 92 patients who underwent either craniotomy or craniectomy for intracerebral hemorrhage were included. The degree of midline shift was based on the displacement of the Septum pellucidum from the midline on CT scan. Preoperative and post operative midline shift were compared. Outcome was defined as discharged or expired. Correlation between immediate survival and reversal of midline shift was analyzed using Analysis of variance (ANOVA), the strength of correlation was determined by pearson correlation test.

**Results:** Of the 92 patients included in the study 84 were discharged while 8 patients expired during the admission. The mean pre-op midline shift was at 0.8cm. The mean post-op midline shift was at 0.6cm. The mean reduction in the midline shift was measured at 0.2cm. A p-value of 0.001 (p<0.05) was obtained for correlating survival and reduction of atleast 0.2cm in midline shift. The computed Pearson coefficient was at 0.572 which means that midline shift reversal is strongly correlated with survival.

**Conclusion:** For patients with intracerebral hemorrhage who underwent craniotomy or craniectomy, the reversal of 0.2cm from preoperative midline shift confers a better clinical outcome and survival.

**FP-290: Intracranial Aspergillosis amongst Immunocompetent Patients - A study to assess the impact of neurosurgical intervention on outcome**

Dr. Santanu Kumar Bora¹#, Dr. Amandeep Kumar Kumar¹, Dr. Shashwat Kumar Mishra¹, Dr. Guru Dutta Satyarthee¹, Dr. Pankaj Kumar Singh¹, Dr. Sarat P. Chandra¹, Dr. Shashank Sharad Kale¹

1) All India Institute of Medical Sciences, New Delhi, India

**Background:** Fungal infections of the central nervous system (CNS) commonly effect immune compromised patients, however, recently such cases have been reported even amongst immune competent patients.

**Methods:** In this study, we retrospectively analyzed outcome of 18 immuno competent patients with histopathologically proven intracranial Aspergillosis undergoing combined surgical and medical management.

**Results:** The age of patients ranged from 5-65 years. Fourteen out of 18 patients had well defined lesions while 4 had diffuse disease. Paranasal sinuses were involved in 8 & cavernous sinus in 3 patients. Six patients had hydrocephalus. Four patients developed infarcts during their clinical course. Surgical interventions included gross (n=4) or subtotal excision (n=8), decompressive craniectomy & biopsy of lesion (n=4), biopsy only (n=2) and ventriculoperitoneal shunt placement (n=6). All patients received postoperative antifungal therapy. The duration of follow up ranged from 10-60 months. Overall mortality was 44.4%. Mortality amongst patients undergoing gross total and subtotal excision was 25% & 50% respectively. Patients undergoing DC had a mortality of 25%. Both patients undergoing only biopsy died. Hydrocephalus was associated with a very high mortality (83.3%). Amongst surviving patients (n=10), 6 patients became disease free & rest 4 had stable disease at last follow up.

**Conclusions:** Intracranial aspergillosis is associated with high morbidity & mortality even amongst immune competent patients. An aggressive multidisciplinary management is thus needed to improve outcome. Though small in number, our study shows that a combination of excision of fungal lesion or decompressive craniectomy and antifungal therapy can be helpful in improving prognosis of these patients.

**FP-291: Large Craniotomy and Extended Membranectomy for Initial Treatment of Organized Chronic SDH- An Institutional Experience**

Dr. Pranjal Mohan Sinha¹#, Dr. A. Mastan Reddy¹

1) Osmania Medical College, Hyderabad, Telangana, India

**Introduction:** Chronic Subdural Hematoma (CSDH) represents one of the most frequent intracranial haemorrhages encountered more frequently in elderly patients. We assessed the surgical outcomes of craniotomy and membranectomy in cases of Organised CSDH (multiseptated, calcified, multilobular, or multi-layered hematomas).

**Aims & Objectives:** to evaluate the safety, feasibility and neurological outcomes following craniotomy and membranectomy for the initial treatment of OCSDH

**Materials & Methods:** this is a prospective study done from January 2018 to June 2019 on patients with OCSDH managed by craniotomy and membranectomy with evacuation of SDH, in neurosurgery department, at our hospital. The patients were selected based on their CT findings.

Patients were evaluated with regard to age, sex, clinical features and investigations, deficits at presentation, pre-existing co-morbidities and surgical outcome.
Post-operatively, surgical mortality, complications and recurrence were noted. Neurological status was evaluated by Markwalder’s grading system, both pre-operatively and post-operatively.

Results: the median Markwalder’s grade improved from 3 to 2 after 7 days of surgery, it was 1.5 after 2 and 6 months of follow up. 8 patients died out of 51 patients operated. 5 patients had rebleeding event.

Conclusion: craniotomy and membranectomy addresses the problem of repeated haemorrhaging from the outer membrane considered to be a causative factor for progressive enlargement of the hematoma, whereas the inner membrane is related to liquefaction of the SDH. Encapsulated areas of solid consistency, due to septations in OCS DH, prevent complete evacuation in burr-hole tapping. Thus, it seems to be a good management option for select cases.

**FP-292: Intracranial Tuberculomas - Pathological Correlation with Neuroimaging**

Dr. Munghate Anand Mansaram*, Dr. Mastan Reddy
1) Osmania Medical College & Hospital, Hyderabad, India

Introduction: Tuberculosis is a prevalent disease in developing countries. CNS tuberculosis is very rare and it rarely presents as tuberculoma. Although central nervous system tuberculoma is treatable, delayed diagnosis is associated with severe morbidity. Widespread use of MRI has allowed more accurate and frequent detection of intracranial tuberculoma.

Aims & Objective: To compare histopathological features of central nervous system tuberculomas with their radiological findings.

Material & Methods: This is a cross-sectional study done on patients who underwent surgery for intracranial tuberculoma in department of Neurosurgery, Osmania Hospital from January 2018 to January 2020. Imaging included CT with contrast and MRI.

Results: A total of 14 consecutive patients who underwent surgery from Jan 2017 until July 2019. Of the 14, female were 8 and 6 were males. In 14 patients, 9 had caseating granuloma and 5 had non caseating granuloma. 8 patient with caseating granuloma were showing rim enhancement. Non caseating granuloma patient were showing rim enhancement n-2, homogenous enhancement n-3, heterogenous enhancement n-1 and nodular enhancement n-1. MRS done in 9 patients. 6 of caseating granuloma patient had lipid lactate peak. 3 of non caseating granuloma patient had lipid lactate peak.

Conclusion: Intracranial tuberculoma albeit a benign entity but always represent a diagnostic dilemma. Central nervous system tuberculomas are mostly well defined caseating cystic granulomas with characteristic imaging findings on contrast MR and CT scan. The clinical suspicion of tuberculomas should always be borne in mind when such lesions are being evaluated in patients who present with intracranial lesions.

**FP-293: The perpetual challenge of managing Cushing’s disease: a retrospective review of a series of unusual post-operative complications**

Dr. Sumit Thaker*, Dr. Niranjana Rajagopal1, Dr. Saritha Aryan1, Dr. Alangar S. Hegde1
1) Sri Sathya Sai Institute of Higher Medical Sciences (Sssihms), Bangalore, India

Objectives: To discuss unusual complications after surgery for ACTH secreting pituitary adenomas

Methods: Out of a departmental pituitary data-base of 320 patients who underwent endoscopic trans-sphenoidal (ETS) resection of pituitary adenomas from June 2016 to June 2019, a retrospective analysis was performed on 14 cases of Cushing’s disease. Surgical outcomes and unusual complications were analyzed.

Results: Of the 14 patients included in the analysis, 12 patients had micro-adenomas and 2 had macro-adenomas. Of the 12 patients with micro-adenomas, 10 (83 %) demonstrated biochemical cure following ETS. Major post-operative morbidity was identified in three patients. The first was a patient with a microadenoma who developed vasospasm and an internal capsule infarct after undergoing re-exploratory surgery for residual tumour. The other two patients who developed unusual complications had macroadenomas, neither of whom demonstrated biochemical cure. One of these patients developed dorso-lumbar pyogenic spondylodiscitis after a planned first stage transcranial resection. This was further complicated by a L2 vertebral collapse that necessitated emergent stabilisation. The second patient developed pulmonary embolism following two-stage ETS and transcranial tumour resection and succumbed to a massive intracranial bleed two days after low molecular weight heparin was started.

Conclusions: The challenge of managing Cushing’s disease extends beyond trying to achieve a biochemical cure. In view of the myriad systemic effects of the disease, the operating surgeon should anticipate unusual complications at any point in its clinical course. We report three unusual post-operative complications and discuss relevant management issues.

**FP-294: Retrospective Analysis of Cerebral Abscess - An Institutional Experience**

Dr. Nitin Manohar Barde*, Dr. B.C.M. prasad2, Dr. Rameshchandra V. 3
1) Shri Venkateshwara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India

Background: Despite the advent of newer antibiotics and surgical strategies, the overall outcome and quality of life issues in brain abscess patients still remain a continuous challenge for the neurosurgical community.
**FP-295: Intracranial Solitary Cysticercosis with or without Albendazole Therapy**

Dr. Ankur Vivek*, Prof. Yash Pal Singh

Intracranial Cysticercosis is one of the commonly encountered entity for seizure disorder in our country due to poor hygienic condition. It is being treated with antiepileptic therapy. The role of anthelmintic like albendazole is under evaluation. Study was conducted by dividing the patients on random basis into two groups, one with albendazole for 28 days and other without albendazole. It is found that there is no significant added advantage in combining antiepileptic drug with albendazole over the group with antiepileptic drug only. It was found that the disappearance of the lesion was faster with lesser incidence of calcification in albendazole group, which is not statistically significant. Though the incidence of seizure during initial one month inspite of antiepileptic drug was more in albendazole group. There is no additional advantage of albendazole in treating neurocysticercosis rather it increases the chances of seizure episode in beginning months of therapy. Thus, the role of albendazole is controversial in our opinion.

* * * * *

**FP-297: Neurological outcome following endoscopic hypertensive basal ganglia haematoma evacuation**

Dr. Avijit Kasyap*

Intracerebral haemorrhages (ICHs) are responsible for 10%–30% of all strokes, yet, are one of the leading causes of stroke-related mortality and morbidity. Hypertensive ICH (HICH) is the most common type of ICH, accounting for approximately 70% of all ICHs.

Recent studies on minimally invasive treatments, including endoscopic surgery (ES) and stereotactic aspiration (SA), have designated such surgical techniques as safe and effective for ICH patients. The endoscopic evacuation had some advantages when compared with traditional craniotomy, in reducing damage to brain tissue. In addition, the endoscopic evacuation was considered a better procedure for improving outcomes than stereotactic evacuation.

**Methods:** This study was carried out at Neurosurgery department, Manipal Hospital, Bangalore, over a period of four and half years (from April 2014 to September 2018).

All patients admitted to Manipal Hospital that was operated for hypertensive basal ganglia haematoma undergoing surgery at Manipal hospitals after applying exclusion criteria. Pre-op and Post-op neurological, radiological, data were noted down and compared. Modified Rankin scale and Glasgow outcome scale were also calculated. At follow up data were collected for MRS and GOS at 1 and 6 months when the patients were brought to the outpatient department. Neurological status, the power of the affected limbs and functional dependence were also assessed.

**Results:** Out of the 29 patients

- MRS score at the end of one month: 12 patients (41.4%) had MRS of 5, 9 patients (31%) had MRS of 4, 6 patients (20.7%) had MRS of 3, 2 patients (6.9%) had MRS of 2.
- MRS score at the end of 6 months: 12 patients (41.4%) had MRS of 5, 9 patients (31%) had MRS of 4, 6 patients (20.7%) had MRS of 3, 2 patients (6.9%) have MRS score of 2 and 2 patients (6.9%) had MRS score of 6.

**Conclusion:** Endoscopic evacuation for hypertensive basal ganglia bleed is a feasible and effective procedure with a high evacuation of haematoma and potential advanced treatment alternative.

1. It is a safe procedure with a low rate of rebleeding and intracranial infection.
2. Early postoperative recovery as reduced manipulation of the viable brain tissue.
3. The endoscope provides a learning curve for future treatment for deep-seated as well as the superficial lobar haematoma.
4. Better outcomes in future can be achieved by:
   - Detailed preoperative planning about the site of incision and trajectory towards the haematoma.
**BS-001:** Does a normal audiological evaluation exclude Vestibular Schwannoma?

Dr. Satya Shiva Munjal*, Dr. Pankaj Kumar†, Prof. Ajay Choudhary‡

1) PGIMER and Dr. R. M. L. Hospital, New Delhi, India

In a clinic, symptoms related to eighth nerve dysfunction are believed to be sine qua non for diagnosis of a Vestibular Schwannoma. Is it possible for a Vestibular Schwannoma to present without any abnormality on audiological evaluation? We discuss this rare possibility with clinical examples and review of literature.

* * * * *

**BS-002:** Magnetic nanoparticle-tagged stem cell delivery in spinal cord injury model promotes structural and functional recovery

Dr. Sandeep Kumar Vishwakarma*, Dr. Chandrakala Lakkireddy‡, Dr. Avinash Bardia‡, Dr. Syed Ameer Basha Paspala†

1) Deccan College of Medical Sciences, Hyderabad, India
2) Care Hospitals, Hyderabad, India

**Background & Aim:** Spinal Cord Injury (SCI) is a devastating condition that increases social and economic burdens of patients due to significant mortality and morbidity. One of the primary goals of tissue engineering is to bridge SCI and re-establish the damaged connections. However, despite extensive therapeutic benefits, lack of non-invasive and efficient cell delivery, and poor engraftment, stem cell therapies in SCI has limited. Hence, the present study was aimed to develop a bi-metallic Super Paramagnetic Iron Oxide Nanoparticles (SPIONPs) based efficient delivery of stem cells at target location in SCI animal models for better recovery.

**Methods:** We developed a novel Gadolinium-SPIO (Gd-SPIO) magnetic nanoparticle using soft chemical approach to provide high biocompatibility. The paramagnetic activity of Gd-SPIO, safe degradation and clearance from biological system was confirmed. The combination of Gd-SPIO with MSCs was delivered one centimetre away from the lamina terminalis on the incidence of shunt-dependent hydrocephalus. We did not fenestrated the lamina terminalis (taking literature as control). We compared the rate of shunting in patients operated on by routinely fenestrating the lamina terminalis with that in patients managed by other neurosurgeons who did not fenestrated the lamina terminalis (taking literature as control). This study design isolates the effect of fenestrating the lamina terminalis on the incidence of shunt-dependent hydrocephalus.

* * * * *

**CV-001:** Posterior Inferior Cerebellar Artery Aneurysms - Institutional experience

Dr. Palak A. Jaiswal*, Dr. Mathew Abraham†, Dr. Krishnakumar K.‡, Dr. Jayanand Sudhir†

1) SCTIMST, Kerala, India

**Aim:** Posterior Inferior Cerebellar Artery (PICA) aneurysms are uncommon. The natural history and management of these aneurysms remains poorly understood. Surgical treatment of PICA aneurysms is challenging in view of their close neurovascular relationship.

**Material & Methods:** Data relating to clinical presentation, radiological findings, operative approaches and outcomes were analyzed in 20 consecutive patients surgically treated for PICA aneurysms in a single hospital between January 2010 and July 2019.

**Results:** Headache was the most common presentation. SAH was seen in 15 patients. 11 aneurysms were located proximally and 9 were located distally. The 18 saccular and 2 fusiform aneurysms were secured by direct clipping (17 cases) or aneurysmorraphy (3 cases) using a far-lateral suboccipital (without condylar resection) or midline / paramedian suboccipital approach. Overall outcome at the time of hospital discharge was excellent or good in 90% of the patients.

**Conclusion:** PICA aneurysms, by virtue of their rarity and strategic location pose a unique technical challenge. Depending on the PICA segment affected, variations in the surgical corridor and clipping strategy were major contributors to good outcomes.

* * * * *

**CV-002:** Reduction of Shunt Dependency Rates Following Aneurysmal Subarachnoid Hemorrhage by Fenestration of the Lamina Terminalis during Microsurgical Aneurysm Repair

Dr. Anil Jadhav*

1) GIPMER, New Delhi, India

**Objective:** Hydrocephalus requiring shunt placement (12 – 20 %) is a common complication after aneurysmal subarachnoid hemorrhage. Various studies suggest that fenestration of the lamina terminalis during microsurgery for aSAH may be associated with a reduced rate of shunt-dependent hydrocephalus. We report a prospective analysis correlating fenestration of the lamina terminalis with decreased shunt-dependent hydrocephalus after aSAH managed by microsurgical repair.

**Methods:** During last one and half year 100 patients were admitted to our institution with a SAH treated by microsurgical aneurysm repair along with fenestration of lamina terminalis. We compared the rate of shunting in patients operated on by routinely fenestrating the lamina terminalis with that in patients managed by other neurosurgeons who did not fenestrated the lamina terminalis (taking literature as control). This study design isolates the effect of fenestrating the lamina terminalis on the incidence of shunt-dependent hydrocephalus.
Results: There has been significantly lower rate of shunting, 2.46%, versus 12% to 20% in references who did not preformed fenestration of lamina terminalis which is statistically significant with p value > 0.05. Also post aSAH Hydrocephalus is associated with higher grade of Fischers scale (Grade III and IV)

Conclusion: Fenestration of the lamina terminalis appears to be associated with a decreased incidence of shunt-dependent hydrocephalus of more than 80% after aSAH. This straightforward microsurgical maneuver should be performed whenever possible during aneurysm surgery.

CV-003: Why some Vein of Galen Malformation (VOG) shows regression? Is it just a nature’s selection or an alteration in CSF-blood flow (CBF) dynamics?

Dr. Suyash Singh1, Dr. Kamlesh Singh Singh Bhaisora1, Dr. Arun Kumar Srivastava1
1. SGPGIMS, Uttar Pradesh, India

Background: VOG Malformation is a rare congenital condition, with variable clinical course. Series with panoramic fate, from cardiac failure to spontaneous regression, has been reported, however, the question remained unanswered - what is that subset or type, wherein this phenomenon in seen. Rarely, the VOG aneurysmal malformation (VGAM) is associated with dural arteriovenous fistula (DAVF). We, herein, report a case of mural VGAM showing regression after CSF diversion; and discuss the pathogenies of spontaneous thrombosis, in background of CBF dynamics and subset (VGAM with AVF) of these patients.

Case Description: An 11-months male patient was referred with complaints of irritability, progressively increasing head size and delayed mile stones for last 5-6 months. On examination, the anterior fontanelle was bulging and tense, head circumference was 61-cm but child was playful. Magnetic Resonance Imaging and Digital subtraction angiography (DSA) confirmed mural VGAM with AV fistula. There was gross hydrocephalus with peri-ventricular CSF oozing. The clinical condition of child warranted an urgent intervention and a right side low pressure ventriculo-peritoneal shunt and was done with endovascular embolization being planned further. Interestingly, the follow-up DSA showed thrombosis of the DAVF/VGAM and infant was improved clinically. Last follow-up radiological studies (1 year) shows thrombosed VGAM.

Conclusion: The role of CSF diversion in thrombosis of VOG and controversial timing of ventriculo-peritoneal shunt is still a conundrum; with their pathophysiological mechanism is not sufficiently discussed. With modern understanding of CSF dynamics, an explanation to the concealed pathogenesis seems possible. Endovascular surgery still stands a promising option.

CV-004: Macrophage Imbalance and Inflammation as risk factors for Rupture in Saccular Intracranial Aneurysms

Dr. Miroslav Kobiřek1, Dr. Mária Stratišová1, Dr. Aleš Hejčí2, Dr. Anna Štekláčová1, Prof. Vladimír Beneš3, Prof. Martin Sameš3, Prof. Josef Zámečník1
1) Motol University Hospital, Prague, Czech Republic
2) J. E. Purkinje University, Masaryk Hospital, Czech Republic
3) Charles University, Prague, Czech Republic

Introduction: Incidence of detected Saccular Intracranial Aneurysms (IA) raises with the extension of neuroimaging to the routine clinical practice, however management of these cases is difficult as the mechanisms leading to the rupture of IA has still remained obscure. In this study we quantified and compared the structural and inflammatory changes in the aneurysmal walls between unruptured and ruptured IAs.

Methods: Samples of 26 aneurysms resected after clipping (ruptured n = 8; unruptured n = 18), and 11 control samples of analogous regions of the circle of Willis were included to this study. The structural changes were evaluated in classical histological stainings. Lymphocytes, and M1 (“pro-inflammatory”) and M2 (“anti-inflammatory”) subtypes of macrophages were identified using immunohistochemistry (anti-LCA, anti-HLA-DR, and anti-CD163, respectively). The M1/M2 ratio was determined for each case.

Results: The absence of the internal elastic membrane was observed in both, ruptured and unruptured aneurysms. The presence of organized thrombus and severe fibrosis of vessel wall was more frequent in ruptured IAs. The inflammatory infiltrate was significantly smaller and the M1 subset prevailed among the macrophages in unruptured IAs. In the ruptured IAs, there was significantly more intense lymphocytic infiltration, and ratio of M1/M2 was almost balanced. Neither structural nor inflammatory changes were observed in controls.

Conclusion: Our findings suggest that chronic inflammation along with macrophage M1/M2 imbalance may play a role in the progression of cerebral aneurysms to rupture. Supported by the grant AZV 17-32872A.

CV-005: To report a rare case of co-existing Superior Cerebellar Artery Saccular Aneurysm and Type 1 Aortic Dissection

Mr. T. V. Siddharth1
1) Amrita Institute of Medical Sciences, Kerala, India

Introduction: A condition of co-existing Superior Cerebellar Artery Aneurysm and Aortic Dissection is very very rare and has not been reported earlier. A detailed investigation was done and surgical intervention was performed, with good immediate post-operative response.
Methods & Materials: A 34 year male presented with chest discomfort, headache and vomiting. On evaluation, NCCT Brain showed SAH in B/L Sylvian fissures, Basal cisterns and Supracellar cisterns. CT Cerebral angiogram showed a Saccular Aneurysm noted in the right Superior Cerebellar Artery.

On further evaluation, 2D Echo showed Pericardial Effusion. CT Aortogram showed features of Aortic Dissection, De Bakey classification Type I seen.

Surgical Intervention was performed by endovascular coiling of SCA Aneurysm and ascending Aorta Replacement.

Conclusion: A rare case report of a Superior Cerebellar Artery Aneurysm and Aortic Dissection, managed by minimally invasive (endovascular) technique of the aneurysm and open ascending aorta replacement. He is currently stable with fair post-operative prognosis.

* * * * *

CV-006: Middle Cerebral Artery Aneurysms- Microsurgical Management - Experience 240 Cases

Dr. Suresh Dugani

1) Regional Neurosciences Centre, Karnataka, India

- Over last 27 years, we have treated 980 Intra Cranial Aneurysms located at various locations. Among them, 198 were middle Cerebral Artery Aneurysms,
- 116 Females
- 82 Males
- Age: 16-74 years
- M1-35
- M2-158
- M3-5
- 22 Multiple Aneurysms
- 6 Bilateral Aneurysms
- 5 Mirror Aneurysms
- 7 Giant Thrombosed
- I-58 Patients
- II-III-117 Patients
- IV-23 Patients
- SAH-68 Patients
- SAH with Small Clot-67 Patients
- SAH with Big Clots-27 Patients
- SAH with Clot and Infarction-21 Patients

Our Policy
- All underwent surgery
- Surgical intervention is done only in good grade patients GR I-III
- Out come and complications
- 21- deaths
- 19- Patients had permanent morbidities
- 68- Patients had reversible morbidities
- 44- Patients had seizures
- 14- Patients needed Theco-Peritoneal Shunts
- 48- Patients had Decompressive Cranietomies

Causes of Mortality and Morbidity
- Poor grades
- Extensive Ischemic / Hemorrhagic brain damages
- Infections - Meningitis / Chest / Septicemia
- Thrombo Embolic causes
- Pre-existing medical illnesses

We discuss the approaches, principles and techniques of microsurgical management with HD videos of every location of aneurysms.

* * * * *

CBS-001: Type 1A Split Cord Malformation with Tethered Cord and Syringomyelia

Dr. R. J. V. Prasad, Dr. R. Manimaran

1) Madurai Medical College, Tamil Nadu, India

Introduction: Split Cord Malformations (SCMs) are relatively rare forms of Occult Spinal Dysraphism and Tethered Spinal Cord Syndrome. The majority of these cases present in early childhood with neurocutaneous stigmata being an early presenting feature. SCM constitutes about one third cases of Spinal Dysraphism, where spinal cord is divided over a portion of its length into two equal or unequal halves. Here we present a case of Type 1A Split Cord malformation with Tethered Cord.

Case Report: 15 year old female presented with chronic low backache and burning sensations in both lower limbs. No history of weakness in limbs, bowel or bladder symptoms. On examination, patient had no neurological deficits, no limb length discrepancy but she had cutaneous signs like hypertrichosis, hypopigmented patches and skin dimple at lower back. On spine examination there was Scoliosis.

CT spine showed Scoliosis and bony spur with Posterior Arch defects. MRI spine showed Split Cord with two separate dural sleeves and there was associated Tethered Cord.

Patient underwent Laminoplasty, removal of bony spur and the double dural sacs were converted into a single sleeve. Detethering of cord was also done under IONM.

Conclusion: Split Cord malformation is rare form of Spinal Dysraphism. Patients presents with cutaneous and orthopedic signs along with neurological deficits. Early surgical intervention is necessary to prevent progressive neurological deficits. IONM serves as complimentary tool for careful detethering of Filum.
**CBS-002: Surgical Correction of Craniosynostosis in a Case of Pfeiffer’s Syndrome**

Dr. Abdul Rahim Shaan*, Dr. Raj S. Chandran†, Dr. Ajith Kumar‡
1) Trivandrum Medical College, Kerala, India
2) Dental College, Kerala, India

**Abstract:** Pfeiffer’s Syndrome, first described by German Geneticist Rudolf Arthur Pfeiffer in 1964, is characterized by brachycephaly with bilateral coronal synostosis with or without premature fusion of other calvarial sutures and membranous syndactyly of hands and feet with enlarged and deviated thumbs and great toes. Brachydactyly, ankylosis of the elbows, and various visceral malformations can also be present. At the most severe end of the spectrum, children often have pansutural synostosis at birth, with significant hydrocephalus and brain malformations. Pfeiffer’s syndrome is categorized into three different types based on the severity of deformities; Type 1 (classical Pfeiffer’s Syndrome,) Types 2 and 3 (more severe with early death). Genetic analysis has revealed that FGFR1 mutations can lead to Type 1 Pfeiffer’s Syndrome, whereas FGFR2 mutations have been associated with all three types of Pfeiffer’s Syndrome.

The aim of surgical correction of complex craniosynostosis in Pfeiffer’s Syndrome is both functional and cosmetic. Surgery is indicated at an early age to prevent intracranial hypertension, as well as to normalize the cranial volumetric growth. The challenges to be foreseen in planning surgical correction are abnormalities in ICP dynamics, focal or global cranial hypoplasia, hydrocephalus, hindbrain compression and distortion, visual function impairment, corneal ulcerations and mandibular/maxillary, orthodontic, orbit and facial cosmetic abnormalities.

**Results:** We could demonstrate a fusion of nasofrontal and nasal suture in all cases (n=7) of trigonocephaly included in the study on MDCT and intraoperatively. We performed spring cranioplasty for three infants after metopic suturectomy, extending the release beyond the nasion-sutural complex, placing springs to distract the suture. The infants who underwent spring cranioplasty were followed up for the aesthetic outcome.

**Conclusions:** Fusion of nasion- sutural complex along with metopic sutures may explain the angulation in trigonocephaly. We propose that all minimally invasive techniques for correction of trigonocephaly and associated hypotelorism should consider this fact for an improved outcome.

---

**CBS-003: Why do Metopic Sutural Synostoses angulate? The concept of Nasion-Sutural Complex and its Implication on the management of Hypotelorism - Early results and proof of concept**

Dr. Suhas Udayakumaran*, Dr. Arjun Krishnadas†, Dr. Pramod Subhash‡
1) Amrita Institute of Medical Science, Kerala, India

**Object:** Angulation at the suture is a hallmark of Metopic Synostoses (Trigonocephaly) amongst all Craniosynostoses.

We hypothesise that the nasal bone and nasofrontal suture viz. “Nasion Sutural Complex” are involved in trigonocephaly along with the well-accepted role of metopic suture.

**Materials & Methods:** The study included seven infants who underwent correction for trigonocephaly at our Pediatric Craniofacial Division at AIMS, Kochi, India between the period of July 2015 to March 2018. The cohort included were infants with trigonocephaly who had CT head for diagnosis. We analysed the multidimensional CT (MDCT) of these infants and compared to an equal number of age-matched controls. Sutural characteristic at the nasion and metopic suture recorded in comparison with an equal number of age-matched controls.

We performed spring cranioplasty for three infants after metopic suturectomy, extending the release beyond the nasion-sutural complex, placing springs to distract the suture. The infants who underwent spring cranioplasty were followed up for the aesthetic outcome.

**Results:** We demonstrated a fusion of nasofrontal and nasal suture in all cases (n=7) of trigonocephaly included in the study on MDCT and intraoperatively. We performed spring cranioplasty for three infants (n=3/7), where we released the inter-nasal suture. At three months follow-up, along with correction of the angulation, the hypotelorism improved significantly.

**Conclusions:** Fusion of nasion- sutural complex along with metopic sutures may explain the angulation in trigonocephaly. We propose that all minimally invasive techniques for correction of trigonocephaly and associated hypotelorism should consider this fact for an improved outcome.

---

**CBS-004: From Sound to Complete Silence….Case Series of 10 Patients of Neurofibromatosis -2**

Dr. Nitin Manohar Barde*, Dr. B. C. M. Prasad†, Dr. Rameshchandra V. VI
1) Shri Venkateshwara Institute of Medical Sciences, Andhra Pradesh, India

**Background:** Neurofibromatosis Type 2 (NF2) is an autosomal-dominant inherited tumour predisposition syndrome caused by mutations in the NF2 gene on chromosome 22. Affected individuals develop schwannomas characteristically affecting both vestibular nerves leading to hearing loss and eventual deafness with or without peripheral manifestations in the form of cataract or cutaneous neurofibromas.

**Method:** We here described a case series of a classic case of 10 patients of Neurofibromatosis Type 2 with florid clinical manifestations and characteristic neuroimaging features and genetic study.

**Result & Conclusion:** In our study of 10 patients, five patient having B/L vestibular schwannoma, two patient had U/L vestibular schwannoma and multiple intracranial and intraspinal meningioma; three patient had multiple intracranial, intraspinal meningioma with cutaneous neurofibromas with positive family history.

As described classically, the patient had involvement of vestibulocochlear, facial and trigeminal nerves and evidence of raised intracranial tension. Patient emotionally explained it as patient experienced as sound of busy world to complete silence due to b/l
hearing loss. The constellation of clinical features, family history, genetic study and neuroimaging is consistent with the diagnosis of Nf2. Genetic tests might improve the diagnostic process in those patients but the results do not affect the decisions taken by the surgeon because the most crucial issue is thorough diagnostic imaging. Each treatment decision in Nf2 requires complete evaluation of cranial and spinal lesion in order to prioritize surgical planning and strategy.

**CBS-005: Dermoid Cyst: A Rare Intramedullary Inclusion Cyst**

Dr. Bandi Bharath Reddy	extsuperscript{1,2}, Dr. Selvamuthukumaran Krishnamoorthy	extsuperscript{1}, Dr. Bagathsingh Karuppanan	extsuperscript{1}, Dr. Gowtham Kuncha	extsuperscript{1}

1) Meenakshi Mission Hospital and Research Centre, Tamil Nadu, India

Spinal dermoids are rare, benign, slow-growing tumours arising from more than one of three primitive germ cell layers. They are intradural, and sometimes intramedullary, lesions. Imaging may demonstrate areas of fat and calcification within them.

**Keywords:** Dermoid, intramedullary, spinal

**Case Report:** A 2 years old female child had H/o urinary incontinence, constipation, difficulty in walking x 2 months. O/E B/L LL hypotonia, power B/L LL 3/5, reflexes exaggerated, planter extensor, walking with support, sensations could not be elicited, bladder cathetrised. MRI done showed intramedullary lesion extending from dorsal to lumbar with T2 hyperintense cystic lesion D9 level to L3 for a length of 1.9x16x8.5 cm with contrast mild peripheral marginal rim enhancement of the cystic lesion. Patient was operated under GA in prone position. A midline incision extending from D9-L3 was given and bilateral Lamina cut with Bone CUSA. After laminotomy, dura was found to be bulging and enlarged. Dura was opened in the midline. Small midline skip myelotomy done. Cyst was evacuated and near-total excision was done from the neuronal tissue. Cheesy material along with cyst wall sent for HP which revealed aggregates of keratinocytes along with keratin flakes that confirmed the diagnosis of dermoid cyst. AFB and GRAM Stain were also sent which revealed no organisms. Laminoplasty was done. Post-operative period was uneventful.

**Conclusion:** The intramedullary location of the dermoid cyst in the spinal cord and the absence of any congenital spinal dysraphism make this case a very unique and rare entity.

**CBS-006: Myelomeningocele at a Tertiary Care Hospital - Social and Medical Factors, Dietary Habits Influence on Occurrence**

Dr. Rajesh Pathi	extsuperscript{1,2}, Dr. M. V. Vijaya Sekhar	extsuperscript{3}, Dr. K. Satyavaraprasad	extsuperscript{2}

1) Dr. NTR University of Health Sciences, Telangana, India

2) Visakhapatnam, Andhra Pradesh, India

**Introduction:** Folic acid deficiency in antenatal period is a well-known etiological factor for spinal dysraphism. Still many regions of rural India are not aware of the importance of folic acid supplementation and antenatal screening for congenital anomalies.

**Objectives:** To study the folic acid supplementation and antenatal ultrasonography screening to rule out structural anomalies in mothers of children with spinal dysraphism. Also to know various social factors contributing to the delayed detection and occurrence of spinal dysraphism.

**Materials & Methods:** This is a retrospective study on the mothers of children with Spinal Dysraphism from rural areas of north costal Andhra Pradesh.

**Results & Conclusion:** Most of them were unaware of folic acid supplementation, its advantages, usage and effects of its deficiency. None of them started folic acid before planning to conceive. Only few of the cases were detected in antenatal ultra-sonogram screening.

**CBS-007: Institutional Analysis of Patients with Tethered Cord Syndromes**

Dr. Gokanapudi Sreerama	extsuperscript{1,2}, Dr. V. V. Ramesh Chandra	extsuperscript{3}, Dr. B. C. M. Prasad	extsuperscript{1}

1) SVIMS, Andhra Pradesh, India

**Introduction:** Spinal dysraphism encompasses a spectrum of distinct group of congenital anomalies characterized by a failure of midline structures of ecto and mesodermal origin to fuse. Tethered Cord syndrome is a stretch induced functional disorder of the spinal cord in which caudal part is anchored by inelastic structure. The clinical presentation differ according to underlying pathological condition and age, with pain, cutaneous signs, orthopedic deformities and neurological deficits being commonest.

**Aim:** To study the frequency and type of spinal dysraphism associated with tethered cord and evaluate clinical presentation, imaging and post-op complications of tethered cord.

**Methods:** Retrospectively 18 patients diagnosed with tethered cord from 2007 to 2018 were included in the study. Age, sex, presenting complaints, cutaneous findings, neurological deficits, intra-operative findings, post-operative complications were assessed.

**Results:** A total of 18 patients underwent surgery for tethered cord during the period of 2007-2017. 10 patients were females rest being male. 8 patients were less than 10 years. 11 patients have cutaneous stigmata. 3 patients had pre-operative urological symptoms, 4 patients had orthopaedic symptoms. Lipoma was found in 7 patients. Diplomyelia was found in 1 patient with tethered cord.

**Conclusion:** The presence of cutaneous stigmata over the midline axis should not be considered benign and must initiate prompt radiological and neurosurgical evaluation. MRI is an accurate, safe & non-invasive modality for detection of occulta. Early detection and complete correction reduces neurological disability.
**EP-001:** Association of Calcified Neurocysticercosis with Hippocampal Volume among Children with Epilepsy

Dr. Kiran Bala, Dr. Jaya Shankar Kaushik, Dr. Seema Rohilla, Dr. Shriseel Tiagi
1) Pt BD Sharma PGIMS, Haryana, India

**Objective:** To compare the hippocampal volumes among children with calcified Neurocysticercosis (cNCC) with age matched controls

**Method:** This cross sectional study was conducted among Children with Epilepsy (CWE) aged 3-14 years diagnosed with cNCC. Patients showing evidence of cNCC, with a prior serial imaging evidence of active NCC were enrolled as cases. Age and gender matched children who were subjected to MRI brain for non-epileptic indications served as their control. Cases were subjected to MRI based protocol and a sleep deprived electroencephalography. Hippocampal volumes were compared between two groups.

**Results:** A total of 31 cases and 28 controls were enrolled. Enrolled participants had variable number of calcified lesions: single [16 (51.6%)], two [7 (22.5%)], three to four [6 (19.3%) or multiple, more than five [2 (6.4%)]. Bilateral hippocampal volumes were higher and T2 values were lower in children with cNCC when compared to controls, but did not achieve statistical significance. Among 31 children with cNCC, 27 (87.1%) had nidsus within the lesion and 21 (67.7%) had perilesional gliosis. There was no correlation between the seizure frequency and presence of gliosis in the cNCC. Similarly, there was no significant correlation between the number of calcified lesions and hippocampal volumetry.

**Conclusion:** The present study found no correlation between the hippocampal volume and number of calcified lesions, presence of perilesional gliosis or presence of nidsus within the lesion. Further research with larger sample size is suggested to establish this association.

* * * * *

**EP-002:** Porencephalic Cyst an Unusual Cause of New Onset Seizure in an Adult: A Case Report and the Literature Review

Dr. Krishna Govind Lodha, Dr. Tarun Kumar Gupta, Dr. Gaurav Jaiswal, Dr. Yogendra Singh
1) RNT Medical College, Rajasthan, India

**Background:** Porencephalic cyst is congenital and quite a rare entity in adults with only few cases reported so far. It may be an unusual cause of first seizure in an adult.

**Case Report:** We report a 32 year old female who presented with new onset of generalized tonic and clonic seizures. On evaluation diagnosis of Porencephalic cyst in left tempo-parietal region was confirmed by magnetic resonance imaging (MRI). She was started on Anti-epileptic drugs and is on follow up.

**Conclusion:** The rarity in occurrence, atypical presentation and little knowledge of pathogenesis and management makes Porencephaly a special entity.

* * * * *

**EP-003:** Epileptosurgery - Our Experiences

Dr. Jan Hemza
1) Saint Ann, Czech, Czech Republic

In Faculty Hospital at Saint Ann there is exist Moravian Epileptologic Centre.

We have experiences with 612 resections together, extratemporal 205 resections (3 of insular lesions left side, 1 right side, 12 in SMA), and through this around 407 resections were performed in mesiotemporal area, from this 179 resections mesiotemporal areas with finding any pathology than different grades of mesiotemporal sclerosis: from different pathology 125 tumors (DNET, oligodendroglioma, hamartoma, ganglioglioma etc.), 17 vessels lesions (cavernoma, AVM, aneurysma), 11 giosis, 3 congenital anomalies (porencephalic, meningoencephalocele), 5 chronic inflammatory disease (encephalitis chronic), 18 patients were with negative histopathological findings in hippocampal area.

Patients are follow-up of mesiotemporal lesions pathology findings of temporal epilepsy 1-23 y. 147 patients were under Engel scale IA-IC, 7 IIA-B, 11 IIIA and 13 IV. During follow-up especially tumors diseases were deterioration about 4 patients 1 degree of scale, 1 patient die, 5 time were implants vagal stimulation (VNS) but 11 patients were improved by 1-2 degree of scale.

We take surgery of more than 600 SEEG, subdural grids and strips 46 and from this combine subdural and SEEG 5, 200 VNS and 20 DBS.

The courses of this type of epilepsy and exchange of clinical effect of resection, deterioration by degree of scale is debit of progress origin disease.

* * * * *

**FN-001:** Parkinsonism- An Unusual Case

Dr. Amit Kapoor, Dr. Mukul Varma
1) Indraprastha Apollo Hospital, New Delhi, India

**Aim:** To report a rare cause of Parkinsonism and management thereof.

**Introduction:** Parkinson’s disease can be primary or secondary to an underlying pathology.

**Method:** 72 years old lady with increasing gait and balance disturbances for 2 years, multiple falls over last one year leading to long bone fractures. She complained of stiffness of right sided limbs with involuntary tremors of right hand at rest for last 1 year. She had become clumsy and had increased emotionality. Anti-parkinsonism medications - Syndopa / Amantyl / Pacitane. Symptoms persisted.

MVD provides significant relief of pain post operatively common is anterior inferior cerebellar artery and results showed that Trigeminal neuralgia is Superior cerebellar artery and the next most Conclusion: The most common vessel implicated in the genesis of post-operative degree of freedom from the pain. were correlating with the intraoperative findings. There is significant decompression of arachnoid cyst is a good treatment option.

**FN-002: Vessels implicated in the Genesis of Trigeminal Neuralgia - Our institutional experience**

Dr. Mohana Murali Krishna N1*, Dr. V.V. Ramesh Chandra1, Dr. B.C.M. Prasad1 1) SVIMS, Andhra Pradesh, India

**Introduction:** Trigeminal neuralgia or Tic douloureux is a chronic pain disorder affecting the face. Historically it can be classified into primary and secondary types. Primary type remains mainly idiopathic. Secondary type includes caused by vascular loop compression, veins, combined artery and vein, posterior fossa tumors, multiple sclerosis, aneurysms, AV malformations. After the advent of Magnetic Resonance Imaging the classification is not used routinely, as many of the idiopathic cases are found to have nerve compression by a vascular loop. The reported incidence of vascular loop compression has been as high as 96%. There are many vessels described to cause nerve compression.

**Objectives:** To identify various vascular causes of the trigeminal nerve compression. To study the varied clinical presentations. To correlate the intra operative findings with the pre-op Magnetic Resonance Imaging.

**Materials & Methods:** Retrospective study in which the data was collected from 2007 to 2019. Overall 29 patients who were diagnosed with Trigeminal neuralgia and underwent Microvascular decompression were studied.

**Results:** Outcome data was analysed for the 29 patients. The most common type of vascular loop implicated is superior cerebellar artery in 14 cases, AICA in 6 cases. Among the 29 patients who underwent Microvascular decompression most common indication is failure of the medical management and mean duration of symptoms is 2.5 years. Most of the pre-operative findings in MRI showing vascular conflict were correlating with the intraoperative findings. There is significant post-operative degree of freedom from the pain.

**Conclusion:** The most common vessel implicated in the genesis of Trigeminal neuralgia is Superior cerebellar artery and the next most common is anterior inferior cerebellar artery and results showed that MVD provides significant relief of pain post operatively.

**HN-001: Quality of Life Following Endoscopic Endonasal Surgery for Pituitary Macroadenoma**

Dr. Elad Avraham1*, Dr. Dayana Cohen-Kobi2, Dr. Amit Azriel2, Dr. Merav Fraenkel1, Dr. Sofia Kordeluk1, Dr. Israel Melamed2, Dr. Yuval Sufaro1 1) Soroka, Nevatim, Israel 2) Soroka, Beer Sheva, Israel

Endoscopic Transsphenoidal Surgery (TSEES) has become the standard treatment choice for Pituitary Macroadenoma (PMA). Nevertheless, literature describing Quality Of Life (QOL) assessment for patients following this surgery is sparse.

We aimed to assess patients’ QOL as perceived by the patients themselves, after undergoing TSEES for PMA via validated surveys, namely, the SF-36 Health Survey and SNOT-22 questionnaire. Total of 52 transnasal neurosurgeries took place in our institution in the years 2016-2018. Of them, 26 patients who underwent transnasal transsphenoidal endoscopic resection of pituitary macroadenoma were included in the current study.

The average score for SF-36 health survey score was 51 ± 20, highest score was registered for ‘physical role functioning’ and ‘mental health’ (64 each), and lowest for ‘emotional role functioning’ (30).

Average post-surgery SNOT-22 questionnaire score was 1.4 ± 1.6 (0 - best, 5 - worst). The average result for the extra twenty-third question - “what is the level of improvement regarding nasal related symptoms after surgery?” was 2.2 ± 1.5 (1 - a significant improvement, 5 - significant worsening).

Since 2018, we replaced the technique of nasoseptal flap for closure with sphenoidal sinus mucosa. The later technique seems to be superior regarding subjective improvement after surgery 2.5 vs. 1.3 (but without statistical significance, P = 0.26, T-test).

We assessed QOL of patients after microscopic resection of PMA and compared those results to the results described above for endoscopic resection. Except for physical functioning, in which better results were documented in the TSEES group, results were similar for both groups.

**IBS-001: Intraventricular Aspergilloma masquerading as Ependymoma**

Dr. Saurav Kumar1*, Dr. Anil Kumar1 1) RIMS, Jharkhand, India

Aspergillosis of the lateral ventricle is rarely encountered entity, commonly associated with immunocompromised state and may turn fatal. They are commonly mistaken for tumours, tuberculomas etc. Its occurrence in an immunocompetent patient is also uncommon. Infection spreads haematogenously from primary source such as lungs, gastrointestinal tract or the paranasal and nasal sinuses. They present acutely with neurological signs and symptoms. Here we
present a case of a 54 year old male admitted with complains of headache since 3 months, blurriness of vision and slurred speech since 15 days. CT scan brain and MRI BRAIN with contrast was done that revealed a globoid shaped space occupying lesion localized to the lateral ventricle and expanding it, with normal sized right lateral ventricle. A diagnosis of ependymoma was suggested by the radiologist. Patient was put up for surgery and endoscopy was applied. Intraoperatively, the lesion was soft, whitish, flaky, adhered to walls of the ventricle. After gross resection of the mass, third ventriculostomy was performed. Post-operatively, patient developed meningitis on the 4th postoperative day and intravenous itraconazole was started. Patient recovered by the 14th day and was discharged after excluding other primary source or any compromise of the immune system. HPE revealed the mass to be aspergillous infection. This case emphasizes that differential diagnosis must consider fungal entities while taking into account the infective pathologies in cranial lesions.

**IBS-002: Hydatic Cyst Rupture due to Non-floated Dowling technique and Successful Long-term Chemotherapy**

Prof. Gopalkrishnan Madhavan Sasiadharan\*\*, Dr. Kashyap D. Vyas\*, Dr. Mehboobullah Shariff\*

1) Jawaharlal Institute of Post-graduate Medical Education and Research, Puducherry, India

Abstract: We report the case of a nine-year-old girl who presented with a large hydatid cyst. Although we followed the Dowling-Orlando technique of hydrostatic dissection, unexpected rupture and retraction of the cyst into the brain with spillage of cyst fluid occurred. We suggest that a large cyst has to be manually supported and floated out carefully into a saline-filled basin to prevent shear forces from developing on the wall. Radiological images of the lesion and videos of this complication are provided. The patient developed recurrence many months later and we re-excised all the cysts. We also report on successful long-term chemotherapy with albendazole and praziquantel.

**IBS-003: Rare case presentation of Calvarial Tuberculosis with Extradural Extension**

Dr. Anirudha D. Patil\*\*

1) NHL Medical College, Gujarat, India

Abstract: Tuberculosis is a very common disease in developing countries. Its prevalence, capacity to affect every other organ and its atypical presentation makes it an important part of the differential diagnosis for cases presenting in developing countries. Cranial bone and epidural tuberculosis is a rare manifestation of intrapulmonary tuberculosis. With the resurgence of immunocompromised states, incidence of tuberculosis is increasing. In the literature very few cases of calvarial tuberculosis has been reported in the past. We present such a rare entity of a 35 year old male who presented with a swelling in the frontal region.

A high index of suspicion and knowledge is required for early diagnosis. We excised the calvarial sol. along with its underlying bone and its extradural extension and titanium mesh cranioplasty done. Surgery with Anti-tubercular therapy is the main stay of treatment for calvarial tuberculosis. With early diagnosis and a combination of surgical and medical management, all cases of calvarial tuberculosis are potentially curable.

**IBS-004: A Case of Bilateral Subdural Empyema**

Dr. Aniruddha Bhagwat\*, Dr. Suneel Niranjan Shah\*, Dr. Vibhor Pardasani\*, Dr. Sunila Jaggi\*

1) Bombay Hospital, Mumbai, India

Abstract: Subdural empyema is a life threatening infection of the intracranial space, with very high rates of mortality if not appropriately diagnosed and treated. When managed well, with surgery and antibiotics, patients usually recover without significant residual deficits. The route of spread of infection and the organism involved needs to be investigated for complete eradication of the disease. We present the case of a young girl without any co-morbidities, initially diagnosed as having Cerebral Venous Sinus Thrombosis and treated accordingly, who later suffered a cascade of complications that proved almost fatal. She was managed successfully at our institution, and recovered completely in the end and is currently leading a normal life. A pathophysiological analysis of her disease process was made retrospectively and indicated how a seemingly innocuous dental infection spread over time to produce a life threatening subdural empyema, involving a fastidious opportunistic commensal organism. We present an account of the same.

**IBS-005: Intraspinal Tuberculoma mimicking Schwannoma**

Dr. Ankur Vivek\*, Prof. Yash Pal Singh\*

1) Himalayan Institute of Medical Sciences, Dehradun, India

Abstract: Spinal tuberculosis is usually found in paradiscal region with erosion of vertebral edge progressing into cold abscess formation in intra as well as extraspinal compartment. It may lead to vertebral collapse with spinal cord compression. At times it may be exclusive extramedullary or intramedullary presenting as space occupying lesion without constitutional symptoms. Our case presented with spastic sensory-motor paraparesis with vertebral level at D4 with predominant weakness on left side. There was no bladder bowel involvement. MRI spine depicted an extradural well defined left antero-lateral mass with scalloping into vertebral body with intact disc space and without pre or para vertebral collection. Vertebral burrowing edges were well defined.
Chest X-ray was normal. MRI finding was suggestive of schwannoma. Quantiferon TB Gold test was positive. Patient was not willing for surgical decompression. She was put on classical anti-tubercular treatment with complete disappearance of intraspinal lesion with full neurological recovery. It is a rare case of intraspinal intradural spinal tuberculosis presenting as schwannoma in MRI. Tuberculoma at times may confuse as meningioma. MRS may be beneficial in establishing the pre-operative diagnosis thereby avoiding unnecessary surgical decompression. It may also help in checking the delayed vertebral deformity.

***

**IBS-006: The Many Faces of Tuberculosis; Intradural Extramedullary Spine Tuberculosis - Expect the Unexpected**

Dr. Alvernia Neysa Binti Ujat1, Dr. Pradeep Chand1, Mr. Ramish Paramasivam2, Mr. Senthil Kumar Rajapathy3, Mr. Pulivendhan Sellamuthu1, Dr. Angeline Madatang4, Dr. Heng Gee Lee5

1) Hospital Queen Elizabeth, Sabah, Malaysia

**Introduction:** Tuberculosis, one of the oldest diseases ever described, has a wide spectrum of presentation. And for that reason, it continues to surprise us with its unique & unexpected presentation. In this case report, we are discussing a rare presentation of intradural extramedullary spine tuberculosis.

**Case Summary:** Madam K, 23 y/o lady, admitted for treatment of pleural tuberculosis in March, 2018 complicated with right sided pleural effusion. Diagnosis was made with positive adenosine deaminase (ADA) test. 1 month into treatment, she developed bilateral lower limb weakness with power 4/5 (Medical research council grading) and numbness. Otherwise intact bowel and bladder function. MRI spine was done, showing elongated heterogenous mass with moderate enhancement from T5-T7 with extensive edema from T3-T9. Two centrally located small hypointense lesion likely pointing towards haemorrhage or central necrosis. Proceeded with operation, T5-T9 laminectomy and debulking of intradural spinal cord lesion. The bone and dura appeared normal. Upon duratomy, firm solid yellowish-reddish lesion with thick pus discharge noted. Spinal cord was only identifiable with ultrasound guidance. Internal debulking reveals non-neuronal structures. The tissue sample shows chronic granulomatous inflammation from histopathological examination and auramine positive for acid fast bacilli. Post-operatively, she recovered well with sensory deficit on bilateral lower limb.

**Conclusion:** Despite of the medical advancement, this disease continues to challenge us in many ways. It is especially challenging and unpredictable at times especially when patient came with atypical presentations. We must keep in mind that tuberculosis should be included as one of the differential diagnosis when we encounter such patient.

***

**IBS-007: Management of Orbital Tumours**

Dr. Lee Chun Lin**

1) Hospital Kuala Lumpur, Malaysia

**Abstract:** Tumours of the orbit are rare disease comprises of 3.5 - 4 % of orbital pathology. They are of great challenge as they often share the same cardinal clinical findings of exophtalmos and clinical history. Age at presentation, associated ophthalmological findings, and radiological features; however, provide invaluable information as to the possible histological type of tumour. Their management can be challenging and surgical interventions often needed. Although a significant percentage of these tumours are treated by the ophthalmologist alone, collaboration with a neurosurgeon is often required, especially for tumours that are located deep within the orbit, are large or have an intracranial extension. Technical advances and modifications in surgical technique have decreased surgery related morbidity and increased its success. In this article, we describe 3 case series of orbital tumours particularly tumours located in the intraconal portion of the orbit that present with benign appearing but symptomatic tumours and we discuss the rationale in the choice of surgical approach, the principles and surgical techniques for orbital tumours.

**Keywords:** orbital tumour, intraconal, tumour excision, surgical approach

***

**IBS-008: A Review on Spinal Tuberculosis in King George Hospital, Andhra Medical College, Visakhapatnam**

Dr. Yarlagadda Srinivas Rao**, Dr. K. Satya Vara Prasad1, Dr. M. V. Vijayasekhar2

1) Dr. NTR University of Health Sciences, Visakhapatnam, India

**Introduction:** Spinal Tuberculosis remains an important public health problem in developing countries. The most frequent presenting complaint is back pain and the most common site of involvement is the thoracic spine. Chemotherapy with Anti Tubercular Drugs is the cornerstone of treatment. In cases with abscess formation, kyphosis, neurologic deficits surgical intervention is required along with ATT. Early diagnosis and prompt treatment is necessary to prevent permanent neurological disability and to minimize spinal deformity.

**Materials & Methods:** Prospective observational study of 10 patients with TB of the spine done from October 2018 to April 2019.

**Results:** Out of the 10 patients 6 were males and 4 are females. Backache is the most common symptom and the most common affected segment is the dorsal spine. ATT was started in all cases and in 9 patients surgical instrumentation was done to stabilize the spine. One female case had a large paravertebral collection with destruction of posterior elements in which ATT was started and drainage of the collection was done. No active pulmonary tuberculosis was identified in any of the case.
**Conclusion:** Spinal Tuberculosis is the most common form of skeletal tuberculosis. A high degree of clinical suspicion is required if patients present with chronic back pain, even in the absence of neurological symptoms and signs. Surgical intervention is necessary in cases with marked bony involvement, abscess formation or paraplegia.

**M-001: Endoscopic Third Ventriculostomy: Our Experience at Tertiary Care Centre (50 Cases)**

Dr. Kunal Kumar, V. V. Ramesh Chandra, B. C. M. Prasad

1) Sri Venkateswara Institute of Medical Sciences, Andhra Pradesh, India

**Introduction:** The use of ETV started as a first-line treatment for hydrocephalus due to aqueductal stenosis, is now becoming more widely used in management of hydrocephalus due to other causes like primary shunt failure, complementary to diagnostic biopsy via intraventricular route etc. Although consensus exists regarding its success in cases of aqueductal stenosis, experience vary in the success rates of ETVs undertaken in cases involving post-hemorrhagic and post-infectious hydrocephalus, its overall success rate and redo cases. Still a lot of scope exists to explore its potential use and other dimensions like complications, outcome and prognosis associated with ETV procedure.

**Aims & Objective:** The objective of this study is to discuss the presentation, diagnosis, decision, operative approach, outcome and prognosis of patients who underwent ETV at our institute from beginning till now. We will review our experience with other studies and find out how far we have gone and future challenges.

**Materials & Methods:** In order to carry out our study we performed a retrospective data collection with analysis of the patient who underwent ETV from the beginning of the procedure at our institute till now. The various presentations, demographic data, diagnosis, our approach, outcome and prognosis of 50 cases will be collected and evaluated.

**Results:** Total 50 patients underwent ETV till now; some of them had ETV as definitive procedure and in some ETV was done as complementary to diagnostic procedures. The success rate, complications and patient selection will be reviewed and prognosis & follow-up will be discussed.

**M-002: Non-Traumatic Spontaneous Extradural Hematoma in a Patient with Thrombocytopenia: A Case Report**

Dr. Mahesh Kumar Kusta, Prof. Sudhansu Sekhar Mishra, Prof. Sanjib Mishra, Prof. Manmath Kumar Dhir

1) S. C. B. Medical College, Odisha, India

**Introduction:** Extradural hematoma is one of the most common entities in neurotrauma surgery. It is mostly traumatic in origin. Spontaneous extradural hematoma is a rare entity and that too in thrombocytopenic patients it is very rare presentation. Although there are literatures about different form of Intracranial Haematomas (ICH) like subdural hematoma in ITP, spinal epidural hematoma in ITP but intracranial extradural hematomas in ITP patients is very rare. So here we report such a rare case.

**Case Report:** We report a case of a 40 year young woman with thrombocytopenia who presented with menorrhagia for few months followed by headache and vomiting for few days and altered sensorium for 2days. On evaluation with NCCT of brain, she was found to have extradural hematoma in left fronto-parietal area with mass effect. Her total platelet count was 10000/cmm and bone marrow biopsy shows abundant of megakaryocytes. The patient was treated conservatively with platelet transfusion and corticosteroid and symptomatically improved well. We discuss the pathophysiology and management of this rare entity.

**Conclusion:** Although it is rare, clinicians should be aware of this phenomenon as part of a spectrum of neurologic complications in patients with thrombocytopenia and also in patients with spontaneous extradural hematoma, we should keep ITP in mind during evaluation and management.

**Keywords:** thrombocytopenia, spontaneous extradural hematoma, ITP

**M-003: Spontaneous Subdural Hemorrhage in a Patient with Scleroderma: A Case Report**

Dr. Anurag Srivastava, Prof. Sudhansu Sekhar Mishra, Prof. Sanjib Mishra, Prof. Manmath Kumar Dhir

1) S. C. B. Medical College, Odisha, India

**Abstract:** A 32-year-old woman with a history of limited cutaneous systemic sclerosis presented with head reeling and vomiting. The patient’s history supported the diagnosis of scleroderma. The patient was also noted to have a subdural hemorrhage in the absence of trauma. This is the case report of scleroderma associated with a spontaneous SDH. The patient was evaluated, operated and discharged with good outcome.

**M-004: Spontaneous Intracerebral Hemorrhage with Transverse Sinus Thrombosis in a Patient with Mixed Connective Tissue Disease: A Rare Case Report**

Dr. Rahul Gupta, Prof. Sudhansu Sekhar Mishra, Prof. Sanjib Mishra, Prof. Manmath Kumar Dhir

1) S. C. B. Medical College, Odisha, India

**Background:** Mixed Connective Tissue Disease (MCTD) which is an overlap syndrome has uncommon role in developing stroke. Although
collagen disease is an important condition for stroke. When CNS is involved, MCTD is usually diagnosed after patients present with neurologic symptoms. Cerebral venous sinus thrombosis is a very rare neurological manifestation of mixed connective tissue disease. This disorder is potentially lethal but can be treated if evaluated on proper time, often it was overlooked in both clinical and radiologic in routine practice.

**Case Presentation:** We report a 44 year old non-hypertensive woman with MCTD developed intracranial hemorrhage with intra ventricular hemorrhage with hemiparesis and right transverse sinus thrombosis. There were no obvious predisposing factors revealed by clinical and pathological examination. MCTD was diagnosed on the basis of serological features like positive anti U1RNP and anti R0-52 antibodies, Antinuclear Antibodies (ANA) was 3+ (speckled pattern) and C3, C4 levels were low. Patient was managed with external ventricular drainage (EVD), antiepileptic drug, prednisolone, hydroxychloroquine and warfarin after which she recovered well and discharged.

**Conclusion:** MCTD may contribute to the development of intra cerebral hemorrhage by some mechanism other than hypertension. Therefore, MCTD associated indicators should be investigated in patients without the common risk factors for stroke who present with spontaneous intracranial hemorrhage.

**Keywords:** MCTD, stroke, intracranial hemorrhage, Anti RO-52 antibody, Anti U1 RNP antibody, warfarin.

---

**M-005: Spontaneous Intracerebral Haemorrhage in a Patient with Evans Syndrome: A Very Rare Case Report**

**Dr. Paresh Kumar Gouda**, Prof. Sudhansu Sekhar Mishra, Prof. Sanjib Mishra, Dr. Paresh Kumar Gouda, Prof. Manmath Kumar Dhir

1) S.C.B. Medical College, Odisha, India

**Background:** Evans Syndrome (ES), which was first described in 1951, is a rare autoimmune disorder characterized by the simultaneous or sequential development of Autoimmune Hemolytic Anemia (AIHA) and Immune Thrombocytopenia (ITP) and/or immune neutropenia in the absence of any underlying cause. Evans Syndrome may be primary or idiopathic when no cause is found and secondary when there is any underlying disorder. ES is a potentially life-threatening condition. Intracranial Haemorrhage (ICH) is the most serious complication of Idiopathic Thrombocytopenic Purpura (ITP) and is the leading reported cause of death. But association of this with autoimmune haemolytic anaemia makes it very rare.

**Case Report:** We report a 29 year old male, a known case of Evans Syndrome diagnosed in 2015 with Coomb’s positive anaemia with immune thrombocytopenia developed spontaneous intracerebral haemorrhage. Patient also had haematuria. He had thrombocytopenia with decreased haemoglobin component. Patient was treated conservatively with inj. mannitol, antiepileptics and other supportive measures for intracerebral bleed and followed with serial CT scans. Acute exacerbation of Evans was treated with oral prednisolone after consultation with clinical haematologist. Patient recovered and discharged subsequently.

**Conclusion:** Evans Syndrome is a very rare condition. Spontaneous intracerebral bleed in Evans Syndrome may have a devastating outcome if not diagnosed and treated aggressively.

**Keywords:** Evans Syndrome, AIHA, ITP

---

**M-006: Patient Attitudes to Neurosurgery: Finding the contributors through a qualitative approach**

Dr. Sandhya Cherkil**, Dr. Dilip Panikar1, Ms. Liza Mary Cherian1, Ms. Betsy Baby

1) Aster Medcity, Kerala, India

**Objective:** Undergoing a neurosurgical procedure is thought to be very traumatic and patients sometimes back off due to their perceptions and attitudes. This study aims to explore the attitude and perception to neurosurgery.

**Method:** Qualitative research methodology of ethnography was used where the tools are interview and direct observation. Sample selection was on a purposive basis. Eight semi-structured open-ended questions were given to 36 patients who underwent neurosurgery from 2018 October to 2019 April. Eight patients underwent awake procedure. Two questions were common to both pre and post-operative conditions which explored the patients’ emotional response to the surgery and concerns. Two other questions asked during pre-op explored the communication between the patient and the doctor. Post-operatively two additional questions were asked to find the moderating factors of the changes in the attitude. The patients were interviewed a week before the surgery and later 2 days after surgery. Patient responses verbatim were noted and recorded.

**Results:** The responses were subjected to thematic analysis and emerging themes were noted. The most frequently occurring themes were 1) worries about loss of functionality, 2) comfort level and communication with the doctor 3) clarity of communication from the doctors’ side.

**Conclusion:** Patients experience a set of anxieties and have concerns prior and after the procedure. Clear and transparent communication with the patient will reduce the anxiety. This has direct implications for the healing, compliance and further treatment. Communication and people skill of the surgeon has a moderating effect on the patients' perception of neurosurgery.
**M-007: Post-operative Vision Loss: A Rare Complication following Posterior Fossa Surgery**

**Dr. Souryav Sankar Mondal**

1) Madras Medical College and Rajiv Gandhi Govt. General Hospital, Chennai, India

**Introduction:** Postoperative Vision Loss (POVL) during non-ocular procedures is a devastating complication following surgery under general anaesthesia. Post-operative vision loss is a rare complication following surgery in prone position such as posterior fossa surgery. The risk of POVL following spinal surgery is 0.2%. Etiologies of POVL include Ischemic Optic Neuropathy (ION), Central Retinal Artery Occlusion (CRAO), Cortical Blindness (CB) and Corneal Abrasion (CA).

**Methods:** We reported 10 cases of POVL and performed VEP and OUTF. They were informed about POVL and provided written consent.

**Results:** Of these 10 cases, 5 were UCL patients and 5 were surgical patients. In 6 cases, POVL was confirmed. Four patients were treated successfully and two (4.44%) showed no evidence of vision loss. The number of biopsy attempts can increase morbidity. We investigated the use of intraoperative fluorescein sodium and compared it to frozen section assessment, for confirming pathological tissue samples in the stereotactic biopsy in patients with cerebral lesions, who were not candidates for cyto-reductive surgery.

**Conclusion:** Although POVL is a rare complication, the results are extremely devastating. Therefore, patients undergoing surgeries with increased risk for POVL should be adequately informed. Surgeons should include POVL as a possible complication when obtaining consent.

**M-008: Case series of Biopsy proven Immunoglobulin G4 (IgG4) related Pachymeningitis.**

**Dr. Rajesh Kumar Singh**, **Dr. Deepa Dash**, **Dr. Deepti Vibha**, **Dr. Rohit Bhatia**, **Dr. Manjari Tripathi**, **Dr. Ajay Garg**, **Dr. M. C. Sharma**

1) All India Institute of Medical Science, New Delhi, India

**Introduction:** IgG4 related Pachymeningitis is a rare disorder, with wide spectrum of clinical presentation.

**Methods:** Patients with Pachymeningitis and biopsy suggestive of IgG4 related disease were prospectively included. The clinical, radiological profile and treatment options used and outcome of these patients were studied.

**Results:** Three patients of Pachymeningitis with biopsy suggestive of IgG4 related disease were enrolled. Two of them were females and their age ranged from 23 - 55 year. Clinical phenotypes encountered in these patients were: chronic relapsing remitting meningitis, sphenoidal sinus mass mimicking malignancy and myelopathy. All were treated with steroids along with steroid sparing agents and all of them demonstrated clinico-radiological improvement.

**Conclusion:** IgG4 related Pachymeningitis have varied presentations and responded well with treatment.

**M-009: Utility of Intraoperative Fluorescein Sodium to improve the accuracy of Tissue Diagnosis during Stereotactic Needle Biopsy**

**Dr. Sachin Sambhaji Chemate**, **Dr. M. Balamurugan**, **Dr. Shankar Ganesh C.V.**, **Dr. Chandrasekar K.**

1) Apollo Hospitals, Chennai, India

**Introduction:** Intraoperative frozen section assessment, to confirm pathological tissue samples, is used in stereotactic brain biopsy to minimise sampling errors. It is limited by dependence on dedicated neuropathologists and an increase in operative duration. Increasing number of biopsy attempts can increase morbidity. We investigated the use of intraoperative fluorescein sodium and compared it to frozen section assessment, for confirming pathological tissue samples in the stereotactic biopsy patients with cerebral lesions, who were not candidates for cyto-reductive surgery.

**Methods:** This prospective observational study consisted of 20 patients (15 men and 5 women; median age 52 years) with cerebral lesions who underwent stereotactic biopsy with intravenous fluorescein sodium administration. All received an injection of 3 mg/kg fluorescein sodium during anaesthesia induction. 45 specimens were obtained and examined for the presence of fluorescence using a microscope with Yellow 560 filter. Positive and negative predictive values were calculated based on the fluorescence status of the biopsy samples with its corresponding intraoperative frozen section and definitive histopathological diagnosis.

**Results:** 37 (82.22%) were fluorescent and 8 (17.77%) were non-fluorescent. All 37 fluorescent specimens were confirmed to be lesional on intraoperative frozen section assessment and were suitable for histopathological diagnosis. Four of the non-fluorescent specimens were confirmed to be lesional on intraoperative frozen section assessment, two (4.44%) contained minor hypercellularity or gliosis, and two (4.44%) contained tumor with a high proportion of necrosis. The sensitivity was 90% and positive predictive value was 100%.

**Conclusions:** Fluorescein fluorescence may improve diagnostic accuracy and expedite stereotactic biopsy procedures.

**M-010: Postoperative Fatigue, Anxiety and Cognitive Function following Elective Neurological Surgery: Interim Analysis of a Prospective Multi-Centre Study**

**Dr. M. C. Sharma**

1) 111 Centre Study

**Introduction:** Postoperative fatigue, anxiety and cognitive function following neurosurgical procedures are common outcomes. They affect patients’ quality of life and may lead to increased healthcare costs. Recovery after neurosurgery is a complex process influenced by multiple factors. This study aimed to assess the prevalence and impact of postoperative fatigue, anxiety, and cognitive dysfunction in patients undergoing elective neurosurgical procedures.

**Methods:** A prospective multi-centre study was conducted in 111 healthcare centres across 16 countries. Patients aged 18 years or older undergoing elective neurosurgical procedures were recruited. Fatigue, anxiety, and cognitive function were assessed preoperatively and at 1, 3, and 6 months postoperatively using validated questionnaires.

**Results:** A total of 1,234 patients were enrolled. Preoperative scores for fatigue, anxiety, and cognitive function were high, indicating a substantial burden of these symptoms. Postoperatively, improvements were observed, but significant deficits persisted at 6 months in a substantial number of patients. Multivariate analysis identified several predictors of delayed recovery, including age, preoperative scores, and surgical procedure.

**Conclusions:** Postoperative fatigue, anxiety, and cognitive dysfunction are common following neurosurgical procedures. Identifying and addressing these outcomes early can contribute to improving patient recovery and quality of life. Further research is needed to develop strategies for effective management and prevention.

**Acknowledgments:** The study was supported by a grant from the National Institute of Mental Health, USA. The authors thank all participating centres and patients for their contribution.
Introduction: The vein of Galen aneurysmal malformations (VGAM) are vascular anomalies associated with an enlarged cerebri magna vein. According to the angioarchitecture, VGAM are divided in choroidal and mural types. We present a case of Choroidal type of VGAM presenting in early childhood achieving near total occlusion after a staged endovascular treatment.

Case Report: A 11 yr. girl presented with increased head circumference, prominent facial veins since birth. She was delivered by LSCS in view of oligohydramnios, large head size (antenal scan). Patient was investigated, underwent endovascular embolization at age 2 and 4 yrs. elsewhere. Clinically child is stunted in growth. She had frontal bossing with increased head circumference. There is marked prominence of facial veins bilaterally with a warm face and neck. Cerebral DSA showed partially embolised choroidal type of VGAM with a high flow multiple feeders from choroidal arteries. An uneventful trans-arterial embolization of major feeders was performed with 70% NBCA glue, lipoidal mixture.

Postoperatively patient evolution was satisfactory and at discharge
there were no fresh complaints, deficits (Bicetre score: 4). Patient was advised for follow-up after 6 months for check DSA.

**Discussion & Conclusion:** The present case is unusual in that the girl presented with progressive complaints surviving her early childhood. She underwent a successful staged transarterial embolization using unassisted embolic fluid agents. Staging of endovascular procedure is important in such high flow AVM because of high risk of periprocedural cardiac failure (sudden increase in preload with heavy vascular steal).

**NEV-002: A Rare Co-occurrence of Right Middle Cerebral Artery Distal Fusiform Aneurysm with Pituitary Macroadenoma**

Mr. T. V. Siddharth*  
1) Amrita Institute of Medical Sciences, Kerala, India  
**Aim:** To report a rare co-occurrence of right MCA distal fusiform aneurysm with pituitary macroadenoma

**Introduction:** The association of pituitary adenoma with intracranial aneurysm is very rare; amongst them the incidence of MCA aneurysm is extremely rare. A 57 year old male presented with a headache & blurring of vision in both eyes with generalized weakness and giddiness since 3 months. Upon evaluation with MRI, he was found to have Pituitary Macroadenoma and incidentally detected right MCA aneurysm

**Discussion:** He underwent Endoscopic Trans-nasal Trans-sphenoidal approach and gross total excision for pituitary adenoma and endovascular coiling (Flow diverter deployed- 2.5*4 cms (SILK) across the aneurysm after 3D angiography) for right MCA aneurysm.  

**Conclusion:** Minimally invasive procedures/techniques (endoscopic approach and endovascular coiling) were performed to reduce comorbidities. Upon 1 yr follow-up, the patient is symptom free and follow-up DSA showed good flow across the flow diverter and no residual aneurysm.

* * * * *

**NEV-003: Overlap Stenting for Restenosis within the Previously Deployed Carotid Artery Stent with Proximal Inward Protrusion Deformity**

Dr. Satoshi Kurabe**  
1) Yamagata Prefectural Central Hospital, Yamagata, Japan  
**Abstract:** Retreatment for restenosis following carotid artery stenting (CAS) is not uncommon; however, additional stenting for recurrent stenosis through a previously deployed stent with stent deformity, a rare device failure characterized by the inward protrusion of the open-cell stent strut has not been described. We herein report our experience of overlap stenting for post-CAS restenosis within the deformed stent. A 74-year-old man with a history of coronary artery bypass graft and CAS for symptomatic right internal carotid artery (ICA) stenosis underwent CAS for asymptomatic cervical ICA stenosis of the left side. At one week postoperatively, carotid ultrasonography revealed the inward protrusion of the proximal edge of the deployed stent, which had not been seen at the intervention. The stent deformity was left untreated while medical treatment including dual-antiplatelet therapy was continued. Eight weeks later, however, he suddenly presented with aphasia and mild motor weakness on his right side. Magnetic resonance imaging confirmed fresh shower embolism in his left hemisphere. Carotid ultrasonography showed newly developed stent plaque protrusion at the distal part of the stent, which was considered the source of embolism. We then attempted overlap stenting through the deformed stent and successfully deployed an additional stent without any complications. During the procedure, before advancement of the additional stent, we precededly performed intravascular ultrasonography with a microguidewire to confirm the correct stent lumen. Since the microguidewire may inadvertently penetrate the stent cell, this technique helps to avoid stent fracture, which is a potentially dangerous complication of overlap stenting through the deformed stent.

* * * * *

**NEV-004: Developmental Variation and its Technical Applications in Endovascular Management of ACA-Acom Complex Aneurysms**

Dr. Vivek Agrawal*, Dr. Rajendra Aher  
1) Sir H. N. Reliance Foundation Hospital and Research Center, Mumbai, India  
**Abstract:** Anterior Cerebral (ACA) and Anterior Communicating Artery (Acom) complex is one of the oldest arteries developed in fish brain from medial and lateral olfactory arteries, the two divisions of rostral branch of internal carotid artery. We encounter wide range of vascular anatomical variability in our clinical practise in this region due to persistence of phylogenetic or embryological substrates. Understanding the process of variability is crucial in management and outcome of aneurysms located in the vascular territory. We are presenting anatomical variations encountered in 21 cases of ACA-Acom Aneurysms coiled in last 3 years, its technical applications in endovascular approach and outcome.

* * * * *

**NEV-005: Treatment of Complex Intracranial Aneurysms by Endovascular Reconstruction**

Dr. Shah Rushabh Ajay*, Dr. Sreehari N. R.  
1) Amrita Institute of Medical Sciences, Kerala, India  
**Aims & Objectives:** To evaluate the feasibility, safety and outcome of stenting, stent-assisted embolization in the treatment of cerebral aneurysms and the applicability of flow-diverting stents in endovascular reconstruction of complex intracranial aneurysms.

**Materials & Methods:** Patients with intracranial aneurysms treated with either stenting, stent assisted coiling or with flow-diverting stent in our institute during the study period from 2015 to 2019. In addition to evaluating technical success of the procedure, angiographic and
clinical outcomes were retrospectively assessed. Special attention was focused on the complications and in finding factors associated with poor clinical outcome. The patients were followed up for period of 1 year.

Results: 20 patients of complex intracranial aneurysms were treated with endovascular reconstruction by stent, stent assisted coiling and flow-diverting stents. The patients with severe SAH were also treated initially with long tract EVD in view of anticipated increase in hydrocephalus and vasospasm so as to avoid secondary complications related to raise ICP. Also, sheath was retained for 24-48 hours post endovascular procedures and intra-arterial treatment was given in case of vasospasm. The patients treated with endovascular reconstruction had better outcomes when compared to craniotomy and clamping or other destructive procedures in terms of reduced pain score, hospital stay, negligible blood loss, better cosmetic outcomes and comparable anaesthesia duration.

Conclusion: Stent-assisted coil embolization is a feasible endovascular treatment method for ruptured wide-necked or complex intracranial aneurysms which are difficult to treat surgically or with balloon assisted embolization. Flow-diverting stents offer another valuable tool in the endovascular reconstruction.

* * * *

NO-001: Supratentorial Multiple Synchronous Multi-centric Gliomas of Distinctly Different Grade - A Rare Entity

Dr. Rohit Wadikhaye*, Dr. Suchanda Bhattacharjee1

1) NIMS, Hyderabad, India

Introduction: Multiple gliomas are a well-recognized but relatively uncommon entity, with a reported incidence of approximately 2 to 5%. Multi-centric gliomas are tumours arising independently in more than one site of the brain with absence of seeding. Multiple gliomas may be classified depending on the time of presentation as synchronous if the tumours are detected on initial examination.

We present a case of supratentorial synchronous multi-centric glioma of different phenotype which is an extremely rare presentation.

Case Report: A 42 year old male presented to the hospital with complaints of headache and left hemiparesis of 2 months duration. MRI brain study showed two different space occupying lesions. A left frontal lesion was noted which was T1 hypointense, T2 hyperintense with FLAIR images showing peripheral ring enhancement which was hypointense non-enhancing on contrast. Another lesion was noted in right thalamic region which was T1 hypointense, T2/FLAIR hyperintense and on contrast isointense non-enhancing. A whole body PET CT was done to rule out metastasis from unknown primary.

A left parasagittal frontal craniotomy was done. Gross total excision of the left frontal lesion was done. Biopsy of the thalamic lesion was done through interhemispheric approach. The HPE reported the frontal lesion as diffuse astrocytoma (WHO Grade II, IDH mutant) & the thalamic lesion as midline glioma H3K27M mutant, WHO Grade IV.

Conclusion: A correlation between the pathological findings and genetic features of the two distinct lesions would eventually be required to improve our understanding of this condition necessary for future-targeted therapy.

* * * *

NO-002: A Case of Predominantly Intraosseous Meningioma

Dr. Vybhav Raghu*, Dr. Ashish Chugh1, Dr. Sarang Gotecha1, Dr. Prashant Punia1
1) Dr. D.Y. Patil Hospital and Research Centre, Pune, India

Abstract: Meningiomas are the second most common primary brain tumours. Mostly benign and intradural. Extradural meningiomas are rare. Intraosseous meningiomas are rare in occurrence with predominantly intra-osseous meningiomas being rarer.

Case: 35 year old female presented to our institute with complaints of proptosis with pain and diminution of vision in the right eye. CT showed bony lesion in the sphenoid bone compressing over the lateral content of right orbit, anterior clinoid process, orbital roof and lateral wall with mass effect on the intraorbital contents and lateral wall of the sphenoid sinus. MRI brain with orbit showed heterogenous enhancement with thickening of dura adjoining the bony lesion. Patient underwent single staged resection with decompression of orbital contents. Postoperatively patient had improvement in vision with reduction in proptosis.

Conclusion: When a patient presents with primary sclerotic calvarial swelling, meningiomas must be considered in the differential diagnosis. Although primary intraosseous meningiomas are rare they can be associated with morbidity secondary to mass effect.

* * * *

NO-003: Diffuse Leptomeningeal Glioneuronal Tumour: A Case Report and Review of Literature

Dr. Anshul Goel*, Dr. Vivek Tandon

1) All India Institute of Medical Sciences, New Delhi, India

Introduction: Diffuse leptomeningeal Glioneuronal Tumour (DLGNT) is a new term introduced in WHO 2016 classification. It is a rare entity, known in literature as disseminated Oligodendrogial-like leptomeningeal tumour. They are characterized by diffuse leptomeningeal growth, oligodendrogial-like tumour cell morphology and variable neuronal and glial differentiation. Despite the recent recognition, further characterization is crucial.

Case Summary: A 36-year-old lady with headache and seizures had positive cerebellar signs. On MRI, T2 hyperintense multiple cervicodorsal subpial cord lesions were present with seedings in cerebellar folia. Patient underwent laminectomy with tumour decompression.
Histopathology revealed moderately cellular tumour without evidence of mitosis and endothelial cell proliferation with immunopositivity for GFAP, synaptophysin, Neu-N and negative for IDH-1 and p53.

**Discussion:** Malignancies presenting as primary diffuse leptomeningeal infiltrates in absence of intra-axial mass are rare. DLGNT is one of the rarer entities, with less than 100 cases reported. DLGNT are postulated to originate from a common glioneuronal precursor and are histologically characterized by a single population of oligodendrogial like cells that show immunohistochemical evidence of dual glial and neuronal differentiation. The diffuse nature makes it surgically challenging. They have been treated using CSI, temozolomide, chemotherapy using low-grade glioma protocols or combinations thereof.

**Conclusion:** Further data supported by cytogenetical and molecular investigations are mandatory to better characterize this entity. They clinically and radiologically mimic chronic infectious and inflammatory processes. CSF being frequently negative for malignancy, an early biopsy is crucial for timely diagnosis.

* * * * *

**NO-004: CNS High Grade Neuroepithelial Tumour with BCOR Gene Alteration: Tumour you shall die**

Dr. Shweta Kedia*†, Dr. Niveditha Manjunath†, Dr. Aruna Nambirajan†, Dr. Keshav Goyal†, Dr. Rajinder Kumar†, Dr. Gopishankar Natanasabapathi†

1) All India Institute of Medical Sciences, New Delhi, India

**BCOR co-repressor (BCOR) gene alterations have recently been identified as the defining molecular alteration in a subset of CNS embryonal tumours. The clinic-pathological profile of such tumours is yet to be fully elucidated with available information being largely derived from individual case reports and very small case series. Reported cases have presented in young children with a male preponderance, located predominantly in the posterior fossa, and sometimes showed an ependymoma-like morphology. BCOR protein overexpression and exon 16 internal tandem duplications were characteristic and most patients showed a poor overall survival. Herein we present the first adult case from our institute, and third in the world with BCOR Gene Alteration: Tumour you shall die.**

**Objective:** The clinic-pathological profile of such tumours is yet to be fully elucidated with available information being largely derived from individual case reports and very small case series. Reported cases have presented in young children with a male preponderance, located predominantly in the posterior fossa, and sometimes showed an ependymoma-like morphology. BCOR protein overexpression and exon 16 internal tandem duplications were characteristic and most patients showed a poor overall survival. Herein we present the first adult case from our institute, and third in the world with BCOR Gene Alteration: Tumour you shall die.

**Discussion:** The clinic-pathological profile of such tumours is yet to be fully elucidated with available information being largely derived from individual case reports and very small case series. Reported cases have presented in young children with a male preponderance, located predominantly in the posterior fossa, and sometimes showed an ependymoma-like morphology. BCOR protein overexpression and exon 16 internal tandem duplications were characteristic and most patients showed a poor overall survival. Herein we present the first adult case from our institute, and third in the world with BCOR Gene Alteration: Tumour you shall die.

**Conclusion:** Further data supported by cytogenetical and molecular investigations are mandatory to better characterize this entity. They clinically and radiologically mimic chronic infectious and inflammatory processes. CSF being frequently negative for malignancy, an early biopsy is crucial for timely diagnosis.

* * * * *

**NO-005: Recurrence in Craniopharyngiomas: Our Experience Over 20 Years**

Dr. Ratnika Joshi1#, Dr. Siddhartha Ghosh1, Dr. Anil Pande1, Dr. S. Selvapandian1, Dr. M. Ambuselvan1, Dr. Mira Ghosh1

1) Apollo Speciality Hospital, Chennai, India

**Introduction:** Craniopharyngiomas histologically benign lesions have significant morbidity and mortality and recurrence rate of 5-57%.

**Aim:** To determine the significance of histopathological factors, in addition to several clinical variables, as predictors of recurrence in craniopharyngioma. We reviewed 71 cases of craniopharyngiomas from 1998 to August 2019. Data collected concerning clinical presentation, imaging features, treatment modalities and recurrences.

**Result:** In our study, 42 cases were males, 29 cases females with age ranging from 3 to 75 years (27 cases age more than 18 years). More commonly seen at age group 10-20 years (n=25). Radiologically 84.5% cases (n=60) were solid-cystic and 15.5 % cases (n=11) predominantly cystic. Recurrence noticed more in pure cystic lesions (n=7). Total 48 patients underwent gross total resection, 5 near total, 15 partial or subtotal resection and in 7 tans-nasal trans-sphenoidal excision was done. Peri-operative mortality seen in 4.2% (n=3) and Tumor recurrence in 30.9% (N=22). In total tumour excision group, 12 cases recurrence seen. Histologically in adult, adamantinomatous type seen in 90.9% cases (n=40) and papillary in 9.1% cases (n=4); among 27 children, adamantinomatous type 96.3% (n=26) but only one case with papillary type histology (age 16 years). None of the papillary histology (n=5) had recurrence, all 22 recurrent cases (including 10 children) were of adamantinomatous type. In cases where postoperative radiation was given, only 7 cases had recurrence.

**Conclusion:** In our study, recurrence was significantly associated with cystic tumours, extent of resection and tumour size. Gross total resection and post-operative radiation, significantly reduces recurrence rate. Adamantinomatous type recurred more.

* * * * *

**NO-006: The Management of Tumours of the Fourth Ventricle and their Outcomes: A Single-Institution Experience**

Dr. Goutham Hanu Tammireddy*, Dr. V. V. Ramesh Chandra1, Dr. B. C. M. Prasad

1) Sri Venkateswara Institute of Medical Sciences, Andhra Pradesh, India

**Objective:** Fourth ventricle tumours are rare and surgical series are typically small, comprising a single pathology or focused exclusively on paediatric populations. This study investigated surgical outcome and complications following fourth ventricle tumour resection in a diverse patient population.

**Methods:** This is a retrospective review of 56 cases operated for fourth ventricular tumours at Sri Venkateswara Institute of Medical Sciences from January 2007 to January 2019. Data included patient
demographic characteristics, pathological and radiographic tumour characteristics and surgical factors (approach, surgical adjuncts, extent of resection, etc.). The neurological and medical complications following resection were collected and reviewed to determine patient recovery.

Results: Gross-total resection was achieved most of the cases. Postoperative neurological complications new or worsening gait/local motor disturbance, speech/swallowing deficits and cranial nerve deficits were analysed. The analysis showed that patients undergoing a transfemoral approach had a higher incidence of postoperative cranial nerve deficits, gait disturbance, and speech/swallowing deficits than those treated with a telovelar approach. Most complications were respiratory.

Conclusion: The occurrence of complications after fourth ventricle tumour surgery is not rare. Postoperative neurological sequelae were frequent, but a substantial number of patients had neurological improvement at long-term follow-up. The surgical approach had the most significant impact on neurological morbidity.

**NO-007: A Rare Case of Brain Stem Embryonal Tumour**

Dr. Harsha Hegde†, Dr. Chandrashekhar Deopujari†

1) Bombay Hospital, Mumbai, India

Abstract: Tumours of the brainstem account for 10% of all pediatric brain tumours. High-grade gliomas (most commonly, diffuse intrinsic pontine gliomas) account for 85% of pediatric brain stem tumours. Low-grade gliomas constitute 15 to 20% of the tumours. Brain stem origin embryonal cell tumours are rare (1%-3%). Should be considered as one of the differential diagnosis of brainstem lesions. Non medulloblastoma embryonal tumours have a distinct aggressive clinical course and there is no standard therapy. Discovery of new molecular markers and subclassification of embryonal tumours holds promise for predicting clinical outcome.

Here presenting a case of 4 year old male child presenting with right sided weakness and on MRI brain, found to have left pontine SOL with middle cerebellar extension, operated through transcerebellar approach, On histopathology diagnosed as Embryonal tumour NOS variety.

This is one of the first case reports of non medulloblastoma embryonal tumour after 2016 WHO embryonal tumour classification.

**NO-008: Awake Focused Craniotomy for Edematous / Large Brain Lesions - A Pilot Study for Safety and Feasibility**

Dr. Jitin Bajaj‡#, Dr. Sharad Narayan Sharma†, Dr. Gopal Maravi†, Dr. Aamir Iqbal‡, Prof. Yr Yadav§, Dr. Ankur Shrivasu§, Dr. Ketan Hedaoou, Dr. Ambuj Kumar†, Dr. Malika Sinha†, Dr. Shailendra Ratre†, Dr. Vijay Parihar†, Dr. Narayan Swamy†

1) NSCB Medical College, Jabalpur, India

Objectives: Awake craniotomy has been proven to be safe and effective in brain lesions. It has generally been used for non-edematous conditions, possibly due to the apprehension of intraoperative brain bulge. If done in edematous states, large craniotomies are advised. Here, we report the combined use of techniques of awake anaesthesia and focused craniotomy for large/edematous brain lesions.

Methods: Included were adult cooperative patients presenting with edematous brain lesions near eloquent cortex. A completely awake cycle was used using scalp block, dexmedetomidine, midazolam and fentanyl. Sedation on Ramsay sedation score was maintained from 3 to 5. The dural flap was lifted limited to the lesion and sometimes-in stages to tackle the bulging brain. Data was collected for resection volume, pain scores using VAS scale during the surgery, seizures, complications, new deficits, blood loss and duration of surgery, ICU and postoperative hospital stay.

Results: Eight patients underwent the procedure. Pathologies were high-grade gliomas (3), metastasis (1), tuberculosis (2), and meningioma (2). Seven patients underwent total, and 1 underwent subtotal excision (due to tumor inaccessibility). Brain bulge could be handled with the staged opening of the dura and intratumoral decompression. Intraoperative pain scores ranged from 2-3. Duration of surgery ranged from 60-280min. Blood loss ranged from 75-200ml. Postoperative stay varied from 3-20 days. There was one intraoperative seizure (managed), one CSF leak, and one infection. No other perioperative complication and no new neurological deficit.

Conclusion: Awake focussed craniotomy was found safe and effective for large/edematous brain lesions in appropriately selected patients.

**NO-009: Rare Synchronous Presentation - Prolactinoma and Supra Tentorial Tanycytic Ependymoma: A Case Report and Review of Literature**

Dr. Sangeetha Adhikesavan†, Dr. Visvanathan K.†

1) Sri Ramachandra Institute of Higher Education and Research, Chennai, India

Tanycytic ependymoma is the rarest subtype of ependymoma, which primarily occurs in the spinal cord. Only 10 ventricular and 5 subcortical cases have been reported in literature. The association of prolactinoma with supra tentorial ependymoma has not been reported earlier. We hereby report a rare presentation of synchronous intracranial tumours — macro prolactinoma and tanycytic ependymoma with both subcortical and ventricular components. A 29 year old male was under evaluation for infertility. Serum prolactin level was found to be high. Hence MRI brain was done to rule out pituitary adenoma. In the MRI, in addition to the pituitary adenoma, a
3.5x1.9x3.2cm well defined lesion was seen in the periventricular region of left parietal lobe with a small intraventricular component along the posterior horn of left lateral ventricle. Prolactinoma was treated with cabergoline.

As the patient was completely asymptomatic and the lesion was in the dominant lobe, patient was taken up for left parietal craniotomy, superior parietal lobule approach and microsurgical excision of the tumour under intra operative neurosonographic guidance.

Histologically, the tumour section showed spindle cytologic features and poorly developed inconspicuous pseudorosette, with areas of rounded nuclear profiles and perinuclear cytoplasmic clearing. While the tumour cells were positive for Vimentin, GFAP and S100, it was negative for EMA. Ki67 was <7%.

Immediate post op outcome is good as there is no neurological deficit. The patient is at present awaiting radiotherapy.

---

**NO-010: Case Report: Glioblastoma in Young Patient with NF1.**

Dr. Yogendra Singh\*\*, Dr. Krishna Govind Lodha\*

1) RNT Medical College, Udaipur, India

**Abstract:** NF1 is an autosomal dominant inherited familial tumour syndrome. Glioblastoma is a malignant brain tumour but is a rare occurrence in patients with NF1. There are very handful cases in which glioblastoma presented with NF1. Here we report a rare occurrence of glioblastoma in 15 year old male patient with NF1 who presented with headache and vomiting for 7 days. He had plexiform neurofibroma and first degree relative with NF1. He also had large congenital melanocytic nevus over his back. Patient underwent CT and MRI and showing a high grade glioma. The patient underwent surgical excision and the pathology revealed glioblastoma. After the surgery he received concomitant chemoradiotherapy.

---

**NO-011: Grade III Meningioma: 10 year Single Centre Case Series**

Mr. Hari McGrath\*\*, Dr. Istvan Bodi\*, Mr. Ioannis Christodoulides\*, Mr. Asfand Baig Mirza\*, Mr. José Pedro Lavrador\*, Dr. Ross Laxton\*, Mr. Richard Gullan\*, Mr. Ranjeev Bhangoo\*, Prof. Keyumars Ashkan\*, Mr. Francesco Vergani\*

1) King’s College Hospital Foundation Trust, London, United Kingdom

Meningiomas are the second most common primary tumour of the CNS, with the anaplastic subtype (WHO grade III) constituting less than 5% of all meningiomas and displaying malignant, aggressive behaviour. It demonstrates rapid growth, poorer prognosis, an overall survival of 41.4% at 5 years and a median survival of 2 years. Anaplastic meningiomas exhibit a highly infiltrative nature to the surrounding brain, making complete resection less achievable due to the risk of damage to surrounding neurovascular structures. As a result we see higher rates of local recurrence at 5 years (50-80%) when compared with lower meningioma grades, leading to a dramatically reduced cure rate in these patients.

Surgical resection is the mainstay treatment approach for any meningioma grade. The Simpson grading tool has been used as an indication for extent of resection and to stratify the potential risk of disease recurrence. 20-40% of completely resected malignant meningiomas (Simpson grade I-III) recur within 10 years, with this increasing to nearly 60% in Simpson grade IV resection. Considering the highly invasive nature of the disease, the potential limitations for complete resection, the high rates of recurrence and the poor overall survival, adjuvant radiotherapy is offered to these patients irrespective of the extent of resection. Overall, lower extent of resection, older age and multiple comorbidities are factors indicative of poorer prognosis.

We present the findings from our institution’s series of 12 cases of grade III meningioma.
of proptosis and stabilize visual function. In some cases, deliberate subtotal tumour resection is useful to avoid severe neurological damage with sufficient tumour control.

* * * * *

NO-014: Intracranial Melanoma in a Vitiligo Patient: A Rare Case Report

Dr. Nitin Prakash Kulshrestha**, Dr. Mastan Reddy‘, Dr. Anurag Sihag'
1) Osmania Medical College, Hyderabad, India

Introduction: Among all brain tumours, Primary Intracranial Melanoma is a rare entity (0.007%). Malignant melanoma is the third most common cause for cerebral metastasis.

Case Details: A sixty year old male presented with complaints of weakness in right upper limb and lower limb and headache. Patient is a known diabetic with vitiligo from the last 2 years. On examination, patient is conscious, having right sided hemisapresis. Provisional diagnosis of left sided parieto-occipital SOL was made by CT and MR imaging. Patient was operated (Left sided parieto-occipital craniotomy and excision of SOL) and tumour tissue was sent for histopathological examination. Peroperatively, a highly vascular, greyish purple mass with black pigmentation of size around 3*3*2 cm was found in left parioeto-occipital region, extending from surface of cortex to occipital horn of lateral ventricle and also involving choroid plexus. Histopathology report was suggestive of melanocytic tumour.

Discussion: Usually vitiligo patients have decreased risk for melanoma. Only 9% melanoma cases have brain lesion at first presentation. Ninety percent melanoma cerebral secondaries have skin primary but in our case origin was not identified. Melanoma secondaries have highest frequency of seizures but it was not present in our case. Choroid plexus involvement is very rare; only three cases have been reported till date.

Conclusion: Most of the symptoms of CNS melanoma metastasis are unspecific and depends on localisation of lesion. Clinical suspicion of the possibility of CNS metastasis in all known cases of melanoma with new neurological signs is important.

* * * * *

NO-015: Gross calcification in Cystic and non-functional Pituitary Macroadenoma - A case report and review of literature

Dr. Saif-UI-Islam Shaikh**
1) AFMC, Pune, India

Most common cystic lesions in the sellar-suprasellar region are Craniopharyngioma and Rathke’s cyst. Also the most common lesions to have calcification in the sellar-suprasellar region are Craniopharyngiomas. Pituitary macroadenoma is very rarely known to have cystic and/or calcification changes. It is of significance to differentiate pre-operatively between Craniopharyngioma and Pituitary macroadenoma, especially with significant suprasellar extension, to make decisions regarding surgical approach. The precise incidence of pituitary macroadenoma associated with both significant cystic component and calcification could not be found in literature. Microscopic calcification is more common than radiologically evident macroscopic-calcification, occurring in 5.4-25% of the cases. Also, calcification in context to pituitary adenoma is known to be associated with hormone secreting pituitary tumors, unlike our case where it was associated with non-hormone secreting pituitary adenoma.

We describe a rare case of non-functional Pituitary macroadenoma associated with significant cystic component and macroscopic calcification.

NP-001: Role of L1CAM Immunohistochemistry in the Detection of C11orf95-RELA Fusion in Supratentorial Ependymomas

Dr. Geeta Chacko**, Dr. Megha Bansal’ , Dr. Julie Joseph’, Dr. Rekha Pal’, Dr. Ambritha Balu’, Dr. Chacko G. Ari’, Dr. Vedantam Rajshekhar’, Dr. Leni G Mathew’, Dr. T. D. Sudarsanam’
1) Christian Medical College Vellore, Tamil Nadu, India

Introduction: A recurrent C11orf95-RELA fusion resulting from chromothripsis at 11q13 characterizes 70% of supratentorial paediatric ependymomas and about 20% of adult supratentorial ependymomas. Tumors with RELA fusion have a poor prognosis. Membranous staining on immunohistochemistry for L1CAM (L1-cell adhesion molecule) is considered a surrogate marker of RELA fusion.

Aim: The aim of the present study was to ascertain if L1CAM is a good surrogate marker for RELA fusion.

Material & Methods: All supratentorial ependymomas diagnosed between 2012 and 2018 with tumour tissue in the tumour bank were included in the study. The histopathology of all the cases was reviewed and a representative section was chosen for immunohistochemistry with L1CAM. Real time PCR was performed to detect RELA type 1 and 2 fusions. The immunoexpression of L1CAM was compared to results of real-time PCR.

Results: There were thirty one cases of supratentorial ependymomas. Twenty seven of these cases were anaplastic ependymoma, WHO Grade III and 4 of the cases were ependymoma, WHO Grade II. Twenty two cases showed diffuse membrane immunopositivity for L1CAM. Using real-time PCR, seven cases had RELA Type 1 fusion, one of which was immunonegative for L1 CAM. One of the 7 cases had both RELA type 1 & type 2 fusions.

Conclusion: Immunohistochemistry for L1CAM can serve as a good screening tool for detection of RELA fusion. Its role as a surrogate marker for RELA fusion has to be viewed with caution, given its low specificity. Funding from Department of Science and Technology

* * * * *
NR-001: Correlation between Heart Rate Variability and Bladder Sensations during Filling and Voiding Phase of Urodynamic Study in Patients with Myelopathy

Dr. Anupam Gupta*, Dr. Tenzil Gomez

1) National Institute of Mental Health & Neuro Sciences, Bengaluru, India

Objective: Correlation between heart rate variability (HRV) and bladder sensations during filling and voiding phase of urodynamic study-UDS in patients with myelopathy.

Patients & Method: Myelopathy patients (traumatic and non-traumatic) within 6 months of illness were included. Demographic data, ethiopathological diagnosis & urinary complaints were noted. UDS was performed and simultaneous HRV calculated at each event of filling and voiding phase by recording and calculating standard deviation of normal-to-normal (NN) interval-SDNN, Root mean square of successive differences, total power-TP, average heart rate, high frequency-HF, low frequency-LF and LF/HF ratio and data analysed.

Results: Study included 30 patients (23 males) with mean age of 31.2 years (range 18-60 years, SD11.6). The mean of LF in normalized units showed an increase from 43.6 ± 14.1 at baseline to 48.9 ± 17.4 at strong desire to void (SDV) and at urgency to 44.1 ± 14.5. HF at baseline 40.4 ± 14.1 reduced to 36.4 ± 12.8 at SDV and rose at urgency to 41.2 ± 13.2. LF/HF at baseline was 1.3 ± 0.8, which increased to 1.6 ± 1.1 at SDV and reduced at urgency to 1.2 ± 0.6. Significant change in mean value was seen in TP (p=0.01) and SDNN (p=0.009) at First Desire to Void-FDV. Significant positive trend was seen in TP (p=0.048) and SDNN (p=0.042) during filling.

Conclusion: Comparison of HRV measures failed to show significant rise in sympathetic or parasympathetic component in myelopathy patients during urodynamic study and requires more critical evaluation.

Keywords: Myelopathy, Urodynamic study, Heart rate variability

NR-002: AgVA- Worlds Smallest and Cheapest Full Featured Ventilator - An Indian Innovation

Dr. Deepak Agarwal*, Dr. Diwaker Vaish

1) All India Institute of Medical Sciences, New Delhi, Delhi, India
2) A-SET Training & Research Institute, Delhi, India

Background: There are large number of patients in developing countries who are require mechanical ventilation with the healthcare facilities unable to arrange them because of the exorbitant costs and lack of technical expertise required to operate them, especially in disaster scenarios.

Objectives: To develop a small, cost-effective and user friendly ventilator with features comparable to standard ventilators which can be deployed in disaster settings.

Materials & Methods: The authors designed and developed a ventilator which could be used for home ventilation, transport as well as in ICU cost-effectively, analyzing the products available in the market. Observations: The developed ventilator (AgVa) can weighs less than 3Kg and is the world’s smallest and cheapest (Approx. US$1000) full featured ventilator. The ventilation is synchronized with patients breathing (SIMV) and it has the capability to run from room air (21% Fio2) as well as from regular oxygen supply. In addition, it has Android based control of all functions and settings and is integrated with pulse oximeter to give real time feedback and optimization of settings. Importantly, it can be operated by relatives at home after minimal training.

Results: AgVa ventilator has the potential to revolutionize healthcare delivery across the world by being available for use in pre-hospital, emergency departments as well as ICU in resource constrained settings. The development of this product shows how innovation is required to keep healthcare affordable and relevant in countries like India.

NT-001: Penetrating & Perforating Cranio-cerebral Brain Injury: Rare Neurosurgical Emergency, Series of 4 Such Rare Cases

Dr. Rahul Chhajed*, Dr. Batuk Diyora

1) Lokmanya Tilak Medical College and General Hospital, Mumbai, India

Introduction: Penetrating craniocerebral injuries are the one in which the object enters the skull but does not exit, where as in perforating it does exit. Penetrating injury accounts for only 0.4% cases of head injury, while perforating injuries are even rare. Most common route for penetrating injury is orbital roof. Missiles in war is the most common mode, though bullets, pellets, Nails, knives, screw-drivers, wood, fishing hooks, sewing needles, spear guns & barbeque skewers have also been described.

Methods: We present 4 such rare cases, out of which 2 were perforating IRON ROD injury and remaining 2 were penetrating injury ( 1 patient: PRESSURE COOKER WHITSLE NOZZLE other patient WOODEN PEICES ) who underwent surgery.

Results: All 4 patients recovered initially, out of which 1 of the perforating injury patient later succumbed due to respiratory problems. Remaining 3 became functionally independent for their daily routine.

Conclusion: Perforating and penetrating brain injury are rare neurosurgical emergency which has to be managed in well planned way, right from shifting to hospital, inside the hospital, while performing scan, anaesthesia and surgical position & approach.
**NT-002: Cognitive Outcomes in Mild Traumatic Brain Injury**

Dr. Prasoon Saurabh1, Dr. Pratheesh Ravindaran1, Dr. Natesan Damodaran1, Dr. Sukanto Sarkar1
1) Mahatma Gandhi Medical College and Research Institute Hospital, Pondicherry, India

**Background:** Recognition of cognitive impairment in patients with mild traumatic brain injury will help in initiating early aggressive neuropsychological rehabilitation and thus improve their functional status.

**Objective:** To study the neuropsychological alterations in patients with mild traumatic brain injury.

**Materials & Methods:** Forty four patients aged 18-65 who fulfilled WHO criteria for mild traumatic brain injury (non-surgically managed) were evaluated at 1, 3 and 6 months post injury with Addenbrooke’s cognitive examination-III (ACE-III) and compared with the normative data. The results were statistically analysed using Friedman and Wilcoxon Signed Ranks tests.

**Results:** The total ACE-III score at 1, 3 and 6 months were 79.43 ± 11.61, 85.86 ± 8.56 and 88.02 ± 7.47. At 1, 3 and 6 months, the Attention, Memory, Fluency, Language and Visuospatial scores were (15 ± 2.33, 16.68 ± 1.7 and 17.4 ± 1); (20.66 ± 5, 23.06 ± 3.93 and 23.09 ± 2.97); (6.6 ± 1.85, 7 ± 0.98 and 7.52 ± 1.02); (22.90 ± 3.59, 23.90 ± 2.52 and 24.40 ± 2.45); (14.59 ± 2.23, 15.18 ± 1.66 and 15.59 ± 1.41) respectively.

**Conclusions:** All the domain scores were within the normative range. There was statically significant continual improvement in the total ACE-III score, Attention, Language and Visuospatial construction abilities at 1, 3 and 6 months post injury. Memory and Fluency improvements occurred in the early and late follow-up periods respectively.

* * * * *

**NT-003: Influence of Age and Height of Fall on Head Injuries in Paediatric Age Group: Single Centre Study**

Dr. Theanmullai Palanisamy1, Mr. Ananda Arumugam1, Mr. Puliwendhan Sellamuthu1
1) Hospital Queen Elizabeth, Sabah, Malaysia

**Abstract:** Fall is a common incident seen among children. The type and height of fall observed in different age groups of paediatric population may affect the injury patterns.

**Objective:** Main objective is to understand the influence age and height of fall on head injuries sustained by paediatric population to help guide clinical evaluation.

**Method:** Retrospectively, 100 children aged 0–12 years with head injuries caused by fall classified as mild, moderate and severe categorised by age (infants <1 year old, 1–6 years old and 7–12 years old) and height of fall: low (<3 feet), intermediate (>3 feet and <10 feet) and high (>10 feet).

**Results:** The severity of intracranial injuries sustained by the children aged 12 years old varied with age. Toddlers sustained more skull fracture compared to other age groups (75%), followed by infants (43%) despite similar severity of injury. Low height fall resulted in primary intracranial injury mainly in children aged 1–5 years (30%), secondly in 6–10 years old age group (13%). Severe head injury was observed in 5% of the population, mostly in the age group of 6–12 years old causing intracranial injury and skull fracture.

**Conclusion:** Age based differences in fall type determine the head injury pattern sustained in paediatric population. Preventive measures are important and to be taken seriously for better future of our younger generation.

* * * * *

**NT-004: Extradural Hematoma Achieving Zero Mortality: A Sabah Experience**

Dr. Lalithambigai Gannison1, Dr. Prabhu Rau Srinar1
1) Hospital Queen Elizabeth, Kota Kinabalu, Malaysia

Extradural hematoma (EDH), a common sequelae of traumatic brain injury, can lead to mortality and disability if a delay in identifying the pathology and subsequent management. In 1920s, mortality rates were reported as 86% and improved to 10% over the new millennium. We review our EDH cases to identify how we can achieve zero mortality.

We retrospectively reviewed all traumatic EDH cases seen in the specialised paediatric neurosurgery department of Sabah Women & Children Hospital from the period of January 2013 to August 2018. A total of 101 cases were identified.

We had 101 patients ranging from ages of 9 months to 12 years. Out of it, 58 patients (58.41%) were males and 42 were females (41.59%). A total of 37 patients (36.3%) were treated surgically, 64 patients (63.7%) were treated conservatively. About 92 patients (91.09%) presented with supratentorial EDH and 9 patients (8.91%) had infratentorial EDH. In the paediatric age group, fall from heights were the commonest cause. We achieved zero mortality among our patients who were treated both surgically and conservatively.

EDH, a neurotrauma emergency, can be lethal yet the most rewardingly responsive lesions treated by neurosurgeons. Early diagnosis, prompt referrals, early surgical intervention when indicated and good intensive care remain the paramount facets towards achieving zero mortality in EDH. This study proves that our results are comparable to those seen in other neurosurgical centres throughout the developed world. An institutional protocol for EDH may ensure that the ultimate goal of towards ‘zero mortality’ could be achieved systematically and consistently.

* * * * *
**NT-005: Multicompartiment Projectile Injuries and Use of Adjuncts - A Case Report**

Dr. Manish Joseph Mathew*, Dr. Anudath Brahmadattan¹, Dr. Sankar Viswanath¹, Dr. Deepak Falgunan¹

1) Avitis Institute of Medical Science, Kerala, India

**Introduction**: Projectile injuries to the head are rare in our part of the world. Surgical management of these injuries are challenging due to narrow entry and exit wounds, difficulty in locating the projectiles and the prospect of injury to the surrounding normal structures. Multicompartiment projectile injuries are more demanding due to the need for extensive explorations and dissections. We present a case of a multicompartiment projectile injury, managed surgically with a minimally invasive approach with help from surgical adjuncts.

**Case Report**: 19 year old male presented with accidental projectile injury to the head from an airgun. On examination an entry wound was noted just above the left eyebrow and no visual or neurological deficits. A computerised tomogram of the head showed pellets within the left orbit near the apex and in the left frontal sinus. He underwent left eyebrow incision, subfrontal transorbital approach and removal of the pellets. Intraoperative fluorscopy was used to localise the pellets in different compartments, operating microscope used to trace the track and angled endoscope to locate the pellet within the frontal sinus. He recovered uneventfully with no deficits and a barely visible scar.

**Conclusion**: Surgical adjuncts play an important role in the safe removal of projectiles in multicompartiment projectile injuries with minimum collateral damage.

* * * * *

**NT-006: Anterior Odontoid Screw Fixation in an 11 year old child: A Case Report.**

Dr. Dilip Dutta*

1) Narayana Multispeciality Hospital, Howrah, India

**Introduction**: Spinal injuries following trauma is rare in children as compared to adults. Cervical spine injuries are even more uncommon in the paediatric age group younger than 11 years of age. Among the cervical spine injuries in children, the upper cervical spine remains the most susceptible region with Odontoid fractures being the most common ones in this age group.

**Case Report**: An 11 year old boy was presented in unconscious state following a fall from height into a gutter, head first. On initial examination he was opening eyes to pain, verbalising with inappropriate words and localising to painful stimuli. There was a deep scalp laceration in the left fronto-parietal region. CT brain revealed a depressed fracture with underlying contusion and a left fronto-parietal decompressive craniectomy was done. Post operatively the patient improved neurologically and started complaining of neck pain. CT scan of cervical spine revealed type II Odontoid fracture. The boy was preoperatively shifted to Holter traction. There was reduction of fracture displacement on fluorooscopy and we proceeded for anterior Odontoid Screw Fixation. Right anterior neck skin crease incision was made. Odontoid fracture was fused using single lag screw under fluoroscopic guidance. Postoperatively neck pain diminished. On 9 months follow-up the boy is pain free without any neurological deficit and CT cervical spine showing adequate fusion.

**Conclusion**: Concomitant upper cervical spine injuries are not uncommon in severe head injuries in children. Anterior Odontoid Screw Fixation can be done even in paediatric age group with good results.

* * * * *

**NV-001: Basilar Bifurcation Complex Aneurysms Clipping with Pre-temporal Trans Cavernous Approach (Video)**

Dr. Vamsi Krishna Yerramneni*, Dr. Ramnad Reddy K.*, Dr. Thiurnal Y.

1) Nizam’s Institute of Medical Sciences, Hyderabad, India

**Introduction**: Basilar artery bifurcation aneurysms clipping require the radical skull base approaches aimed at creating the corridor and gaining better view of the aneurysm in different directions. Though there are many advances in the endovascular techniques in the past decade, the solutions offered remain suboptimal in large percentage of these cases. Surgery remains still the best bet for all complex basilar bifurcation complex aneurysms.

**Aim**: The current study is to describe our experience with the less often used and more complex Pre temporal trans-cavernous approaches for the clipping of the basilar bifurcation complex aneurysms.

**Results**: Three patients had clipping of the aneurysm. Two basilar top aneurysms and one patient had P1P2 junction aneurysms. The current approach involved drilling of the ACP, PCP and opening of the occulomotor trigone and drilling of the clivus in one case to gain a 270 view of the aneurysm and gaining access to proximal basilar for temporary clipping. All three patients had transient occulomotor palsy owing to the mobilization of the nerve. One patient had ICA infarct on postoperative day 9 as a result of vasospasm.

**Conclusion**: Although technically difficult, the trans-cavernous approach provides better exposure of the interpeduncular and preoptic cisterns by wider angle of view over conventional approaches and probably could offer better overall surgical outcomes.

* * * * *

**NV-002: Aneurysm Graft Clip (Sundt Clip) - A Saviour in Distress**

Dr. Sandesh Khandelwal*, Dr. S. Balaji Pai

1) Bangalore Medical College & Research Institute, Bengaluru, India

**Introduction**: ICA aneurysms are challenging to deal with, especially when they are fragile, or having dense adhesions to surrounding
Introduction: Spontaneous cerebellar haemorrhages (SCHs) - rare, 6.36-16.4% of all intracerebral haemorrhages (ICHs). Rapid deterioration of clinical symptoms due to narrow space, however, even a small amount of haemorrhage can compress the brainstem, leading to dangerous consequences. Surgical treatments are more often necessary in cases of cerebellar haemorrhage as compared to supratentorial ICHs. Cerebellar haemorrhages have higher mortality and morbidity rates, so a rapid diagnosis must be made and adequate treatment administered immediately.

Objective: To identify easily applicable guidelines for the surgical and conservative management of spontaneous cerebellar hematomas.

Methods: A treatment protocol was developed and prospectively applied for the management of 30 consecutive cases of cerebellar hematomas. The appearance of the fourth ventricle, adjacent to the hematoma, on computed tomographic scans was divided into three grades (normal, compressed, or completely effaced). The degree of fourth ventricular compression was correlated with the size and volume of the hematoma and the presenting Glasgow Coma Scale (GCS) score. The hematoma was surgically evacuated for all patients with Grade III compression and for patients with Grade II compression when the GCS score deteriorated in the absence of untreated hydrocephalus. Patients with Grade I or II compression were initially treated with only ventricular drainage in the presence of hydrocephalus.

Conclusion: Conscious patients with Grade III fourth ventricular compression should undergo urgent clot evacuation before deterioration. Surgical evacuation of the clot may not be required for large hematomas (>3cm) if the fourth ventricle is not totally obliterated at the level of the clot.

NV-004: Acom Aneurysm - Management and Difficulties

Dr. Vernon Leo Velho

1) Grant GMC & Sir J. J. Group of Hospitals, Mumbai, India

Objective: Aneurysms of the anterior communicating (ACOM) artery are the most frequently occurring type of ruptured intracranial aneurysms. The peculiar anatomy of the anterior communicating artery complex, its anatomic variations and its multiple perforators, along with the deep location of these aneurysms and our difficulty accessing them, pose challenging anatomic problems in their surgical treatment.

Methods: We present our series of 178 Acom aneurysms in last 10 years (2009 to 2019). Special, complex situations that may arise during treatment of these aneurysms and their solutions are discussed. We highlight the technical aspects of microsurgical clipping of ACOM artery aneurysms.

Conclusion: Acom aneurysms are difficult to manage in both peroperative and post-op period, management of each patient must be tailored because no one technique is suitable for all situations. Not all ACOM artery aneurysms can be coiled; therefore, the surgeon’s microsurgical clipping technique is an important facet of managing these aneurysms.
groups. Favorable mRS was defined as 0-3. Utility weighted mRS was analyzed as continuous variable in linear regression to identify predictors of good outcome at 3 and 12 months.

**Results:** In our cohort, the median GCS was 12. Between the two groups, statistically significant differences were found in favorable mRS at 3 and 12 months (p=0.024 and 0.003 respectively). A significant ultra-early predictor of good long-term outcome was post-operative GCS. We found that following evacuation, a GCS of 12 was a strong predictor of good outcome at 3 (p=0.039) and 12 months (p=0.023). All patients had more than 90% clot evacuation. The side of the ICH, size of the clot, and pre-operative GCS were not significantly different between the two groups and were not predictive of outcome.

**Conclusion:** Surgery for ICH using a MIPS approach was able to achieve a good outcome for patients. The most important predictor of favorable long-term outcome was a post-operative GCS of 12 or above irrespective of the side of the clot.

* * * * *

**NV-006: Persistent Trigeminal Artery: Neuroanatomical and Clinical Relevance for Neurosurgeon**

Dr. Nishanth Sadashiva1, Dr. Gaurav Tyagi2, Dr. Subhas Konar3, Dr. Aravind Gowda4, Dr. Jitender Saini5, Dr. Dhaval Shukla6, Dr. Bhagavatula Indira Devi7

1) National Institute of Mental Health and Neurosciences, Bengaluru

**Introduction:** Persistent trigeminal artery (PTA) is the most common remnant of primitive circulation communicating the developing carotid and vertebrobasilar junction. Although discovered incidentally, an altered hemodynamic may lead to an increased association of aneurysms, vascular malformations and stroke. Neurosurgeons should be aware of the presence and significance of PTA while interpreting imaging and planning interventions.

**Material and Methods:** We retrospectively reviewed all MRA and cerebral DSA done between 2012 and 2017 for the presence of PTA. The radiological and anatomical details were noted and analyzed along with the clinical profiles. We categorized the radiological findings with respect to the available classification systems. A review of the available literature was done comparing our results.

**Results:** We found 33 cases of incidentally detected PTA. Average age of the patients was 45.42 years. Lateral surface of the proximal Cavernous ICA was the most common origin (n=23). Only 3 cases had a medial/trans-sellar course. Maximum cases were Saltzman/Weon type-I (19/33). Intracranial aneurysms were associated with 6 patients (18.18%). Trigeminal Neuralgia was presenting feature in 5 patients. None of them had a direct neurovascular (NV) conflict at the REZ.

**Conclusion:** Our study is one of the largest describing the incidence of PTA. We have emphasized on the importance of PTA to the neurosurgeons, increased association of aneurysms, as a route for intervention in occlusive disease of posterior fossa, risk of injury and bleeding during trans-sphenoidal surgeries and the association with TN. However, we found that only PTA variants are likely to be associated with TN due to their cisternal course causing NV conflict.

* * * * *

**PBS-001: Paediatric Meningiomas: A Retrospective Analysis of 37 Surgical Cases**

Prof. Dattatraya Muzumdar 1, Dr. Sonal Prakash Jain 1, Prof. Atul Goel 1

1) Seth G. S. Medical College / KEM Hospital, Mumbai, India

**Background:** Paediatric meningiomas are infrequently encountered in clinical practice. In comparison to adults, they have a distinct pathophysiology and clinical presentation. They are benign but locally aggressive tumours. Radical excision often culminates in good outcome.

**Objective:** To study the demographic profile, clinic-radiological features, pathophysiology and surgical outcome of childhood meningiomas.

**Methods:** The case records of patients less than 18 years of age operated for meningiomas in our institute from 1985 to 2014 was retrieved. The demographic profile, clinical and radiological features, surgical approach, extension of resection and surgical outcome were recorded and subsequently analyzed.

**Results:** Amongst 37 patients, 20 were males and 17 were females. The mean age was 13 years. 20% children had identifiable predisposing etiologies like Neurofibromatosis and radiation exposure. There were 31 intracranial and 6 spinal meningiomas. Headache associated with vomiting was the most presenting complaint. Majority were supratentorial tumors. A safe maximal excision was attempted in each case. Recurrence was noted in 5 patients. Average follow-up was about 24 months. 2 patients succumbed to their illness and 30% patients had significant morbidity.

**Conclusion:** Although rare, paediatric meningiomas are biologically different from their adult counterparts. They have a male predominance, common in intraventricular region and cystic in nature. Radical excision is associated with good prognosis. Although benign, they are aggressive in nature and have a tendency to recur. The response to adjuvant therapy is modest. Molecular research and genetic studies are necessary to understand the biology, which will help in identification of targeted molecular therapy.

**PBS-002: Pleuro-Peritoneal Shunt in Paediatric Hydrocephalus**

Dr. L.N. Tripathy1, Dr. Harsh Jain1, Dr. Sunandan Basu1, Dr. Indrajit Rana1, Dr. Chandan Sarkar

1) Medica Superspecialty Hospital, Kolkata, India

Post-meningitic multiloculated hydrocephalus is a difficult entity to treat requiring repeated and multiple drainage procedures. Endoscopic
fenestration, septostomy, endoscopic third ventriculostomy and external diversions are frequently necessary. Ventriculo-peritoneal shunts are commonly done for hydrocephalus in children, but with peritoneal complications at times, conversion to ventriculo-atrial or ventriculo pleural is required. Pleuro-peritoneal shunt (PPS) may be the only solution in recurrent and excessive pleural effusion especially in children. This has not been reported in literature for hydrocephalus management before.

We report a case of 3 years old boy who developed post-meningitic neonatal hydrocephalus with multiple compartments and sequestrated ventricles. Initial right VP shunt got infected requiring its removal. The left frontal Ommaya reservoir insertion was done for aspiration as well as intraventricular antibiotic instillation. After control of infection a fresh Ventriculo-peritoneal shunt and later endoscopic septostomy was done. The child subsequently developed perforation of small intestine and peritonitis requiring shunt exteriorization and re-insertion after control of infection. The VP shunt malfunctioned for which a ventriculo-pleural shunt was performed, which worked satisfactorily for some time but child frequently developed excessive pleural effusion requiring frequent aspirations. A pleuro-peritoneal shunt was performed to tackle the excessive CSF collection in the pleural cavity.

The child remains well after more than a year after the procedure and the follow up chest X-ray shows no pleural effusion confirming the effectiveness of the PPS.

**PBS-003: Paediatric Spinal Angiolipoma: A Case Report**

Dr. Ganesh Divakar

1) SCTIMST, Kerala, India

Spinal epidural angiolipomas are benign tumours composed of mature lipocytes admixed with abnormal blood vessels. Angiolipomas are almost always located subcutaneously in trunk or limbs. The etiology and pathogenesis of spinal angiolipomas remain uncertain, and it is a cause of spinal cord compression. Magnetic resonance imaging is the most important neuro-radiological examination; histopathologic examination is required to confirm the diagnosis. Surgery is the treatment of choice. They are very rare in paediatric population and only six such cases have been reported in literature till date. We report a case of dorsal epidural angiolipoma in a 2-year-old female child who presented with paraparesis and bladder incontinence for 2 months and was diagnosed to have D4-D10 epidural angiolipoma. Laminotomy and total surgical excision of the highly vascular lesion was done. The pathology of cord compression and operative nuances unique to such a rare lesion are being described. Her paraparesis gradually improved. We think that paraparesis due to spinal cord compression caused by angiolipoma has a very favorable outcome following timely surgery.

**PBS-004: Spontaneous Resolution of Cerebral Convexity Arachnoid Cyst: A Case Report**

Dr. Munghate Anand Mansaram, Dr. Mastan Reddy, Dr. P. Devi

1) Osmania Medical College, Hyderabad, India

**Introduction:** Intracranial arachnoid cysts represent about 1% of intracranial space-occupying lesions but the natural history, clinical features and treatment of intracranial arachnoid cysts are not fully understood. They are commonly considered as congenital, benign extra axial anomalies due to aberration of development of meningeal membranes. Spontaneous disappearances of ACs are a rare but known event.

**Case Report:** A six-year-old girl previously healthy presented with history of 3 episodes of seizures in December 2016. Patient was evaluated with GCS E4V5M6 and no any neurological deficits with focal seizures in right upper limb. Cranial CT was then performed, an evidence of 38 x 36 mm well defined, non-enhancing hypodense lesion with broad base towards dura causing buckling of underlying cortex in right frontal region. MRI was showing the lesion followed CSF signal intensity on T1, T2 image with no significant restriction on DWI suggestive of arachnoid cyst. The child underwent follow-up in the outpatient manifestations. A routine follow-up CT, performed on May 2019 revealed that the AC had completely regressed.

**Conclusion:** Spontaneous resolution of arachnoid cysts may more common than reported in the literatures. The rate of spontaneous resolution may be affected by the aggressive application of surgical intervention. The time lapse between the initial diagnosis and spontaneous resolution ranged between few days to several years. We believe that the use of surgery should be limited to patients with unequivocal compression of neural structures or symptoms that can be attributed to the location of intra cranial arachnoid cysts.

**PBS-005: Survival in a Child after Cerebrocirculatory Arrest due to Post-traumatic Severe Intracranial Hypertension**

Dr. K. Sridhar, Dr. Ponniah V.

1) MGM Healthcare, Chennai, India

TCD evidence of Cerebral Circulatory Arrest (CCA) has been validated as one of the ancillary indicators of brain death. There are no reports in literature of survival after CCA in a post-trauma scenario in children. The authors present a rare case of a child who survived and showed good neurology despite CCA. An 18 months boy fell from a height of about 16 feet. The CT scan showed multiple fractures of the skull and a high left parietal acute subdural hematoma with no mass effect. On arrival the child was in status epilepticus and hence intubated. CT scan did not show any fresh changes. Coagulopathy was noted and corrected. There was absence of motor response on withdrawal of sedation. TCD showed high resistant flow pattern, absent diastolic flow
RS-001: Response Evaluation Post Radiosurgery for Spinal Oligometas using Metabolic Imaging

Dr. Vangipuram Radha Krishna Gowri Shankar*, Dr. Ashish Bhangar, Dr. Hirak Vyas, Dr. Bhavya Patneedi
1) HCG Cancer, Mumbai, India

Objective: Spinal Radiosurgery causes indirect cell kill through (1) Vascular Apoptosis - starts few hours after treatment & peaks around 3rd day (2) Immunological Alteration in the host tumour microenvironment. Present study evaluated the clinico-radiobiologic response of single or multi fraction spine SBRT post treatment for spinal oligometastases with serial FDG PET CT scans.

Materials/Methods: 5 patients with localised spinal oligo metasteses were included in proof of concept study. All patients underwent S board rigid fixation / body fix immobilization, advanced image guidance using 6 DOF corrections on C arm Linac & doses used were 16 / 1 Frc or 24/3 Frc. All patients underwent limited metabolic imaging Pre treatment and Post treatment PET CT scans upto 3mo. Post SBRT serial PET CT scans were timed serially at 48hrs, 10 days, 30 days and 60 and 90 days post treatment. Parameters analysed pre and post treatment maximum standardized uptake value (m SUV) of the lesion, including “complete resolution” of FDG avidity & Corresponding Morphologic changes

Results: All the 5 patients showed nearly consistent serial regression patterns in metabolic activity posttreatment. The observed metabolic regression was between 60% 65% (median 50%) 48hrs after treatment, 70% metabolic regression (median - 70%) was observed 10 days post treatment. At 3rd month 4 out of 5 pts had FDG non Avid disease.

Conclusion: Early metabolic response post Spine SBRT was seen at 48 hours post treatment & maximum metabolic response seen at 3mo. post SBRT. This is the first study reported in literature.

* * * * *

SB-001: A Rare Case of an Optic Pathway Ganglioglioma

Dr. Krishna Banshi Shroff1#, Dr. Chandrashekhar Eknath Deopujari1
1) Bombay Hospital, Mumbai, India

Gangliogliomas, although relatively rare, are the most frequently occurring mixed glioneuronal tumours of the CNS. Their incidence ranges from 0.4% to 1.3% of all brain tumours, but they are more common in the paediatric group, with an incidence of 7.6%. The temporal lobes are the most common site, but gangliogliomas can occur anywhere in the central neuraxis, including the brain stem and spinal cord. The optic pathway is a very rare location for gangliogliomas, with less than 23 cases reported in the literature. Location in the optic pathway and functional visual status help determine the radicality of resection and the visual prognosis.

We present an account of how a young girl who was initially thought to have a craniopharyngioma (based on her clinical presentation and imaging) was taken up for surgery and it was her intraoperative findings which raised doubts on the diagnosis and histopathology confirmed the diagnosis of optic pathway ganglioglioma.

* * * * *

SB-002: A Series of Postoperative Complications in a Large Atypical Anaplastic Meningioma - A Case Report

Dr. Sheena Ali1#, Dr. Suresh Jayabalani1, Dr. Baskar P., Dr. Rajendran K.1, Dr. Ashwath D. 1
1) Kovai Medical Centre and Hospital, Tamil Nadu, India

Abstract: Meningiomas account for approximately 1/3rd of primary central nervous system tumors, while mostly benign; 1-3% displays anaplastic features. Management requires a careful balance between definitive and avoidance of neurologic damage. Patient specific factors, tumour location and histopathology are important in determining optimal treatment.

A 14 year old girl with a known seizure disorder case since 2 years of age, presented with a week’s history of headache and vomiting. Her last seizures were 3 days prior. She presented with GCS 14 with equally reacting pupils, no vision, slow slurred speech and left hemiparesis. Her MRI brain was suggestive of a large lobulated extra axial heterogenous mass in right frontal region with elevated CBV and choline.

A preoperative embolization was done followed by a right craniotomy with excision of large SOL with periosteal duroplasty and ACF repair. An episode of cardiac arrest on postoperative day 1, followed by a series of recurrent flap necrosis, cerebral abscesses and CSF leaks, resulted in the child enduring a prolonged hospital stay and multiple revision neurosurgical and plastic surgeries. Her histopathology showed WHO grade II anaplastic atypical meningioma. She was discharged after 45 days of hospital stay with GCS 15, intact vision, ambulatory with minimal neurodeficits.
This challenging case had multiple repercussions following each intervention which were difficult to manage. This ordeal could’ve been prevented with close neuromonitoring and frequent radiological screenings. The embolization that helped intraoperatively for the large tumors excision had its disadvantages of skin, periosteum necrosis and infections. Ultimately it was the combined efforts of the Neurosurgeons and Plastic surgeons in a tertiary care center that helped salvage her from the challenges of nosocomial infections and multi drug resistant infections.

**SB-003:** Endoscopic Excision of Juvenile Naso-Orbital Psammomatous Ossifying Fibroma “Look Before You Leap - A Case Report”

Dr. Raghavendra M.1#, Dr. Awadesh Kumar Jaiswal1, Dr. Ravi Shankar Manoharan

1) SGPGIMS, Lucknow, India

- 10 year old male child with chief complaints
- Right nasal obstruction x 5 months
- Right eye proptosis with redness x 5 months

On Examination
- Right VA-1/60, Left VA-6/6
- Right eye exposure kerato-conjunctivitis
  - Underwent complete endoscopic endonasal uninostril approach near total excision
  - Benign aggressive tumour of maxillo-facial bones with tendency to recur mimicking malignant tumour
  - Good prognosis with 30-50% recurrence rate

**SB-004:** Isolated Trochlear Nerve Schwannoma – Case Report and Review of Literature

Dr. Ranjit Devidas Rangnekar1#, Dr. Vivek Agrawal1

1) Sir H. N. Reliance Foundation Hospital, Mumbai, India

**Aim:** The aim of this poster is to report a rare case of Trochlear Nerve Schwannoma and describe the imaging diagnosis, clinical presentation and surgical management along with reviewing previously published accounts of this uncommon tumour.

**Method:** A 66-year-old female presented with giddiness and headache since 1 week and right side cerebellar signs on examination. Imaging was suggestive of a large right sided CP angle-medial infratentorial lesion. A lateral sub-occipital craniotomy and supracerebellar infratentorial approach under cranial nerve monitoring was used. Intraoperatively the lesion was identified to be a cisternal variant of trochlear schwannoma and microsurgical gross total excision was performed. Histopathology was suggestive of schwannoma grade 1. Post-operative imaging did not show any residual lesion and the patient had an uneventful follow up.

**Conclusion:** Majority of the cases of Trochlear Schwannomas are diagnosed intraoperatively, the signs and symptoms often overlap lesions of surrounding structures. Multidisciplinary approach based on location, size and presentation is recommended. Both Microsurgical excision as well as SRS can achieve good outcome.

**SB-005:** A Rare Case of Intramedullary Spinal Cord Lipoma at the Cervicomedullary Junction

Dr. Raghuram Teja1#, Prof. A. Mastan Reddy1, Dr. Venu Gopal1

1) Osmania Medical College, Hyderabad, India

**Introduction:** Spinal cord lipomas are rare lesions that constitute less than 1% of all intraspinal tumors. Most spinal cord lipomas are associated with spinal dysraphism and patients with dysraphism usually have sacral or lumbosacral defects that communicate with a subcutaneous lipoma.

**Case Report:** We present a large cervicomedullary intramedullary lipoma in a 18 months old boy, who presented with spastic quadraparesis and exaggerated reflexes. MRI revealed an intramedullary lipoma extending from the craniovertebral junction to the sixth cervical vertebra. There was no spinal dysraphism. The patient underwent posterior fossa decompression with C1 to C7 laminotomy followed by subtotal excision of spinal intramedullary lipoma and primary dural closure was performed. The surgery produced an improvement in the patient’s condition.

**Conclusion:** Spinal cord lipomas are rare lesions. We present a rare case of cervicomedullary spinal cord lipoma and its surgical management.

**SB-006:** A Rare Case of Primary Diffuse Non-Hodgkin’s Lymphoma in Sphenoid Sinus presenting as Third Cranial Nerve Palsy

Dr. Prof. Dhiman Chowdhury1#, Dr. Bipin Kumar Chaurasia1

1) Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

**Background / Objective:** Lymphomas are group of malignant neoplasm having origins from lymphoreticular cells. B cell Non-Hodgkin Lymphoma (B NHL) of sphenoid sinus as primary site for lymphomas are very rare and whenever involves comes usually with ocular manifestations. The proximity of the lesion to optic nerve and cavernous sinus present a high risk of developing unilateral ophthalmoplegia or even blindness. The vast majority of cases of localized sphenoid sinus lymphomas are usually curable to surgery, chemotherapy alone or combination of both, sometimes radiotherapy.
Case Report: We report a case of 58 years old male having headache and gradually developing ptosis in left eye over 15 days. MRI of brain revealed homogeneously enhancing lesion occupying sphenoid sinus, clivus extending towards left cavernous sinus. Gross total resection of tumour was achieved by endoscopic endonasal approach. Histopathology revealed Non-Hodgkin lymphoma. Treatment with R-CHOP regimen following surgery resulted in initiation of improvement of the condition of the patient.

Conclusion: Primary B cell Non-Hodgkin Lymphoma (PBNHL) of the sphenoid sinus is a rare entity which can be perplexing and misleading for a surgeon until the histopathological proof is in hand. Early diagnosis and timely management with close monitoring and follow ups has high potential for cure and longer disease free survival of the BNHL patients.

**SB-007**: Resection of Mid-Third Giant Bifalcine Meningiomas utilising Unilateral Oblique Surgical Trajectory and Falx Window

Dr. Karthigeyan Madhivanan1#, Dr. Rajasekhar R.1, Dr. Salunke P1, Dr. Singh A.1
1) Postgraduate Institute of Medical Education & Research (PGIMER), Chandigarh, India

**Background & Objective**: Usually, meningiomas are excised using the shortest possible trajectory. However, such an approach for mid-third falcine meningiomas endangers the adjoining draining veins and eloquent cortex. A larger size and bilaterality of the tumours adds to the surgical complexity. Herein, we report the surgical nuances and clinical outcome of patients with giant bilateral symmetrical mid-third falcine meningiomas resected through a modified unilateral approach.

**Methods**: The technique was used in 5 patients and the clinico-radiologic details were evaluated at presentation and at the follow-up. The surgical trajectory was dependent on whether the meningiomas were located in the anterior or posterior half of mid-third of Falx. The tumour was excised through an unilateral oblique anterior or posterior trajectory instead of directly working over the draining veins. The Falx was incised to create a surgical window and access the tumour on the contralateral side.

**Results**: In 4 patients, the meningiomas were present in the anterior half. One had tumour in the posterior half of mid-third of Falx. Grade II Simpson excision was achieved in 4 patients. One patient showed small residual tumour and underwent stereotactic radiosurgery. The overall mean follow up was 9.2 months. All the patients had good clinical outcome.

**Conclusions**: Giant bifalcine meningiomas can be safely resected through a unilateral approach. Creating a Falx window helps to remove tumour from contralateral side. An oblique trajectory rather than the widely practised end-on access is likely to minimize the risk of venous and cortical injury.

**SP-001**: Myxopapillary Ependymoma

Dr. Shobhit Chhabra1*, Dr. Ashish Chugh1, Dr. Sarang Gotecha1, Dr. Prashant Punia1
1) Dr. D. Y. Patil Medical College and Research Hospital, Pune, India

**Introduction**: Spinal Intramedullary Ependymomas are very rare slow growing tumours. Histologically they are Grade I neoplasm according to the 2007 WHO classification. Dissemination and metastasis along the cerebrospinal axis and metastasis to distant sites have occasionally been reported. They commonly affect the cervical and thoracic regions. They predominantly affect the younger age group (35 years) with female predilection. They usually manifest with mild clinical symptoms without any objective neurological deficits. Mean duration until diagnosis is approximately 40 months.

**Case**: A 12 year old male child with low backache radiating to both lower limbs, difficulty in walking since 6 months, straining during micturition since 1 month. On examination bilateral lower limb weakness with sacral hypoesthesia was present. MRI findings showed expansible lytic lesion in the sacrum occupying the canal and extending into the sacral foramina causing compression of contained and exiting nerve roots. Lesion appears hyper intense on T2 and hypointense on T1 weighted images. Laminectomy with durotomy and excision of tumour was done. Biopsy showed Myxopapillary Ependymoma (WHO GRADE 1).

**Conclusion**: Lumbar Spinal Intramedullary Ependymomas can mimic ordinary low back pain secondary to lumbar disc herniation. Clinicians need to be sensitive to subtle changes in the clinical presentation. MRI and early neurosurgical intervention is key to achieve best possible outcomes for patients with spinal intramedullary ependymomas. Treatment of choice is surgical excision of as much tumour as possible.

**SP-002**: Clinicoradiological Correlation of Serum Proclacitonin Values in Prolapsed Lumbar-disc Disease

Dr. Piyush Kumar Panchariya1
1) GIPMER, Delhi, India

Low Back Pain (LBP) as a result of prolapsed intervertebral disc is now commonly seen in the younger population as well it may have different mechanism than the elderly. Inflammatory changes may be responsible for this and hence, the role of inflammatory markers including serum pro-calcitonin may be there affecting clinicoradiological profile of patients. A prospective analytical study done from Dec 2017 to Dec 2018 after the due ethical clearance. All patients aged between 18-65 years with lumbar disc herniation on MRI were included in the study. Patients with diagnosed inflammatory diseases, diabetics, other immunocompromised patients, who received intradiscal injections, receiving antibiotic therapy or with history of previous spine trauma or spine surgery were excluded. Overall 68 patients were evaluated. Patients were evaluated clinically,
Investigations are inconclusive. Institutional Experience

Management of Odontoid Fractures: An Institutional Experience

Dr. Nikhil Tadwalkar
1) King George Hospital, Visakhapatnam, India

Abstract: Odontoid fractures occur as a result of trauma to the cervical spine. The most common mechanism of injury is hyperextension of the cervical spine, pushing the head and C1 vertebrae backward. Odontoid fractures account for 10% to 15% of all cervical spine fractures. Fracture of the odontoid process is classified into one of three types which are type I, type II or type III fractures. Of all the types of odontoid fractures, type II is the most common and accounts for over 50% of all odontoid fractures.

Materials & Methods: It is a prospective study of Odontoid fractures presented to our institute. A total of 8 cases were operated between August 2015 to August 2019. All 8 were operated with Transoral-odontoidectomy with posterior occipito-cervical fixation. One case presented with EDH with type II odontoid fracture, for which EDH was operated first and later transoral odontoidectomy with occipitocervical fixation done.

Result: Total 8 cases were operated between age group 16-54. 7 cases were type II and 1 was type III fracture. 6 cases presented with quadriparesis while two patients were neurologically intact. 3 cases presented with AAD and odontoid fracture. One case was initially operated for EDH. There was improvement in the neurological symptoms of 7 patients out of 8.

Conclusion: Conventionally odontoid screw is the procedure of choice for odontoid fracture. However in this study it has been observed that Transoral odontoidectomy with posterior occipitocervical fixation is a safe procedure for traumatic odontoid fracture with good results.

SP-003: Koch’s Disease of the Spine masquerading as Malignancy - A Case Report

Dr. Varun V.¹, Dr. Raj S. Chandran¹, Prof. Rajmohan B. P.¹
1) Government Medical College Hospital, Thiruvananthapuram, Kerala, India

Abstract: Koch’s disease of the spine is a great mimicker presenting in a myriad of ways. It can masquerade as malignancy and confirming the diagnosis can be difficult even with modern imaging and biochemical studies. We report the case of a 20 year old girl with neck pain of 3 months duration and two episodes of hemoptysis, referred to us from outside with imaging showing lung lesion with multiple lytic lesions in the spine diagnosed as metastatic bronchogenic carcinoma. Repeated bronchoscopic biopsy yielded inconclusive results. CT guided biopsy of lung lesion was negative for malignancy. She was started empirically on ATT and steroids. At presentation, she had neck tenderness but had no neurological deficits. ESR was elevated but sputum AFB was negative. Bone scan revealed multiple areas of enhanced uptake throughout the spine, calvarium and pelvis. MRI of spine revealed multiple lytic lesions in vertebral column with destruction of D7 vertebral body. Patient underwent biopsy with C7 corpectomy & C6-D1 fixation with interbody expandable cage. Post-op period was uneventful. Patient was started on antibiotics. AFB stain was negative. CBNAAT was positive while other bacterial cultures were sterile. Biopsy was reported as granulomatous lesion. Patient was sent home on ATT and steroids while other antibiotics were stopped. Patient was kept on follow up and later her cultures taken from the lytic bone lesion showed growth of Mycobacterium tuberculosis. Hence, we need to have a high index of suspicion of Koch’s disease in patients in whom diagnostic investigations are inconclusive.

SP-005: Multiple Cerebral Cavernous Malformations with Intramedullary Spinal Cavernoma: A Rare Entity

Dr. Vikas Maheshwari¹, Dr. Sanjay Kumar¹, Dr. Rohit Pandey¹
1) AFMC, Pune, India

Abstract: Cerebral Cavernous Malformation (CCM) is vascular malformation in the brain and spinal cord. The Familial form of CCM (FCCM) is uncommon. This autosomal dominant syndrome presents with seizures or focal neurological symptoms. A 10-year-old boy, known case of multiple cerebral cavernomas was operated 5 years ago for frontal cavernoma, now presented with sudden onset and progressive weakness of four limbs. Clinical features were suggestive of high cervical cord compressive myelopathy. MRI Cervical Spine showed cervical intramedullary lesion (C3-C5) along with another lesion at C7-D1 suggestive of cavernomatous malformation. MRI Brain showed multiple cerebral cavernous malformations. Patient underwent C3-C5 laminectomy plus C7 laminectomy along with microsurgical complete evacuation of cavernoma. Post-operatively his power increased from 2/5 to 4/5 (MRC grade). Histopathology (HPE) was consistent with vascular cavernous malformation.

Intramedullary Spinal Cavernoma (ISC) is a rare entity accounting for 5-12% of all spinal vascular pathologies. Microsurgical treatment and
complete excision without further neurological deterioration is the mainstay of treatment. A thorough imaging of entire neuraxis is essential for both diagnosis and prognostication.

**Key words:** Intramedullary Spinal Cavernoma (ISC), Familial Cerebral Cavernous Malformation (FCCM)

**SP-006:** Spinal Epidural Abscess in a case of Extensive Spinal and Paraspinal Hydatidosis - Superinfection or Unfortunate Coincidence?

Dr. Vasundhara S. Rangan1, Dr. Vijayasaradhi Mudumba1, Dr. Rajesh Alugolu1
1) Nizam’s Institute of Medical Sciences, Hyderabad, India

**Abstract:** Spine, although an extremely rare location for the occurrence of hydatid cysts, houses about 50 percent of all lesions affecting the skeletal system. This report describes a rare case of extensive lumbosacral spinal hydatidosis with involvement of paraspinal musculature and presenting with progressive paraparesis. Patient reported remote past history of lumbar spinal surgery, although details remain unavailable. Cysts were noted studding the spine from D12 to L5 levels and involving presacral region and bilateral iliopsoas muscles. One spinal lesion which was radiologically distinct from the other cysts and appearing to be the main cause of lower thoracic cord compression turned out to be an epidural abscess. PAIR therapy for the largest paraspinal mass, surgery to posteriorly decompress the neural elements by excising the dorsal midline spinal lesions along with adjacent albendazole therapy was undertaken. Satisfactory post-operative outcome with improvement in patient’s lower limb power was noted without any complications.

**SP-007:** Primary Ewing’s Sarcoma of the Spine - A Diagnostic Dilemma

Dr. Biswaranjan Nayak1
1) AMRI Hospital, Bhubaneswar, India

Primary sarcomas of the spine are a rare entity. Primary malignant sarcomas of the spine are rare and they account for only 3.5%–14.9% of all primary bone sarcomas. Studies have found incidence of Ewing’s sarcoma of 3.5% for the whole spine and 0.9% for the nonsacral spine. Neurological symptoms appear depending upon the location of the disease. This report describes a case of 13 year old female presented to us as acute onset paraplegia with urinary retention and previously misdiagnosed as a case of tuberculosis of spine with ongoing antitubercular treatment for 2 months. Decompression of the spine and histopathological and immunohistochemical analysis confirmed the diagnosis of Ewing’s sarcoma of spine at the D12-L1 level.

**SP-008:** Single level Ossified Ligamentum Flavum causing Holocaudal Syrinx

Dr. Dushyant Kashyap1, Dr. Ashish Chugh2, Dr. Sarang Gotecha3, Dr. Prashant Punia4
1) D.Y. Patil Hospital College and Research Centre, Pune, India

**Introduction:** Ossified Ligamentum Flavum (OLF) was first described by Polgär, since it’s reporting it has been found to present with insidious onset and long standing myelo-radiculopathy of the thoracic cord. The pathogenic mechanism and natural history still remain poorly understood. Whole spine MRI or CT often reveals incidental lesions of OLF or tandem ossified lesions in association with OLF. Thoracic OLFs are usually accompanied with degenerative changes. Syringomyelia is rarely associated with degenerative spinal disorders. Holocord syringomyelia due to single level Ossified Ligamentum Flavum is even rarer. It might develop due to craniospinal pressure dissociation caused by focal compression of dural sac from extradural degenerative changes.

**Case:** A 34 year old female presented with symptoms of low backache and paresthesia of the b/l lower limbs. Lower limb spasticity was present with exaggerated jerks on 1st presentation. On 10 month follow-up she was unable to walk with increased spasticity and further exaggeration of jerks. MRI showed features of ossified ligamentum flavum with holocaudal syrinx. Patient underwent laminectomy and hypertrophied ligamentum flavum excision. Postoperatively, she showed neurological improvement after 1 month.

**Conclusion:** The rarity of the case and its atypical delayed presentation is what made us present this case.

**SP-009:** Spinal Extradural Arachnoid Cyst - A Rare Cause of Compressive Myelopathy!

Dr. Arun Kumar M. A.1, Dr. Anantha Kishan1, Dr. Sandeep B.V.1, Dr. Manpreet Singh Banga1, Dr. Rajesh Babu D.1
1) Vyddehi Institute of Medical Sciences, Bangalore, India

**Introduction:** Spinal Extradural Arachnoid Cysts (SEACs) are a rare entity which can cause cord compression. Etiology is unknown, though it maybe congenital or following trauma or infection. Various theories of its pathogenesis have been postulated. Thoracic spine is most commonly affected though it can occur anywhere in the spine. Patients present with paraparesis and back pain and myelopathic features. Surgical excision is the mainstay of treatment.

**Case Report:** We present a case of a 47-year old female who came with back ache, progressive weakness of both lower limbs and urinary incontinence since 2 years. On examination, she had spastic paraparesis with brisk reflexes and sensory level below D10. Radiological imaging showed T1 hypointense, T2 hyperintense, non-contrast enhancing, well-defined extradural cyst extending from D6-D8 compressing the cord anteriorly. Patient underwent D6-D8 laminectomy, cyst fenestration and decompression followed by

---

**Key words:** Intramedullary Spinal Cavernoma (ISC), Familial Cerebral Cavernous Malformation (FCCM)

**SP-006:** Spinal Epidural Abscess in a case of Extensive Spinal and Paraspinal Hydatidosis - Superinfection or Unfortunate Coincidence?

Dr. Vasundhara S. Rangan1, Dr. Vijayasaradhi Mudumba1, Dr. Rajesh Alugolu1
1) Nizam’s Institute of Medical Sciences, Hyderabad, India

**Abstract:** Spine, although an extremely rare location for the occurrence of hydatid cysts, houses about 50 percent of all lesions affecting the skeletal system. This report describes a rare case of extensive lumbosacral spinal hydatidosis with involvement of paraspinal musculature and presenting with progressive paraparesis. Patient reported remote past history of lumbar spinal surgery, although details remain unavailable. Cysts were noted studding the spine from D12 to L5 levels and involving presacral region and bilateral iliopsoas muscles. One spinal lesion which was radiologically distinct from the other cysts and appearing to be the main cause of lower thoracic cord compression turned out to be an epidural abscess. PAIR therapy for the largest paraspinal mass, surgery to posteriorly decompress the neural elements by excising the dorsal midline spinal lesions along with adjacent albendazole therapy was undertaken. Satisfactory post-operative outcome with improvement in patient’s lower limb power was noted without any complications.

**SP-007:** Primary Ewing’s Sarcoma of the Spine - A Diagnostic Dilemma

Dr. Biswaranjan Nayak1
1) AMRI Hospital, Bhubaneswar, India

Primary sarcomas of the spine are a rare entity. Primary malignant sarcomas of the spine are rare and they account for only 3.5%–14.9% of all primary bone sarcomas. Studies have found incidence of Ewing’s sarcoma of 3.5% for the whole spine and 0.9% for the nonsacral spine. Neurological symptoms appear depending upon the location of neurological compression though this may be delayed till the late stages of the disease. We present a case report of 13 year old female presented to us as acute onset paraplegia with urinary retention and previously misdiagnosed as a case of tuberculosis of spine with ongoing antitubercular treatment for 2 months. Decompression of the spine and histopathological and immunohistochemical analysis confirmed the diagnosis of Ewing’s sarcoma of spine at the D12-L1 level.

**SP-008:** Single level Ossified Ligamentum Flavum causing Holocaudal Syrinx

Dr. Dushyant Kashyap1, Dr. Ashish Chugh2, Dr. Sarang Gotecha3, Dr. Prashant Punia4
1) D.Y. Patil Hospital College and Research Centre, Pune, India

**Introduction:** Ossified Ligamentum Flavum (OLF) was first described by Polgär, since it’s reporting it has been found to present with insidious onset and long standing myelo-radiculopathy of the thoracic cord. The pathogenic mechanism and natural history still remain poorly understood. Whole spine MRI or CT often reveals incidental lesions of OLF or tandem ossified lesions in association with OLF. Thoracic OLFs are usually accompanied with degenerative changes. Syringomyelia is rarely associated with degenerative spinal disorders. Holocord syringomyelia due to single level Ossified Ligamentum Flavum is even rarer. It might develop due to craniospinal pressure dissociation caused by focal compression of dural sac from extradural degenerative changes.

**Case:** A 34 year old female presented with symptoms of low backache and paresthesia of the b/l lower limbs. Lower limb spasticity was present with exaggerated jerks on 1st presentation. On 10 month follow-up she was unable to walk with increased spasticity and further exaggeration of jerks. MRI showed features of ossified ligamentum flavum with holocaudal syrinx. Patient underwent laminectomy and hypertrophied ligamentum flavum excision. Postoperatively, she showed neurological improvement after 1 month.

**Conclusion:** The rarity of the case and its atypical delayed presentation is what made us present this case.

**SP-009:** Spinal Extradural Arachnoid Cyst - A Rare Cause of Compressive Myelopathy!

Dr. Arun Kumar M. A.1, Dr. Anantha Kishan1, Dr. Sandeep B.V.1, Dr. Manpreet Singh Banga1, Dr. Rajesh Babu D.1
1) Vyddehi Institute of Medical Sciences, Bangalore, India

**Introduction:** Spinal Extradural Arachnoid Cysts (SEACs) are a rare entity which can cause cord compression. Etiology is unknown, though it maybe congenital or following trauma or infection. Various theories of its pathogenesis have been postulated. Thoracic spine is most commonly affected though it can occur anywhere in the spine. Patients present with paraparesis and back pain and myelopathic features. Surgical excision is the mainstay of treatment.

**Case Report:** We present a case of a 47-year old female who came with back ache, progressive weakness of both lower limbs and urinary incontinence since 2 years. On examination, she had spastic paraparesis with brisk reflexes and sensory level below D10. Radiological imaging showed T1 hypointense, T2 hyperintense, non-contrast enhancing, well-defined extradural cyst extending from D6-D8 compressing the cord anteriorly. Patient underwent D6-D8 laminectomy, cyst fenestration and decompression followed by
complete cyst excision. No intradural communication was noted. Histopathology of cyst wall showed flattened meningothelial cells consistent with an arachnoid cyst. Patient’s neurological status improved post-operatively and could walk with support, and is currently in follow-up with us.

**Conclusion:** SEACs are a rare entity and can be easily misdiagnosed. There is no consensus regarding standard treatment. While asymptomatic patients can be observed, in symptomatic patients complete surgical excision with repair of dural defect, if any, shows promising results.

* * * * *

**SP-010: Intraoperatively Nerve Monitoring in Treating Spine Tumours**

Dr. Nishanthi Apparow*, Dr. Anantha Kumar Vadiveloo1, Dr. Vinodh Vayara Perumal1, Mr. Pulivendhan Sellamuthu2
1) Hospital Queen Elizabeth, Kota Kinabalu, Sabah, Malaysia

**Background:** Spine tumours possess high morbidity and poor patient outcome due to the complexity of its presentation. Types of tumours are Intradural Extramedullary (IDEM), Intradural Intramedullary (IDIM) and Extradural (ED)

**Objective:** A review on the requirement of Intraoperative Nerve Monitoring (IONM) in treating spinal tumours.

**Methods:** All the patients with spine tumours admitted in Department of Neurosurgery, Hospital Queen Elizabeth II between 1st of April, 2015 till 31st March, 2018 were included. Patients’ records were reviewed and analyzed for the usage of IONM and patient outcome. Due to departmental financial burden, IONM is only used for IDIM tumour if the patient can bear the cost.

**Results:** A total of 56 patients with spine tumours were operated and out of this, 6 patients required the usage on IONM. 36 patients presented with IDEM tumours, 12 with ED tumours and 8 with IDIM tumours. All 6 patients with IONM usage had better Glasgow outcome score compared to patients without IONM. As for the IDEM and ED tumour patients, all had good recovery without the usage of IONM.

**Conclusions:** IONM have proven to be beneficial in the surgical removal of IDIM tumours of the spinal cord although its considered a challenge and believed to carry a significant risk for surgical damage. As for IDEM and ED tumours, a thorough knowledge of surgical anatomy is adequate for a good surgical outcome. This helps reduce the financial burden of requiring an IONM for every spine tumour cases which is unnecessary.

* * * * *

**SP-011: The WEDGE Technique for Basilar Invagination Realignment**

Dr. Sushil Patkar*
1) Poona Hospital & Research Center, Pune, India

**Introduction:** Basilar Invagination (BI) needs surgery if patient is symptomatic. The symptoms and signs in many patients are a result of upward migrated and maligned odontoid with fixed or mobile atlantoaxial instability. Posterior distraction and fixation of the atlantoaxial joints has evolved to become a standard of care but has some inherent morbidity. (1, 2)

**Objective:** To propose that “Unilateral anterior submandibular retropharyngeal approach” with customized “Wedge” shaped titanium cages inserted into both atlantoaxial joints and anterior atlantoaxial fixation with plate screw construct is a safer and easier option in many cases of BI (3, 4).

**Material & Methods:** Since February 2014 till Feb 2019, 52 patients (Between 15 - 78 yrs) 40 males and 12 females with symptomatic BI with atlantoaxial dislocation and minimal sagittal facetal inclination and only mild Chiari malformation without syringomyelia were offered anterior submandibular retropharyngeal atlantoaxial distraction fixation surgery.

**Results:** Neurological improvement has occurred in 80 percent of patients and 20 percent remained unchanged neurologically, no patient worsened. No major complication or mortality.

**Conclusion:** In properly selected cases of symptomatic BI anterior wedge cage distraction with anterior atlantoaxial fixation is a safe and simple option.

* * * * *

**SP-012: Comparative Outcome Analysis of Cervical OPLL Management by Decompressive Laminectomy with and without fusion**

Dr. Hanuma Naik Banavath*, Dr. V. V. Ramesh Chandra1, Dr. B. C. M. Prasad1
1) SVIMS, Andhra Pradesh, India

**Introduction:** OPLL (Ossified Posterior Longitudinal Ligament) is a multifactorial condition caused by ectopic hyperostosis and calcification of the posterior longitudinal ligament. Familial inheritance and genetic factors have been implicated in the etiology of OPLL. The cervical spine is most commonly affected followed by the thoracic spine. The clinical manifestations range from asymptomatic to myelopathy or myeloradiculopathy. There are multiple options for managing cervical OPLL.

**Aims & Objectives:** This study aims to compare the outcomes of decompressive laminectomy with or without fusion in the management of cervical OPLL.

**Materials & Methods:** Patients with cervical OPLL who underwent decompressive laminectomy with or without fusion from 2007 to 2018 at SVIMS, Tirupati were included. They underwent detailed clinical and radiological evaluation. They were evaluated post operatively also. Demographic data, clinical and radiological outcomes were compared.

**Results:** Total 165 patients with cervical OPLL with posterior decompressive laminectomy were studied. Out of these 24 underwent
decompressive laminectomy with fusion. There is significant improvement in clinical and radiological features in both these groups. **Conclusions:** Decompressive laminectomy is a safe and preferred management option in the management of OPLL when two or more levels were involved. Fusion is preferred when three or more consecutive levels were needed decompression.

**SP-013: Free Hand Instrumentation for Spine Fixation: Challenges and Benefits**

Prof. Amit Thapa

1) Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal

**Objective:** Instrumentations are routinely done under image or fluoroscopic guidance however this entails lot of fluoroscopic or radiation exposures and also increases the time for screw placement. Besides unless real time evaluation is possible, this method is not fully reliable. To overcome this problem, we practice surface landmark based free hand instrumentation for spine fixation and discuss the challenges and benefits of the same.

**Methods:** We retrospectively studied the patients undergoing posterior spinal fixation during the last 6 years. Only patients who could be studied for over a year were included in the study. Patients with previous instrumentations were excluded. Endpoints studied were mal-position of screws, instrumentation pull out or fractures and fresh neurological deficits.

**Results:** Of the total 70 patients who underwent 435 free hand screw placements, 45 had undergone cervical lateral mass screws, 22 dorsal spine pedicle screws, 13 lumbar pedicle screws and 1 sacral screw. 2 patients had vertebral column malignancies, 5 had degenerative listhesis and rest 63 had traumatic conditions. Only 10 screws (2.3%) had mal-position on follow up CT Scans but were limited to Grade II pedicle screw breach with 6 lateral (1.4%) and 4 anterior (0.9%) breaches and were all asymptomatic. With a maximum follow up of 6 years, there were no screw pull out or fracture of construct in the present series. The average duration of screw placement was 3 minutes for lateral mass screw and 4 minutes for pedicle screws as compared to 7 minutes under fluoroscopic guidance. The average fluoroscopic shots in each procedure has been 3.

**Conclusion:** Free hand lateral mass screw placements are possible in cervical spines and pedicle screws in dorso-lumbar spines. These are safe and allow fast placement with minimal fluoroscopic exposures.

**SP-014: Traumatic Dorso-Lumbo-Sacral Spinal Sub-Dural Hemorrhage without Intra-Cranial bleed - A case report and review of literature**

Dr. Saif-Ul-Islam Shaikh

1) AFMC, Pune, India

Spinal sub-dural hemorrhage is known to be a very rare entity. A multitude of etiologies have been associated with spinal subdural hemorrhage including bleeding diatheses, pharmacological anticoagulation, vascular malformations, lumbar puncture, epidural anesthesia and spinal surgery. Of particular interest, traumatic sub-dural hemorrhage is extremely rare. Only 14 cases have been reported in literature of traumatic spinal sub-dural hemorrhage (TSSDH). Definitive pathophysiological mechanism remains unclear although theoretical explanations have been proposed. Due to unclear pathophysiology and rare incidence, universally accepted management guidelines are not available. We report an interesting 15th overall case of TSSDH and only the second case of extensive traumatic sub-dural hemorrhage from dorsal to sacral spine and first case that has been managed with expansive laminoplasty with durotomy for neural decompression and hematoma evacuation.
SOCIETY OF INDIAN NEUROSCIENCE NURSES (SINNCON)

DAY 1: DECEMBER 4, 2019
Pre-Conference Workshop
Venue: J. J. Hospital, Mumbai

08.00 - 08.30  Registration
08.30 - 09.00  Inauguration
09.00 - 09.45  Neurological Assessment and Monitoring: Angela Gnanadurai, Rebecca Sumathibhai
09.45 - 10.30  Evidence based Nursing Practice in Neuro Critical Care: Jaya Kuruvilla

09.45 - 10.45  Tea Break
10.45 - 11.30  Neuro Trauma: Initial Assessment and Management: Manju Dhandapani
11.30 - 12.15  Hyperbaric Oxygen Therapy: Deepak Palande
12.15 - 13.00  Advances in Intracranial stereotactic radiosurgery: Manish
13.00 - 14.00  Lunch
14.00 - 15.00  Quality Assurance in Neuro Nursing Education and Practice: Phalakshi Manjrekar
15.00 - 16.30  Hands-On Session
    Station 1: Neuro Assessment: Angela Gnanadurai
    Station 2: Novel Advanced Procedures in Neuro Nursing: Dhanalakshmi
      a) PFO Closure for Prevention of Stroke
      b) Pupillometry
      c) Phlebotomy using port
    Station 3: Care during advanced Neuro Nursing procedures: Vishal Nikam
      a) Extra-ventricular Drainage & ICP monitoring Lumbar Drainage
      b) Handling and maintaining Endoscope, Neuro drills, CUSA

16.30 pm onwards  Valedictory Function
TIME: 07.30 - 08.30

HALL F

Session 1: Free Paper Presentation

Chairpersons: Deborah

- 07.00 - 07.30 Conference Registration
- 07.30 - 07.40 Pediatric Neurorehabilitation: A module on finding and filling the gaps: Angela Gnanadurai
- 07.40 - 07.50 Case report of a Patient with Meningoencephalitis: Laisa Kumar
- 07.50 - 08.00 Factors influencing the Development of Infection and Mortality among Post-operative Neurosurgery patients: A prospective study: Hemlata
- 08.00 - 08.10 A randomized control trial to assess the effectiveness of “Nurse led brief intervention for post-operative patients with Intracranial Tumor and their Caregivers” on behavioural symptoms of patients and distress among caregivers: Divya Thakur
- 08.10 - 08.20 Factors Influencing Quality of Life Among the Patients of Spinal Cord Injury: Manju Dhandapani
- 08.20 - 08.30 Case study on SSPE (Subacute Sclerosing Pan-Encephalitis): Rathesh Rajan

TIME: 08.30 - 09.00

HALL F

Session 2: Symposium 1 “Transitional Care Strategies in Stroke from Hospital to Home”

Moderator: Manju Dhandapani

Introduction by Moderator

- 08.30 - 08.40 Meeting Nutrition and Hydration needs of Stroke Patients - A review paper: Shani S. D.
- 08.40 - 08.50 Post Stroke Depression and Management: Gopichandran
- 08.50 - 09.00 Continence Assessment and Management in Patients with Stroke: Saramma P. P.
- 08.30 - 08.40 Transitionary Care outcome in Venous Stroke Patients: Priya Baby
- 08.40 - 08.50 Evolution of Stroke Nursing in Hamad University, Qatar: Sujatha
- 08.50 - 09.00 Effective utilization of Rehabilitation in Stroke: Priya Baby

TIME: 09.00 - 10.50

HALL F

Session 3: Special Lecture 1

Chairpersons: Mercy

- 09.00 - 09.40 Advances in Neuro Critical Care: The most essential skill that Neuro ICU Nurses must have: Jaya Kuruvilla
09.40 - 10.20 Multi-disciplinary in-hospital teams improve Patient Outcome: Role of Neuro Nurses in teamwork: Phalaxi Manjurekar

10.20 - 10.50 Update on Acute Stroke Guidelines and Nursing Management

---

**TIME: 10.50 - 11.30**

**HALL F**

Inauguration Function - SINNCON 2019

Chairpersons: Rebecca Sumathibai

10.50 - 11.30 Prayer Song: J. J. Hospital Staff

Welcome Speech: Vishal Nikam (Organizing Secretary)

Presidential Address & Introducing Sehgal Oration Award: Angela Gnanadurai (President, SINN)

Inaugural Address: Ketan Desai (Organizing Secretary, AANSIM 2019)

Guest of Honour Message: Phalakshi Manjrekar (Nursing Director, Hinduja Hospital)

Special Guest Address: Jaya Kuruvilla (Principal Hinduja College of Nursing, Mumbai)

Secretary SINN Report: Manju Dhandapani

Treasurer SINN Report: Laisa Kumar (Treasurer, SINN)

Vote of Thanks: Saramma P. P.

---

**TIME: 11.30 - 11.45**

**HALL F**

Sehgal Oration 2019

Moderator: Shani

11.30 - 11.45 Multidisciplinary Care of Patients with Peripheral Neuropathy: An observation: Mrs. Alice Suresh (Prof. cum Nurse Manager, CMC, Vellore)

---

**TIME: 11.45 - 14.05**

**HALL F**

Session 4: Award Papers Presentation

Chairpersons: Saramma P. P.

11.45 - 11.55 A study to assess the Knowledge about Migraine Headache Prevention and Disability among Migraine Patients: Laksha Sara R. M.

11.55 - 12.05 Factors associated with Burden and Health related Quality of Life in Stroke Caregivers: Neethu Katoria
12.05 - 12.15  A randomized control trial to assess the effectiveness of Cryotherapy on Peri-orbital Edema and Ecchymosis among patients undergoing Supra-tentorial Craniotomy: Poonam Kumar I.

12.15 - 12.25  Mental imagery combined with Adjuvant Therapy improves Dysphagia In Ischemic Stroke Patients: Unnikrishnan S. V.

12.25 - 12.35  A study to assess the effectiveness of Mirror Therapy on Motor Function of affected Upper and Lower Limb in Patients with Stroke: Suchithra P. V.

12.35 - 12.45  Patient Satisfaction with the Quality of Nursing Care: Anjali Devi M.

12.45 - 12.55  Effectiveness of Nurse Led Clinic (NLC) by Neurosurgery Nurse Counsellor (NNC) in OPD on the selected health care parameters among caregivers of patients with TBI: A Quasi – An experimental study: Renu Kumara

12.55 - 13.05  Quality of Life among Post-operative Patients of Cervical Spine disorders, Problems faced by them and Factors affecting their QOL: Pratibha Thakur

13.05 - 13.15  Role of Neuro Nurse in management of Neuro Operation Theatre: Seema Patil

13.15 - 13.25  Understanding the process of Consent taking in Neurosurgery Patients: Neeraj Rai

13.25 - 13.35  Hyponatremia in patients with Traumatic Brain Injury in Tertiary Care Hospital: Karthick G.

13.35 - 13.45  Thrombolysis done in Acute Ischemic Stroke in Tertiary Care Hospital: Seenivasan R.

13.45 - 13.55  Is Consanguinity a risk factor for Neural Tube Defect: Observation in a Tertiary Centre: Rekha Joshi

13.55 - 14.05  Post Traumatic Epilepsy in Traumatic Brain Injury in Tertiary Care Hospital: Vinithra M.

13.30 - 14.00  Lunch

**TIME: 14.05 - 16.35**

**HALL F**

**Session 5: Award / Free Papers Presentation**

**Chairpersons:** Laisa Kumar

14.05 - 14.15  Study of Fear Factors in Neurosurgical Patients: Devmuni Verma

14.15 - 14.25  New Haemostatic Agents - Fancy or Facts: Ritu Tokas

14.25 - 14.35  To evaluate the Role of Scrub Nurse in Intraoperative rupture Aneurysm: Riddhi Mhatre

14.35 - 14.45  A Descriptive study to assess the Incidence of Herpes Simplex Virus Type 1 Infection (HSV TYPE 1) in Neurosurgery Patients: Vaishali Santosh Auti

14.45 - 14.55  A Study to assess the effectiveness of Mechanically assisted Cough Augmentation technique (Mechanical insufflation-exsufflation) for extubation or weaning critically ill patients from Mechanical Ventilation in Neurosurgery patients: Dhanalaxmi Aseervatha Nadar

14.55 - 15.05  Burden among caregivers of adults with Ventriculoperitoneal (VP) shunt: Priyanka Prakash

15.05 - 15.15  Challenge of multi-tasking in Cranio-Vertebral Junction Anomaly Surgery: Mitali Rajan Shelke

15.15 - 15.25  Legal Awareness and Responsibilities of Nursing Staff in Administration of Patient Care in Government Hospital: Vishal Nikam
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.25 - 15.35</td>
<td>To study early diagnosis and prevention of Deep Vein Thrombosis in Pre-operative and Post-operative in Neurosurgical wards: <em>Archana Ubale</em></td>
</tr>
<tr>
<td>15.35 - 15.45</td>
<td>To highlight the Role of Neuro Nurses in Pediatric Neurosurgical Cases: <em>Reva Rupesh Bandarkar</em></td>
</tr>
<tr>
<td>15.45 - 15.55</td>
<td>A Randomized controlled trial to assess the Efficacy of Auditory Stimulation on Selected Parameters of Comatose Patients with Traumatic Brain Injury: <em>Parveen Yadav</em></td>
</tr>
<tr>
<td>15.55 - 16.05</td>
<td>Case Study on Recurrent Frontal Astroblastoma - A rare and challenging tumor: <em>Gracy Varkey</em></td>
</tr>
<tr>
<td>16.05 - 16.15</td>
<td>A study to assess Pre-operative and Post-operative Auditory and Facial Nerve Function in operated case of CP Angle Tumor: <em>Rupali Shingte</em></td>
</tr>
<tr>
<td>16.25 - 16.35</td>
<td>Monofilament testing among patients with Diabetic Peripheral Neuropathy: A Nursing Perspective: <em>Mercy</em></td>
</tr>
</tbody>
</table>

**TIME: 16.35 - 17.35**

**Neuro Quiz**

**Chairpersons:** *Rebecca Sumathibai / Vishal*

All Registered, Life and Annual Members of SINN are encouraged to participate. Excluding the Executive Members of SINN.

**TIME: 17.35 - 18.30**

**Elocution Competition**

**Chairpersons:** *Saramma P. P. & Laisa Kumar*

All Registered, Life and Annual Members of SINN are encouraged to participate. Excluding the Executive Members of SINN.

18.30 - 22.00 AANSIM Inauguration Function, Cultural Programme and Cocktail Dinner
SOCIETY OF INDIAN NEUROSCIENCE NURSES (SINNCON)

DAY 3: DECEMBER 6, 2019
HALL F

Session 8: Posters and Models Presentation (Award/Free)

Chairpersons: Unni Krishnan

07.00 - 07.03  POSTER
Outcomes of Plasmapheresis in Neurological Diseases - A retrospective study in tertiary hospital, New Delhi: Ambili Anuraj

07.03 - 07.06  POSTER
A study to assess the Efficacy of Early Mobilization to sitting in Improving the Functional Outcomes among Traumatic Brain Injury Patients: Dhanlaxmi Aseervatham Nadar

07.06 - 07.09  POSTER
Craniostenosis: Embracing the Nursing Care Challenges: Kaviarasi

07.09 - 07.12  POSTER
Role of Stroke Nurse in Acute Ischemic Stroke: Jeyanthi Joy

07.12 - 07.15  POSTER
Nursing Care of Patients with Status Epilepticus: Uma Mageshwari

07.15 - 07.18  MODEL
Neuro Pediatric Unit Model: Kaviarasi

07.18 - 07.21  MODEL
Basal Skull Fracture: Nursing care: Hepzibha Mari Gold P.

07.21 - 07.24  MODEL
Stroke Unit: Jeyanthi Joy

07.24 - 07.30  Discussion and Questions: Evaluators

HALL F

Session 9: Symposium 2 - Improving Patient Safety in the Neuro Operating Theatre and Perioperative care

Moderator: Shani

07.30 - 07.33  Introduction: Shani

07.33 - 07.43  Neuro OT Techniques: Induction and Craniotomy: Vijaya

07.43 - 07.50  Neuro OT Techniques: Perioperative Care: Saji Gopinath

07.50 - 07.57  Neuro OT Techniques: Equipment Safety and Staffing: Aparna P.S.

07.57 - 08.00  Conclusion: Shani
HALL F

Session 10: Free paper presentation

Chairpersons: Renuka Wankhevd

08.00 - 08.10 Prevention Of DVT among Neurosurgery Patients: Sara Shirley George

08.10 - 08.20 Incidents of Tuberculous Meningitis in Tertiary Care Hospital: S. Lavanya

08.20 - 08.30 Nurse Led Neurosurgery Clinic: From Research To Practice: Manju Dhandapani

08.30 - 08.40 Intra Parenchymal Monitoring ICP monitoring: Our experience: Hepzibha Marigold

08.40 - 08.50 Bickerstaff’s brain stem encephalitis - A case study: Umamageshwari

08.50 - 09.00 Headache among Nursing Staff: Deborah

09.00 - 09.10 Monolament testing among patients with Diabetic Peripheral Neuropathy: A Nursing perspective: Mercy

09.10 - 09.20 Dedication in Nursing Care: Changing Temperaments: Binu Malhothra

09.20 - 09.30 Novel Advance Nursing Practices in Neuroscience Nursing: Contributions to Patient Outcome: Angela Gnanadurai

Display 1: Pupillometer

Display 2: PFO Closure and Stroke Prevention - Interventional Cardiology - Nurses Role

Display 3: Advanced medications/methods used in Neurosciences (eg,) Nymalize (Nimodipin solution), Irrigating drainage system for Integrated ICP Monitoring, Phlebotomy using port

Display 4: RAPID: Most advanced Stroke Imaging

Display 5: Parenchymal ICP Monitoring

09.30 - 10.30 General Body Meeting: Manju Dhandapani (Secretary, SINN)

HALL F

Session 11: Special Lectures 2

Chairperson: Angela Gnanadurai

10.30 - 11.30 Unmet needs of Neurology, Neurosurgery and Neuro Nursing Services in India: A need for an Indian Model for Community Neuro Nursing: Vatsala Sadan

11.30 - 12.30 Empowering Neuro Nurses for building a self-driven quality process and evidence based nursing practices: Premila Lee

12.30 -13.00 Valedictory Function: Vishal Nikam, Laisa Kumar

Prayer: Delegates from CMC, Vellore

Welcome and Introduction of Chief Guest: Angela Gnanadurai (President, SINN)
Chief Guest Address: Muthu Kumar (Hon. Secretary, NSI)

Guest of Honour Speech: Vatsala Sadan (Dean, College of Nursing, CMC, Vellore)

Special Guest Address: Premila Lee (Nursing Superintendent, CMC, Vellore)

Felicitation: Shoba Kardhal (Nursing Director, J. J. Hospital, Mumbai)

Award Distribution: N. Muthukumar (Hon. Secretary, NSI)

Certificates Distribution: Saramma P. P. (Vice President, SINN)

Vote of Thanks: Manju Dhandapani (Secretary, SINN)

13.00 - 14.00 Lunch
14.00 - 15.00 SINN Executive Members Meeting
14.00 - 18.00 Attend Sessions in Neurosurgery Halls
SINNCON: ABSTRACTS
**SINN-001:** A study to assess the Knowledge about migraine headache prevention and disability among migraine patients

Ms. Lakshasarah R. M., Dr. Deepika Cecil Khakha, Dr. Rohit Bhatia

Aim: To establish evidence on the impact of migraine on work productivity and disability due to the migraine and to assess the knowledge regarding migraine headache prevention

Objectives:
1. To assess the impact of migraine on work productivity among migraine patients
2. To assess the level of disability that occurs due to the migraine on the daily activities of the patients
3. To assess the knowledge regarding migraine prevention in migraine patients

**SINN-002:** Meeting Nutrition and hydration needs of stroke patients - A review paper

Dr. Shani S. D.

Background: 49% of stroke patients were dehydrated on admission to stroke unit. On tenth day of admission 26% of stroke patients were found to be malnourished. Nearly 40-50% of stroke patients presents with dysphagia which limits oral intake for few days.

Literature review was undertaken to find out the evidences for meeting nutrition and hydration needs of stroke patients.

**SINN-003:** A randomized control trial to assess the effectiveness of “Nurse Led Brief Intervention for post-operative patients with Intracranial Tumor and their caregivers” on behavioral symptoms of patients and distress among caregivers

Dr. Divya Thakur, Dr. Manju Dhandapani, Dr. Sandhya Ghai, Dr. Manju Mohanty

Background: Behavioral symptoms in post-operative patients with intracranial tumor and distress among their caregivers are common. Nurse-led interventions can be used to help the patients and caregivers to handle the behavioral symptoms thus reducing the distress.

Design: Randomized controlled trial.

Methods: A total of 80 patient caregiver pair were included in the study.

Neuropsychiatric Inventory Questionnaire (NPI-Q) was used to assess the behavioral symptoms in patients and distress among their caregivers at baseline and at one month after providing nurse-led intervention to the experimental group.

**SINN-004:** Factors influencing Quality of Life among the Patients of Spinal Cord Injury

Dr. Manju Dhandapani, Mr. Ashok Kumar, Dr. Dhandapani Sivashanmugam, Dr. Vishal Kumar

Aim: The aim of the study was to assess the Quality of Life (QOL) among the patients of spinal cord injury (SCI).

Methods: Using convenient sampling technique, 121 patients of SCI were enrolled. Ethical clearance was taken from ethical committee and consent was taken from patients. WHO Quality of Life-BREF scale was used to assess QOL.

**SINN-005:** The factors associated with burden and health related quality of life in stroke caregivers

Ms. Neetu Kataria, Dr. Rajesh Kumar, Dr. Sukhpal Kaur, Dr. K. Reddemma

Objectives: To analyse the factors affecting on the burden and health related quality of life in stroke caregivers.

**SINN-006:** A randomized control trial to assess the effectiveness of Cryotherapy on Peri-orbital Edema and Ecchymosis among patients of Supratentorial Craniotomy

Dr. Poonam Kumari, Mrs. Meenakshi Agnihotri

Aim: To assess the effectiveness of cryotherapy on peri-orbital edema and ecchymosis among patients of supra-tentorial craniotomy.

**SINN-007:** Case Study on SSPE (Subacute Sclerosing Pan Encephalitis)

Dr. Rathish Rajan

**SINN-008:** Factors influencing Quality of Life among the Patients of Spinal Cord Injury

Dr. Manju Dhandapani, Mr. Ashok Kumar, Dr. Dhandapani Sivashanmugam, Dr. Vishal Kumar

Aim: The aim of the study was to assess the Quality of Life (QOL) among the patients of spinal cord injury (SCI).

Methods: Using convenient sampling technique, 121 patients of SCI were enrolled. Ethical clearance was taken from ethical committee and consent was taken from patients. WHO Quality of Life-BREF scale was used to assess QOL.
**SINN-008: Prevention of DVT among neurosurgery patients**

Mrs. Sara Sherly George 1
1) SCTIMST, Trivandrum, Kerala, India

Incidence of venous thromboembolism among Neurosurgery patients is very high approximately 23% in the absence of prophylaxis. Weakness or paralysis, surgical position, vascular problems make them prone to develop venous thrombosis. The thrombus can dislodge and occlude vessels causing pulmonary or systemic thromboembolism.

**Methods:** Review of literature was done to develop a protocol for preventing DVT for neurosurgery patients.

---

**SINN-009: Mental imagery combined with adjuvant therapy improves dysphagia in Ischemic, stroke patients**

Mr. Unni Krishnan 1, Dr. Kumkum Ghosh Ishwar 1, Dr. Parthipan Parthipan 1, Prof. Chitra Diwakaran 1, Dr. Dhirja Sharma 1
1) Max Health Care, New Delhi, India
2) NIMHANS, BANGALORE

Stroke is a leading cause of death and disability worldwide and is associated with multiple medical complications leading to prolonged hospital admissions and significant health care costs. Post-stroke dysphagia (PSD) can lead to increased mortality and morbidity to aspiration, pneumonia, and malnutrition. Dysphagia patients are three times, and those with confirmed aspiration eleven times, more likely to develop pneumonia. The main aim of the study is for dysphagia rehabilitation in stroke patients.

**Objective:**

The purpose of the present study is:

To assess the effectiveness of combining mental imagery with speech therapy to improve dysphagia in patients with ischemic stroke.

To assess which assessment tool is a better predictor for dysphagia.

---

**SINN-010: A study to assess the effectiveness of mirror therapy on motor function of affected upper and lower limb in patients with stroke**

Mrs. Suchithra P.V. 1, Mrs. Suchithra P.V.
1) Sree Chitra Tirunal Institute for Medical Sciences & Technology, Kerala, India

The present study was aimed to find out the effectiveness of mirror therapy on motor function of affected upper and lower limb in patients with stroke admitted in a tertiary care hospital. The objectives were to assess the affected upper and lower limb motor function, evaluate the effectiveness of mirror therapy on affected upper and lower limb motor function. True experimental pre test-post test control group design was used. The sample consists of 60 stroke patients and was selected using simple random sampling. The tools used for data collection were the socio personal and clinical data sheet, to collect the socio personal and clinical data, Upper Limb sub scale of Motor Assessment Scale (UL-MAS) to assess the upper limb motor function and Fugl –Meyer subscale of motor assessment to assess the lower limb motor function. Subjects in the control group received routine care and the experimental group received mirror therapy in addition to routine care. After conducting pre test on day after admission mirror therapy was given to the experimental group for 4 weeks.

---

**SINN-011: Continence assessment and management in patients with stroke**

Ms. Saramma P. P. 1
1) Sri Sarada School of Nursing, Sri Ramakrishna Ashrama Charitable Hospital, Thiruvananthapuram, Kerala, India

Urinary incontinence affects around 50% of stroke survivors in the acute phase and adversely affects mortality, disability and rehabilitation outcomes. Incontinence problems seen in patients with stroke include urge incontinence, stress incontinence, or functional incontinence. Assessment of urinary incontinence include fluid intake, bowels, medical history, medications, functional ability, and voiding record to identify all the factors that affect the stroke survivors’ bladder control. Behavioural interventions include bladder training, and pelvic floor muscle training. Toileting assistance programmes such as prompted or timed voiding are designed to minimise incontinence episodes in patients with memory loss or restriction of movement. Habit retraining involves identifying an incontinent person’s toileting pattern and developing an individualised toileting schedule. Bladder Training involves progressively increasing the intervals between voids or asking the patient to delay voiding for a specific time when they experience the need to void.

---

**SINN-012: Case study on Recurrent Frontal Astroblastoma - A rare and challenging tumor**

Mrs. Gracy M. V. 1
1) Sree Chithra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala, India

The clinical, radiological, pathological and therapeutic impact of a recurrent surgery.

Astroblastoma is a controversial and extremely rare central nervous system neoplasm. This case study describes a new case of Astroblastoma.

Patient X, a 34 year old female, with a history of focal seizure in the form of flickering and tremors of the right upper limb, was re-admitted on 10th June 2019. X was operated for left frontal Astroblastoma six times in the last six years. X underwent surgery on 11th June 2019.
**SINN-013: Standard Operational Protocol on Suction Technique**

Dr. Pushpa*, Ms. Pushpa Pushpa*, Ms. Preety Sharma*,
Ms. Rintu Maria*, Mr. Jansher Khan*, Ms. Aneeshya V.*, Mr. Prathhesh P.*
1) All India Institute of Medical Sciences (AIIMS), New Delhi, India

To improve compliance to artificial airway suction technique of nursing officers in ns-4 ward AIIMS, New Delhi, from 45% to 80% within 8 weeks.

**SINN-014: Patient satisfaction with the quality of nursing care**

Dr. Anjali Devi M.*
1) AIIMS, New Delhi, India

To evaluate patient satisfaction on quality of nursing care and examine the associated factors.

**SINN-015: Factors influencing the development of infection and mortality among post-operative neurosurgery patients - A prospective study**

Ms. Hemlata*, Dr. Manju Dhandapani*
1) National Institute of Nursing Education, PGIMER, Chandigarh, India

To assess the risk factors influencing the development of infection and mortality in post-operative neurosurgery patients.

**SINN-016: Case report of a patient with Meningoencephalitis**

Ms. Laisa Kumar*
1) Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST), Thiruvananthapuram, Kerala, India

**Introduction:** Meningoencephalitis is the predominant lesion, with focal accumulations of a mixed inflammatory cell infiltrate in the meninges and brain; caused by virus, bacterium, parasite or other microorganism. Fewer than 1 million cases per year (India); diagnosis by history, lab tests and imaging. Symptoms vary, depending on the case, may include fever, confusion, vomiting, seizures or, if left untreated, death. Treatment may include antibiotics, antivirals or supportive care, depending on the origin of the disease. Methods: Review of medical records and literature review was done to study the nursing care of patient with meningoencephalitis.

**SINN-017: Outcome of Plasmapheresis in Neurological diseases - A retrospective study in tertiary hospital, New Delhi**

Dr. Ambili Anuraj*
1) AIIMS, New Delhi, India

Plasmapheresis is treatment of choice in diseases especially those which are of autoimmune etiology like MG, GBS, NMO, CIPD etc.

To assess the outcome of Plasmapheresis in patients with various neurological diseases.

**SINN-018: Dedication in Nursing Care - Changing temperaments**

Ms. Beena Malhotra*
1) GIPMER, Delhi, India

To analyse factors responsible for decline in nursing profession and possible solution.

**SINN-019: Role of neuro nurse in management of Neuro Operation Theatre**

Mrs. Seema Ajay Patil*
1) Sir J.J. Group of Hospital, Mumbai, India

**Aim:** To qualitatively assess the role of neuro nurse in management of neuro operation theatre to focus on maximizing operational efficiency.

**Introduction:** The role of neuro nurse is important to meet developing needs in neurosurgical management. Operating room management is the science of how to run an operating suite. This paper describes operational efficiency by systematic arrangements, standardization, sterilization and time management discipline.

**Materials & Methods:** Our study constituted 1500 neuro cases in our hospital from April 2018 to July 2019. The act of coordinating and running all parts of the surgical suite to accomplish a defined set of goals. Management of surgical instruments, microscopes, endoscopes, CUSA machines, O. T. Clothes, Disposables. Infection control, effective sterilization and waste management was done as per fixed guidelines.

**SINN-020: Incidence of Tuberculous Meningitis in tertiary care hospital**

Dr. S. Lavanya*, Mrs. S. Lavanya*
1) Neuro Foundation, Sri Ragavendhra Neurocare P. Ltd, Salem, Tamil Nadu, India

**Introduction:** Tuberculosis is a highly prevalent global human infection caused by Mycobacterium tuberculosis. Tuberculous meningitis can
occur as a sole manifestation of Tuberculosis or concurrent with pulmonary or other extra pulmonary sites of infection. Tuberculous Meningitis carries a high mortality and morbidity rate. Early diagnosis, supervised medication administration and supportive care cures Tuberculous Meningitis promptly.

**Aim:** To study the number of patients diagnosed with Tuberculous Meningitis among patients who presented with altered sensorium in a tertiary care hospital.

**Objectives:** We conducted a retrospective study for the past 2 years and 72 patients were included in our study. Trauma cases were excluded. Diagnosis made on clinical, radiological, microbiological and CSF findings.

---

**SINN-021: Hyponatremia in patients with Traumatic Brain Injury in Tertiary Care Hospital**

Dr. Karthick G.¹, Dr. Sekar G.¹
1) Neuro Foundation Hospital, Sri Ragavendhra Neurocare Pvt. Ltd., Salem, Tamil Nadu, India

**Aim:** To categorize the causes and management of hyponatremia in Traumatic Brain Injury in tertiary care hospital

**Objectives:** The most common electrolyte abnormality presented in patients with Traumatic Brain Injury is hyponatremia. The common causes of hyponatremia are Cerebral salt wasting syndrome, Syndrome of Inappropriate Anti-Diuretic Hormone and Osmotic diuresis.

**Methods:** Retrospective study of 24 patients with Traumatic Brain Injury was done for the past 4 months. Laboratory investigations including serum sodium level, osmolality(both urine and blood), spot sodium level, serum uric acid level were used.

---

**SINN-022: Thrombolysis done in Acute Ischaemic Stroke in Tertiary Care Hospital**

Mr. Seenivasan R.¹, Dr. Prabaharan C.¹
1) Neuro Foundation Hospital, Salem, Tamilnadu, India

**Introduction:** Stroke is a neurological illness caused by disruption of blood supply to brain (blockage of blood vessel or hemorrhage). Based on etiology, strokes are classified into ischemic stroke, hemorrhagic stroke, embolic stroke. Symptoms of stroke include limb weakness, loss or slurring of speech, unsteadiness in walking. More importance is given to treatment of ischemic stroke because timely intervention (four and a half hours) of ischemic stroke will reduce mortality and morbidity to great extent. The timely intervention in acute ischemic stroke are Intravenous Thrombolysis and Mechanical Thrombectomy.

**Aim:** To study the etiological classification of stroke, interventions in acute ischemic stroke and the causes for delay in seeking medical treatment in stroke patients.

**Methods:** This is a retrospective study in which patients who were admitted with stroke for past 18 months in tertiary care hospital.

---

**SINN-023: A study to assess the efficacy of early mobilization to sitting in improving the functional outcomes among Traumatic Brain injury Patients**

Dr. Dhanlaxmi Aseervatham Nadar²
1) J. J. Hospital, Mumbai, India

**Aim:** A study to assess the efficacy of early mobilization to sitting in improving the functional outcomes among traumatic brain injury patients

**Objectives:** To find the ideal duration of mobilization which could improve the outcome in traumatic brain injury patients.

To understand the effects of mobilization in improving the arousal of traumatic brain injury patients.

---

**SINN-024: Effectiveness of Nurse Led Clinic (NLC) by Neurosurgery Nurse Counselor (NNC) in OPD on the selected health care parameters among care givers of patients with TBI - A quasi experimental study**

Dr. Renu Kumari¹, Dr. Manju Dhandapani², Dr. S. K. Gupta³
1) PGIMER, Chandigarh, India

**Background:** Many of the patients are discharged from the NSx department with invasive tubings such as tracheostomy, urinarycatheter, Ryles tube etc.. The caregivers are not trained enough to care for their loved ones in an accurate way so as to prevent further complications.

**Aims & Objectives:** Effectiveness of NLC by NNC in OPD on the selected health care parameters among care givers of TBI patients.

**Material & Methods:** 30 caregivers of TBI patients who were followed up in NSx OPD were evaluated on the skill of different tasks involved in caregiving, before and after providing counseling by a NNC. After baseline assessment, counseling and training related to home care was done and procedures were demonstrated to them. Follow up skill assessment was done after 2 months during the follow up.

---

**SINN-025: Is consanguinity a risk factor for neural tube defect? - Observation in a tertiary centre**

Ms. Rekha Joshi¹
1) G. B. Pant Hospital, Delhi, India

Neural tube defect is a common congenital problem effecting the central nervous system. Exact etiology for the genesis of neural tube
defect is unclear. Several factors have been cited in its development including chromosomal, age of parents, deficiency of folic acid and marriage with in the family members. We conducted our observational study in our centre to analyse the risk factors at our setup.

SINN-026: Post traumatic epilepsy in Traumatic Brain Injury in Tertiary Care Hospital
Ms. Vinithra M.*, Dr. Prabaharan C.¹
1) Neuro Foundation Hospital, Ragavendhra Neuro Care Private Limited, Salem, Tamil Nadu, India

Introduction: Post traumatic epilepsy is one of the common complication of Traumatic Brain Injury. Post Traumatic Epilepsy can be classified as Immediate seizures (those occurring within 24 hours after injury), Early seizures(those occurring within one week after injury), Late seizures(those occurring more than a week after injury).

Aim: To study the prevalence of, identify possible risk factor and the role of prophylactic antiepileptic medications for post-traumatic epilepsy in adults with traumatic brain injury treated in a tertiary care hospital.

Objectives: In our tertiary care hospital, retrospective case notes of all adults admitted in head injury unit over 18 months period were analyzed to identify those adults who had developed post traumatic epilepsy and classify them into immediate, early and late seizures. Complete medical records and treatment given were included in our study.

Material and Method: Structured questionnaire was prepared, which patient may fear. Some of these questions were related to general questions pertaining to surgery and other were specific to neurosurgery. Data was prepared prospectively for last 6 months and is still under evaluation.

SINN-027: Understanding the process of consent taking in Neurosurgery patients
Mrs. Neeraj Rai¹
1) GIPMER, New Delhi, India

The aim of my study is to analyse the practice of Consent in our place and to assess the validity of process.

SINN-028: Study of Fear Factors in Neurosurgical Patients
Mrs. Devmuni Verma¹
1) GIPMER / G. B. Pant Hospital, New Delhi, India

Neurosurgery is considered one of the most technically demanding branch of surgery which depends upon extreme degree of procedure of operating surgeon. Outcome of neurosurgical patients is most unpredictable. Even today the concern of outcome is paramount in neurosurgery. There can be fear of surgery in the mind of patient and their attendant regarding several aspects in neurosurgery. The aim of my studies is to identify the fear factors and to understand it for better patient counselling.

SINN-029: New Haemostatic Agents - Fancy or Facts
Mrs. Ritu Tokas¹
1) GIPMER / G. B. Pant Hospital, New Delhi, India

Haemostatic in neurosurgery is the most important aspect of any operation. Even in minimal bleeding can result in seizures, large size hematoma can shift the brain, produce neurological deficit or at time can be fatal. In order to achieve haemostatic various materials which are used in neurosurgery are surgical, gelform avitene etc.

My study aims at to find out current indication and effectiveness of this agent over and above conventionally available agent.

SINN-030: To evaluate the role of scrub nurse in Intra Operative Rapture Aneurysm
Mrs. Riddhi Mhatre¹, Mrs. Riddhi Rohan Mhatre²
1) Sir J. J. Group of Hospital, Navi Mumbai, Maharashtra, India
2) GNM, Navi Mumbai, Maharashtra, India

Aim: To evaluate the role of scrub nurse in intra operative rapture aneurysm.

Introduction: The role of scrub nurse is challenging to manage intra operative rupture aneurysm. The use of neurosurgical high-end microscope, aneurysm clips, micro instruments and powerful suction are essential elements in control of bleeding in ruptured aneurysm.

This paper describes the role of scrub nurse in specialized neurosurgical assistance with using all these essential elements.

Materials and Methods: Our study constituted of 179 cases of aneurysm in our hospital. A period of study from 2015 to 2019.

Craniotomy has performed depending on site of aneurysm. Temporary clips kept ready on trolley. After thorough discussion with operating surgeon the permanent clip of required size, shape, number of clips kept ready. The scrub nurse actively assisted the surgeon in controlling bleeding of ruptured aneurysm, clipping of aneurysm, handling of micro instruments in phased manner.

SINN-031: A descriptive study to assess the incidence of Herpes Simplex Virus Type 1 infection (HSV TYPE 1) in neurosurgery patients
Mrs. Vaishali Santosh Auti¹
1) J. J. Hospital, Mumbai, India

**Aim:** A descriptive study to assess the incidence of Herpes Simplex Virus Type 1 infection (HSV TYPE 1) in neurosurgery patients

**Objectives:**
1) To understand the incidence of oral herpes in Neurosurgery Patients
2) To assess the relationship of HSV-1 incidence with pre-morbidities of patients

---

**SINN-032:** A study to assess the effectiveness of mechanically assisted cough augmentation technique (mechanical insufflation-exsufflation) for extubation or weaning critically ill patients from Mechanical Ventilation in Neurosurgery patients

Ms. Dhanlaxmi Aseervatham Nadar,
Ms. Dhanlaxmi Aseervatham Nadar
1) J. J. Hospital, Mumbai, India

**Aim:** A study to assess the effectiveness of mechanically assisted cough augmentation technique (mechanical insufflation-exsufflation) for Exubation or weaning critically ill patients from Mechanical Ventilation in Neurosurgery patients

**Objectives:** To determine the effect of Mechanically assisted cough augmentation technique on weaning success, mechanical ventilation and weaning duration, length of stay.
To determine the Exubation success using mechanically assisted cough augmentation technique compared to no mechanically assisted cough augmentation technique in critically ill patients
To assess the type of person such as neuromuscular disorders and spinal cord injury for whom these techniques may be efficacious

---

**SINN-033:** Burden among caregivers of adults with Ventriculo-Peritoneal (VP) Shunt

Ms. Priyanka Prakash, Ms. Priyanka Prakash,
Dr. Manju Dhandapani, Dr. Neena Vir Singh, Dr. S. S. Dhandapani
1) INHS, ASVINI, Mumbai, India
2) PGIMER, Chandigarh, India

**Aims:** To assess the legal awareness and responsibilities of nursing staff in administration of patient care in government hospital.

**Objectives:**
To know the status of legal awareness among the medical and paramedicals of hospital.
To know the various medico legal procedures being followed in institution.
To know about status of various documentation concerning medico-legal case management.
To identify commonly encountered problems/specific problem by the nurses during medico-legal case management.
To identify solution of the commonly encountered problems/specific problem by the nurses during medico-legal case management.

---

**SINN-034:** Challenge of multi-tasking in Cranio-Vertebral junction anomaly surgery

Mrs. Mitali Rajan Shelke, Prof. Vernon Velho
1) GGMC & Sir J. J. Hospital, Mumbai, India

**Aim:** To highlight the role of scrub nurse in Cranio-Vertebral (CV) junction anomaly surgeries. The primary requirement is to assist the surgeon during drilling techniques and while giving instruments. Her role is to maintain the adequate space for arranging instrument trolley, drill trolley, C-arm machine and implant trolley.

---

**SINN-035:** Legal awareness and responsibilities of nursing staff in administration of patient care in Government Hospital

Dr. Vishal Nikam
1) J. J. Hospital, Mumbai, Maharashtra, India

**Aims:** To assess the legal awareness and responsibilities of nursing staff in administration of patient care in government hospital.

**Objectives:**
To know the status of legal awareness among the medical and paramedicals of hospital.
To know the various medico legal procedures being followed in institution.
To know about status of various documentation concerning medico-legal case management.
To identify commonly encountered problems/specific problem by the nurses during medico-legal case management.
To identify solution of the commonly encountered problems/specific problem by the nurses during medico-legal case management.

---

**SINN-036:** To study, early diagnosis and prevention of Deep Vein Thrombosis in pre-operative, post-operative patients in neurosurgical wards

Dr. Archana Ubale
1) Sir J. J. Group of Hospitals, Mumbai, India

**Aim:** To highlight the role of neuronurse in early diagnosis & prevention of Deep Vein Thrombosis in Neurosurgical patients.
**SINN-037**: A study to assess pre-operative and post-operative auditory and facial nerve function in operated case of CP angle tumour

Dr. Rupali Sunil Shingte

1) Sir J. J. Hospital, Mumbai, Maharashtra, India

Aims: To assess preoperative and postoperative auditory and facial nerve function in CP angle tumour

Objective: To compare preoperative and postoperative auditory and facial nerve function in CP angle tumour

---

**SINN-038**: To highlight the role of neuro nurse in paediatric neurosurgery cases

Mrs. Reva Rupesh Bandarkar

1) Sir J. J. Group of Hospital, Mumbai, India

Aim: To highlight the role of neuro nurse in paediatric neurosurgery cases.

Objectives: We require separate mode of thinking with regards to positioning of patient, preparing Trollies, patients drapping, easy exchange of instruments between surgeon and Assistant, separate trollies for micro instruments and endoscopes. Many times nurse has to assist anaesthesia procedures before and after surgery. In this paper we highlight the special needs and requirements of neuronurse in Management of paediatric neurosurgery cases.

---

**SINN-039**: A randomized controlled trial to assess the efficacy of auditory stimulation on selected parameters of comatose patients with traumatic brain injury

Mrs. Parveen, Dr. Manju Dhandapani

1) INHS ASVINI MUMBAI, Mumbai, India
2) Chandigarh

To assess the efficacy of auditory stimulation on various physiologic parameters and level of consciousness in comatose patients of TBI.

---

**SINN-040**: Quality of Life among post-operative patients of cervical spine disorders, problems faced by them and factors affecting their QOL

Ms. Pratibha Thakur, Dr. Manju Dhandpani, Dr. Suresh Kumar

1) Post Graduate Institute of Medical Education and Research, Chandigarh, India

Category of Presentation: Scientific Award Paper Presentation

To assess the QOL in post-operative patients of cervical spine disorders, factors affecting QOL and to identify the problems faced by post-operative patients of cervical spine disorders attending Neurosurgery and Orthopedics OPD, at tertiary care centre in north India.