The British Skull Base Society Meeting

Thursday 29th – Friday 30th January 2015
Royal College of Surgeons in Ireland, Dublin

Programme and Abstract Booklet

Organising Committee
Mr Rory McConn Walsh
Consultant Otolaryngologist & Neuro-Otologist, Beaumont Hospital/RCSI, Dublin

Mr Daniel Rawluk
Consultant Neurosurgeon, Beaumont Hospital, Dublin

Mr Mohsen Javadpour
Consultant Neurosurgeon, Beaumont Hospital, Dublin

Invited Faculty
Professor Dennis Kraus
North Shore-LIJ Cancer Institute, New York

Professor Luc Morris
Memorial Sloan Kettering Cancer Centre, New York
The British Skull Base Society Meeting

Programme*

Thursday 29th January 2015

10.00 Council Meeting  
Sir Thomas Myles Room

12.30 Registration  
Lunch and Exhibition  
Front Hall  
College Hall

14.00 Welcome Address  
Mr Declan Magee, President  
Royal College of Surgeons in Ireland, Dublin  
Albert Lecture Theatre

14.10 The Evolution of Anterior Skull Base Surgery  
Professor Dennis Kraus  
Albert Lecture Theatre

14.50 Free Papers – Lateral Skull Base  
Session Chairs - Mr Rory McConn Walsh and Mr Daniel Rawluk  
Speakers - G. Adan, O. Pathmanaban, C. Gavin, A. Helmy, A. Sheikh, J. Barber and A. Naudé  
Albert Lecture Theatre

16.00 Refreshments and Exhibition  
College Hall

16.20 Free Papers – Lateral Skull Base  
Session Chairs - Mr Rory McConn Walsh and Mr Daniel Rawluk  
Albert Lecture Theatre

18.00 Close of Meeting

19.15 Drinks Reception**  
Boardroom

20.00 Dinner**  
College Hall
Friday 30th January 2015

08.30  Refreshments and Exhibition  Atrium

09.00  Olfactory Neuroblastoma: The MSKCC experience  Albert Lecture Theatre
Professor Luc Morris

09.40  Panel Discussion  Albert Lecture Theatre
Mr Rory McConn Walsh, Mr Danny Rawluk and Mr Mohsen Javadpour

10.20  Free Papers – Anterior Skull Base  Albert Lecture Theatre
Session Chairs – Mr Mohsen Javadpour and Mr Peter Lacy
Speakers – H. Othman, K. Tambirajoo, A. Paluzzi, M. Albarazi, K. Patel and N. Sharma

11.20  Refreshments and Exhibition  College Hall

11.40  Free Papers – Anterior Skull Base  Albert Lecture Theatre
Session Chairs – Mr Mohsen Javadpour and Mr Peter Lacy
Speakers – N. Philips, T. Land, H. Othman and R. Romani

12.20  AGM  Albert Lecture Theatre
(Including presentation of prizes for abstract submission)

12.50  Lunch and Depart  College Hall

* We reserve the right to change the programme without additional notice
** Drinks reception and dinner are not included in the course fee
# Abstracts

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Validation of the facial dysfunction domain of the Penn Acoustic Neurona Quality of Life (PANQOL) Scale</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>G. Adan, S. Leong, T. Lesser</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Decision making in the Manchester multidisciplinary vestibular schwannoma stereotactic radiosurgery clinic</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Evolution in management strategies in vestibular schwannoma</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>C. Gavin, S. Saeed, R. Bradford</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Skull base approaches to tentorial meningioma tumours</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>A. Helmy, R. Kirollos</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>A novel way of grading chordomas</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>A. Sheikh, N. Phillips</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Posterior fossa epidermoid cysts – Keeping uncomplicated surgery uncomplicated</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>J. Barber, O. Pathmanaba, S. Freeman, S. Lloyd, C. Ward, S. Rutherford, A. King</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Neurofibromatosis type 2 – Management strategies of vestibular schwannomas</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>A. Naudé, K. Walsh, D. Rawluk, M. Javadpour, R. McConn Walsh</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>A 18 year audit of skull base surgery by a single surgeon</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>J. Sajjad, K. Tamirajao, M. O'Sullivan</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Balance dysfunction in vestibular schwannoma's – The Wii Balance Board as an assessment tool</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>F. Toner, S. Hampton, S. Cooke, N. Baille</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Primary stereotactic radiosurgery for vestibular schwannomas – The Irish experience</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>A. Naudé, M. Sadadcharam, K. Walsh, D. Rawluk, M. Javadpour, R. McConn Walsh</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Evolution of trans-nasal endoscopic trans-sphenoidal approaches to skull base over 5 years in a combined setting</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>G. Anichini, M. Shakeel, V. Vallamkondu, M. Kamel, A. Hussain</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Auricular prostheses in patients following temporal bone resection</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>J. Chan, P. Monksfield, M. de Wolf</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Neutrophil to lymphocyte ratio as a prognostic marker for vestibular schwannoma growth</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Richard Locke, John Crowther, William Taylor, Georgios Kontorinis</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Clinical deterioration of skull base meningiomas during pregnancy – An update</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>R. Romani, J. Paddock</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Cochlear schwannoma – Treatment options and literature review</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>M. Rodriguez-Valero, S. Freeman, S. Rutherford, A. King, C. Ward, O. Pathmanaban, S. Lloyd</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Lesions of the petrous apex – A review of their diagnosis and management, the Beaumont experience</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>C. Wijaya, RB. Speaker, R. McConn-Walsh, J. Kulasegarah, D. Rawluk, M. Javadpour, S. Looby</td>
<td></td>
</tr>
</tbody>
</table>
## Abstracts

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Where is it safe to leave residual vestibular schwannoma during surgery?</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>A. Kasbekar, G. Adan, A. Beacall, A. Youssef, C. Gikas, T. Lesser</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>A review of olfactory neuroblastoma in the Welsh population over the last 15 years</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>H. Othman, M. Zaben, S. Etoum, O. Tilley, P. Goetl</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>BioGlue® reinforcement for cerebrospinal fluid leak repair during endoscopic transsphenoidal pituitary and anterior skull base surgery</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>K. Tambirajoo, M. Javadijour</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Dural arterio-venous fistulas</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>A. Pichierri, A. Silva, S. Ahmed, A. Paliuzzi</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Indications and experience with the “Mini” Modified Orbitozygomatic Cranietomy (MMAOZ) in a UK neurosurgical centre</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>M. Albarazi, J. Tailor, D. Fernando, Z. Sidhu, S. Barazi, N. Thomas, D. Walsh</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Single surgeon case series of transcranial resection of olfactory groove meningiomas – Is there an alternative approach?</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>K. Patel, A. Kolas, R. Kirollos</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Paediatric skull base and extended endoscopic sinus surgery in very young children – Lessons of the past 5 years</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>N. Sharma, M. Parulekar, D. Rodrigues, S. Ahmed, A. McDermott</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>A national audit of skull base chordoma and chondrosarcoma referred for adjuvant proton therapy in the UK, 2007–2014</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>N. Phillips</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Temporo-Parietal Temporalis Myo-Fascial Flap (TPTMFF) – A vascularised regional flap to reconstruct complex skull base defects following Expanded Endonasal Approaches (EEA)</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>T. Land, A. Silva, R. Mitchelli, A. Paliuzzi, S. Ahmed</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Pre-moulded custom implants for sphen-ocular reconstruction – A novel multi-disciplinary approach</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>H. Othman, S. Evans, D. Morris, J. Martin, C. Lane, S. Bhatia, C. Hayhurst</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Lateral supraorbital approach for anterior skull base meningiomas</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>R. Romani</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Anterior skull base surgery in children – The practicalities for the surgical and anaesthetic team</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>R. Finn, A. Brazier, S. Ahmed, D. Rodrigues, A. McDermott, M. Stokes</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>A 3D-endoscopic transtubular transcannsolal approach to the third ventricle</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>A. Shoaizem, A. Evins, J. Burrel, A. Bernardo, P. Stieg</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Extra-sellar extensions of pituitary adenoma on magnetic resonance imaging</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>D-S. Lee, M. Yuniarti, J. July</td>
<td></td>
</tr>
</tbody>
</table>
# Abstracts

<table>
<thead>
<tr>
<th>31.</th>
<th>Three cases of complete resolution of Abducen (VI) nerve palsy following endoscopic decompression</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L. Ritchie, C. Tornari, N. O'Shea, P. Andrews</td>
<td>21</td>
</tr>
<tr>
<td>32.</td>
<td>Endoscopic transpterygoidal excision of lateral sphenoid recess meningocoele under fluorescein visualisation</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>SA. Evans, SS. Ling, M. Al-Rahbi, SK. Ahmed</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Comparing three-dimensional (3-D) with two-dimensional (2-D) endoscopes in transsphenoidal surgery – A systematic review</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Y. Wan, N. Shah, H. Marcus</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Meningioma masquerading as chondrosarcoma of the lateral skull base</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>M. Adams, S. Hampton, N. Bailie, S. Cooke</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Protection of facial nerve during translabyrinthine approach – Superior gutter dissection</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>M. Rodriguez-Valero, S. Lloyd, A. King, S. Rutherford, C. Ward, O.Pathmanabhan, S. Freeman</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Spontaneous shrinkage of unilateral vestibular schwannoma</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>R. Romani, J. Pulloek</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Presenting hyponatraemia and the sellar lesion</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>S. Solanki, I. Robertson</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>A review of the last thousand cases presenting to the neuro-otology and lateral skull base clinic</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>W. Huang, D. Fitzgerald, R. McConn Walsh, D. Rawluk, M. Javadpour, K. Walsh</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>Unabsorbed dura patch removed eight years after pituitary surgery</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>I. Zaidi, A. Nassimizadeh, A. Warfield, S. Ahmed</td>
<td></td>
</tr>
</tbody>
</table>
Validation of the facial dysfunction domain of the Penn Acoustic Neuroma Quality of Life (PANQOL) scale

G. Adan, S. Leong, T. Lesser
Department of Otorhinolaryngology – Head and Neck Surgery, University Hospital Aintree, Liverpool L9 7AL

Aim
The Penn Acoustic Neuroma Quality of Life (PANQOL) scale is an Acoustic Neuroma (AN) specific QOL instrument. This 26-item survey assesses patient-perceived QOL in seven domains: hearing, balance, facial symptoms, anxiety, energy, pain and general health. The aim of this study was to evaluate the strength of content validity within the facial dysfunction domain of PANQOL and to compare how it correlates with a facial dysfunction specific QOL tool.

Method
The Facial Clinimetric Evaluation (FaCE) scale was selected after a review of the literature suggested that it was the most practical tool to specifically evaluate the impact of facial palsy on quality of life. An online survey was sent to 880 members of the British Acoustic Neuroma Association (BANA). The online questionnaire anonymously surveyed patient demographics (age range, gender), year of diagnosis, type of AN management and when treatment started. Respondents who had facial dysfunction were asked to complete the FaCE questionnaire, in addition to the PANQOL.

Result
Of 398 (45.2%) responses received, 178 (44.7%) respondents indicated that they had facial paralysis of which 158 had complete PANQOL and FaCE datasets for analysis. There was statistically significant correlation (r = 0.48) between the total scores of the PANQOL and FaCE. Stronger correlation (r = 0.63) was observed between the PANQOL’s facial dysfunction domain and the FaCE total score.

Conclusion
There was significant total score correlations and strong correlation between PANQOL’s facial dysfunction domain and FaCE total score. Conversely, there was low correlation in many domains, including non-significant correlation with lacrimal control. This highlights the potential for the development of a novel validated tool for the assessment of facial nerve weakness in AN patients. Thus enhancing the ability to evaluate patients with facial dysfunction as a result of their diagnosis and to quantify the impact of AN treatment on their lives.

Decision making in the Manchester multidisciplinary vestibular schwannoma stereotactic radiosurgery clinic

Manchester Skull Base Unit, Dept. Neurosurgery, Salford Royal Hospital, Stott Lane, Salford, Greater Manchester, M6 8HD

Objective
Stereotactic radiosurgery (SRS) has been available in Manchester since July 2011 (Novalis Tx™). A combined skull base surgery and clinical oncology SRS clinic was established in June 2013 to provide a one-stop balanced consultation for patients with vestibular schwannomas (VS) suitable for either SRS or microsurgical treatment. Risks and benefits of each treatment are discussed including unit-specific outcomes based on our own high volume series. Here we present our initial experience and evaluate the decision making.

Method
All new patients seen in the multidisciplinary VS SRS clinic from June 2013 to December 2014 inclusive were identified from clinic records. Age, sex, co-morbidities, tumour size, solid/cystic tumour, reason for referral to the joint clinic, professionals in attendance and treatment decisions were retrospectively obtained from the case notes.

Result
83 patients were seen in the combined clinic over the 19 month time period. All clinics were attended by a skull base surgeon, a clinical neuro-oncologist and a specialist nurse. All patients were referred via skull base MDT meetings. All patients had tumours with a CP angle dimension 3cm or less. All patients were considered to be technically and medically suitable for either SRS or microsurgery. Patients made a mixture of informed treatment decisions including watch wait and rescan, SRS and surgery. The outcomes of this process will be presented. Notably a number of patients with lesions suitable for either SRS or open surgery continue to elect for microsurgical management in our series.

Conclusion
The combined surgery/oncology SRS clinic has streamlined the patient-experience for those with VS suitable for either microsurgical or SRS treatment. In this setting, decision making is more complex than might be expected and patients do not necessarily choose SRS over open surgery. Decisions may be influenced by the good outcome statistics from our own our high volume microsurgical series.
Evolution in management strategies in vestibular schwannoma

C. Gavin, S. Saeed, R. Bradford
The Skull Base Service, The Molly Lane-Fox Brain Tumour Unit, The National Hospital For Neurology and Neurosurgery, Queen Square, London WC1N 3BG

Objective
The management of vestibular schwannoma has evolved. Earlier diagnosis and the availability of alternative (nonsurgical) management options have increased patient expectations. We report our experience in the multidisciplinary management of acoustic neuroma at our skull base clinic over the past three decades.

Method
From 1990 to 2011, we have maintained a database of patients presenting to our Skull base clinic. This comprises 728 patients. For analysis we have divided these into 4 distinct groups of comprising of 5-year periods. Groups I (1990-94) II (1995-99), III (2000-04) and IV (2005-2011).

Result
Group I: 91 cases: Retrosigmoid approach (RS) in 49 (53.8%), Trans labyrinthine approach (TL) in 23 (25.3%), Sterotactic-RadioSurgery in 1 case (1.1%) & surveillance (W+S) in 8 cases (8.8%). Group II: 191; RS 97 (52%), TL 46 (27%), SRS 13 (7.7%) & W+S in 14 (8.3%). Group III 144: RS 78 (54%), TL 8 (5.5%), SRS, 31 (21.5%) and W+S 27(19%). Group IV: 302: RS in 53 (17.5%), TL 17 (6%), SRS 27 (9%) and W+S 205 (67.5%). Patient satisfaction, preservation of neurological function and tumour control progressively improved. The introductions of SRS and Surveillance (W+S) were statistically significant factors. There was a linear increase with time in the proportion of preoperative patients with serviceable hearing. Tumour size became significantly smaller year on year.

Conclusion
In our early experience 75% of patients with VS were managed surgically. 20 years later this has completely reversed with 77% of cases managed with SRS or W+S. Microsurgical emphasis has shifted to facial nerve and hearing preservation where possible in selected cases.

Skull base approaches to tentorial meningeal tumours

A. Helmy, R. Kirolos
Department of Neurosurgery, Addenbrooke's Hospital, Hills Road, Cambridge CB2 0QQ, UK

Aim
Tentorial meningeal tumours are surgically varied lesions that require knowledge of a broad range of skull base approaches for successful treatment. We present a case series that illustrates the surgical challenges and discuss the rationale for choosing from the wide range of surgical strategies available.

Method
Retrospective case review of 36 operations in 35 consecutive cases in which the main origin of the meningeal tumour was the tentorium cerebri were identified. Predominantly sphenoid wing or posterior faleline meningiomas with extension onto the tentorium were excluded.

Result
All tumours except 1 were >3cm in size. The cases were classified according to location into 3 groups determining the surgical approach{. Group A(n=13): Infratentorial {posterior fossa craniotomy}. Group B(n=8) Supra and Infra-Tentorial Extension combined supra/infra-tentorial. Group C(n=16): Deep lesions related to tentorial hiatus subdivided into C1(n=3): anterior {tran-Sylvian}; C2(n=4): middle {subtemporal}; C3(n=6): deep falcotentorial {posterior interhemispheric}; C4(n=3) pineal region {occipital-transtentorial or supracerbellar}.

All patients had maximal safe resection without compromising patent venous sinuses. In 14 cases the tentorial origin was at least partially resected. There was an obvious minor radiological residual in 12 cases. 8 cases received RT (2 haemangiopericytoma, 4 Grade 2 meningioma and 2 for progression of residual).

Follow-up was 6 months–11 years. Major morbidity included visual field defects(3), worsened gait ataxia(3) and requirement for post-procedural VP shunt (6). There were no perioperative deaths. In several patients presenting symptoms improved post-operatively including gait ataxia (11) and visual field defects (4). 5 patients had radiological recurrence.(2 WHO Grade 1 tumours, 3 WHO Grade 2 tumours). 2 were treated with radiotherapy, 1 with radiotherapy and surgery, 2 with repeat surgery, 1 was observed and 1 died.

Conclusion
Tailoring an appropriate skull base approach to each lesion can achieve tumour control with modest surgical morbidity.
A novel way of grading chordomas

A. Sheikh, N. Phillips
Neurosurgery Department, Ward 25, Leeds General Infirmary, Great George Street, Leeds, LS1 3EX

Objective
Chordomas present as rare, slow growing tumours arising from notochord cells. They are most commonly found in skull base and seen to encompass major blood vessels. They frequently compress brainstem causing major morbidity. There are three types of chordomas described, but to date there doesn’t seem to be any grading system for them.

Method
We propose a grading method for chordomas based on their maximum size, vascular invasion and brainstem compression. 124 cases of chordoma in UK in last 5 years were analysed and graded using this system. These were graded from 1-5. 0-3 cm size were given 1 point, 3-5 cm given 2 and more than 5 cm given 3 points. 1 point each was given for vascular invasion and brainstem compression.

Conclusion
We propose such grading will help plan surgical resection and further radiological treatment as well as being helpful in predicting prognosis.

Posterior fossa epidermoid cysts – Keeping uncomplicated surgery uncomplicated

Barber J, Pathmanaban O, Freeman S, Lloyd S, Ward C, Rutherford S, King A
Department of Neurosurgery, Salford Royal Hospital, Stott Lane, Salford, Greater Manchester, M6 8HD

Aim
Epidermoid cysts are benign tumours for which the only treatment option is surgical excision. Despite being technically straightforward, we have previously encountered a large number of post-operative complications, relating principally to meningitis, both chemical and infective with consequent CSF malabsorption. We have therefore instigated a standardised protocol of intra-operative hyper-irrigation and post-surgical high-dose corticosteroids, in all subsequent patients treated for this condition. This paper describes the outcome of this protocol.

Method
Analysis of retrospective data on 33 posterior fossa epidermoid cysts operated over 11 years. Outcome data from 13 patients over 6 years (pre-protocol) was directly compared with data from the 19 patients over 5 years (post-protocol) for complications not directly attributable to neurological injury at the time of surgery. All patients post-protocol had a standard regime of hyper-irrigation/corticosteroids and the data was evaluated in order to assess the effects of this intervention.

Result
All 33 patients had a satisfactory early post-operative course. Pre-Protocol: 8/13 patients had complications attributable to CSF malabsorption/inflammation (62%), 5 of whom required de-novo (or revision of) permanent CSF shunting (39%). Post-Protocol: 5/19 patients had CSF flow problems (26%), only one of whom required CSF shunting (5%).

Conclusion
Epidermoid cyst surgery can frequently be associated with marked morbidity, largely (but not exclusively) related to frequent meningitis and CSF malabsorption. Our analysis of outcomes following the instigation of a standardised hyper-irrigation/corticosteroid protocol has shown that this morbidity can be significantly reduced, prompting the recommendation that these measures should be routinely considered when performing such procedures.
The British Skull Base Society Meeting

**Neurofibromatosis type 2 – Management strategies of vestibular schwannomas**

A. Naudé, K. Walsh, D. Rawluk, M. Javadpour, R. McConn Walsh  
Department of Otolaryngology, Beaumont Hospital, Dublin

**Objective**  
To discuss the different management strategies of vestibular schwannomas in patients with neurofibromatosis type 2 (NF2) in a tertiary neuro-otology unit. We also review the clinical presentation, size of tumour at presentation, hearing and facial nerve function outcomes.

**Method**  
A retrospective review of all NF2 patients that presented to the neuro-otology unit between 2002 and 2014.

**Result**  
Twenty nine patients were identified for the period. Management strategies for these patients included microsurgery, auditory brainstem implantation, cochlear implantation and chemotherapy with bevacizumab.

**Conclusion**  
Vestibular schwannomas are the hallmark of neurofibromatosis type 2 and present a unique and difficult challenge to the neurootologist. These patients are best served by a team of physicians who can provide individualized patient care.

**A 18 year audit of skull base surgery by a single surgeon**

J. Sajjad, K. Tambrirajoo, M. O’Sullivan  
Department of Neurosurgery, Cork University Hospital, Cork, Ireland

**Aim**  
There is a recent trend to deliver neurosurgical care in large supraregional centres with subspecialisation. We present a 17 year audit of a single surgeon’s experience of skull base surgery with an emphasis on complications, in a low volume centre.

**Method**  
A prospectively maintained database containing all the surgically managed skull base cases was analysed. The number and type of procedures including complications were identified. Our centre provides neurosurgical care to a population of 1.6 million people.

**Result**  
145 procedures were carried out in 143 patients over 17 years. A skull base approach was utilised in all these cases. Pathologies include meningiomas [n=72], schwannomas [n=18], aneurysms [n=31], sellar region tumours [n=5], intrinsic tumours [n=5], benign tumours [n=6], metastases [n=8] and arteriovenous malformation [n=1]. Complications include death [n=3], stroke [n=4], cranial nerve palsy [n=8], haematoma [n=1], CSF leak with meningitis [n=2], shunt insertion [n=1], visual field defect [n=1] and bone flap infection [n=1].

**Conclusion**  
Our morbidity and mortality rate is 12.4% and 2.07% respectively, which compares favourably to published series. This shows that with an experienced surgeon, specialised care can be delivered in a small centre.
Balance dysfunction in vestibular schwannomas – The Wii Balance Board as an assessment tool

F. Toner, S. Hampton, S. Cooke, N. Bailie
ENF, Royal Victoria Hospital, Belfast, BT12 6BA, NI

Aim
Vestibular schwannomas (VS) are benign slow-growing tumours of the vestibular nerve. Vestibular dysfunction is usually gradual, which allows for implementation of central adaptive mechanisms i.e. vestibular compensation. Patients with a small/intracanalicular VS often do not complain of any dizziness or balance symptoms.

Our aim was to compare balance test results of patients with a known intracanalicular vestibular schwannoma to matched controls. We use a unique system, which consists of a Wii Balance Board and an iPod accelerometer app, to collect data.

Method
Patients attending the Regional CON clinic with unilateral intracanalicular VSs
Custom written software allows use of a Wii Balance board as a low-cost posturography system.

The software interfaces with the Wii balance board and is able to measure the Modified Clinical Test of Sensory Interaction and Balance – a data set used to document the presence of sensory dysfunction.

The assessment involves 30 seconds on the board with eyes open, then 30 seconds with eyes closed. Process repeated - eyes open/closed with a balance foam pad placed on the Wii board to act as a compliant surface.

Result
There was a statistically significant difference between the study and control group in condition 4 (compliant surface/eyes closed), with the acoustic neuroma patients demonstrating much greater variability in centre of pressure.

Conclusion
Our preliminary results would appear to confirm that patients with intracanalicular vestibular schwannoma’s, while not being clinically symptomatic of balance problems, do have measurably poorer balance function.

Primary stereotactic radiosurgery for vestibular schwannomas: The Irish experience

A. Naudé, M. Sadadcharam, K. Walsh, D. Rawiluk, M. Javadpour, R. McConn Walsh
Department of neurology/Skull base surgery, Beaumont Hospital, Dublin

Introduction
Since the 1980s, stereotactic radiosurgery has been an important treatment option for patients with small to medium-sized vestibular schwannomas. In Ireland we have been able to offer this treatment modality locally since May 2013.

Aim
To evaluate the safety and efficacy of stereotactic radiosurgery at our tertiary neuro-otology/skull base referral center, as a primary treatment modality for vestibular schwannomas in terms of tumor control, hearing preservation and complications.

Method
We reviewed, retrospectively, 75 patients diagnosed with vestibular schwannoma, treated consecutively with stereotactic radiosurgery from May 2013 to May 2014 in Ireland. Patients with neurofibromatosis Type 2 and patients who previously received another modality of treatment for their vestibular schwannomas, were excluded from the review. Clinical follow up notes, audiometric results and quantitative radiological imaging were reviewed for all patients.

Result
Stereotactic radiosurgery achieved tumour control in the majority of patients, with a low complications rate via a multidisciplinary approach.

Conclusion
Stereotactic radiosurgery is a safe and effective non surgical treatment modality for vestibular schwannomas. Patient and tumour selection as well as follow up by a multidisciplinary team are paramount.
The British Skull Base Society Meeting

Evolution of trans–nasal endoscopic trans–sphenoidal approaches to skull base over 5 years in a combined setting
G. Ariachini, M. Shakeel, V. Vallamkondu, M. Kamel, A. Hussain
Aberdeen Royal Infirmary, Neurosurgery, Foresterhill road, Aberdeen, Aberdeenshire, AB25 2ZD

Aim
The evolution and experience of a multidisciplinary teamwork and technique on endoscopic approaches to the ventral skull base is described.

Method
Retrospective analysis of a prospectively maintained departmental database was performed. The data were collected for patients who underwent Transnasal Endoscopic Transsphenoidal (TET) resection of skull base pathology from May 2009 to May 2014. Data includes demographics, clinical presentation, investigations, surgical indication, technique details including skull base repair, duration of hospital stay and post-op complications and their management.

Result
A total of 107 operations were performed. Four procedures were revisions. Three revisions were for recurrence of pituitary adenoma and 4th procedure was for further resection of residual chordoma. Most common diagnosis was pituitary macroadenoma. Others included microadenoma, craniopharyngioma, chordoma, meningioma, and Rathke’s cleft cyst. The skull base defect was repaired using multilayered principle with acellular dermis, Surgicel, Tisseel, Floseal, Nasapore and Nasoseptal flap. Several changes in technique were introduced over time: neuronavigation evolved from optical to electromagnetic (thus not requiring head fixation anymore), position and use of endoscope was modified from free hand to scope holder during tumour resection, and naso-septal flap was used.

Conclusion
Endoscopic skull base surgery evolved radically in the last years on our institute. Multidisciplinary approach was introduced; devices and techniques were changed, thus obtaining higher confidence for surgeons, safer maneuvers, and lower rate of complications.

Auricular prostheses in patients following temporal bone resection
J. Chan, F. Monkfield, M. de Wolf
ENT Department, Queen Elizabeth Hospital Birmingham , Queen Elizabeth Medical Centre, Edgbaston, Birmingham, B15 2TH

Aim
Reconstruction is a critical component in the management of patients with temporal bone and external auditory canal (EAC) cancers after resection of the malignancy. Following pinnectomy, patients are assessed for suitability for a prosthetic ear by means of an osseointegrated implant placed during tumor removal surgery.

Method
Although these implants in general have a high success rate in terms of osseointegration and skin infections, adjuvant radiotherapy treatment can pose a challenge towards osseointegration. A review of all patients receiving auricular prostheses following temporal bone resection showed 215 implants in 100 patients. The average implant follow-up time was 4.59 years (range 0.01 year to 14.84 years). 71 patients were wearing an auricular prosthesis and 78 patients had an implant abutment placed.

Result
21 patients had received radiotherapy treatment. All initial implants were placed at the primary surgery. Implant loss was 6 (8.5%) in the non-radiated group and 7 (33%) in the radiated group (P<0.05). Implant-related problems including skin overgrowth, infection, delayed healing and bone problems were 8 (38.1%) in the radiotherapy group and 22 (27.8%) in the non-radiated group (P>0.05).

Conclusion
In conclusion it is recommended to place osseointegrated implants during tumor removal surgery. Radiotherapy poses a higher risk of implant loss.
Neutrophil to lymphocyte ratio as a prognostic marker for vestibular schwannoma growth

R. Locke, J. Crowther, W. Taylor, G. Kontorinis
Institute of Neurosciences, Southern General Hospital, Glasgow, G51 4TF

Aim
Despite its potential huge clinical significance, to date, there are no reliable predictors of vestibular schwannoma (VS) growth. Neutrophil-to-lymphocyte ratio (NLR) has been examined in the context of malignant tumours or illness to assess its ability to act as an indicator of growth or prognosis but never in patients with VS. Our objective was to identify any predictive value of the NLR for tumour growth in patients with VS.

Method
A retrospective analysis of patients with VS managed in a tertiary referral centre was performed. The NLR, prior to any intervention and within 12 months of the initial diagnosis, was identified through our prospectively updated database in patients with growing and non-growing VS. Blood tests obtained during acute illness or in the presence of malignancy were excluded. We performed logistic regression and compared NLR with tumour growth, as defined on magnetic resonance imaging (MRI) (>1 mm/year). Level of significance was set at 0.05. We adjusted data for age, gender and side and found specificity and sensitivity to identify if NLR is a predictive model.

Result
In a 15 year period 160 patients with VS and available NLR results were identified. 74 had growing VS and 86 non-growing tumours. P-value for NLR of growing and non-growing VS was 0.001. AUC (area under the curve) when adjusted for age, gender and side was 0.71 showing that NLR is a good, independent prognostic factor for VS growth.

Conclusion
These retrospective results show a trend with growing tumours exhibiting a higher NLR. As NLR is a cost-effective and easily obtained value, further prospective investigations and larger case series need and are currently being examined.

Clinical deterioration of skull base meningiomas during pregnancy – An update

R. Romani, J. Pollock
Department of Neurosurgery, Essex Neurosciences Centre, Queen’s Hospital, Romford, Essex, RM7 0AG

Aim
To report the phenomenon of clinical deterioration in skull base meningioma during pregnancy.

Method
Retrospective review of case notes and radiological investigations.

Result
1. A 32 year old female presented with progressive left sided hearing loss, dizziness and headache. There was a three month history of recent deterioration coinciding with the third trimester of pregnancy. MRI investigation demonstrated a large left sided petroclival meningioma. There was no associated hydrocephalus. She was treated with debulking of the tumour via a left posterior fossa craneectomy and subtotal removal of a WHO Grade I meningioma. After surgery the patient presented with left peripheral facial paresis (House-Brackman III) and she lost hearing on the left side. At 7 years she had Cyberknife radiosurgical (22.5 Gy) treatment for progression of the residual.

2. A 23 year old female presented with a transient facial weakness during her first pregnancy which spontaneously resolved. Two years later she presented with right sided hearing loss, right facial numbness, dizziness and headache with ataxia. She underwent in September 2010 a right sided presigmoid translabyrinthine approach with subtotal removal of a meningioma (WHO Grade I). The residual was treated with conventional radiotherapy. During a second pregnancy she experienced transient palsies of the ipsilateral 3rd and 6th cranial nerves which completely resolved within one month of delivery. There was evidence of radiological progression during the period of symptomatic deterioration. At most recent follow-up she remains neurologically stable. There is further evidence of progression in the residual on recent scanning.

3. A 22 year old female presented at the end of pregnancy with a new right sided oculomotor paresis presented during pregnancy. MRI demonstrated a right sided anterior clinoidal meningioma with significant cavernous sinus extension. Her symptoms completely resolved after delivery. Management to date has been conservative. There is evidence in the literature that there is a discrepancy between distribution of estrogen and progesterone receptors in meningiomas. Antiprogesterone receptor drugs can influence the growth rate tumours but are contraindicated in pregnancy and are associated with side effects such as endometrial hyperplasia or second tumour induction.

Conclusion
The role of pregnancy in meningioma presentation and clinical deterioration is described. This observation highlights the role of progesterone in growth promotion of meningiomas and suggests antiprogesterone therapy as an alternative management strategy in selected cases.
The British Skull Base Society Meeting

Cochlear schwannoma – Treatment options and literature review
M. Rodriguez-Valero, S. Freeman, S. Rutherford, A. King, C. Ward, O. Pathmanaban, S. Lloyd
Skull Base, ENT and Neurosurgery, Salford Royal Foundation Trust, Sott Lane, Salford, Manchester, M6 8HD

Aim
Describe presentation symptoms, radiographic findings and treatment from patients with cochlear schwannomas (CS) in a tertiary referral hospital.

Method
Retrospective review of patient records over an 8 year period of patients with the diagnosis of CS.

Result
Eleven patients (5 male, mean age 59±11 years) were evaluated. All patients had a gadolinium enhanced MRI scans and audiometric testing. The presenting symptom was hearing loss in 90% (1 incidental finding). MRI showed one CS extending to the vestibule and two CS infiltrating the IAM. Four patients presented tumor growth, two underwent surgical resection (transotic and translabyrinthine), one went for SRS and one refused SRS and preferred to be observed for another 6 months. One patient had a successful chemical labyrinthectomy due to disequilibrium and vertigo. The rest of the patients (54%) had static tumors which were observed.

Conclusion
CS are unfrequent tumors that are mainly presented by hearing loss. Different treatment modalities can be offered; the decision should be made depending on symptoms, tumor growth and hearing status.

Lesions of the petrous apex – A review of their diagnosis and management, the Beaumont experience
C. Wijaya, RB. Speaker, R. McConnell-Walsh, J. Kulasegarah, D. Rawluk, M. Javadpour, S. Looby
Department of Otorhinolaryngology and Head & Neck Surgery, Beaumont Hospital, Beaumont Road, Dublin 9, Ireland

Aim
Lesions of the petrous apex represent a diverse group of pathologies, which may be neoplastic, infectious, inflammatory or vascular in origin. Furthermore, given the central location within the skull base surgical access to the petrous apex is technically challenging.

Method
This study will include a discussion of all patients with petrous apex pathology currently under review in the Beaumont University Hospital Neurotology and Skull Base Multidisciplinary Clinic.

Result
Lesions of the petrous apex represent the third commonest lesion reviewed in the neurotology and skull base clinic after vestibular schwannomas and glomus tumors. A series of 58 patients were identified as having lesions involving the petrous apex. Within the case series there are 25 cholesteatomas or cholesterol cysts; 7 schwannomas of the trigeminal or facial nerve; 4 chondrosarcomas; 4 glomus jugulare tumours; 2 chordomas; 2 metastatic lesions; and 1 parapharyngeal epithelial tumour. Of these patients 41 have undergone operative intervention and 17 and being managed conservatively with interval imaging.

Conclusion
Diagnosis of petrous apex lesions is generally made based on radiologic criteria; however, a clinical assessment by a multidisciplinary team is essential. Many of these lesions may be managed conservatively. The choice of approach to this region of the skull base is influenced by: the patients diagnosis, the hearing on the effected side, and involvement of other cranial nerves. Management decisions are best made in the multidisciplinary team setting with input from a neuro-otology, neurosurgery and neuro-radiology.
Where is it safe to leave residual vestibular schwannoma during surgery?

A. Kasbekar, G. Adan, A. Beacall, A. Youssef, C. Gliks, T. Lesser
Liverpool Skull Base Service, c/o Department of ENT, Aintree University Hospital, Liverpool, L9 7AL

Aim
To identify whether certain locations at the cerebellopontine angle (CPA) and internal auditory meatus (IAM) predispose to growth of vestibular schwannoma (VS) residuum left behind at surgery.

Method
A retrospective review of case notes and MRI scans was undertaken. Measurement methods conformed to those proposed by Kanzaki et al. at the 2003 Consensus meeting on VS reporting. Appropriate statistical tests were undertaken.

Result
67 medium and large sporadic VS not suitable for further conservative management or radiation treatment were surgically treated between 2006 and 2010. 52 cases (78%) had residual tumour left behind that was available for analysis. Median age at surgery was 53 years (range 27 – 84 years). The retrosigmoid approach was utilised in 45 cases, translabyrinthine in 7. Of the 52 residual tumours, 20 grew (4 were near-total and 16 sub-total excisions. p=0.30). Follow-up was for a median of 6.4 years (4.5 - 8.1 years). Residuum was left at various locations. 42 cases had multiple sites of residual tumour and 10 had single sites. See table below for details.

<table>
<thead>
<tr>
<th>Site of residual</th>
<th>Not growing</th>
<th>Growing</th>
<th>Total cases</th>
<th>p value (Chi2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA</td>
<td>18</td>
<td>16</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>IAM</td>
<td>19</td>
<td>13</td>
<td>32</td>
<td>p=0.60</td>
</tr>
<tr>
<td>Porus</td>
<td>18</td>
<td>11</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Fundus</td>
<td>13</td>
<td>1</td>
<td>14</td>
<td>p=0.03</td>
</tr>
</tbody>
</table>

Conclusion
Time to growth varied between 1.75 years and 5.5 years (average 3.1 years). Of 20 growing residuals, 17 required treatment (13 radiotherapy, 1 surgery, 3 surgery and radiotherapy).

Along with other patient, tumour, and surgical factors, the sub-total and near-total excision of a VS predisposes to regrowth of the residuum, and such patients should be monitored closely. The data shows that the CPA and porus are the most likely sites for residual tumour to grow. Residual at the fundus is less likely to grow. This work also suggests that nodular residual tumours are more likely to grow requiring further treatment.
A review of olfactory neuroblastoma in the Welsh population over the last 15 years
H. Othman, M. Zaben, S. Etoum, O. Tilley, P. Goetz
University Hospital of Wales, Heath Park, Cardiff, CF14 0XE

Aim
Olfactory neuroblastoma (ONB) is a rare malignant neuroectodermal nasal tumor. This study aimed to explore its historical and current management in Wales.

Method
The Cancer Network Information System Cymru (CanISC) was searched for all patients diagnosed with ONB in Wales between 1999 and 2014. Data relating to patients’ demographics, clinical presentation, referral patterns, grading, treatment and outcomes was obtained retrospectively.

Result
Fifteen patients with a median age of 55 years were identified. The female to male ratio was 1.5:1. The most common presentation was nasal obstruction (n=10) followed by epistaxis (n=4), and a median duration of symptoms of 6 months. 4 patients were Kadish stage B, 10 stage C, and 1 stage D. There were 4, 2, 3 and 1 patients of Hyams stage IV, III, II, and I, respectively. Planned treatment was typically surgery followed by radiotherapy (n=10). 13 patients were operated (8 in Wales and 5 in England) with 8 patients underwent craniofacial surgery (CFS), 1 debulking and 4 endoscopic surgery (3 of them done recently). Average follow-up was 47 months (3-165 months). Median overall survival (OS) was 44 months (3 and 165 months) with 5 years survival 48% and 10 years 32%. Disease free survival for 5 and 10 years was 60% and 45% respectively. Kadish grade B and C OS was comparable to the literature.

Conclusion
The demographics, clinical presentation and grading are consistent with published series. Improved outcomes are expected with subspecialisation and regional provision of services for this rare condition. Whilst CFS plus adjuvant radiotherapy remains the standard of care, endoscopic resection is increasingly being adopted in selected cases.

BioGlue® reinforcement for cerebrospinal fluid leak repair during endoscopic transsphenoidal pituitary and anterior skull base surgery
K. Tamibrajo, M. Javadpour
National Neurosurgical Centre, Beaumont Hospital, Beaumont Road, Dublin 9, Ireland

Aim
To assess the effectiveness of BioGlue® (CryoLife, Inc, Atlanta, GA) in reinforcing a pedicled nasoseptal flap (PNSF) when repairing CSF leaks during endoscopic transsphenoidal or extended transsphenoidal approaches.

Method
All patients in whom BioGlue® was used in endoscopic transnasal skull base surgery were identified from a prospective database. The severity of intraoperative CSF leaks, methods of repair and occurrence of postoperative CSF leaks were identified.

Result
Over 19 months, 62 patients (26 male and 36 female; age range 5-84 years) underwent endoscopic transnasal skull base procedures. Pathology included 42 pituitary adenomas, 8 craniopharyngiomas, 4 meningiomas, 2 chordomas and 8 others. Intraoperative CSF leak occurred in 30 (48%) patients, of which 22 were high flow leaks (defined as large arachnoid tear or dural defect). In all cases a PNSF was reinforced with BioGlue®. In those with high flow leaks, additional fascia lata was placed intradurally. Nasal packing, lumbar CSF drainage and Foley balloon catheters were not used in any cases. Postoperative CSF leak occurred in only 1 case (failure rate 1.6% overall, 4.5% in high flow cases). This single case of repair failure occurred in a patient with craniopharyngioma who developed high CSF pressure due to ventriculoperitoneal shunt blockage in the postoperative period.

Conclusion
The use of multilayers PNSF reinforced with BioGlue® is highly effective in preventing postoperative CSF leaks after endoscopic transnasal skull base approaches. This technique obviates the need for nasal packing, lumbar CSF drainage and Foley balloon catheters in reinforcing the skull base repair.
Dural arterio-venous fistulas

A. Pichieri, A. Silva, S. Ahmed, A. Paluzzi
Department of Neurosurgery and Skull Base Surgery/Department of ENT Skull Base Surgery
Queen Elizabeth University Hospital Birmingham, Mindelsohn Way, Edgbaston, Birmingham, United Kingdom

Aim
Dural arterio-venous fistulas (DAVFs) are abnormal communications between an artery and a vein contained within the two layers of the dura. They can present with headache, seizures or intracranial hemorrhage. They need to be treated urgently if there is radiological evidence of cortical venous retrograde flow.

Treatment options include surgery and endovascular embolization. Surgical ligation or excision of the fistula through a craniotomy is considered the preferred treatment option. Endovascular embolization is possible by catheterizing directly the ophthalmic artery, however this needs to be sufficiently dilated and the risk of visual compromise from embolic occlusion of the central retinal artery can be high.

Method
We report two cases of anterior cranial fossa dural arteriovenous fistula (DAVF), one unruptured and one ruptured, excised via a fully endoscopic endonasal approach. Both displayed cortical venous retrograde flow and were completely excised on post-operative angiography.

Result
The main advantages of this approach when compared to an open one through a craniotomy are the use of a safe anatomical corridor leading directly to the arterial feeders of the fistula, the absence of brain retraction and a better cosmetic result without visible external scars, not to mention shorter hospital stay. When compared to embolization the risk of visual loss is minimal, though the one of anosmia is very high.

Conclusion
We conclude that the endoscopic endonasal approach is a safe and feasible new option in the armamentarium of treatments available for DAVFs in the anterior cranial fossa.

Indications and experience with the “Mini” Modified Orbitozygomatic Craniotomy (MMOZ) in a UK neurosurgical centre

M. Albarazi, J. Tailer, D. Fernando, Z. Sidhu, S. Barazi, N. Thomas, D. Walsh
Department of Neurosurgery, Fourth Floor Hambledon Wing, King’s College Hospital NHS Foundation Trust, Denmark Hill, London SE5 9RS

Aim
To describe the indications for and complications of the MMOZ craniotomy in a large volume UK neurosurgical unit.

Method
Retrospective review of operative logs and electronic patient notes form Sept 2007 - December 2014. All patients undergoing the one-piece modified orbitozygomatic craniotomy carried out by neurosurgeons at our institution. Two and three piece procedures were excluded from this analysis.

Electronic theatre logs, neurovascular operative data base and electronic patient notes were reviewed from Sept 2007 to December 2014. The indications for the procedure were recorded and notes consulted for evidence of complication particular to the surgical approach selected. The first operator seniority was recorded.

Result
18 MMOZ procedures were carried out over the period reviewed. The most common indications were in order: anterior circulation aneurysms, posterior circulation aneurysm and paraclinoid tumour. Complications related to the surgical approach were rare. Pulsatile enophthalmos, bone flap infection and ocular injury were not encountered in this series. Two patients suffered large volume MCA stroke in the days following the procedure, and underwent a decompressive hemicraniectomy. Two other patients had a mild 3rd-nerve palsy.

Conclusion
The MMOZ affords excellent access to the anterior cranial base and Circle of Willis. It is most commonly utilised for midline vascular lesions in our practice. Complications attributable to the approach were not encountered consistent with low morbidity reported in the literature hitherto. Two and three piece variants of the technique do not afford additional access for cranial vault and cranial base procedures. The craniotomy may be quickly fashioned with conventional neurosurgical instruments if necessary and may be safely carried out by appropriately trained neurosurgeons.
The British Skull Base Society Meeting

Single surgeon case series of transcranial resection of olfactory groove meningiomas – Is there an alternative approach?
K. Patel, A. Kolias, R. Kirollos
Cambridge University Hospitals NHS Foundation Trust and University of Cambridge, Cambridge Biomedical Campus, Hills Road, Cambridge, CB2 0QQ

Aim
Advances in endoscopic surgery have led neurosurgeons to adopt this technique to resect a number of Olfactory Groove Meningiomas (OGM). We examine a single surgeon experience of transcranial (Bifrontal transbasal with supraorbital osteotomy; bifrontal transbasal with modified midline osteotomy; bifrontal & interhemispheric) approaches and examine whether endoscopic surgery would have been a feasible alternative.

Method
Retrospective analysis of prospectively collected data. This series included 35 consecutive patients (26 female, 9 male) who underwent transcranial resection of OGM between 2002-2014. This represented 9.5% of all intracranial meningiomas operated on by this surgeon (370 total). We examined criteria to determine the suitability for endoscopic resection, including size and neurovascular encasement or adherence.

Result
Maximum tumour diameter varied from 2.2 to 6.63cm (average 4.28cm). Simpson grade I or II resection was obtained in 97.1% of patients. There was 1 operative mortality (2.8%) and 1 patient developed severe neurological deficit post operatively and died 4 months later. No other patients developed permanent focal neurological deficits other than anosmia. CSF leak occurred in 7 patients, 4 of whom underwent repair (11.4%). 2 of these developed low grade meningitis (5.7%) and 1 developed a bone flap infection (2.8%). 1 patient developed post operative seizures (2.8%). 80% of patients had a favourable Modified Rankin Scale (mRS) score of 0-1 at follow up. 1 had residual tumour left in the sphenoïd sinus. No recurrences have been detected 3-96 months post surgery (mean follow up 33.9 months). A detailed evaluation of pre-operative imaging and operative findings (tumour size, neurovascular attachment/involvement and intraoperative vascular adherence) revealed that 6 of the 35 patients’ (17%) could have been suitable for an endoscopic approach. However pitfalls in preoperative selection will be discussed.

Conclusion
Transcranial surgery remains the standard approach for OGM’s. A small proportion of patients with OGM’s in this series might have been suitable for endoscopic resection.

Paediatric skull base and extended endoscopic sinus surgery in very young children – Lessons of the past 5 years
N. Sharma, M. Parulekar, D. Rodrigues, S. Ahmed, A. McDermott
Department of Otorhinolaryngology, Ophthalmology and Neurosurgery, Birmingham Children’s Hospital. Steelhouse Lane, Birmingham B46NH

Aim
Evaluate the outcomes of young children under the age of 10 years who have undergone transnasal extended endoscopic anterior skull base surgery at the Birmingham Children’s Hospital. September 2009 to November 2014.

Method
Skull base surgery is a well established and accepted subspeciality in adults. Over the past decade, surgery for skull base lesions has evolved significantly as modern technologies, imaging modalities and multidisciplinary team working have advanced. Such surgery poses unique challenges in paediatric practice. Pathology is rare in this group and there is paucity of data to help guide clinical decision making. We aim to evaluate the lessons we have learnt with such surgeries in young children over the past 5 years.

Result
There were 38 children under the age of 10 years. Predominantly male cases. Very varied, unusual and rare pathologies were identified. Complications included one case of unilateral loss of vision, four early CSF leaks, late recurrence of a post traumatic CSF leak, enophthalmos, dental abnormalities, saddle deformity of the nose and nasal obstruction.

Conclusion
Undertaking endoscopic skull base surgery in children presents unique challenges to the surgical team. Rare pathologies present both diagnostic challenges to the pathologist and oncologist as well as clinical and ethical dilemmas to the surgical team. Surgical techniques performed in adults are not always possible in young children and equipment can be a problem in small children. Post-operative and long-term management dilemmas of the more unusual pathologies have been very challenging.
A national audit of skull base chordoma and chondrosarcoma referred for adjuvant proton therapy in the UK, 2007–2014

N. Phillips
Department of Neurosurgery, Leeds General Infirmary, Great George Street, Leeds LS1 3EX

Aim
To identify excellence and improve surgical practice in the treatment of skull base chordoma and chondrosarcoma, and to open discussion regarding surgical outcome measures.

Method
A review of all postoperative referrals to the UK Proton Panel for adjuvant proton therapy in the UK between the years of 2007 and 2014, - a period of change in the approach to the surgery of skull base lesions with the adoption of endoscopic procedures.

Result
123 cases from 34 units were referred between 18.12.2007 and 29.10.2014, - a mean of 3.6 cases (range 1 to 15) per unit. Scans were available for 110 patients. There were 77 (62%) chordomas and 46 (37%) chondrosarcomas. 63 (51%) lesions were based on the clivus. 44 (36%) patients had brainstem compression at presentation and 61 (50%) had vascular encasement. 55 (45%) patients had preoperative imaging available in 3 planes with contrast enhancement. 37 (30%) patients had a primary endoscopic procedure. 10 (8%) patients had 2 endoscopic procedures. 13 (10%) had a primary microscopic transphenoidal procedure. 20 % of patients had an intial biopsy. A prospective grading scale based on size of tumour, vascular encasement and brainstem compression was evaluated.

Conclusion
Over the period of review wide variation in approaches regarding radiology and surgery were observed. Discussion will allow identification of optimal pathway recommendations.

Temporo–Parietal Temporalis Myo–Fascial Flap (TPTMFF) – A vascularised regional flap to reconstruct complex skull base defects following Expanded Endonasal Approaches (EEA)

T. Land, A. Silva, R. Mitchell, A. Paluzzi, S. Ahmed
Department of Neurosurgery and Skull Base Surgery/Department of ENT Skull Base Surgery
Queen Elizabeth University Hospital Birmingham, Mindelsohn Way, Edgbaston, Birmingham, United Kingdom, B15 2WB

Aim
The application of expanded endonasal approaches (EEA) to the skull base revolutionized and increased the scope and extent of pathologies that can be treated with this technique. Such methods can leave large defects requiring reconstruction to re-establish barriers between the nasal cavity and intra-cranial arachnoid space and prevent complications such as CSF leak and infection in cases associated with extensive dural resection and high flow CSF leaks. A common method for reconstruction is a local vascularized pedicled naso-septal flap. However sometimes this option may not be possible, for example where multiple previous surgeries, adjuvant radiotherapy or even extensive tumour may have corrupted the vascular pedicle. This may necessitate a regional flap such as the temporo-parietal fascial flap (TPTMFF) transposed via the trans-ptyerigoid route as described by Fortes et al 2007. We describe a novel modification of this technique applying the principle that incorporation of temporalis muscle tissue at the flap tip with a preserved vascular pedicle would provide a greater volume of vascularized tissue resulting in a more robust repair in selected cases.

Method
We present a retrospective review of two cases where we applied this modification of the trans-ptyerigoid transposition of the TPTMFF to include a harvest of temporalis muscle and preserve a superficial temporal artery vascular pedicle. Both patients had received multiple EEs to resect skull base tumours and received post-operative radiotherapy and their post-operative course was complicated by CSF leaks resistant to multiple surgeries.

Result
Our patients underwent repair of their persistent CSF fistula using trans-ptyerigoid transposition of a pedicled temporo-parietal temporalis myo-fascial flap (TPTMFF). The CSF leak resolved without further complication.

Conclusion
In situations where local flap repair to reconstruct skull-base defects following EEA may not be viable or have failed as a result of multiple surgeries and/or adjuvant radiotherapy, a modified regional flap incorporating temporalis muscle with a preserved vascular pedicle provides a robust alternative.
The British Skull Base Society Meeting

Pre-moulded custom implants for sphenoid-orbital reconstruction – A novel multi-disciplinary approach
H. Othman, S. Evans, D. Morris, J. Martin, C. Lane, S. Bhatia, C. Hayhurst
Department of Neurosurgery, University Hospital of Wales, Cardiff, CF14 4XW UK

Aim
Spheno-orbital hyperostotic tumours require extensive bony resection to achieve the desired cosmetic, visual and oncolgical outcome. Orbital reconstruction method after extensive resection is controversial. We report the use of pre-moulded custom orbital and cranial implants after combined complete tumour resection.

Method
Six patients underwent resection of spheno-orbital tumours (5 meningioma, 1 fibrous dysplasia) between August 2012 and July 2014. All patients underwent helical 3D CT planning and the intended resection was defined to remove all involved bone including the orbital rim, anterior clinoidectomy and optic canal where necessary. The reconstructive implant is fashioned based on the contours of the contralateral side. The implant material was dependent on the anticipated need for adjuvant radiotherapy (Poly-ether-ether-ketone (PEEK) or titanium). A combined team of neurosurgeons, ophthalmic and maxillofacial surgeons undertake surgery.

Result
All patients presented with visual deficit and proptosis. Five cases were female, median age 49.5 years and median follow-up 10 months. 2 patients had previous meningioma resections, one re-presenting with recurrence and one with failure of the previous prosthesis. At the latest follow-up all patients have normal optic nerve function, 4 have no visual symptoms, one has persistent mild proptosis and one has mild vertical diplopia well controlled with prisms. A gross total resection was achieved in all cases. 3 patients had PEEK implants and 3 had titanium with no intraoperative implant placement problems. Overall cosmetic outcome was good with no infections or CSF leak.

Conclusion
Radical resection of sphenoid-orbital hyperostotic tumors can be achieved with good cosmetic outcome and minimal morbidity, using custom pre-moulded rigid implants for reconstruction. The meticulous pre-operative 3D planning and multidisciplinary skull base team has provided excellent functional, oncological and cosmetic outcomes. An advantage of PEEK implants is reduced artefact on subsequent imaging and reduced radiotherapy beam scatter where adjuvant treatment is needed.

Lateral supraorbital approach for anterior skull base meningiomas
R. Romani
Department of Neurosurgery, Essex Neurosciences Centre, Queen’s Hospital, Romford, Essex, RM7 0AG

Aim
There has been a trend in Neurosurgery towards simpler and less invasive access to the skull base. We assessed the reliability and safety of the lateral supraorbital approach (LSO) for the treatment of anterior skull base meningiomas.

Method
Retrospective review of 66 olfactory groove meningiomas (OGM), 73 anterior clinoidal meningiomas (ACM), 52 tuberculum sellae meningiomas (TSM) consecutive patients treated through the LSO approach at Helsinki University (J.H). Altogether 191 patients of a total of 3000 LSO approaches were analyzed, and 3 videos were selected to show the approach and the microsurgical techniques used. The neuroanesthesia method when using this small approach is also presented.

Result
OGM, ACM, TSM: Microsurgical techniques video demonstration.
Slack brain was achieved in 154 cases by a head position elevated 20 cm above cardiac level in all patients; administering mannitol preoperatively in medium or large meningiomas (60 cases); propofol infusion (46 cases) or volatile anesthetics (107 cases) also in patients with large tumor (37 cases); and controlling intraoperative hemodynamics. The mean systolic blood pressure was 95–110 mmHg during surgery. The median intraoperative blood loss was 200 [range, 0–2000] ml and 9% of patients had red blood cell transfusion. One-hundred and fifty-seven patients (84%) were extubated on the day of the surgery. The median (25th/75th percentiles) time to extubation after surgery was 18 [9/105] min.

Conclusion
The LSO approach can be used safely for OGMs, ACMs, and TSMs of all sizes.
Anterior skull base surgery in children – The practicalities for the surgical and anaesthetic team

R. Finn, A. Brazier, S. Ahmed, D. Rodrigues, A. McDermott, M. Stokes
Department of ENT Surgery, The Birmingham Children’s Hospital, Steelhouse Lane, Birmingham, B46NH
Acknowledgements: Mr Manoj Parulekar, Mr Richard Walsh, Dr Katherine Foster

Aim
To highlight difficulties and practicalities of providing a comprehensive anterior skull base surgery to a paediatric population and to discuss the modifications and special considerations that we feel have been instrumental in achieving successful outcomes.

Method
At Birmingham Children’s Hospital, transnasal endoscopic surgery has been performed in children since 2010 for a wide variety of anterior skull base pathology. The learning curve for clinicians with particular reference to the surgical scrub team and the anaesthetist is often underestimated. The considerations are not the same as for adult practice. The importance of having a team who have established a robust working routine for such paediatric cases is extremely important.

Result
The management of significant blood loss is crucial especially in small children. Timing of blood transfusion and the use of continuous intravenous tranexamic acid infusion throughout the procedure have been of great value. The technique of intrathecal fluorescein in children has been developed and has been employed successfully. Many cases were young children under the age of 8 years and traditional skull base instruments were not designed for the small nose. Adaptations of alternative instruments have proved very successful in our paediatric anterior skull base practice and alternative surgical techniques and nasal dressings have been now been developed.

Conclusion
Transnasal anterior skull base surgery in children has proved to have successful outcomes. The familiarity of the entire surgical team and anaesthetist with the necessary modifications in paediatric practice is very important for good outcomes. The development of a designated anterior skull base team is essential since this surgery is not very common.

A 3D-endoscopic transtubular transcallosal approach to the third ventricle

A. Shoakazemi, A. Evins, J. Burrell, A. Bernardo, P. Stieg
Department of Neurological Surgery, Weill Cornell Medical College, New York Presbyterian Hospital, New York New York
Department of Neurosurgery, Regional Neuroscience Unit, Royal Victoria Hospital, Belfast, United Kingdom BT12 6BA

Aim
Surgical approaches to deep-seated brain pathologies, specifically lesions of the third ventricle, have always been a challenge for neurosurgeons. In certain cases, the transcallosal approach remains the most suitable option for targeting lesions of the third ventricle, though retraction of the fornices and wall of the third ventricle have been associated with neuropsychological and hypothalamic deficits. We investigate the feasibility of an interhemispheric 3D-endoscopic transcallosal approach through a minimally invasive tubular retractor system for the management of third ventricular lesions.

Method
3D-endoscopic transtubular transcallosal approaches were performed on 5 preserved cadaveric heads (10 sides). A parasagittal burr hole was placed using neuronavigation and a tubular retractor (Vlycor Medical Inc.) was inserted under direct endoscopic visualization. Following observation of the vascular structures, fenestration of the corpus callosum was performed and the retractor was advanced through the opening. Transforaminal, interforneal and transchoroidal modifications were all performed and qualitatively evaluated by three surgeons.

Result
This approach provided enhanced visualization of the third ventricle and more stable retraction of corpus callosum and fornices. Byronetted instruments were used through the retractor without difficulty and the retractor applied rigid, constant and equally distributed pressure on the corpus callosum.

Conclusion
A transtubular approach to the third ventricle is feasible and facilitates blunt dissection mitigate the transection of the corpus callosum that may minimize retraction injury to white matter tracts. This technique also provides an added degree of safety by limiting the free range of instrumental movement. The combination of 3D-endoscopic visualization with a clear plastic retractor facilitates safe and direct monitoring of the surgical corridor.
Extra-sellar extensions of pituitary adenoma on magnetic resonance imaging

D-S. Lee, M. Yuniarti, J. July
Imperial College London, Room 138 Reynolds Building, Charing Cross Campus, London W6 8RP

Aim
Extrasellar extensions of pituitary macroadenoma causes clinical symptoms and makes resection more difficult. The inferior and lateral aspects of pituitary fossa are bordered by air-filled sphenoid and venous cavernous sinuses; thus the tumour bulges on the sinuses before breaching into the wall and occupying the sinuses. The aim of the study is to establish the extension pattern of pituitary macroadenoma and to assess the changes in the pattern when bulging is considered.

Method
A retrospective review of 28 consecutive patients with pituitary macroadenoma was conducted. Pre-operative magnetic resonance images were analysed by a neuroradiologist to establish the extra-sellar extension pattern. Extensions towards suprasellar, infrasellar (sphenoid sinuses), lateral (cavernous sinuses), anterior, and posterior aspects were recorded. The chi-square test, Fisher’s exact test, and independent samples t-test were used for statistical analysis.

Result
The mean widest diameter of the tumour was 36.54mm. Most common site of extension was the suprasellar region with 27 patients (86.43%). This was followed by anterior, 12 patients (42.86%); infrasellar, 11 patients (39.26%); posterior, 10 patients (35.71%); and lateral extensions, 7 patients (25%). Suprasellar extension was significantly more common than infrasellar (96.43% vs 38.26%; p < 0.0001) and lateral extensions (96% vs 25%; p < 0.0001). When infrasellar bulging, 23 patients (82.14%) and lateral bulging, 19 patients (67.86%) were considered, there was no difference between suprasellar extensions and infrasellar bulging (96.43% vs 82.14%; p=0.19). However, the rate of suprasellar extension remained higher than that of infrasellar bulge (96.43% vs 67.86%; p=0.005).

Conclusion
Suprasellar region was the most common site of extension. However, the infrasellar region was equally affected when the bulging into the bony roof of the sphenoid sinus was considered. However, suprasellar extension remained more common than bulging into cavernous sinuses although both regions are bordered by soft tissue and thus offer similar resistance for the tumour.

Three cases of complete resolution of Abducen (VI) nerve palsy following endoscopic decompression

L. Ritchie, C. Tornari, N. O’Shea, P. Andrews
RNTNE, 330 Grays Inn Road, London WC1X 8DA

Aim
The anatomical relationship of the sixth cranial nerve (abducens nerve) due to its length and tenuous nature, makes it vulnerable to inflammation and subsequent palsy particularly where it abuts the sphenoid. Recovery of the palsy takes between 2 weeks to 6 months. We have shown complete recovery of palsies if the offending sphenoid or compressing aetiology is surgically decompressed. The need to image the sphenoid is a prerequisite.

Method
Three patients presented to a tertiary ENT centre over a 1 year period. Surgical management was our primary treatment option supported with appropriate antibiotic and steroid therapy.

Result
All patients were given intravenous antibiotics appropriate to the source of potential infection in addition to intravenous steroids. The abducens nerve was assessed by MRI with Gadolinium-enhanced T1 and T2 weighted images and CT scans. All patients underwent surgical decompression. Patient One developed VI palsy 11 days after a CSF leak repair secondary to endoscopic sinus surgery. There were multiple causative factors including diabetes, expanding surgical packs that may have exerted local pressure and a lumbar drain which was placed intraperatively – all of which have been reported in the literature as being causative of cranial nerve palsies. There was total resolution within 3 months. Patient Two presented with CNVI palsy secondary to pansinusitis with skull base and cavernous sinus involvement. The patient underwent endoscopic sinus surgery and sphenoid sinusotomy to release pus. The causative organism was Staphylococcus aureus, this was also found in blood cultures. Total resolution of the palsy took 5 months. Patient Three presented with progressive deterioration of a unilateral CNVI palsy secondary to a petrous apex cholesterol granuloma complicated by recurrent infections. Image-guided endoscopic decompression of the cholesterol granuloma resulted in resolution of the palsy within 3 months.

Conclusion
In the absence of total division of the VI nerve, surgical decompression of the underlying pathology precipitating the palsy will result in a favourable recovery rate. If compressive or infective foci are reduced or diffused in a timely fashion through surgery with the use of anti-inflammatory and antimicrobials, there is a good prognosis for VI nerve palsies.
Endoscopic transpterygoidal excision of lateral sphenoid recess meningocele under fluorescein visualisation
SA. Evans, SS. Ling, M. Al-Rahbi, SK. Ahmed
Department of Otolaryngology, Queen Elizabeth Hospital, Edgbaston, Birmingham B15 2GW

Aim
We present the case of a patient with a meningocele in the left lateral sphenoid recess and consequent CSF rhinorrhea. The management of this patient is compared with the literature regarding endoscopic repair, and present hypotheses concerning the aetiology of such lesions are evaluated.

Method
The presence of Sternberg’s canal results from incomplete ossification of sphenoid bone components. Defects of the lateral sphenoid recess result in CSF leak and meningocele, but whether this is aetologically consistent with the developmental abnormality of Sternberg’s canal is debated.

Result
A 44 year old woman presented with a one year history of persistent CSF rhinorrhea and a single episode of meningitis. High-resolution CT demonstrated an intrasphenoidal meningocele associated with a bony defect within the left lateral recess of the sphenoid sinus, lateral to the course of the maxillary nerve. After multidisciplinary discussion, endoscopic exploration was conducted via a transsphenoidal and transpterygoidal approach. Detection and precise localisation of the meningocele was enhanced by pre-operative intrathecal injection of fluorescein. The intraoperative findings were in keeping with a bony dehiscence in Sternberg’s canal. The meningocele was excised and the skull base was repaired with a right nasoseptal flap. The post-operative course was uncomplicated, with no further episodes of CSF rhinorrhea.

Conclusion
Endoscopic repair of meningoencephalocele in the lateral sphenoid recess is technically challenging. Intrathecal fluorescein aids in location of such a defect and confirmation of successful repair. The location of CSF-fluorescein extravasation in this patient coincided with the expected location of Sternberg’s canal.

Cork University Hospital, Wilton, Cork, Ireland

Aim
In this study, we examine a single institution’s experience of olfactory neuroblastoma over fourteen years, from 1998 – 2011

Method
Retrospective study

Result
There were a total of nine histopathological confirmed cases of DNB. The male to female ratio was 2:1 and the age range was from 18-74, with a median age at diagnosis of 57 years. All patients underwent surgery with adjuvant radiotherapy. The median follow-up period was 71 months (range 21–108 months). To date overall survival is a 100%, with recurrences reported in two of nine cases which both of whom received additional radiation treatment.

Conclusion
We conclude that surgery and radiotherapy can achieve a good outcome despite the aggressive nature of the disease, close follow-up is essential due to the high rates of recurrence.
Comparing three-dimensional (3-D) with two-dimensional (2-D) endoscopes in transsphenoidal surgery – A systematic review

Y. Wan, N. Shah, H. Marcus
Department of Otolaryngology- Head and Neck Surgery, Castle Hill Hospital, Cottingham, East Riding of Yorkshire, HU16 5JQ
Department of Biosurgery and Surgical Technology, St Mary’s Hospital, Imperial College London, London, W2 1NY

Aim
Although endoscopic transsphenoidal surgery is now a well-accepted alternative to conventional microsurgical transsphenoidal surgery, most available neuroendoscopes provide 2-dimensional (2-D) visualisation, limiting depth perception. Recently, 3-dimensional (3-D) endoscopes have been developed, but the comparative safety and efficacy of such endoscopes remain unclear. This aim of this study was therefore to synthesise the current evidence for 3-D versus 2-D endoscopy.

Method
We performed a search of MEDLINE, EMBASE and cochrane database of systematic reviews using defined criteria for published series comparing clinical outcomes using 2-dimensional and 3-dimensional endoscopic systems in adult patients undergoing transsphenoidal surgery.

Result
After screening of 151 records, 3 eligible studies were identified [all retrospective case-series], comprising 134 patients being treated with 3-D procedures with the most common diagnosis being pituitary adenomas. The Visionsense 3-D Standard Definition (SD) endoscope was compared to the Storz 2-D High Definition (HD) endoscope in all cases. There was no statistically significant difference in primary outcomes measured, including overall operative time, length of stay and intraoperative CSF-leak rates. There were no validated measures for secondary outcomes. Surgeons reported subjective improvements in depth perception and faster skill acquisition for naive residents. Limitations of these endoscopes included a narrower field of view, lower screen resolution, and wider scope diameters.

Conclusion
No significant difference was demonstrated in the clinical outcomes of patients undergoing transsphenoidal surgery with 3-D and 2-D endoscopes. However, few studies have directly compared the use of 3-D and 2-D endoscopes, and all compared 3-D SD and 2-D HD endoscopy. Moreover, the impact of 3-D endoscopes on the surgeon learning curve warrants further research; low-volume centres may preferentially benefit if naive residents acquire skills more efficiently. Further studies are warranted.

Meningioma masquerading as chondrosarcoma of the lateral skull base

M. Adams, S. Hampton, N. Bailie, S. Cooke
Department of Otolaryngology/Head and Neck Surgery, Royal Victoria Hospital, Belfast, 274 Grosvenor Road, Belfast, BT12 6BA

Aim
We present a case of type 1 meningioma masquerading as a chondrosarcoma of the petrous temporal bone in a 28 year old man with bilateral internal auditory meatus lesions.

Method
Case Report

Result
A 28 year man presented with right sided hearing loss secondary to a small vestibular schwannoma. A second incidental lesion was seen at the left petro-occipital synchondrosis which was radiologically suspicious for chondrosarcoma. Image guided biopsy revealed a type one meningioma. The patient was therefore referred to the genetic service for investigation of possible NF2.

Conclusion
Meningiomata can display highly variable features on MRI which can mimic malignancy. Image-guided biopsy may therefore be required for definitive diagnosis.
Protection of facial nerve during translabyrinthine approach – Superior gutter dissection

Skull Base, ENT and Neurosurgery, Salford Royal Foundation Trust, Stott Lane, Salford, Manchester, M6 8HD

Aim
Share our surgical experience during the superior gutter dissection using a silastic sheet to protect the IAM contents.

Method
The lateral end of the IAM is the most dangerous area with regard to damage to the facial nerve. It is extremely important to remove all bone from the superior aspect to the anterior border of the IAM. Inadvertent exposure and injury of the facial nerve as well as thermal injury can take place, especially with less experienced surgeons.

Result
Our experience shows that the use of a silastic sheet during the dissection of the IAM, especially while drilling the last part of the superior gutter in patients undergoing translabyrinthine removal of vestibular schwannomas increases safety and reduces the surgical time at this stage. It also makes the drilling more confident and is useful while training trainees. Our group has tried different techniques in order to protect the IAM content at this surgical stage; we have found that metallic sheets have cutting edges that can potentially injure the facial nerve. Silastic sheet is thick enough to protect the nerve from thermal or mechanical injuries, has soft borders and it can be adjusted to protect the IAM. It offers a better distribution of pressure when retracting the IAM contents away from the drill.

Conclusion
Protecting the IAM contents with a silastic sheet during the final drilling of the superior gutter is a useful technique, that increases safety, reduces surgical time and is useful during surgical training.

Spontaneous shrinkage of unilateral vestibular schwannoma

R. Romani, J. Pollock
Department of Neurosurgery, Essex Neurosciences Centre, Queen’s Hospital, Romford, Essex, RM7 0AG

Aim
To describe two case reports of spontaneous shrinkage of vestibular schwannoma (VS) and to review the literature regarding this phenomenon.

Method
Retrospective review of case notes and radiological investigations of two patients. Assessment of tumor size was done by recording the maximum intracranial tumour diameter (ICTD). 2mm or more difference in diameter between scans was defined as radiological change. Pure tone and speech audiometry was also performed routinely.

Result
First patient: A 29-year old female presented with a progressive history of visual blurring and intermittent diplopia over 2 months. She was assessed by an optician who noted bilateral papillae edema. MRI with contrast demonstrated a large VS of 35mm maximum intracranial diameter (ICD) with secondary obstructive hydrocephalus. A ventriculoperitoneal shunt was placed shortly after presentation to relieve the hydrocephalus. The patient had early resolution of her symptoms and opted for initial conservative management. In the absence of new symptoms, interval scanning was continued between 2006 and 2014. Progressive reduction in the maximum ICD was observed together with reduction in the degree of central tumour enhancement. Maximum ICD at most recent follow up is 21mm.

Second patient: A 28-year old female was referred with right sensorineural deafness. CT scan done in April 2009 demonstrated a right VS of maximum ICD of 27 mm. Initial conservative management was planned after discussion. Serial MRI showed an initial increase in the size of the tumour followed by progressive reduction in size of the tumor. The most recent MRI investigation showed a maximum ICD of 21mm.

Conclusion
Early ‘watch, wait and rescan’ (WWR) management was associated in these two patients with spontaneous shrinkage over time. WWR is therefore occasionally suitable management even in young patients with large VS and should be considered when symptoms are minimal or absent. Prospective clinical study of larger numbers of such cases using the UK VS database may help to identify predictive factors for spontaneous regression of VS.
The British Skull Base Society Meeting

Presenting hyponatraemia and the sellar lesion
S. Solanki, I. Robertson
Queen’s Medical Centre, University Hospitals of Nottingham NHS Trust, Derby Road, Nottingham, NG7 2UH

Aim
Hyponatraemia in the context of tumours in the sellar region is commonly a post-operative phenomenon and rarely the presenting feature. We present two such rare cases and discuss the potential mechanisms of presenting hyponatraemia.

Method
Two female patients (patients A and B) with hyponatraemia as the sole presenting feature underwent endoscopic transphenoidal resection of large sellar tumours. Pre-and post-operative sodium and electrolyte levels together with endocrine status and histology were recorded.

Result
Presenting sodium levels were 116 and 125 mmol/l for patients A & B respectively, with paired urinary and serum sodium and osmolalities consistent with Syndrome of Inappropriate Antidiuretic Hormone secretion (SIADH) for both patients. Serum ADH was assayed for patient B and was significantly elevated (3.2pg/ml). Extensive endocrinological assessment did not reveal any other hormone deficiency or excess for either patient. Patient A’s histology revealed a central neurocytoma, and patient B’s histology confirmed gangliocytoma. Both tumours were located in the sellar and suprasellar regions. Post-operative SIADH status remained positive with respective sodium levels of 119 and 128 mmol/l.

Conclusion
Sellar tumours presenting with hyponatraemia and otherwise normal hormone status are uncommon and likely to be caused by true SIADH. Tumour resection in these two cases did not reverse hyponatraemia and SIADH. We therefore propose disruption of the osmoreceptor feedback mechanism to the supraoptic and paraventricular hypothalamic nuclei as the causal mechanism in these rare cases.

A review of the last thousand cases presenting to the neuro-otology and lateral skull base clinic
W. Huang, D. Fitzgerald, R. McConn Walsh, D. Rawluk, M. Javadpour, K. Walsh
The Beaumont Hospital, Beaumont Road, Dublin, Ireland

Aim
Assessment of the diagnoses, treatments and clinical outcomes of the first one thousand patients to attend the neurootology and skull base clinic in Beaumont Hospital.

Method
Using the prospectively collated neurootology and skull base data base, we have reviewed the documented pathologies and their respective evolving managements, over a fifteen year period.

Result
The three most commonly occurring pathologies are vestibular schwannoma, glomus tumour and petrous apex lesions. These are discussed in detail.

Conclusion
Beaumont neurootology and skull base clinic is a tertiary referral centre for the pathologies outlined above and, as such, has amassed a wealth of experience and data regarding some of the rarest and most difficult cases our specialty deals with. It is this centre’s largest review of the data to date.
Unabsorbed dura patch removed eight years after pituitary surgery

I. Zaidi, A. Nassimzadeh, A. Warfield, S. Ahmed
Department of Ear, Nose and Throat Surgery/Department of Pathology
New Queen Elizabeth Hospital, Birmingham, Mindelsohn Way, Edgbaston, B15 2WB

Aim
The Codman ETHISORB Dura Patch is a synthetic, absorbable material, and according to the manufacturer absorption is essentially complete in approximately 90 days. We report a case in which a patient presented with nasal obstruction and epistaxis 8 years after pituitary surgery for Cushing’s disease and discuss his management.

Method
A description of our case and his management.

Result
A 62-year-old man presented with epistaxis and nasal obstruction to his local casualty department. He had a history of pituitary surgery for Cushing’s disease 8 years previously. A CT scan was performed to evaluate the cause of his symptoms and a foreign body was identified. Our patient underwent an examination under anaesthetic to remove the foreign body. The operating surgeon, who was not a skull base surgeon, assumed that this was left inadvertently in the patient after his pituitary surgery and referred the case back to our unit for further investigation.

Analysis of the patient’s original operation notes revealed that no silastic nasal splint was used. The only foreign bodies used were a Codman ETHISORB Dura Patch and a BIPP (Bismuth Iodine Paraffin Pastel) pack placed after the repair. The latter was documented to have been removed 5 days after surgery. Pathological analysis of the foreign body revealed it to be in keeping with an unabsorbed synthetic dural repair patch that was used during his surgery to seal an intraoperative CSF leak.

Conclusion
We report the first case of a Codman ETHISORB Dura Patch that has remained unabsorbed 8 years after skull base repair. This resulted in epistaxis and nasal obstruction and skull base surgeons should be aware of this possibility in the long term follow up of these patients.
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