

BS2-1-1 Management strategy and treatment outcomes of unruptured intracranial aneurysms – implications from the UCAS Japan cohort

Akio Morita¹, Shinjiro Tominari², Takeo Nakayama², Ucas Japan Investigators³

¹Nippon Medical School, ²Kyoto University School of Public Health, ³Japan Neurosurgical Society

.....
Background: Management strategy of the unruptured intracranial aneurysms (UIA) should be made by balancing rupture risks and management risks of aneurysms. We now report the treatment data from a Japanese cohort and created risk prediction model in conjunction with rupture risks in the cohort.

Method: Out of the total cohort of 6,413 patients, 2,627 underwent repair in 215 institutions. Morbidity was defined as decline of modified Rankin scale to the level of two or below at one month after treatment. Factors with p value less than 0.10 by multivariate cox regression model were considered important and included in the prediction model for management morbidity.

Results: Overall morbidity was recorded in 79 cases (3.0%). Important risk factors were Size ≥10mm, Basilar Location, not associated with daughter sac, Age ≥70, Hypertension, Diabetes Mellitus, initial modified Rankin scale and multiple aneurysm treatment at one session. We created risk prediction model for morbidity to be balanced with rupture prediction score.

Conclusions: Risk prediction model of management as shown here should support decision making on UIA management in conjunction with rupture risk prediction model.

BS2-1-2 Treatment of clinoid portion of aneurysm

Yoko Kato, Ittichai Sakarunchai, Yasuhiro Yamada, Kei Yamashiro, Daisuke Suyama, Tsukasa Kawase
 Fujita Health University Banbuntane Hotokukai Hospital

.....
 The management of unruptured cerebral aneurysm is still debate either indication or technique of treatment. The complication after treatment is the most serious for the patient who presented with asymptomatic, the technique and the adjacent devices will be the keys to improve of the outcome. We enrolled 340 patients with newly diagnose unruptures cerebral aneurysm in our department last three years. All patients were detected the aneurysm by non-invasive imaging and underwent surgical clipping. The Indocyanine green video-angiography (ICG -VA) was used for confirmation the patency of small perforating arteries through the completion of aneurysm neck obliteration. The endoscope-assisted microsurgery was used to check

the small arteries that hidden behind the aneurysm sac and the intraoperative physiologic monitoring (motor evoke potential : MEP). The outcome of treatment was measured by modify Rankin scale (mRS) score at postoperative time. The combination of microsurgical technique with the adjunct devices such as ICG-VA integrated microscope, endoscope and MEP monitoring is leaded to improve the outcome of treatment.

BS2-1-3 Role of skull base approaches for giant aneurysms

Eka J. Wahjoepramono

Department of Neurosurgery, Pelita Harapan University, Indonesia

BS2-1-4 Risk assessment of vertebral artery vulnerability in congenital atlantoaxial dislocation

Sanjay Behari, Jayesh Sardhara, Kamlesh Singh Bhaisora, Kuntal Kanti Das, Anant Mehrotra, Arun Kumar Srivastava, Rabi Narayan Sahu, Awadhesh Kumar Jaiswal
 Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

.....
Background: This prospective study performs a preoperative risk stratification of factors that render VA at craniovertebral junction(CVJ) vulnerable to injury during surgery.

Methods:104 patients (65 with AAD; 39 controls) underwent a 3 dimensional multiplanar CT angiogram to study anatomical variations in VA, atlantoaxial bony anomalies, and rotational deformity/tilt at CVJ.

Results:An increased predisposition to VA injury was present in 23 (35.4%) patients (persistent first intersegmental artery[n = 20; 30%];fenestrated VA[n = 1; 1.53%],and low lying PICA[n=2;3%] where VA crossed the C1 and 2 facet joint; 8(12%) with anomalous medial deviation; 12(18%) with high-riding VA at C2 and narrow axial isthmus; and 13(20%) with rotation/tilt at CVJ. A normal score of 5 was obtained in 21 patients; and a score of 6-9(indicating increased vulnerability of VA) in 44 patients. "AAD with an occipitalized atlas" group was associated with a significant medial deviation of VA (right: P=0.00 and left: P=0.001).

Conclusions: A preoperative detailed risk assessment of anatomical variations in the size and course of VA at the CVJ significantly reduces chances of its iatrogenic injury.

BS2-1-5 Surgical flow diversion for complex posterior circulation aneurysms

Ehab Shiban^{1,2}, Maria Wostrack^{1,2},
Sascha Prothmann¹, Bernhard Meyer^{1,2},
Jens Lehmborg^{1,2}

¹Technical University of Munich, ²Neurosurgery Department

Objective:

We present our clinical experience of surgical flow diversion including extra-intracranial bypass surgery and vertebral artery occlusion as an alternative treatment in otherwise untreatable complex vertebrobasilar and posterior artery aneurysms.

Methods:

We prospectively followed up four consecutive patients with fusiform and giant aneurysms of the posterior circulation which underwent surgical treatment resulting in aneurysm flow diversion at our department.

Results:

Four patients (1f/3m, mean age 47 y /range 21-59 y) were treated. Three patients had basilar artery aneurysms (one proximal fusiform aneurysm, two distal aneurysm fusiform and giant, respectively), one patient had a posterior artery giant aneurysm. All patients underwent superficial temporal artery-posterior cerebral artery bypass surgery. The mean modified Rankin Scale (mRS) score improved from 1.75 before surgery to 2.5 postoperatively. Post-treatment angiography revealed sufficient flow diversion in all cases. There was no perioperative mortality.

Conclusion

Surgical flow diversion was achieved by extra-intracranial bypass surgery in combination with surgical or endovascular vessel occlusion.

BS2-1-6 Giant aneurysms: Technical advances

Saleem Abdulrauf

Department of Neurosurgery, Saint Louis University Center for Cerebrovascular and Skull Base Surgery, USA

BS2-2-1 Four hand technique for surgery of vestibular schwannomas

Lars Poulsen, Kåre Fugleholm
University Clinic of Neurosurgery, Denmark

Lars Poulsen and Kåre Fugleholm
Department of Neurosurgery,
Rigshospitalet
Copenhagen
Denmark

Since 2009 two experienced neurosurgeons have operated all Vestibular Schwannoma cases in the centralised Neurosurgical Clinic in Copenhagen using four hand technique.

The technique that allows the use of four hands together with positions of both the patient and the surgeons are demonstrated for both the translabyrinthine and the retrosigmoid approaches.

The results of surgery of more than 150 mainly large Vestibular Schwannomas operated from 2009 to 2015 (all with the use of four hand technique) are presented.

We believe, that this technique reduce operating time, reduce the need of fixed brain retraction and improves surgical outcome

BS2-2-2 Acoustic neuroma - evolving management

Marcus Atlas

Ear Sciences Centre, University of Western Australia, Australia

BS2-2-3 The transotic approach for vestibular schwannoma

Yin Xia¹, Wenyang Zhang¹, Yi Li², Xiaobo Ma²,
Qiang Liu¹, Jinghua Shi¹

¹Department of otorhinolaryngology, Beijing Tiantan Hospital, Capital Medical University, ²Department of otorhinolaryngology, Beijing Tongren Hospital, Capital Medical University, China

Objective: To analyze retrospectively the indications and the results obtained with the transotic approach in a series of patients with vestibular schwannoma.

Methods: The study included 36 patients with vestibular schwannoma that was removed with a transotic surgical approach. All 36 patients having a hearing loss of more than 50 dB for the average speech frequencies, an average tumor size of 2.7cm and signs of a contracted mastoid were selected for the transotic approach.

Results: The tumor was totally removed in 34 (94%) and near-totally removed in 2 (6%) of the patients. The anatomical structure of the facial nerve was preserved in all patients. The postoperative facial function after 6 weeks was House-Brackmann grade I in 7(19.4%), grade II in 27(75%) and grade III in 2(5.5%) patients. All patients presented postoperatively with unilateral total deafness. There were no deaths and no severe complications such as hemiplegia or intracranial infections.

Conclusions: The transotic approach has proven to be of value for the removal of vestibular schwannoma up to 5.0cm in the presence of

temporal bone contraction.

BS2-2-4 Value of endoscope in achieving total removal of vestibular schwannoma

Mohamed M.k. Badr-El-Dine^{1,2,3,4}

¹University of Alexandria, Egypt, ²Professor of Otolaryngology; Faculty of Medicine., ³President of the Egyptian Society of Skull Base Surgery, ⁴Member of the International Working Group of Ear Endoscopy, Egypt

The purpose of this presentation is to emphasize the importance of incorporating the endoscope during CPA surgery. We have consistently used the endoscope-assisted surgery since 2005.

The retrosigmoid is becoming our standard approach because of its advantages: wide exposure of CPA with no tumor size limitation; hearing preservation and favorable position of the FN. Yet, Inadequate exposure of the fundus of the IAC is the major disadvantage. The labyrinth limits drilling of the IAC specially when attempting hearing preservation, which is becoming a major goal for better quality of life.

The endoscope 30° or 45° provide angled vision thus overcoming the limitation of the straight vision of the microscope. Our results confirm that perfect visualization offered by endoscopes gives accurate information about the relation between tumor and surrounding anatomical structures thus decreasing the incidence of complications and allows dissection of the last piece of tumor insinuated into the fundus of the IAC ensuring complete tumor removal. Endoscope should be used as an adjunct to the microscope.

BS2-2-5 Clinical feasibilities of middle cranial fossa approach in the treatment of vestibular schwannoma in terms of surgical pitfalls or prognostic factors

Ki-Hong Chang^{1,2,3}

¹The Catholic University of Korea, ²St. Paul's Hospital, ³Dept. of Otolaryngology-HNS, Korea

The choice of surgical approach for vestibular schwannoma is influenced by many factors including patient's hearing, tumor size, tumor location, surgeon's preference, and the likelihood of functional preservation such as facial nerve function and hearing. Middle fossa approach is suitable for an intracanalicular tumor or a small sized tumor with serviceable hearing and extending into the CPA less than 1 cm. However, the conventional surgical indication of middle fossa approach should be tailored to each patient according to the patient and tumor profiles. We

performed middle fossa approach in 25 patients with vestibular schwannoma between Jan. 2001 and Dec, 2015. We are going to discuss clinical feasibilities of middle cranial fossa approach focused on the surgical pitfalls and prognostic factors including facial outcomes and hearing preservation.

BS2-2-6 Facial/cochlear nerve preservation in surgery for large vestibular schwannomas

Roy Thomas Daniel¹, Mercy George², Constantin Tuleasca¹, Etienne Pralong¹, Luis Schiappacasse⁴, Michele Zeverin³, Raphael Maire², Marc Levivier¹

¹Department of Neurosurgery, University of Lausanne, Switzerland, ²Department of ENT and Head and neck surgery, University of Lausanne, Switzerland, ³Institute of Radiation Physics, University Hospital of Lausanne, Switzerland, ⁴Department of Radiotherapy, University Hospital of Lausanne, Switzerland

Objective: Develop a treatment paradigm for the treatment of large vestibular schwannoma (VS Koos Gr IV). **Methods:** A consecutive series of 28 patients underwent planned sub-total resection followed by Gamma knife surgery (GKS). Data pertaining to patient characteristics, surgical and dosimetric features and outcome were collected prospectively at treatment and during follow-up. **Results:** The mean pre-surgical tumor volume was 13.3 cm³ (1.47-34.9). Surgery achieved a reduction of tumor volume to 28.5%. All patients retained normal facial function (House and Brackmann grade I). Thirteen of 14 patients with Gardner Robertson (GR) Class 1-3 retained identical hearing level after surgery (92.8%), inclusive of 11 patients with GR class 1 hearing. The mean duration between surgery and GKRS was 6.4 months (4-13.9, median 6 months). The mean marginal prescription dose for GKS was 11.9 Gy. Following GKS, facial/cochlear functions remained identical during a mean follow-up of 24.4 months (range 3-61.1m). **Conclusions:** Planned subtotal resection followed by GKS yields excellent facial and cochlear nerve outcomes that are comparable to results obtained with upfront GKRS in smaller tumors.

BS2-3-1 Surgery in and around the orbit

Christian Matula

Neurosurgical Department, Medical University of Vienna, Austria

Since the Edwin Smith Papyrus (1500 BC, oldest written document in Medicine) the orbit is from high interest. We present our experience at our Interdisciplinary Orbital Center at the Medical University of Vienna, Austria with special focus on

strategy & planning (The orbital pyramid), approaches & techniques (intraoperative imaging, neuronavigation, piezosurgery, cryosurgery) as well as results. The database consists of more than 2,500 patients in the last 25 years (tumor ~ 80%, Vascular lesions ~ 8%, Trauma ~ 6%, congenital malformations ~ 3%, endocrine Orbitopathy 2%, others ~ 1%), including 1983 tumors (primary orbital TU 693, secondary in the orbit invading TU 1290). Mortality was less than 1%, morbidity 2-3%. Cross total resection of benign lesions was achieved in 98%, in malignant <75%. Clinical results show improvement in 80%, unchanged situation in 15% and deterioration in 5%. Surgery in and around the orbit today is very safe and effective. Special technical equipment, precise knowledge of pathology and morphology, personalized treatment plan, interdisciplinary management and perfect personal experience are the key to success!

BS2-3-2 Surgical indication and localization of the intraorbital tumor

Yoshihiro Natori
 Department of Neurosurgery, Aso Iizuka Hospital, Japan

BS2-3-3 The endoscopic endonasal approach for orbital and orbital apex lesions

Paul A. Gardner¹, Nathan Zwagerman¹,
 S. Tonya Stefko², Eric Wang³,
 Juan Fernandez-Miranda¹, Carl Snyderman³
¹Department of Neurological Surgery, University of Pittsburgh Medical Center, ²Department of Ophthalmology, University of Pittsburgh Medical Center, ³Department of Otolaryngology, University of Pittsburgh Medical Center, USA

Object: The endoscopic endonasal approach (EEA) has been employed for lesions of the orbit and orbital apex.

Methods: A retrospective review was conducted of all patients who underwent EEA for orbital pathology from 2002-2014.

Results: 77 patients underwent 81 EEAs for symptomatic orbital pathology. The most common presenting symptom was vision change (66.7%). 27 patients (33%) had extraorbital lesions with optic nerve compression; 54 (67%) had intraorbital lesions, 26 (48%) of which were intraconal. Of the 27 patients with extraorbital lesions, 7 (26%) had improved vision postoperatively; 20 (74%) had stable vision. For the 28 patients with intraorbital, extraconal lesions, 13 (46%) improved postoperatively (improved vision or decreased proptosis). 14 (50%) patients had stable vision postoperatively. 1 patient (3.6%) had a transient

abducens nerve palsy. Of the 26 intraconal lesions, 10 (38%) had improved symptoms. 14 (53.8%) had stable postoperative vision. 2 (8%) patients developed postoperative orbital hematomas with worsening vision immediately after surgery.

Conclusions: The EEA is a safe and effective option for the treatment of select orbital and orbital apex lesions.

BS2-3-4 Endoscopic sinus surgery of frontal sinus disease

Shinichi Haruna
 Dokkyo Medical University, Japan

Frontal sinus is surgically difficult area because not only 30 or 70 ° endoscopy and several kinds of curved forceps are needed to treat the frontal diseases and surgical space is limited, but also there are close to the dangerous sites which are skull base, orbit and anterior ethmoidal artery.

The range of diseases must be evaluated by CT or MRI before surgery. When mucocele and inverted papilloma exist the lateral site of frontal sinus, only endonasal approach has the limit to treat the lateral site of frontal sinus. Additional approaches of Draf III or external procedure should be selected.

The important points to open the ostium of frontal sinus widely are that complete ethmoidectomy is performed and the triangle surrounded by middle turbinate, agar nasi, papyracella and anterior skull base is confirmed under the view of 30° or 70° endoscopy. Using strong curved forceps and microdebrider, frontal sinus is widely communicated to the ethmoid sinus and the mucosa near the ostium of the frontal sinus is preserved as possible. However, complete removal of mucosa is needed in case of inverted papilloma. I will show the surgical technique of the several kinds of frontal diseases.

BS2-3-5 Surgical treatment of frontal sinus carcinoma

Takahiro Asakage
 Tokyo Medical and Dental University, Japan

Primary frontal sinus carcinoma is extremely rare and accounts for only 0.009%-0.03% of all head and neck cancers and only 0.5%-1.0% of nasal cavity and paranasal sinus carcinoma. An enblock resection with a clear margin is undoubtedly essential to achieve tumor control. Here, three cases of primary frontal sinus carcinoma are presented. The ages of the patients were 46, 71, and 40 years old, respectively. All the patients were male. The histological diagnosis of all the patients was squamous cell carcinoma. All the patients were

treated using an extreme radical extended frontobasal approach with the resection of an eyeball. A wide extent of forehead skin was resected in two patients. The forehead and frontal base were reconstructed using a rectus abdominis myocutaneous flap in all the cases. Histological examination revealed brain invasion in two cases. The margin of the specimen was negative for tumor cells in all the cases. However, only one patient survived for 5 years. The other two patients developed distant metastasis and loco-regional recurrences. The prognosis of patients with frontal sinus carcinoma remains poor. Relevant literature will be reviewed here.

BS2-4-1 Challenges in management of Cushing disease

Imad N. Kanaan
 Department of Neurosciences, King Faisal Specialist Hospital and Research Centre, Saudi Arabia

BS2-4-2 Results of endoscopic resection of acromegaly due pituitary adenoma

Mohamed E. El-Fiki¹, Ahmed Ali Ibrahiem², Samir N. Assad³
¹University of Alexandria, Egypt, Department of Neurosurgery, ²Deaprtment of ENT, Head and Neck Surgery. University of Alexandria, Egypt. ³Department of Endocrinology, University of Alexandria, Egypt

Aim of the work: neurological, visual, endocrinological and radiological outcome of endoscopic endonasal resection of Growth Hormone secreting pituitary adenomas.

Material and Methods: 50 acromegalic patients operated through endoscopic endonasal corridors were included. Joint management with endocrinology, radiation oncologist and endonasal endoscopic surgeon was always applied during evaluation, planning, conduction of surgery, and postoperatively. Patients were compared to historical controls of conventional surgery or medical treatment.

Overall Results: Improvement of the majority of parameters was observed compared to preoperative standards especially when operated early before irreversible damage. Team work with endonasal surgeons, endocrinology and radiation therapy/radiosurgery departments improved the overall results without jeopardizing an increased complication. Minimal surgical difficulties were anticipated and managed.

Conclusion: Endoscopic resection of growth hormone secreting adenomas in conjunction with endocrinology and radiosurgery or radiation

oncology regardless of its size resulted in acceptable outcome.

BS2-4-3 Surgical management of pituitary adenoma : Results in 108 patients treated in a single neurosurgery unit

Ganesh Krishnamurthy¹, Vivek V¹, Bhaskar Naidu P¹, Krishna Seshadri²
¹Department of Neurosurgery, Sri Ramachandra University, India, ²Department of Endocrinology, Sri Ramachandra University,Chennai,India

Objective :To present our experience with microsurgery (MS) , endoscopy assisted microsurgery (EAMS) and endoscopic excision (EE) of pituitary adenoma in 108 consecutive patients.

Method:From 1998 to 2015 hundred and eight patients with pituitary adenoma operated in a single unit by the same surgeon were studied. There were 96 patients (89%) with macroadenoma and 12 (11%) with microadenoma.Adenoma was non secretory in 80 patients (74%) and secretory in 28 (26%).The tumor was excised by transphenoidal approach in 104 patients (96%) and by transcranial approach in 4 (4%).Amongst the patients operated by the transphenoidal route, 23 patients (22%) were operated using the microscope,64 (62%) using both microscope and endoscope and 17 (16%) using the endoscope.

Results : Radical tumor removal (about 90%) was achieved in 10/23 patients (43%) in MS group , in 45/64 patients (70%) in EAMS group and in 17/17 patients (100%) in EE group.

Conclusion : Use of endoscope along with increasing experience of the surgeon has resulted in higher rates of radical tumor resection and remission rate of hypersecretion in our series.

BS2-4-4 Usefulness of endoscopic assisted microsurgery for skull base tumors

Hiroyuki Kinouchi, Masakazu Ogiwara, Tomoyuki Kawataki
 University of Yamanashi, Japan

[Background] Endoscopic assisted microsurgery (EAM) techniques are employed to improve visualization of the neurosurgical filed. We have applied these surgical techniques for the skull base tumors from the early period. We summarized our surgical results and discuss the operative advantages.

[Methods] The EAM was used to the mid-skull base tumors such as vestibular schwannoma, CP angle, petrous meningioma and craniopharyngioma. The 2.7 mm high-definition rigid endoscopes (30, 70 degrees) were used to fix with multi-joints holding

system.

[Results] The EAM was performed in 50 tumors (29 schwannomas, 18 meningiomas, 3 craniopharyngiomas). All skull base tumors were gross totally removed. Endoscope offered many advantages including clear visualization to the fundus of the internal auditory meatus in schwannoma cases and the tumoral attachment hidden in the nerves and bone structures with the minimized brain retraction. Moreover, high-definition endoscope contributed higher image quality than microscope.

[Conclusion] Early recognition of critical neurovascular structures with endoscope helps the safer and durable surgical procedure in skull base tumors.

BS2-4-5 Management of nasal mucosa and olfactory function in an endoscopic skull base surgery

Masayoshi Kobayashi¹, Seiji Hatazaki²

¹Mie University Graduate School of Medicine, Department of Otorhinolaryngology-Head and Neck Surgery, Japan, ²Mie University Graduate School of Medicine, Department of Neurosurgery

In endoscopic skull base surgery (ESBS), the nasal cavities are often regarded simply as corridors to reach the skull base. However, since the nasal cavities have important physiological functions as olfaction, control of intake air, temperature, humidity and air clearance, excessive damage to intranasal structures may induce olfactory loss and nasal discomfort such as in the empty nose syndrome. Here we introduce a strategy for management of the nasal mucosa and olfactory function in ESBS to prevent side effects. Since the middle and superior turbinates are important structures for appropriate intranasal airflow and olfactory function, preservation or minimized damage of them is critical. For conventional hypophysectomy, lateralizing them can provide a corridor to the pituitary fossa. When a pedicled nasoseptal flap is necessary, it should be harvested without involving olfactory mucosa. Even when the olfactory mucosa is preserved, postoperative adhesion in the olfactory cleft may cause respiratory olfactory dysfunction. Intranasal treatment during and after ESBS by otorhinolaryngologists are useful for preventing undesirable adhesions.

BS2-4-6 Can we predict visual impairment based on the size of pituitary tumor?

Maryam Jalessi, Amin Jahanbakhshi, Elahe Amini
Skull Base Research Center, ENT-Head & Neck Surgery
Research Center and Department, Hazrat Rasoul Akram
Hospital, Iran University of Medical Sciences, Iran

Objective: The aim of this study is to find a cut point for tumor size based on perimetry that shows the beginning of significant visual impairment.

Methods: In this cross-sectional study on 92 patients, the sagittal pituitary MRI was used to assess the superior-inferior diameter (SID) of the tumor, the suprasellar part, and the axis of tumor growth. The effect of the axis on the displacement of chiasm was calculated using the Sinus of the angle of axis with the anterior skull base ($\text{Sin}\theta$). Visual impairment was defined using mean deviation of the worst eye in each patient. Receiver operating characteristic curve analysis was used to define a cut point.

Results: The size cut point for visual field defect was 25.5 mm for total SID, while it was 11.5 mm for suprasellar SID. With the inclusion of the axis in the calculation, the new cut point was 10.3mm for suprasellar SID multiplied by $\text{Sin}\theta$.

Conclusion: A discrepancy was showed between SIDs of various parts of the tumor. the SID of the suprasellar part, along with the axis of growth can be used to predict the visual field defect more accurately than the total SID. This result help the surgeon to better decide the time of surgery.

BS2-5-1 Trans lamina terminalis approach to 3rd ventricle in craniopharyngioma

Antonio Cerejo
University of Porto, Portugal

Background: The trans-lamina terminalis (TLT) approach to 3rd ventricle is complex, with risks of visual/ hormonal deficits. We discuss the procedure and the results in surgery using this approach.

Material and methods: The TLT approach was used in 22 patients with craniopharyngioma. The extent of removal, mortality and morbidity (especially visual/hormonal deficits) are studied.

Results: Complete removal was achieved in 17 patients, subtotal extensive removal (more than 90%) in 5. Panhypopituitarism developed in 19 patients. Total tumour removal was associated with development of endocrinological disturbances.

There was worsening or onset of new visual field defects in 4 cases. Postoperative endocrine and visual deficits were in the range generally described in surgery for lesions in this region.

Conclusion: The TLT approach allows for extensive removal of craniopharyngiomas involving the third

ventricle, without increased risks of visual and hormonal deficits, compared to those described regarding surgery for lesions in this region.

BS2-5-2 Avoiding complications of the endoscopic third ventriculostomy

Imane Bersali, Mohamed Si Saber, Kheireddine Abdelouahed Bouyoucef
 department of Neurosurgery - Frantz Fanon University Hospital of Blida, Algeria

Introduction The endoscopic third ventriculostomy (ETV) is nowadays considered the best surgical option in the management of hydrocephalus. However, as any surgical technique, it's not totally devoid of risks.

Methods From January 1994 to May 2015. A Total of 1798 ETV were performed as primary treatment of hydrocephalus.

Results The main cause of ETV complications is the misplacement of the fenestration. Bleeding was due to the peroperative injury of: basilar artery, ependymal vessels, choroid plexus, thalamostriate, septal or choroidal veins. Neuroendocrine disorders, third nerve palsy and memory disorders were also reported. The overall surgical mortality rate was 1.8%. To avoid these complications, the learning curve must be based on : following landmarks, reducing the procedure duration and being armed with patience and irrigation to defeat the first enemy of endoscopy (bleeding)

Conclusion The complication rate of ETV is low comparing to shunts ; however, as a surgical method it requires considerable experience and a perfect knowledge of the endoscopic anatomy of the ventricles, both are related not only with success rates but also with complication avoidance.

BS2-5-3 Contra lateral approach to supra sellar meningioma

Manas Panigrahi, Manoranjitha Kumari, Raghavendra H, Chandrasekhar YVK
 Dept of Neurosurgery, Krishna Institute of Medical Sciences, Hyderabad, India

Objective :

1.To discuss about our experience in treating with supra sellar meningioma operated via contra lateral to the side of the most affected eye.

2.To discuss about the advantages and technical note of this approach

Materials and methods :It is a pilot study done prospectively . Seven patients presented with supra sellar meningioma including tuberculum sellae(n=4), planum sphenoidale (n=2) and medial clinoidal (n=1) in last seven months were operated via contra lateral approach . All patients had undergone pre operative

visual perimetry , visual acuity apart from imaging and hormonal assay. The side of craniotomy was selected opposite to the side of maximum visual loss.

Results : Six female and one male patients were in this study. Mean duration of visual symptoms 2 months (1 month to 4months). Though five patients had bitemporal hemianopia, the right side of the field was affected more in these five patients and hence left side Fronto Temporal Orbital Craniotomy (FTO) was done in all these cases. In two patients there was involvement of left field alone and hence right side FTO approach was chosen. Optic canal deroofting was required in patients with intra canalicular tumor extension (n=5). Intra operatively , in six patients bilateral optic nerve and chiasm were traceable and easily separable from the tumor via contra lateral FTO craniotomy. However , in one patient the contra lateral optic nerve was very much adherent to the nerve which could not be separated. In the immediate post operative day, 4 patients experienced subjective improvement in acuity and field of vision in both eyes including most affected eye which was confirmed by visual perimetry and acuity assessment after one month follow up. Two patients had static vision at one month follow up perimetry charting and one patient worsening

Conclusion : Contralateral approach can be considered in cases of suprasellar meningiomas , as the normal side optic is visualised first which can be traced further to visualise opposite side nerve via chiasm, and also it helps in adequate decompression of the optic canal from medial aspect as most of the time tumor enters into the canal from the medial aspect which can be easily removed via this approach. Though the number is small in our series, the visual outcome was promising in majority of the patients operated via this approach.

BS2-5-4 Safe way for management of incompletely excised craniopharyngiomas

Amr Mahmoud Safwat, Mohamed Mamdouh Salama
 Department of Neurosurgery, Faculty of Medicine, Cairo University, Egypt

Introduction: Recurrence of incompletely excised craniopharyngiomas represents a major concern. Aim of study was to assess efficacy of Ommaya reservoir following incomplete excision in avoiding need for reoperation or adjuvant therapy.

Patients & Methods: 15 patients with craniopharyngiomas with cystic component were operated upon by subtotal or near total excision and simultaneous insertion of Ommaya reservoir. Catheter was introduced through brain parenchyma and left hanging free in the space of excised cyst.

Results: There were 3 cases with single cyst, 1 case with multiple cysts and 11 cases with solid and cystic components. There were 8 recurrent cases including a patient with 5 previous operations. 13

patients showed no recurrence after mean follow up of 3 years without aspiration through Ommaya reservoir. 2 patients developed tumor recurrence after 1 year and 8 years. One patient was asymptomatic and the other was managed by reoperation.

Conclusion: Insertion of Ommaya reservoir in craniopharyngiomas with cystic component after subtotal or near total excision of cyst wall is effective in reducing tumor recurrence and obviating need for adjuvant therapy especially in children.

BS3-1-1 Supraorbital keyhole approach for resection of anterior cranial base meningiomas –a 15 year's experience

Weiguo Zhao, Yu Cai, Chunhua Pu, Zebao Wu, Hanbing Shang
Shanghai Jiaotong University School of Medicine, China

Fifty-eight cases of anterior cranial base meningiomas were surgically resected through a supraorbital keyhole (SAK) approach in our department from 2000 to 2014. Among which there were 15 cases of olfactory groove meningioma, 35 cases of tuberculum sellae(-sellar diaphragm) meningioma and 8 cases of sphenoidal planum meningioma. The diameter of the tumor varied from 3 to 4.5 cm for olfactory groove meningioma and 2 to 4 cm for tuberculum sellae and sphenoidal planum meningioma. Total removal of tumor(Simpson grade II) was achieved in all cases with improvement of visual acuity except one and no other new neurological deficit and major complications. In an average follow-up of 6 years only saw two cases of recurrence.

The approach has the merits of a straightforward surgical view to the anterior cranial base lesions with less exposure and retraction of frontal lobe. Its minimally invasive nature assures patients' recovery quicker and no blood transfusion was needed in all cases. **Conclusion:** SAK approach can eradicate anterior cranial base meningiomas in a minimally invasive way.(Technique will be illustrated in video)

BS3-1-2 Frontolateral in treatment of anterior cranial fossa and suprasellar lesions

Ali Kotb Ali
Ain Shams University, Cairo, Egypt

Background: in the past, anterior cranial and suprasellar lesions were approached by using anterior cranial approach larger than the

lesions itself. After the improvement of microsurgical technique and imaging, it becomes easier to approach these lesions via small frontolateral craniotomy (2x2.5 cm).

Methods: we have done this approach in 206 cases in the last ten years in neurosurgical department, Ain shams university, to treat different lesions in anterior cranial fossa and suprasellar regions.

Results: the use of this approach was in 27 cases of craniopharyngiomas, 68 cases of large pituitary adenomas, 39 cases of suprasellar meningiomas, one 25 cases of orbital lesions, one 7 cases of anterior communicating aneurysms and 40 cases of different lesions of anterior cranial fossa. The time was shorter than before with excellent cosmetic appearance

Conclusion: The frontolateral approach is a safe approach for an experienced neurosurgeon that offers equal surgical possibilities with less approach-related morbidity as conventional approaches in the treatment of anterior cranial fossa and suprasellar lesions.

BS3-1-3 Craniotomy for perisellar meningioma, simple (for endoscopic) vs complex anatomy

Ryojo Akagami, Serge Makarenko, Erick Carreras
Division of Neurosurgery, University of British Columbia, Canada

OBJECT

Endoscopic surgery is an alternative to craniotomy. Historical series for comparison with endoscopic series include tumors inappropriate for endoscopic surgery. Perisellar meningiomas resected via craniotomy are separated into 2 groups based on whether they would be appropriate for endoscopic resection, and outcomes compared.

METHODS

From 2001 - 2013, 53 perisellar meningiomas had open resection at Vancouver Hospital by the senior author. Tumours are split into two groups based on their anatomy and analyzed.

RESULTS

18 tumors with simple anatomy suitable for endoscopic resection and 35 tumors with complex anatomy were identified. Greater resection was achieved in the simple anatomy group (99% vs 87.1%, p < 0.0001). Vision was improved in 96.6%. Our complication rate was higher in the group with complex anatomy (11.1% vs 37.1%, p = 0.0498) with overall 28.3% of patients experiencing complications. Patient QOL improved in the simple anatomy group (ΔSF-36 +16.6 vs -8.4, p = 0.0045).

CONCLUSIONS

In the future patients considered for endoscopic resection should be compared against the surgical group with simple anatomy, who have favourable outcomes regardless of surgical approach.

BS3-1-4 Five fractions radiosurgery for skull base meningioma involving optic pathways

Marcello Marchetti¹, Stefania Bianchi Marzoli³, Ida Milanesi¹, Irene Tramacere⁴, Francesco Acerbi², Giovanni Tringali², Andrea Saladino², Laura Fariselli¹

¹Department of Neurosurgery, Radiotherapy Unit, Fondazione IRCCS Istituto Neurologico C. Besta, Milano, Italy, ²Dept. of Neurosurgery, Fondazione IRCCS Istituto Neurologico C. Besta, Milano, Italy, ³Neuro-ophthalmology Unit, IRCCS Istituto Auxologico Italiano, Milano, Italy, ⁴Neuroepidemiology Unit, Fondazione IRCCS Istituto Neurologico C. Besta, Milano, Italy.

Introduction. The concern about radiation-induced optic neuropathy (RION) has governed recent thinking about the role of radiation therapy in the treatment of meningiomas involving the anterior optic pathways. The aim of the present study is to investigate about the 25 Gy treatment delivered in 5 fractions (five consecutive days).

Patients and methods. The tumor growth control and visual outcome of 108 patients which underwent 25 Gy multisession radiosurgery.

Local control was always based on MRI images All the evaluated patients had at least a pre-treatment and a last follow-up visual function assessment.

Results. The mean follow-up is 36 months (range 12-103 months).

The mean treatment volume was 10.3 cc (range: 0.1-76.8 cc). The mean maximum point dose per fraction to the optic chiasm and optic nerves were respectively 4 Gy and 5.1 Gy (range 0.5-6.8 Gy and 0.6-6.8 Gy).

The 4- and the 5-year actuarial local control is, respectively, 97% and 89%. Vision improved in 27.5% of the patients, while the 6.7% experienced a worsening (4.8% excluding the PD patients).

Conclusions. The 25Gy, 5 fractions mRS, is both safe and effective to treat the anterior and middle skull base meningiomas

BS3-1-5 Surgical management of medial sphenoid ridge meningioma

Ahmed Farhoud
Department of Neurosurgery, Alexandria University

BS3-2-1 Retromastoid approach for petroclival tumors, advantages and disadvantages

Zainal Muttaqin
Department of Neurosurgery, Diponegoro University, Indonesia

BS3-2-2 Combined extradural subtemporal and anterior transpetrosal approach to tumors located in the interpeduncular fossa and the upper clivus

Masaru Aoyagi^{1,2}, Yoshihisa Kawano³, Kaoru Tamura³, Akihito Sato^{1,3}, Yoshiki Obata^{1,2}, Masashi Tamaki⁴

¹Department of Neurosurgery, Shioda Memorial Hospital, ²Department of Neurosurgery, Kameda Medical Center, ³Department of Neurosurgery, Tokyo Medical and Dental University, ⁴Department of Neurosurgery, Musashino Red Cross Hospital

Background: We recently reported the combined extradural subtemporal and anterior transpetrosal approach to the central skull base lesions. Here we present further experience together with the utility of direct monitoring of abducens nerve. **Methods:** 43 patients underwent surgery via the anterior transpetrosal approach. The combined approach was applied to 11 of these patients when the tumors arose from the upper clivus and extended to the interpeduncular fossa. For recording of the abducens nerve stimulation, electrodes were inserted into the lateral rectus muscle, identified by exposure of the supra-orbital fissure. **Results:** The combined approach permitted visualization of the interpeduncular fossa in addition to the upper clivus and the lateral aspect of the brain stem. Mobilization of the temporal lobe by the dissection of the lateral wall of the cavernous sinus facilitates access via the subtemporal route. Electromyographic recording of the abducens nerve stimulation was successful in each of 4 cases. **Conclusion:** The present combined approach provides a wide exposure to lesions of the interpeduncular fossa and the clivus, facilitating safe and effective tumor removal.

BS3-2-3 Improving functional preservation during cerebello-pontine angle meningioma surgery

Hirofumi Nakatomi¹, Minoru Tanaka², Taichi Kin¹, Masanori Yoshino¹, Nobuhito Saito¹

¹University of Tokyo, Japan,

²Division of Innovative Cancer Therapy, and Department of Surgical Neuro-Oncology The Institute of Medical Science, The University of Tokyo

Object Adult cranial nerves are vulnerable to injury during brain surgery; however, nerve function might be restored by minimizing the injury period and maximizing the recuperation period immediately after insult. Here we evaluated postoperative hearing and facial nerve function in 32 consecutive patients who underwent cerebellopontine angle meningioma (CPAMGM) surgery. *Methods* Continuous auditory- evoked dorsal cochlear nucleus action potential (AEDNAP) for cochlear nerve (CN), and facial nerve root-evoked muscle action potential (FREMAP) for facial nerve (FN) monitoring were used to analyze the factors affecting functional preservation. When the responses declined to 40% and 65% of the initial levels, respectively, extended recuperation treatment was performed to restore the determined level and discriminate the reversible injury. *Results* The threshold for the same grade functional preservation for CN and FN were the same as in the acoustic neuroma surgery. Traction and thermal injury were reversible, however, vascular injury was irreversible in CPAMGM surgery. *Conclusions* Patients with extended recuperation treatment could have better functional preservation.

BS3-2-4 Trigeminal Schwannomas: Surgical treatment

Gerardo Guinto

Neurosurgery, Centro Medico Nacional Siglo XXI, Mexico

From January 1994 to December 2014, all patients with TS that were operated on in our department were included for present analysis.

24 patients were included for present analysis. There were 16 man and 8 women, with age ranging from 22 to 68 years (average 42.3 year-old). The main symptom was headache (22 p), followed by facial sensitivity alterations (20 p), chewing problems (6 p) and diplopia (3 p). Most of the patients were operated on through combined approaches. Total removal was achieved in 19 patients, in the remaining 5 patients, a small piece of tumor was left behind in order not to affecting patient's clinical condition. Residual tumor was managed with radiosurgery in 4 of them.

In respect to clinical results, 18 patients presented

some alterations in face sensitivity, 12 patients presented some chewing problems however only in 2 cases this situation persisted for a long period. Cerebrospinal fluid leakage was observed in 4 cases, but only one of them had to be re-operated. There were no major complications or mortality in this series. During follow-up non patient presented tumor recurrence or re-growth.

BS3-2-5 Trigeminal schwannoma: Importance of dural reflection of middle fossa

Suresh Nair Narayanan Nair

Department of Neurosurgery, Sree Chitra Tirunal Institute for Medical Sciences & Technology, India

Objectives: This is a retrospective analysis of 90 consecutive patients with trigeminal schwannoma surgically managed from January 1984 to September 2015 *Methods:* While 42 tumours were located in a single compartment {Meckel's cave (MF) 28, posterior fossa (PF) 14}, 43 were dumbbell-shaped {PF-MF in 36, MF-extracranial 7}. In one case, the tumour was totally extracranial and in four others it occupied all 3 compartments. All 8 patients managed until 1992 were operated on by conventional approaches. With the exception of the 15 patients with posterior fossa tumors and ten with dumbbell PF-MF tumors which were treated by the retromastoid route and three with MF tumor treated by the standard subtemporal approach, all other 54 cases managed since 1993 were operated on by the skull base approaches. *Results:* Tumour could be radically removed in 80 patients and decompressed in ten. The only operative mortality was in a patient with residual/recurrent tumour. Five patients were operated for symptomatic recurrences.

Conclusions: Most multi-compartmental trigeminal schwannomas can be radically removed using a single-stage fronto-temporal interdural skull base approach.:

BS3-2-6 Intracranial epidermoid cysts

Vadim N. Shimansky

WFNS, Russia

BS3-3-1 Transbasal approach for anterior skull base tumors with acute visual impairment

Koji Fujita, Junya Fukai, Hiroki Nishibayashi, Naoyuki Nakao

Department of Neurological Surgery, School of Medicine, Wakayama Medical University

.....

The anterior skull base tumors invading the optic canals (OCs) occasionally result in acute visual impairment. We review our surgical experience for these kinds of tumors. We treated 5 patients (one each of atypical meningioma, adenoid cystic carcinoma, Ewing PNET, chordoma and schwannoma) with acute visual impairment, extending into OCs. To rescue the visual function, as early as possible, we employed the transbasal approach (TBA) for the tumor resection around the optic nerve in all cases. Accordingly, 4 out of 5 patients showed marked visual recovery without complications. The TBA was efficacious in removing the tumors around the OCs and orbits, as well as paranasal sinus, nasal cavity, clivus and parapharyngeal space. But via TBA, there were the blind areas for the tumors in inferolateral orbit and the lateral maxillary sinus. Hence for 3 cases, the lateral approach like infratemporal fossa approach or Dolenc approach was additionally given. In this fashion, gross total removal was achieved in 3 out of 5 patients. The TBA can be a feasible technique to rescue the visual function for the anterior skull base tumors extending into OCs with acute visual impairment.

BS3-3-2 Anterior skull base tumors . The role of the endoscopic approaches.

Jose Alberto Landeiro^{1,2}, Gabriel Pereira Escudeiro^{1,2}
¹Universidade Federal Fluminense, Rio de Janeiro, ²Hospital Universitário Antônio Pedro, Brazil

.....

Objective: The traditional limits of the transsphenoidal approaches can be expanded to include anterior skull base, cavernous sinus and clivus. The purpose is to demonstrate which patients are best suitable for either traditional skull base approaches or extended transsphenoidal endoscopic approach (ETSEA)
Patients and methods: From 2008 to 2012, the ETSEA were used in 47 patients presenting with a variety of lesions placed in and around the sella.
Results: The ETSEA have been used in this following series: 3 tuberculom sella meningiomas, 2 esthesioneuroblastoma, 1 adenoid cystic carcinoma, 18 pituitary adenomas with cavernous sinus invasion, 8 craniopharyngioma, 3 sphenoid sinus mucoceles, 1 lymphoma invading cavernous sinus, 8 clivus chordomas, 1 fibrous dysplasia and 2 clivus meningioma. There was one surgical

mortality. Neurological complications included 6 cases of CSF leak, one 6° nerve deficit, 2 cases of cavernous sinus internal carotid lesion one of which developed severe hemiparesis and permanent insipidus diabetes occurred in 2 patients.

Conclusion: The ETSEA provides a useful approaches and effective management of the tumors beyond the boundaries of the sella.

BS3-3-3 Endoscopic resection of clival chordoma

Rungsak Siwanuwatn

Division of Neurosurgery, Department of Surgery, Chulalongkorn University, Thailand

BS3-3-4 360° Around the posterior fossa - Pros and cons of multiple surgical approaches

Jens Lehmborg

Technical University Munich

.....

Objective:
 Different surgical approaches to the posterior fossa are well established. The choice for one of these is not only guided by the lesion to approach and the individual patients anatomy but also by the experience and preference of the surgeon.
Method:
 The four main trajectories for the approach to the posterior fossa are revisited. Pros and cons are specified.
Results:
 Median suboccipital is used for axial tumors (e.g. ependymoma), lateral suboccipital for extraaxial tumors such as cerebellopontine angle lesions (e.g. vestibular schwannoma). Variants of transpetrous approaches serve in lateral axial lesions (e.g. pons cavernoma) or transdural tumors (e.g. dumbbell hypoglossal schwannoma). Transnasal endoscopic approaches are used in anterior midline lesions (e.g. clival chordomas).
Conclusion:
 To best serve the patients needs, all pros and cons of the suitable approaches should be weighed including extension and nature of the lesion, patients anatomy as well as surgeon experience and preference.

BS3-4-1 Anterior skull base defect closures in malignancies: Our experience

Rajan Sundaresan V¹, Ajay Phillip¹, Regi Thomas¹, Rajiv Michael¹, Ari G Chacko²

¹Department of ENT-1, Head & Neck Skull Base unit, Christian Medical College, Vellore, India, ²Department of Neurosurgery-1, Christian Medical College, Vellore, India

Introduction: Malignancies of the involving the anterior skull base have been a challenge for decades, advent of the endoscope & minimal access expanded endoscopic approaches have increased the ability to address these group of tumours. When used as an adjunct along with traditional approaches it provides better surgical outcome. **Material & Methods:** A retrospective study with prospective analysis of patients who underwent surgical management of Malignancies involving Anterior skull base during the period of 2001-2015 was done. The malignancies were varied in histology at various stages and the approaches included open approaches, Completely endoscopic Trans nasal approach & Combined approaches. All these patients received post operative adjuvant treatment and are being followed up. **Results:** Complete tumour excision was possible in all the patients and tumour free margins were achieved in most of the patient. **Conclusion:** Trans Nasal Endoscopic approach is an excellent adjunct in the armentarium of a Head & Neck-Skull base team in treating advanced tumours of the sinonasal tract involving the Anterior Skull base.

BS3-4-2 Evolution of free-fat autograft in skull base defects reconstruction

Yury Shulev^{1,2}, Ovanes Akobyan¹

¹City hospital # 2, ²North-West State Medical University

This study aims at analyzing the results of free fat graft integration.

Methods. There was an experiment with the purpose to investigate the principles of early graft integration and to evaluate watertight durability closure. Fat and fascial grafts at dural reconstruction were compared. Then histomorphological study was conducted. The clinical part included 450 patients with different skull base tumors. MRI was performed in 7 days after operation and in the long-term after it.

Results: Histological study showed complete physical graft integration in 1 day after surgery; beginning of vascularization – in 7 days; complete biological graft integration – in 14 days. Serial MRI study showed the mean graft size reduction to 71.6% after 1 month; to 38.3% after 3 years and 35.9% after 10 years. 7.8% of patients had fibrous graft transformation, 1.1 % - graft lysis, 0.4% –

graft infection.

Conclusion. Fat graft serves as an effective dural watertight closure and helps to decrease CSF leak rate. Natural evolution can be typical and atypical. Typical evolution provides complete biological graft integration. Atypical evolution is fibrous graft transformation or graft lysis.

BS3-4-3 Transnasal endoscopic repair of skull base defects for CSF rhinorrhea

Bing Zhou, Qian Huang, Jingying Ma, Shunjiu Cui, Yuanchuan Li

Beijing Tongren Hospital, Capital Medical University

An endoscopic approach has become the standard of care in most adult and pediatric cases of anterior of middle skull base defects. The MRC and high resolution paranasal sinus CT scan are routinely used for the precise localization of the sites of defects before surgery. For anterior part of CSF leak, we often used the routine intranasal ethmoidectomy for the defects of ethmoidal roof or cribriform plate. But for the defects of frontal recess or frontal sinus, especially the posterior wall of frontal sinus, the Draf IIb or even Draf III type frontal sinus surgery would be applied. The transpterygoid approach should be applied for the defects of lateral recess of sphenoid sinus.

The rule of repair of skull base defects was so-called 'Sandwich'. The pedicled vascularized septal mucosal flap should be advocated For larger skull base defects (eg. >3 cm) with high successful rate. In general, the advantage of a flap over a graft is immediate viability, which in theory increases the ability to heal. If the patients were spontaneous CSF rhinorrhea, even for a small hole of skull base, the bony skull base reconstruction would be applied.

BS3-4-4 The surgical management of temporal bone and lateral skull base defects

Hannah Jd North, Simon Rm Freeman, Scott A Rutherford, Andrew T King, Charlotte L Hammerbeck-Ward, Jawad Yousaf, Simon K Lloyd

Salford Royal Foundation Trust, UK

Object: Defects in the lateral skull base through the tegmen tympani or tegmen mastoideum allow communication of the sterile CSF environment with the middle ear. Risk of CSF leak presenting with otorrhoea or rhinorrhoea, the development of meningitis or further cranial infections are the main reason for surgical closure of these defects. We present our series of lateral skull base defects

and discuss their presentation, surgical management and outcomes.

Methods: Patients from the database for the Manchester Skull Base Unit Multidisciplinary Meeting were analysed from 2012-2015. All patients presenting with temporal bone or lateral skull base meningocele, meningoencephalocele, encephalocele and CSF leak were included.

Results: We include discussion of 53 patients of which 39 female (74%), average age 53 years at presentation. 10 patients had associated cholesteatoma disease. One patient presented with temporal lobe abscess. Three patients presented with cerebrospinal fluid (CSF) otorrhoea. Surgical approach was transmastoid approach or combined with middle cranial fossa craniotomy.

Conclusions: We will discuss the varying methods used to close the bony defect and their success rates.

BS3-4-5 Graded repair protocol for cerebrospinal fluid leaks in endoscopic endonasal transsphenoidal surgery

Sin Soo Jeun, Jae-Sung Park, David Jae-Hyun Park, Young-Joo Kim

Department of Neurosurgery, Seoul St. Mary's Hospital, The Catholic University of Korea, Korea

Sellar floor reconstruction is critical to avoid postoperative cerebrospinal fluid (CSF) leakage after transsphenoidal surgery. After many modifications, the pedicled nasoseptal flap proved to be valuable and efficient. However, routine usage of this nasoseptal flap appears to be overly invasive and time-consuming.

Patients who underwent endoscopic endonasal transsphenoidal tumor surgery within a 6 year-period were reviewed. Since 2009, we classified the intraoperative CSF leakage into 3 grades, which is absent, minor, and major CSF leaks. Sellar floor reconstruction was tailored to each leakage grade.

Among 249 cases, intraoperative CSF leakage was observed in 24.5%: 20.5% minor leak and 4.0% major leak. Postoperative CSF leakage was observed in 2 cases. We treated both with reoperation using pedicled nasoseptal flap. Autologous fat graft and septal bone buttress was used for minor leaks instead of any other foreign materials. Pedicled nasoseptal flap was used for major leaks. Unused septal bones and nasoseptal flaps were repositioned.

Our graded repair protocol for intraoperative CSF leaks seems effective and reliable for the prevention of postoperative CSF leaks.

BS3-4-6 Skull base reconstruction with multilayer method in endonasal endoscopic surgery

Fumihiko Nishimura, Young-Su Park, Yasushi Motoyama, Yasuo Hironaka, Ichiro Nakagawa, Hiroshi Yokota, Shuichi Yamada, Kentaro Tamura, Ryosuke Matsuda, Hiroyuki Nakase
Department of Neurosurgery, Nara Medical University, Japan

Objective: It is important to make tight skull base reconstruction for patients in endonasal endoscopic surgery. We report about skull base reconstruction with multilayer method for intraoperative cerebrospinal fluid (CSF) leak in endonasal endoscopic surgery at our institution.

Method: There were 48 cases with CSF leak during endonasal endoscopic surgery from Nov. 2008 to Mar. 2015. Diseases consisted of 41 pituitary adenomas, 5 Rathke cleft cysts, 1 chordoma, and 1 malignant lymphoma. Skull base reconstruction with multilayer method was adopted to 14 cases with high flow CSF leak during operation.

Result: There were 18 cases with Esposite grade 1 CSF leak, 16 cases with Esposite grade 2 CSF leak and 14 cases with Esposite grade 3 during surgery. To use multilayer method, we achieved tight skull base reconstruction with no late CSF leak .

Conclusion: Skull base reconstruction with multilayer method was useful to achieve tight repair for intraoperative high flow CSF leak.

BS3-5-1 Salvage operations for patients with persistent or recurrent cancer of the maxillary sinus after superselective intra-arterial infusion of cisplatin with concurrnt radiotherapy

Akihiro Homma
Department of Otolaryngology-Head and Neck Surgery, Hokkaido University Graduate School of Medicine, Japan

BS3-5-2 Concomitant chemo-radiotherapy as a standard treatment for squamous cell carcinoma of the temporal bone

Kiyoto Shiga¹, Katsunori Katagiri¹, Daisuke Saito¹, Shin-Ichi Oikawa¹, Aya Ikeda¹, Koudai Tshuchida¹, Takenori Ogawa², Hisanori Ariga¹
¹Iwate Medical University, ²Tohoku University Hospital

Objective: To evaluate the efficacy of concomitant chemo-radiotherapy (CCRT) for patients with squamous cell carcinoma (SCC) of the temporal bone (TB).

Patients and Methods: Twenty-eight patients who

were provided initial treatment in our hospitals from December 2001 to June 2015. Treatment strategies were as follows: stage I, radiation therapy (RT) alone or with oral S1; stage II, RT with low dose docetaxel; stage III or IV, CCRT using the TPF regimen (docetaxel, cisplatin and 5-fluorouracil).

Results: As an initial treatment, all patients but 3 were treated by RT with or without chemotherapy. Grade 4 adverse events of patients who received CCRT using the TPF regimen involved the leukopenia in 2 patients and the neutropenia in 4. Local recurrences were observed in 5 patients including 4 with T4 tumors, and one with T1 tumor. Five-year disease specific survival rates of all patients and of those with T4 tumor were 87% and 76%, respectively.

Conclusion: We concluded that CCRT is the sufficient method of therapy as a standard treatment for SCC of the TB. Especially, CCRT using the TPF regimen is safe and effective as the first treatment for patients with advanced cancer of the TB.

BS3-5-3 Temporal bone resection for malignancy

Romain Kania^{1,2}, Benjamin Verillaud^{1,2},
Sebastien Froelich^{1,2}, Philippe Herman^{1,2}

¹Paris Sorbonne University, ²APHP Lariboisiere University Hospital

Temporal bone resection for malignancy presents a significant clinical challenge for the otolaryngologist and the neurosurgeon. The prognosis for patients with advanced-stage temporal bone malignancy is poor. Temporal bone resection with free margins is the best way to improve prognosis. According to the Pittsburgh staging system, for Stage I and II, many of these tumors can be removed with a lateral en bloc temporal bone resection with facial nerve preservation. For Stage III and IV, en bloc extended temporal bone resection that includes facial nerve resection and cable graft, total parotidectomy and neck dissection is advised. 2-years actuarial survival rates range from 48%-100%, 28%-100%, 17%-100% and 14%-54% for grade T1, T2, T3 and T4 respectively. At two years, disease-free survival rates range from 81% to 45% with and without obtaining free margins. Surgical en bloc resections either by lateral temporal bone resection (T1, T2) or extended temporal bone resection (T3, T4) are determinant in patients' outcomes in terms of survival rates.

BS3-5-4 Tumor in the lateral skull base

Atsunobu Tsunoda¹, Seiji Kishimoto²

¹Juntendo University School of Medicine, ²Kameda General Hospital

Tumors in the lateral skull base are rare but various disorders occur in this area and the most common malignancy is the squamous cell carcinoma in the ear. The treatments for carcinomas of in the ear are still controversial and those for advanced tumor are still formidable trial for clinicians. Radiotherapy and/ or surgery are performed as a radical therapy and both therapies have merits and demerits. Most reliable therapeutic choice is the total removal with sufficient margin, however, safe and sufficient surgery of the temporal bone is difficult because of anatomical complexity. Our strategy of treatment for carcinoma in the ear is mainly surgery with sufficient margin. To preserve pathological free margin, disease free survival rate accounts for over 85% even in T4 or N positive cases. Currently, CyberKnife had been allied to patients who refuse surgical intervention or could not tolerate surgery. Comparison of these contrastive therapies is introduced in this session.

BS3-5-5 Poor prognostic factors in squamous cell carcinoma of temporal bone

Takashi Nakagawa^{1,2}, Yasuko Okado²,
Kazuki Nabeshima², Noritaka Komune¹

¹Graduate School of Medical Sciences, Kyushu University,
²Fukuoka University School of Medicine

Endothelial mesenchymal transition (EMT) is contributed to poor prognosis in malignant tumor. Tumor budding is one of phenotypes of EMT. Laminin5-gamma 2 (Ln5) is expressed as one of representative protein for EMT. We investigated the relations of the tumor budding and Ln5 expression to the prognosis in squamous cell carcinoma (SCC) of temporal bone (TB).

Objects and Methods; 46 patients with primary SCC of TB for whom the pre-treatment tissue specimens were available who were treated by the same strategy at Department of Otorhinolaryngology of Kyusyu University Hospital from January 1998 to March 2006 and Department of Otorhinolaryngology of Fukuoka University Hospital from April 2006 to December 2013. Prognostic significance of tumor budding and Ln5 expression in SCC of TB were examined.

Results; Patient whose tumor had high budding grade and Ln5 expression exhibited a significantly shorter survival. The budding grade was also significantly correlated with Ln5 expression. Multivariate analysis revealed that a high budding grade predicted poorer prognosis.

Conclusion; The tumor budding grade and Ln5 expression could be indicators of poor prognosis in SCC of TB.

BS3-5-6 Surgical techniques in temporal bone resection for malignancy

Hiroyuki Jimbo¹, Kouki Miura², Kiyooki Tsukahara³, Naoki Yoshizawa⁴, Yukio Ikeda¹, Michihiro Kohono⁵

¹Department of Neurosurgery, Tokyo Medical University Hachioji Medical Center, ²Skull Base Center, International University Health and Welfare Mita Hospital, ³Otolaryngology of Medicine, Tokyo Medical University, ⁴Department of Plastic Surgery, Tokyo Medical University Hachioji Medical Center, ⁵Department of Neurosurgery, Tokyo Medical University

Objective: The surgical resection for the malignant temporal bone tumors is often challenging, and the preservation and reconstruction of facial nerve are complicated.

Materials: 32 patients (26 patients underwent subtotal temporal bone resection and 6 patients underwent lateral temporal bone resection in which 2 patients underwent facial nerve reconstruction) were enrolled.

Methods: In subtotal resection, en block temporal bone resection using diamond thread wire saw (DT-saw) after transposing C6/7 portion of ICA was performed. In lateral temporal bone resection, the line between superior margin of foramen ovale and foot of arcuate eminence should be kept in order to preserve facial nerve. In the reconstruction of facial nerve, hypoglossal nerve and nerve root of cervical plexus – facial nerve anastomosis (H/C-F anastomosis) was performed.

Results: Kaplan Meier analysis showed overall survival of 64% in subtotal temporal bone resection. The recovery of two patients who underwent H/C-F anastomosis is minimal.

Conclusion: Subtotal temporal bone resection using DT-saw is a safe, simple and reliable technique. The result of reconstruction by H/C-F anastomosis was not sufficient.

BS3-6-1 Surgical strategy in treating with giant vestibular schwannomas(GVS)

Xuhui Hui
West China Hospital of Sichuan University, China

Object:We aim to summarize our experience on the surgical strategy of planned near-total resection followed by radiotherapy in treating with GVS.

Methods:268 patients suffered from GVS underwent surgical treatment in our hospital between Sept. 2009 and Aug. 2014.The clinical data,surgery and the clinical outcome were retrospective analyzed.The surgical strategy to improve the preservation of facial nerve function

and the health-economics benefits was discussed.

Results:Gross total resection was achieved in 60 patients(22.4%)and near total resection in 208(77.6%). All the patients achieved anatomical preservation of facial nerve and the residual tumors were treated with radiotherapy postoperatively.During the follow-up,the size of residual tumors was unchanged without progression or recurrence.232 patients(86.6%)had excellent or good facial nerve function,29(10.8%) had fair function and 2(0.7%)had poor function.

Conclusions: One stage safely resection and favorable functional outcome can be achieved through retrosigmoid approach.The surgical strategy of near total resection followed by radiotherapy is recommended when gross total resection are not available due to severe adherence.

BS3-6-2 Influence of cystic degeneration on management strategy in vestibular schwannoma

Zhihua Zhang^{1,2,3}, Zirong Huo^{1,2,3}, Qi Huang^{1,2,3}, Zhaoyan Wang^{1,2,3}, Jun Yang^{1,2,3}, Hao Wu^{1,2,3}

¹Department of Otolaryngology Head & Neck Surgery, Xinhua Hospital Shanghai Jiaotong University School of Medicine, ²Shanghai Key Laboratory of Translational Medicine on Ear and Nose diseases, ³Ear Institute Shanghai Jiaotong University

OBJECTIVE: In this study, we focused on the influence of cystic degeneration on management strategy of vestibular schwannoma (VS).

METHODS: The 96 patients with sporadic cystic vestibular schwannomas (CVS), operated at our center from 2006 to 2013, were included. And 96 random cases with solid vestibular schwannomas (SVS) were used as a control group. The clinical, operative feature and surgical outcomes were reported.

RESULTS: CVSs are associated with rapid growth, worse hearing level (94.8% of patients with hearing level in class C or D) and more frequent onsets of sudden hearing loss than SVSs. The longterm good facial nerve (FN) function rate in CVS is worse than that in SVS because of strong adherence between tumor capsule and FN (30.2% vs 44.8%,p=0.037). There was no significant difference in complications, mortality and recurrence.

CONCLUSION: Surgical resection should be the prefer management strategy for CVS. Physician should inform patient with CVS. In case of difficult dissection in peripheral thin wall cystic tumor, near total tumor resection is suggested for protection of FN function and quality of life.

BS3-6-3 Clinical characteristics and operative strategy of hypervascular vestibular schwannoma

Yu Teranishi¹, Michihiro Kohno^{1,2}

¹Tokyo Metropolitan Police Hospital, ²Tokyo Medical University Hospital

[Background] Hypervascular vestibular schwannoma (HVS) is comparatively rare and HVS surgery is complicated due to excessive tumor bleeding. Since that time, there have been few reports on HVS. Here we describe a large series of HVS. **[Methods]** Between 2008 and 2015, 722 patients with VS underwent operation at Tokyo Metropolitan Police Hospital, and Tokyo medical university hospital. Among these, 31 patients were diagnosed as HVS. The clinical, radiological, and operative findings were reviewed. **[Results]** HVS is seen younger patients. They have solid texture, less cyst, and larger volume than non-HVS. Angiography revealed HVS was fed by intradural/extradural feeder. Significantly, resection rate was lower, and Ki-67 and protein of CSF are higher in HVS. **[Conclusion]** The difficulty of HVS surgery is derived from excessive tumor bleeding, large volume, and severe adhesion to facial nerve. To control excessive tumor bleeding, operative strategy based on angiography and hemostasis technique are efficient.

BS3-6-4 Relationship between warning sign of intraoperative facial motor evoked potential monitoring and postoperative facial function in a vestibular schwannoma surgery

Tetsuya Goto, Kohei Kanaya, Kazuhiro Hongo
Shinshu University School of Medicine

Object: Intraoperative facial motor evoked potential (fMEP) is one of the electrophysiological monitorings of facial nerve function in vestibular schwannoma resection. **Method:** fMEP was performed in 70 cases of initial vestibular schwannoma surgery since 2007. High frequency stimulation was transcranially applied and compound muscle action potential from oris muscle was recorded. Warning sign was determined as higher threshold increase than stable increase and/or correlating threshold increase following surgical event. "Recovered" was defined as threshold decrease after warning sign. The patients were divided into 3 groups by fMEP result: "No warning sign", "Recovered" and "Not recovered". 62 cases of fMEP were analyzed after exclusion. **Result:** Warning sign appeared in 34 surgeries. "Recovered" was in 21 cases / 34 warning signs.

Over Gr III facial palsy at discharge were in 14 cases. Over Gr III palsy was 1/14 "No warning sign", 4/21 "Recovered", 9/13 "Not Recovered". **Conclusion:** fMEP can be used for affixing a warning sign especially before securing REZ of the facial nerve. Prediction of postoperative facial function should be evaluated by multimodal examinations.

BS3-6-5 Posterior transtemporal approaches: Indications and modifications

Sergey Spektor, Samuel Moscovici,
Cezar José Mizrahi

Department of Neurosurgery, Hadassah Hebrew University Medical Center, Jerusalem, Israel

Object Share our experience and lessons learned with transtemporal approaches, and provide some recommendations.

Methods From 2000–2015, we performed 109 surgeries with various modifications of the posterior transtemporal approach (meningioma, 64; epidermoid tumor, 14; chordomas/chondrosarcomas, 8; vestibular schwannoma, 7; parabrainstem AVM; trigeminal schwannoma; endolymphatic sack and glomus jugulare tumors).

Results Retrolabyrinthine, transcrural, translabyrinthine, infralabyrinthine routes were used alone or in combined/modified/expanded transtemporal approaches, fused with pterional, subtemporal or far lateral approaches and neck dissections as appropriate.

Conclusion Modifications should be targeted to the pathology and hearing status. Transtemporal approaches are similar to surgery through a deeply placed keyhole; thus, addition of the endoscope is valuable. The corridor through petrous bone is narrow and should be expanded by tentorial section and tailored craniotomy (temporal, pterional, suboccipital) and neck dissection as needed. Multilayer reconstruction (dural substitute, biological glue, fat graft, titanium mesh) effectively prevents CSF leaks and pseudomeningocele.

BS3-6-6 Volumetric assessment of subdural air collections after vestibular schwannoma surgery in the semisitting position

Milan Stanojevic¹, Helene Hurth¹, Marcos Tatagiba¹,
Ulrike Ernemann², Florian Ebner¹

¹Department of Neurosurgery, University of Tuebingen,

²Department of Neuroradiology, University of Tuebingen

Objective: To assess the correlation between postoperative subdural air volume and tumor volume and duration of surgery after microsurgery of vestibular schwannomas in the semisitting

position.

Methods: We included 36 patients operated for vestibular schwannoma in the semisitting position in this retrospective study. Tumor volume was measured on T1 weighted contrast enhanced MRI Images, the air volume on postoperative CT Scans. For volumetric measurement we used the Software Analyze Direkt 12.0.

Results: 16 patients were men, 20 women (age 21-67). The mean tumor volume was 5ccm (range 0.2-31.9), the mean postoperative air was 48.9ccm (range 2.3-232), the mean operation time was 219min (range 131-352). Patients with large vestibular schwannomas had less intracranial air than the patients with smaller vestibular schwannomas.

Conclusion: An indirect correlation seems to exist between tumor volume and subdural air volume. As well as a correlation between age and subdural air volume. Duration of the surgery did not have any influence on postoperative subdural air volume.