

P-1 Penetrating traumatic brain injury on the anterior skull base

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Penetrating injury on the anterior skull base due to scissor is rare case. 5 years old boy was admitted to our emergency neurosurgical unit. 7 hours prior to admission, when he was riding bike and holding scissor, suddenly he felt down and the scissors stab on the medial part of his right eye, GCS 13, difficult to be examined on the right eye. Skull x ray revealed a scissors stab on the right medial part of eye, penetrate to the anterior skull base. CT scan showed a penetrating wound on lateral part of anterior clinoid process. It may injured the optic nerve or ICA.

Therefore he underwent emergency surgery after preparing any possibility occurrences on it. Frontolateral craniotomy was perform and penetrating wound was confirmed extradurally. Bone bleeding was controlled by bone wax. After opening the dura, frontal lobe was retracted superiorly under microscope, and the top of the scissor was seen. It was just 2 mm from optic nerve and 3 mm from ICA. There was lacerated vein on the sphenoid sinus and managed by fibrillary haemostatic agent (surgicel).

After confirmed that there was no other injury on the intracranial, the scissor was removed without any neurological deficits.

P-2 Orbitozygomatic approach for an unusual transorbital penetrating brain injury via optic canal- Case report

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Transorbital penetrating brain injuries via the optic canal is considered extremely rare.

Object: A 23-year-old man having orbito cranial injury caused by penetrating wooden piece after motorcycle accident, light perception was negative on the left site. Noncontras head CT study revealed a linier hypodense lesion running through optic canal continue to basal cistern and stop on the mid brain.

Methods: Patient underwent orbitozygomatic approach and retrieval foreign object done by cutting wooden material into two part.

Result: Post operative no other neurological deficit except loss of visual on the left site.

Conclusion: Surgical approach for orbitocranial injury is determined by the location of the penetration, this case Orbitozygomatic approach

was so convenience.

P-3 Optic nerve decompression via trans-SOF approach for traumatic optic neuropathy

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Objects: We describe our experience of extradural optic nerve decompression via the trans-SOF approach for traumatic optic neuropathy. **Methods:** We retrospectively review a total of 8 consecutive patients with TON underwent extradural optic canal decompression via the trans-SOF approach. In addition, the surgical technique and procedures are reviewed. **Results:** Postoperative visual acuity on discharge was improved in 6 patients and unchanged in 2. 2 patients with ophthalmoplegia gradually recovered by 3 months after operation. Postoperative outcome was GR in 7 patients and MD in one patient. There were no complications related to the surgical procedure. **Conclusion:** The advantage of this approach is easy identification of the optic canal, resulting in fewer surgical complications. We recommend this modified approach with mini-peeling as a safe and reliable procedure in patients with TON.

P-4 Systematic review: Microvascular decompression for tinnitus

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Object: To examine operative outcomes in cases of microvascular decompression (MVD) of cranial nerve VIII for tinnitus through a critical review of the literature.

Methods: Forty-three English-language articles were gathered from PubMed and analyzed. In this review, 2 different case types were distinguished: 1) tinnitus-only symptomatology which is defined as a patient with tinnitus with or without sensorineural hearing loss (SNHL); and 2) mixed-symptomatology which is defined as tinnitus with symptoms of other cranial nerve dysfunction. This review reports outcomes of those with tinnitus-only symptoms.

Results: Forty-three tinnitus-only cases were found in the literature with a 60% positive outcome rate following MVD. Analysis revealed a 5-year cutoff of preoperative symptom duration before which a

good outcome can be predicted with 78.6% sensitivity and after which a poor outcome can be predicted with 80% specificity.

Conclusion: As the 60% success rate is more promising than several other therapeutic options open to the chronic tinnitus sufferer, future research into this field is warranted.

P-5 Microvascular decompression with a novel method "Teflon-bridge technique" for hemifacial spasm by vertebral artery

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Objective: In cases of Hemifacial spasm (HFS) by vertebral artery (VA) as offending artery, Microvascular decompression (MVD) is considered to be more difficult, and has a higher rate of incomplete cure. The objective of this study was to investigate the outcome of MVD for HFS caused by VA and to evaluate the alternative technique.

Methods: There were 147 patients of HFS treated by MVD from 2001 to 2015. We evaluated the clinical outcomes of the patients treated with the novel technique, "Teflon-Bridge" technique making a bridge between anterior pons and cerebellar flocculus with a stick-like Teflon.

Results: Fifty five patients (37%) were associated with VA. The results of MVD for VA-associated patients were less successful than those of the remaining patients (84% vs 98%). The patients treated with "Teflon-Bridge" technique had more successful rate and less permanent complications rate than the patients treated with conventional methods (successful: 100% vs 78%, complications: 0% vs 20%).

Conclusion: "Teflon-Bridge" technique used in the present study is useful way to perform MVD for HFS by VA effectively and safely.

P-6 High cervical myelopathy caused by arteriovenous fistula fed by the intradural vertebral artery: Case report and review of the literature

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It is rare to find dural arteriovenous fistula fed by the intra dural vertebral artery as the cause of

progressive high cervical myelopathy.

A 26 years male presented with progressive spastic quadriplegia with respiratory difficulty. His MRI cervical spine showed a vascular lesion at the craniovertebral junction. DSA showed an arteriovenous fistula fed by the intradural vertebral artery. The fistula was surgically excised successfully.

The angiographic findings are compared with similar cases from the literature

P-7 Interlaminar fenestration approach for management of spinal meningiomas

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Introduction: Spinal meningiomas represent 25 to 46% of tumors of the spine. Typically located in the intradural extramedullary space. They most frequently occur in the thoracic region in middle-aged women.

There is many approaches to deal with these tumors, one of the approaches is the interlaminar fenestration with preservation of the Laminae, pedicles and spinous processes which account of preservation of spinal stability.

Patients and methods: From 1994 till 2014 we operated 145 patients with spinal meningiomas, 102 females and 53 males , age ranged between 29 and 76 year.77 located in thoracic, 41 in cervical and 27 in lumbar area. Presenting symptoms : 80% pain , 70% weekness, 75% sensory disturbances, and 40% sphincter dysfunction

Results: 96% total excision.Recurrence in 5.2%. Complications as following: CSF leak 3%, wound infection 2% neurological deterioration 1.5%.

87 % improvement of preoperative deficits, 13% were stable, an 2% get worse.

Conclusion: Interlaminar fenestration give almost equal surgical exposure in comparsion with laminectomy or hemilaminectomy with less approach related complication specially instability.

P-8 Fusion in patients with occipito-atlanto-axial joint instability: Management strategy and results

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Object: We reported that patients with hereditary disorders of connective tissue (HDCT) or post-traumatic condition (PTC) may present with lower brain stem symptoms attributable to occipito-atlanto-axial (OAA) hypermobility, or instability. We performed occipito-cervical fusion (OCF) using instrumentation for OAA instability. We examined the factors that influences the outcome and have reported the preliminary results.

Methods: We detected OAA joint instability in 445 patients with HDCT, PTC and so on. Surgical indication for CCF was determined on the basis of craniocervical traction test. OCF was performed in 250 patients using VERTEX™ MAX or Synapse™, reconstruction system, human allograft of fibula and INFUSE® (rh-BMP).

Results: Out of 250 patients, 200 patients showed improvement or resolution of signs and symptoms. Complete fusion was confirmed in 212 of 255 surgery cases using reconstructed 2D-CT and dynamic plain cervical X-ray examination.

Conclusions: OCF is effective for improving and stabilizing of symptoms in patients with OAA joint instability. The craniocervical traction test was an important pre-operative procedure for selecting the surgical procedure.

P-9 Pathogenesis and management of chiari malformations

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Objective: We describe subtypes of Chiari malformations (CMs) based on a morphometric and volumetric analyses of the posterior cranial fossa (PCF). We report the preliminary results of treatments for CMs subtypes. **Materials and Methods:** 500 patients with CMs, calculation of the volume of posterior cranial fossa (PCFV). Out of 500 cases, 115 cases performed expansive suboccipital cranioplasty (ESCP), 185 cases underwent foramen magnum decompression (FMD), and 100 cases were followed without surgery. **Results:** By multiactor analyses, three

independent subtypes confirmed. CMs type A: normal PCFV and the volume of surrounding foramen magnum (volume FM), CMs type B: normal PCFV and small FM, CMs type C: small PCFV and FM same as CMII, CM none as CM0 is same as CMs type B. CMs type A: normal occipital bone size, elongation and downward displacement of the brain stem. Both FMD and ESCP had good results, not relating opening arachnoid membrane, or not. The rate of improvement were 87% and 84 %, the rate of improvement and stabilization of symptoms were 98% and 99%. **Conclusions:** Considering mechanism of cerebellar tonsils based on morphometric analyses of PCF, choose the surgical procedure.

P-10 One-stage reconstruction of the extensive defects involving middle skull base and orbital floor with the combination of temporalis muscle flap and free ALT flap

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Introduction: Reconstruction of extensive craniofacial defects involving middle skull base and orbital floor in a child is challenging because aesthetic and functional results are required. We report a case where satisfactory result was obtained using the combination of temporalis muscle(TM) flap and free anterolateral thigh (ALT) flap transfer.

Case Report: A 9-year-old male presented with a large nasopharyngeal angiofibroma. Tumor resection was performed preserving left eyeball. The resultant defects involved left middle skull base, orbital floor and lateral wall. We reconstructed the orbital defects allocating TM flap to the orbital defects and middle skull base defect transferring ALT flap. Perioperative course was uneventful. He had slight diplopia in early period but recovered 10 months postoperatively. Two years postoperatively, depression of temporal region and enophthalmos are inconspicuous with adequate eye position.

Discussions: We believe our procedure is one of the good options that guarantee the functional and aesthetic reconstruction for the case with extensive defects involving middle skull base and orbital floor and lateral wall.

P-11 A case of skull base reconstruction including the dural defect only with a flap

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Objects:In the skull base operation, the cranial cavity are temporarily connected with paranasal sinuses. When the infection spread through the dural defect, it will lead to serious complications.

In our department, the dural reconstruction using the temporal pericranial flap has been the first choice to prevent the complications. In cases who had had many surgery and/or radiation therapy, pericraial flap can't be used. In such a case, we used only a musculocutaneus flap.

Methods:We report the case of a 66 years-old woman with meningioma. Because she had a recurrence, she was introduced to our department for the reconstruction.

In the operation, as a result of having removed tumor, wide skull base defect was occurred.

In this case, pericranial flap couldn't be used for the dural defect because of many surgery, so we reconstructed the defect only with a RAM flap. The dural defect was reconstructed with a muscle part of the flap overlapping the surrounding residual dura.

Results:After the operation, the postoperative course was satisfactory without liquorrhea and infection.

conclusion:This method was very useful and safety when the pericranial flap can't be used.

P-12 左眼窩先端部の腫瘍性病変を認めた鼻副鼻腔サルコイドーシスの一例

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はじめに:サルコイドーシスは、全身のあらゆる臓器を侵す原因不明の疾患である。病理組織学的に乾酪壊死を伴わない類上皮肉芽腫性病変を認める。鼻副鼻腔粘膜病変については比較的まれである。今回、我々は左羞明が主訴で来院し、画像にて左眼窩先端部に腫瘍性病変を認めた鼻副鼻腔サルコイドーシスの1例を経験した。その臨床症状や治療における経過について文献的考察を含めて報告する。

症例:35歳男性が2週間前からの左羞明を主訴に、近医眼科受診。その際、左瞳孔が散大しており、精査加療目的に当院眼科紹介受診となった。CT(造影なし)にて左眼窩先端部に10mm×15mm大の腫瘍性病変が示唆され、造影MRI施行した。CTと同じ部位に、造影効果を認める腫瘍性病変と認めた。当科にコンサルトとなり、診断目的に内視鏡下鼻副鼻腔手術を施行した。鼻副鼻腔粘膜、また左眼窩先端部腫瘍にアプローチし、組織を採取して病

理組織学的に検査した。結果、鼻副鼻腔粘膜から乾酪壊死を伴わない類上皮肉芽腫性病変を認め、胸部CTにて両側肺門部リンパ節腫大も示したためサルコイドーシスの診断となった。

結果:眼窩先端部へのアプローチにての病理検体では、診断がつかかねたが、鼻副鼻腔粘膜病変での病理にて診断がついた。しかしながら、眼窩先端部への内視鏡下鼻内アプローチは今後、同部位への他疾患においても低侵襲で診断に有用であることが示唆された。

P-13 Treatment of frontal sinusitis caused by foreign material

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Purpose: In the neurosurgical field, foreign material had been used for filling the frontal sinus after the craniotomy frequently by about 10 years before. However, the frontal sinusitis sometimes occurred at over 10 years after the surgery. We hereby report a reliable treatment method for such sinusitis.

Method: After removing the front wall of the frontal sinus from the bicoronal insion, the debridement of the foreign material and abscess was performed. A widely drainage route to the nasal cavity was made and a large silicon tube inserted into the route. To separate the cranial cavity from the frontal sinus, a musculo-pericranial flap was used.

Result: This method was carried out in 15 cases, all of them were cured. Most of the foreign material were bone wax.

Consideration: Although filling the frontal sinus with the foreign material has been reduced recently, sever frontal sinusitis due to the foreign material sometimes occur in some cases. We think that this method is an effective and convenient way to treat such sinusitis.

P-14 A case of malar intratumoral abscess originated from cavernous sinus meningioma

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We report a case of malar intratumoral abscess originated from cavernous sinus meningioma. A 66-year-old woman, who had received craniotomy and gamma knife radio surgery for her left cavernous sinus meningioma about 20 years ago,

presented with a recurrent meningioma invading sinonasal, orbit, infratemporal fossa and malar subcutaneous. The CT revealed the lesion under the buccinator muscle with 65×82×66 mm. Since she suffered from the intratumoral abscess several times, the surgery was planned to control the infection. After presurgical maxillary artery embolization, the tumor was approached using modified Weber Fergusson incision, and the anterior wall of the antrum was removed. The tumor in the malar was then removed after resecting the posterior wall of the antrum and the coronoid process. The mass in the ethmoid, orbital and middle cranial fossa was also reduced after resection of lateral nasal wall. Lastly, the dural reconstruction was performed using fascia lata, and fat, the defect of the partial maxillectomy was reconstructed using rectus abdominis free flap. Neither facial infection nor remarkable postoperative complications appeared 18 months after the operation.

P-15 A case: Skull base osteomyelitis with cholesteatoma

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Skull Base inflammatory disease is very rare. Osteomyelitis of skull base is a life threatening disease. This disease may occur due to contiguous spread of invasive infection from the ear.

Severe otalgia and headaches are a typical symptoms, and cranial nerves may also become involved through stylomastoid foramen or jugular foramen.

Most of suffered patients have systemic immunocompromised condition, often diabetes, or history of radiotherapy for head and neck malignancy.

Chronic osteomyelitis is often much more indolent and slowly progressive. It is difficult to diagnose and manage.

Here we present such a case, seen in a 75 years old man who initially diagnosed as COM with cholesteatoma. open cavity mastoidectomy was performed. 3 months later he suffered from facial palsy and diagnosed skull base osteomyelitis

P-16 Meningoencephalocele of the temporal bone: A report of 2 cases

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Meningoencephalocele is a rare condition with potentially dangerous complications. Surgery must take place expeditiously and different surgical techniques were used for treatment. Sanna et al reported that middle ear obliteration represents the safest and most definitive treatment for meningoencephalocele. However, it should be reserved for cases with poor hearing function because a blind sac closure of the external auditory canal and removal of the mastoid and the tympanic cavity mucosa with malleus and incus is required in this operation.

We report two cases of meningoencephalocele who underwent the obliteration of mastoid without removal the tympanic cavity mucosa, malleus and incus to preserve hearing. In both cases, a combined mastoid-middle cranial fossa approach was performed and the bone defect was repaired. The mastoid cavity was obliterated with abdominal fat in the first case and with calcium phosphate cement in the second case. In both cases, hearing loss has not occurred and the recurrence of meningoencephalocele has not been seen after the surgery.

P-17 Cochlear implantation in deaf patients with eosinophilic otitis media

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We investigated the usefulness and safety of our cochlear implantation method for two deaf patients with eosinophilic otitis media. The surgical approach was a subtotal petrosectomy to remove the theater of eosinophilic infiltration. Then the external auditory canal and Eustachian tube were closed to prevent leaching of foreign substances and entry of stimuli which are the cause of eosinophilic inflammations. And the operative cavity was obliterated with abdominal fat to reduce the risk of post-operative complications. During surgery, blood loss were 170 mL and 50mL respectively. There were no complications and recurrent inflammation following surgery in two patients. It was confirmed by CT scan that the Eustachian tube was closed and the operative cavity remained obliterated with abdominal fat. Following the procedure, the hearing threshold

results were 30 dB and 34dB respectively. Our cochlear implantation procedures for deaf patients resulting from eosinophilic otitis media may be effective and safe. From the point of view of the ease of operation and the apparent safety during the procedure, it seems that the use of steroid pulse before operation is the better option.

P-18 Management of facial nerve in removal of petrous bone cholesteatoma

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Objectives: To analyze the surgical approaches according to the type of petrous bone cholesteatoma (PBC) and the functional preservation of facial nerve function in long-term follow-up cases. **Materials and Methods:** Medical records of 31 patients who underwent surgery for PBC were analyzed. **Results:** Facial nerve manipulation was needed in 5 out of 14 supralabyrinthine and 7 out of 16 massive type of PBCs. Decompression was performed in 3, rerouting in 2, end-to-end (E-to-E) anastomosis in 3, and rerouting and E-to-E anastomosis in 2 patients. Patients who received posterior rerouting showed worse postoperative facial function (average HB grade 4). Patients who received E-to-E anastomosis showed better facial outcome (HB grade 3). **Conclusion:** Worse prognosis of facial palsy was observed in posterior rerouting and better surgical outcome was observed in E-to-E anastomosis.

P-19 Neuroenteric cyst presenting with atypical radiological features in an adult

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A 21-year-old man presented with gait disturbance and hearing loss. MRI revealed a large extra-axial cystic lesion with a solid component in the left CP angle. The cystic component was T1-hyper and T2-hypointensity, but the solid component appeared hemorrhage and a contrast-enhancement. The patient underwent surgery via the transcondylar fossa approach. Intraoperative findings showed a cystic component containing a dark-brown viscous liquid and a solid component that strongly adhered to the surrounding neural structures. Histopathological examination revealed that this

was an NC. In particular, the solid component had xanthogranulomatous features. Generally, NCs appear as a non-contrast-enhanced cyst and complete resection of the cyst wall is recommended. Although it is rare, a solid component with contrast enhancement on preoperative MRI indicates the possibility of xanthogranulomatous changes indicative of strong adhesions to the surrounding structure in the NCs. Neurosurgeons should therefore carefully manipulate these lesions during surgery.

P-20 Discovery of facial and trigeminal nerve function: Herbert mayo and charles bell

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Object: To clarify the contributions of Herbert Mayo and Charles Bell toward the discovery of the functions of the fifth and seventh cranial nerves.

Methods: Review of Charles Bell's and Herbert Mayo's original publications of 1821 and 1822, respectively and subsequent reports relevant to these primary works.

Results: Bell's original submission to the Royal Society of London in 1821 details the discovery of the 'respiratory nerve of the face' responsible for coordinating facial motion with the organs of respiration. In this account, Bell only peripherally alludes to motor function and often inaccurately comments on the dual fifth-seventh cranial nerve motor innervation of several structures. By contrast, in 1822, Herbert Mayo accurately and unequivocally defined the voluntary motor function of the facial nerve and sensory-motor function of the trigeminal nerve based on his experiments.

Conclusions: Several notable clinicians and anatomists have contributed toward our current understanding of the anatomy and physiology of the facial and trigeminal nerves. Herbert Mayo should be remembered for first providing a more accurate and clear description of their separate functions.

P-21 Middle ear meningioma mimicking otitis media with effusion : A case

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Meningiomas are the most common intracranial neoplasm and frequently develop in the parasagittal region. Meningiomas are slow-

growing, benign tumors originating from the arachnoid cap cells. They account for 13 to 26 percent of all intracranial neoplasms. Meningiomas arising in the middle ear are extremely uncommon and only a few cases are reported in the literature. Patients with middle ear meningiomas present with hearing loss, aural fullness, tinnitus, dizziness and facial palsy. Otitis media with effusion (OME) secondary to eustachian tube dysfunction has also been reported. In case of therapy resistant OME, temporal bone computed tomography and magnetic resonance imaging (MRI) examination should be considered. In this report, we describe a case of intracranial meningioma extending into the middle ear cavity and clinically presenting as a OME with a review of the literatures.

P-22 Superior canal dehiscence syndrome

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Superior canal dehiscence (SCD) syndrome is an increasingly recognized cause of vestibular and/or auditory symptoms in both adults and children. These symptoms are believed to result from the presence of a pathologic mobile "third window" into the labyrinth due to deficiency in the osseous shell, leading to inadvertent hydroacoustic transmissions through the cochlea and labyrinth. The most common bony defect of the superior canal is found over the arcuate eminence, with rare cases involving the posteromedial limb of the superior canal associated with the superior petrosal sinus. Operative intervention is indicated for intractable or debilitating symptoms that persist despite conservative management and vestibular sedation. Surgical repair of the defect can be accomplished by reconstruction or plugging of the bony defect or reinforcement of the round window through a variety of operative approaches. We present 4 patients with superior canal dehiscence and review the etiology, pathophysiology, presentation, diagnosis, surgical options, and outcomes in treatment of this entity, with a focus on potential pitfalls that may be encountered during clinical management.

P-23 Occipital sinus as the main venous drainage in a case of 4th ventricular mass

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Objective: This paper describes a case of 4th ventricular mass, whose management was modified due to a rare variation of the occipital sinus (OS).

Methods: 32 year-old female presented with persistent headache and nausea. MRI showed a 4th ventricular mass and hydrocephalus. Venous sinus anatomy appeared unusual, thus an MRV was performed.

Results: MRV revealed the OS as the main drainage pathway for the whole brain, providing the only drainage between the superior sagittal sinus and the jugular veins through the marginal sinus (MS). Both transverse and sigmoid sinuses were atresic/hypoplastic. Flow through the straight sinus was diminished. Thus, endoscopic third ventriculostomy and biopsy were performed as the first step. Postoperatively the nausea persisted and biopsy was inconclusive. Thus, a second surgery was planned. Dural opening was tailored so as not to damage the OS and MS. Tumor was resected subtotally through the limited dural opening. Pathology was low grade glioma.

Conclusion: Awareness of rare variations of the venous/sinus anatomy may fundamentally change the surgical management plan and would be crucial in minimizing the risk of potentially fatal complications.

P-24 Intercarotid distance in pituitary macroadenoma: A comparative study

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Object: Evaluate the intercarotid distance (ICD) of patients with pituitary macro adenoma and compare with controls. **Methods:** We retrospectively reviewed 20 consecutive patients with non-functioning pituitary macroadenoma, compared to twenty paired controls. Contrast-enhanced MRI images were used to measure the ICD at the petrous segment (ICD1) and horizontal cavernous segment (ICD2). **Results:** There was no statistically significant difference between the mean ICD1 in the case group ($21,17 \pm 2,49$ mm), control group ($19,89 \pm 2,65$ mm), adenoma subgroup ($21,26 \pm 2,48$ mm) or giant subgroup ($21,00 \pm 2,69$ mm). For the ICD2 there was statistically significant

difference between the case (24.27 ± 5.14 mm), control (19.41 ± 3.00 mm), adenoma subgroup (21.54 ± 3.52 mm) and the control group. In contrast, the giant subgroup ICD2 (25.97 ± 3.63 mm) showed to be statistically significantly higher than the control group ($p < 0.0001$) and the adenoma subgroup ($p = 0.0002$). **Conclusion:** Our results support previous reports, showing a bigger ICD2 in the cases group. In the subgroup analysis, the ICD2 was significantly higher in the giant subgroup compared to the adenoma subgroup and the controls.

P-25 Radiologic analysis of the atlas with special reference to atlas hypoplasia

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Purpose: As there is little information regarding the useful parameters for defining atlas hypoplasia, we recorded radiological measurements of the atlas in 223 patients for the considering of C1 hypoplasia. **Methods:** The inner anteroposterior diameter (IAP) of C1, the space available for the spinal cord (SAC), and the cross-sectional area of the atlas (CSA) were measured on CT images of 223 patients and compared. **Results:** The average IAP-, SAC-, and CSA measurements were 29.7 ± 2.0 mm, 18.0 ± 1.8 mm, and 602.5 ± 74 mm², respectively. There was a strong correlation between IAP and SAC ($r = 0.853$) and between IAP and CSA ($r = 0.827$). SAC was positively correlated with CSA ($r = 0.699$) although the correlation was weaker than between IAP and CSA. Partial correlation analysis showed that IAP was positively correlated with SAC ($r = 0.619$) and CSA ($r = 0.684$) when SAC and CSA were controlled, respectively. SAC was not correlated with CSA when IAP was controlled ($r = -0.023$). **Conclusion:** Our measurement study demonstrates that IAP or CSA are more useful indicators for defining atlas hypoplasia than SAC.

P-26 Microsurgical anatomy of the maxillary artery

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Objective: The maxillary artery passes through the infratemporal and pterygopalatine fossae and its

branches have anastomoses with intracranial arteries. Precisely understanding the maxillary artery and its relationships with adjacent neural structures is important for skull base surgeons and endovascular surgeons.

Methods: The relationship and surgical approaches to the maxillary artery were examined in 4 formalin-fixed specimens with a microscope.

Result: The maxillary artery branches off from the external carotid artery behind the mandibular neck and courses anteriorly to enter the infratemporal fossa. It courses along the lateral pterygoid muscle and reaches to the posterior wall of the maxillary sinus. After passing through the pterygomaxillary fissure, the artery courses in the pterygopalatine fossa and emanates terminal branches. As the artery passes through the infratemporal and pterygopalatine fossae, it supplies the nerves and muscles in these areas.

Conclusion: Understanding the relationship between the maxillary artery and the surrounding area allows more accurate surgery for lesions involving the infratemporal and pterygopalatine fossae.

P-27 Evaluation of rotational changes of the VA atlas loop using 3D-CTA

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Object: During operation via occipital condyle region such as transcondyle approach or transjugular approach, surgeons should pay attention for the V3 segment of the VA which runs behind occipital condyle to secure it. Furthermore in such approaches, head rotation is needed to make adequate surgical position. This study indicates how the atlas loop of the VA moves by head rotation.

Methods: 3DCTA images of 18 patients were used for analysis of displacements of the atlas loop. To determine them, distance between occipital condyle and posterolateral point of the atlas loop, distance between atlas and highest point of the atlas loop, were measured.

Results: Transverse displacements were rarely recognized (mostly within 0.3mm). In contrast, upward vertical displacements were recognized at the lateral part of the atlas loop (at most 2.1mm) in the VA of approach side, and downward displacements in the contralateral VA (at most 1.8mm).

Conclusion: The authors discuss about the mechanism of this phenomenon from anatomical point of view. Surgeons should note unexpected upward protrusion of the atlas loop of the VA by head rotation to reduce the risk of intra-operative VA injury.

P-28 Intra-spinosum middle meningeal artery ligation

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Objective: To describe the technique of intra-spinosum middle meningeal artery (MMA) ligation, which enables us to control bleeding during the anterior transpetrosal approach (ATPA).

Methods: During epidural dissection, we identified the FS and partially drilled the lateral side of the FS. Next, we cut the convergence site of the neurovascular structures with the periosteal dura within the FS and continued dural detachment epidurally. Bleeding control around the FS and postoperative facial nerve paresis were assessed for 96 patients treated with the ATPA. Next, histological study was performed around the FS using Masson's trichrome stain.

Results: In all cases in which this technique was used, bleeding from the interdural space was well controlled and no persistent facial nerve paresis was identified. In the histological study, we confirmed that the MMA, the MMV, and the meningeal branch of the mandibular nerve converged into the FS and many venous channels existed in the interdural space around the FS and the FO.

P-29 Microsurgical anatomy of the abducens nerve (cavernous segment)

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Objective: The aim of this study is to demonstrate and review the detailed microsurgical anatomy of the abducens nerve and surrounding structures along cavernous sinus and to provide its topographic measurements. **Methods:** Both sides of each cadaveric head were dissected using different skull base approaches to demonstrate the course of the cavernous segment of the abducens nerve.

Results: The anatomy of the cavernous sinus through which the abducens nerve passes, are complex due to the high density of critically important neural and vascular structures. The abducens nerve has angulations and fixation points along its course that put the nerve at risk in many clinical situations. **Conclusion:** Surgeons must have detailed knowledge of the microsurgical anatomy of the cavernous sinus to avoid injuring the abducens nerve and the ICA and additionally should be aware of the possibility of anatomical variations of

the abducens nerve along its course to prevent nerve dysfunction.

P-30 Microsurgical anatomy of the carotid cave

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Objective: The aim of this study is to define the carotid cave and examine the dural relationships of clinoid segment of the internal carotid artery.

Methods: The paraclinoid region was examined. Information was obtained about the location and depth of the carotid cave. **Results:** The carotid cave is a dural pouch located along the posteromedial aspect of the internal carotid artery at the level of the distal dural ring. The carotid cave is usually infraclinoid- intradural- subarachnoid space. The distal dural ring is usually tightly adherent to the anterolateral aspect of the carotid artery just below the origin of the ophthalmic artery. The superior hypophyseal artery accidentally arises from the medial side of the carotid artery in the carotid cave. **Conclusion:** Optimal treatment of the paraclinoid lesions including the aneurysms requires an accurate knowledge of the carotid cave and its relationship to the clinoid segment of the carotid artery and the anterior clinoid process.

P-31 Outcome for neurological deficits due to ICA aneurysms using RA graft with ICO

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Object: No study has the risk factors for non-improvement in terms of the residual neurological deficit.

Methods: We analyzed the risk factors associated with non-improvement of the cranial nerve palsy.

Results: We identified 35 patients with a mean age at surgery of 63.9 years. Aneurysms ranged in size from 15 to 50 mm (mean, 25.7 mm). Visual disturbance (7 cases, 20%) and external ophthalmoplegia (28 cases, 80%) were the only preoperative cranial nerve palsies. Visual disturbance improved in 28.5% of cases (2/7) and external ophthalmoplegia improved in 85.7% of cases (24/28). Time to therapy was significantly associated with recovery from cranial nerve palsy

($p < 0.0001$), with a wait of over 6 months being associated with the risk of non-improvement (odds ratio [OR], 200; 95% confidence interval [CI], 11.2–3579; $p < 0.0001$). The recovery of visual disturbance was worse than that of external ophthalmoplegia (OR, 15; 95%CI, 2.13–105.7 $p = 0.002$).

Conclusion: Early treatment is recommended when cranial nerve palsy is present because treatment delay is a risk factor for non-improvement of the neurological deficit.

P-32 Time-staged gamma knife stereotactic radiosurgery for large cerebral arteriovenous malformations: A preliminary report

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Object: The aim of this study was to evaluate the long-term outcome of Gamma Knife Radiosurgery (GKS) for vestibular schwannoma (VS).

Methods: This retrospective study included 112 patients without previous history of radiation, who had unilateral sporadic VSs and underwent clinical follow-up more than 60 months (median, 108; range, 60-168). The mean age was 48 years, and the mean initial tumor volume was 3.21 cm³ (range, 0.1–20.8). The median marginal tumor dose was 13 Gy.

Results: The tumor volume increased $\geq 120\%$ in 8 patients (7.1%), remained stationary in 21 patients (18.8%), and decreased $< 80\%$ in 83 patients (74.1%). Actuarial 2, 5, 10-year tumor control rates were 94.6 \pm 2.1%, 93.8 \pm 2.3%, and 91.8 \pm 2.6%, respectively. The 10-year actuarial tumor control rate was lower in the patients with tumor volume ≥ 4 cm³ (< 1 cm³, 93.9 \pm 4.2%; 1 - 4 cm³, 93.2 \pm 3.8%; ≥ 4 cm³, 88.0 \pm 5.6%; $P=0.618$). The rate of maintaining the same G-R scale was 25.6%, and that of serviceable hearing was 48.7%.

Conclusion: GKS is a safe and effective treatment option for VS. Marginal dose between 12-13 Gy is adjustable for VSs to obtain optimal tumor control with minimal morbidity.

P-33 Treatment of ruptured posterior inferior cerebellar artery aneurysms

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Treatment for PICA aneurysm is challenging because of anatomical variations and the narrow space, especially during SAH. Microsurgical and endovascular treatments are possible, with acceptable aneurysm occlusion rates. We describe the outcomes of a series of ruptured PICA aneurysm cases, based on different treatment strategies.

Among 643 ruptured intracranial aneurysm cases, we retrospectively reviewed 15 treated between January 2003 and December 2014. Clinical presentations, radiologic findings, locations, configurations, treatment methods, and clinical outcomes were collected.

Total 15 patients, seven patients underwent surgical treatment, whereas 8 required endovascular treatment. Eight trappings were conducted surgically or endovascularly for fusiform or dissecting aneurysms, while 1 was treated using stent-assisted coil embolization to save the PICA. The 3 deaths reported involved fusiform aneurysms, and 2 had been treated to save the PICA. Twelve patients had good outcomes.

Appropriate individualization of treatment enabled us to achieve good outcomes through conventional or endovascular treatment and by choosing to save or sacrifice the PICA, depending on patient condition.

P-34 Paraclinoid aneurysmにおける直達手術の意義と当院での手術手技の工夫

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目的: Paraclinoid aneurysm(PCA)は近年の血管内手術の発展に伴って直達手術を適応外とする施設も多い。しかし我々は瘤の完全閉塞と穿通枝の直視下温存が可能であるとの考えで、直達手術も選択肢の1つとしている。またPCAを3つのtypeと8つのsubtypeに分類することで、より安全かつ完全な治療を行っている。各々の症例を手術の工夫と共に提示する。

対象: 当院で手術を行った過去10年間、159例のPCAのうち、52例のcarotid cave aneurysm, 32例のposteriorPCA, 20例のanterolateralPCAの計104例を対象とし、分類を提示する。

手技: 1.前床突起切除と視神経管の開放に止まらず、

optic strutを視神経管下壁まで削除、視神経鞘も十分に開放し視神経の腹側から視交叉、視索の腹側まで十分に観察する。2.distal dural ringの十分な開放と眼動脈の確認。3.十分な骨削除により、内頸動脈のanterior loopを露出、クリップ先端の中核側への進入を目視可能にする。4.海綿静脈洞を意図した範囲まで開放する手技を修得する。5.安全の為、頸部を同一術野で消毒し頸動脈確保の為の皮切マークを行っておく。6.症例によりsuction decompressionを併用する。

結語：PCAの直達手術における当院での分類、手技の工夫について述べた。安全かつ完全な治療のためには、上述の術前の詳細な分析と手技のpitfallが重要と考える。

P-35 Unusual cerebral vasospasm after tumor resection; 2 cases report

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A 49-year-old man admitted with hyposmia for 1 year. MRI revealed right olfactory groove meningioma. Tumor was completely removed by resection. Three days after surgery, patient was drowsy and aphasia. Newly developed diffuse T2 high signal intensity in bilateral paramedial frontal lobe and corpus callosal genu that suggest ACA infarction. Cerebral angiography showed marked vasospasm in both ACA, angioplasty was performed at 2 times. Now patient had mild dysarthria and no other neurologic deficit.

A 50-year-old woman admitted with bitemporal hemianopsia for 3 years. MRI revealed well circumscribed cystic mass in sellar and suprasellar space suggested Rathke's cleft cyst. Tumor resection was performed by transsphenoidal approach. Patients was drowsy after surgery, Five days after surgery, patient was stupor. Two weeks after surgery, CT angiography showed acute infarction of left thalamus and posterior limb of internal capsule.

Conclusion: Cerebral vasospasm after tumor resection is a rare but challenging complication with very high morbidity and mortality. A high index of suspicion is required for early diagnosis and prompt management which are key elements of final outcome.

P-36 Incidental finding of non-contiguous dural metastasis of olfactory neuroblastoma

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Object: To report a patient with incidental finding of non-contiguous meningeal metastasis of olfactory neuroblastoma at 1 year after the primary surgery.

Method: Case report and literature review.

Result: A 55 year-old man with Kadish C olfactory neuroblastoma originated from the right nasal cavity and paranasal sinus had complete transnasal endoscopic resection and skull base repair by left naso-septal flap in December 2014. Postoperative adjuvant 60Gy radiotherapy to skull base was given. Nasal endoscopic surveillance did not find local recurrence.

However, routine contrasted MRI paranasal sinus at 1 year after the surgery showed an incidental finding of contrast enhanced meningeal metastasis at right frontal region that was out of the initial surgical and radiation field. Complete tumor resection by craniotomy was performed. Patient did not have any neurological impairment after the salvage surgery.

Conclusion: Non-contiguous meningeal metastasis of olfactory neuroblastoma is a rare condition. It is still salvageable if it could be detected early. Regular surveillance with contrasted MRI brain and paranasal sinus may be beneficial to patients with advance olfactory neuroblastoma.

P-37 Partial maxillary swing approach and Infratemporal approach for three malignant tumors in pterygopalatine fossa

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Introduction: We report three cases of malignant tumors extended to a pterygopalatine fossa (PF), which was successfully resected using modified partial maxillary swing approach with infratemporal approach (PMSA with ITA).

Case 1: A 64-years-old woman who had a myoepithelial cancer arising in maxillary sinus was operated by partial maxillectomy. We resected the recurrent tumor using PMSA with ITA. She lives

without a local recurrence.

Case 2: A 67-years-old man who had a myxofibrosarcoma arising in the PF was operated using PMSA with ITA. He alives with no evidence of recurrence.

Case 3: A 45-years-old man who had a SCC of maxillary sinus was performed chemo-radiotherapy. The tumors recurred in the PF with skull base invasion. The front wall of maxilla was swung laterally with the buccal skin. The postoperative course was uneventful, but a dead space in the back side of the preserved maxillary bone was infected.

Conclusion: PMSA with ITA has a merit on a conditioning the figure and a function and is available for a malignant tumor contacting with the skull base. However, a dead space is easy to be made on back side of maxilla, so we need to pay attention to the wound infection.

P-38 Clival metastasis of hepatocellular carcinoma which was first histopathologically diagnosed as atypical pituitary adenoma

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Histologically hepatocellular carcinoma (HCC) and atypical pituitary adenoma (APA) are similar and that could become a clinical problem. 76 years old woman, whose past medical history was significant for HCV positive without liver cirrhosis presented with abducens nerve palsy. Contrast enhanced MRI showed clival tumor with infiltration of the right cavernous sinus. The tumor was subtotally resected through a right anterior petrosal approach. Histological diagnosis was APA. 2 months after the operation, MRI showed enlargement of remaing tumor, without any enhanced liver masses on CT. The tumor was reoperated through an endoscopic transnasal transsphenoidal approach. The histological exam revealed the specimen was positive reaction for AFP. Repeat whole body CT showed an enhanced liver mass. Based on these findings, the lesion was diagnosed as metastasis of HCC. The patient died of liver failure in 6 months. What made diagnosing the tumor difficult was histological similarity of HCC and APA and the fact that the clival tumor grew before the liver mass appeared on CT. To make definitive diagnosis pathological diagnosis should be compared with clinical course.

P-39 Functional outcomes of immediate facial nerve repair after radical parotidectomy

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Object: Extirpation of aggressive parotid tumors often involves facial nerve sacrifice. We examined functional outcomes in patients undergoing radical parotidectomy and simultaneous facial nerve reconstruction to identify factors that may affect rehabilitation. **Methods:** 23 patients underwent radical parotidectomy and had sacrifice of the facial nerve with simultaneous reconstruction with sural nerve(15/23) or greater auricular nerve(8/23). Functional outcomes were assessed with the House-Brackmann grading system at 3, 6, 9, 12, and 18 months after surgery. Affecting factors were analyzed. **Results:** Total recovery (≤H-B grade II) occurred in 13.0%, favorable recovery (H-B grade III) occurred in 30.4%, and partial recovery (H-B grade IV) was shown 26.1%. Preoperative facial palsy, length of defect, radiation, and delay of rehabilitation were worse prognostic factors. **Conclusion:** More than 70% of patients get benefit from simultaneous facial nerve reconstruction in radical parotidectomy. The restoration of facial nerve function after facial nerve reconstruction would be affected by aggressiveness of tumor and relating results such as radiation and delay of rehabilitation.

P-40 Cranionasal excision of paranasal sinus immature teratoma

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Method: Case Report
A 50 years old gentleman presented as left submandibular gland immature teratoma with left submandibular sialoadenectomy and radical neck dissection performed. Half years after the surgery, he complained of left nasal obstruction and blood stained nasal discharge. Examination showed left nasal cavity tumour and biopsy confirmed immature teratoma. CT and MRI scan showed anterior skull base extension. Combined approach with neurosurgeon using cranionasal resection and multilayer skull base reconstruction by pericranial

flap and right nasoseptal flap was performed. Completed resection was confirmed by histology. Patient was then received adjuvant radiotherapy.
Conclusion: Immature teratoma in nasal cavity is extremely rare. We are the first case report presenting complete resection by using combined cranionasal resection approach.

P-41 Chemoradiotherapy for the squamous cell carcinoma of the external auditory canal

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The squamous cell carcinoma (SCC) of the external auditory canal (EAC) is very rare and its incidence is one to six per one million people per year. Because of its rarity, the treatment for the carcinoma remains controversial. Here we report the efficacy of CCRT for carcinomas of EAC.

This is a retrospective analysis of 24 patients who received CCRT of the SCC of the EAC in our institution from 2005 to 2015. The Pittsburgh staging system was used to classify all cases. Our treatment strategy is radiotherapy alone for Stage I, radiotherapy concomitant with low dose docetaxel for Stage II, and CCRT using a TPF regimen (docetaxel, cisplatin, 5-fluorouracil) for Stage III, IV.

Overall survival rate of Stage I, II, III and IV at three years, calculated by the Kaplan-Meier method, were 100%, 80%, 60% and 66.7% respectively. Disease-specific survival rate of Stage I, II, III and IV at three years were 100%, 100%, 60% and 83.3% respectively. We also evaluated hearing level after CCRT and two patients who were irradiated more than 60 Gy to inner ear showed hypacusis after the treatment.

These result suggested CCRT can be a treatment option for the SCC of the EAC.

P-42 Synchronous skull base SCC and osteomyelitis: Case reports and literature review

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Object: Squamous cell carcinoma (SCC) of the lateral skull base is a rare and aggressive disease in a complex anatomic site with poor prognosis. It may seldom arise synchronously with osteomyelitis (OM), delaying diagnosis with management dilemmas.

Methods: We describe two rare cases of patients

with synchronous skull base OM and SCC, both refractory to the institutional standardised treatment. The history, examination and investigations are described and we review the world literature on the management of skull base SCC in the presence of OM.

Results: Patient 1 had resectable disease and underwent a lateral temporal bone resection with neck dissection and free flap reconstruction.

Patient 2 had metastatic disease and underwent palliative radiotherapy.

Conclusions: Lateral skull base SCC and OM are clinically indistinguishable and the two separate pathologies can co-exist. A high index of suspicion and early detection is crucial to a prompt diagnosis, and a multidisciplinary approach is the key to effective management.

P-43 Vestibular schwannoma atypically invading temporal bone

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Vestibular schwannoma (VS) usually present the widening of internal auditory canal (IAC), and these bony changes are typically limited to IAC, not extend to temporal bone. Temporal bone invasion by VS is extremely rare. We report 51-year-old man who revealed temporal bone destruction beyond IAC by unilateral VS. The bony destruction extended anteriorly to the carotid canal and inferiorly to the jugular foramen. On histopathologic examination, the tumor showed typical benign schwannoma and did not show any unusual vascularity or malignant feature. Facial nerve was severely compressed and distorted by tumor, which unevenly eroded temporal bone in surgical field. Vestibular schwannoma with atypical invasion of temporal bone can be successfully treated with combined translabyrinthine and lateral suboccipital approach without facial nerve dysfunction. Early detection and careful dissection of facial nerve with intraoperative monitoring should be considered during operation due to severe adhesion and distortion of facial nerve by tumor and eroded temporal bone.

P-44 Treatment outcome of olfactory neuroblastoma in our institute

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Object: Olfactory neuroblastoma (ONB) is a rare tumor arising from the olfactory epithelium. Because of its rarity few reports on the ONB in Japan. To elucidate the characteristics of ONB in Japan, we report our institutional experience of 14 cases.

Methods: This retrospective study included 14 ONB patients treated at our institute between 1992 and 2012. We analyzed the patient characteristics, Hyam's grading, Kadish staging and treatment outcome. We performed craniofacial resection for all tumors until 2010, from 2011 endoscopic resection for Kadish A, B tumors and craniofacial resection for Kadish C tumor.

Results: Half of the patients had Kadish C and 57% were low grade ONB. Eight of nine surgically treated patients are alive without disease. All non-surgically treated patients experienced local treatment failure. The 4-year overall survival for surgically treated patients and non-surgically treated patients was 89% and 40%, respectively.

Conclusion: Our data showed almost ONB patients underwent surgery had good outcome independently of Kadish stage and Hyams' grade, which were reported to be the prognostic factors for survival.

P-45 耳下腺がん側頭骨進展症例に対する手術戦略 一側頭骨、顔面神経の切除方針

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局所進行耳下腺がんは頭側へ進展することが多く、腫瘍が側頭骨に接している症例では、側頭骨を含んだ切除範囲と顔面神経処理に関する手術方針を決定する必要がある。また、耳下腺がん治療は組織型が多岐に渡り、悪性度は様々である。悪性度により周囲組織に対する進展様式が異なり、悪性度も考慮に入れた切除範囲の決定が必要となる。名古屋市立大学では術前に針生検による病理組織診断を施行している。

術前に手術方針を決定する際に必要な情報として、以下の要素が挙げられる。

- 1) 顔面神経麻痺の有無
- 2) 進展範囲、骨浸潤（側頭骨、下顎骨）の有無
- 3) 悪性度

術前に悪性と診断され、腫瘍が側頭骨に接している場合には、乳突削開をして外耳道底～乳突洞底を合併切除す

る。顔面神経麻痺の有無と悪性度、腫瘍と側頭骨の位置関係、術中迅速診の結果により、顔面神経の切除方針を決定する。

P-46 Outside-in draft 3 approach for sinonasal squamous cell carcinoma- a case report

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Object: Surgical resection is the main choice for sinonasal malignant tumor. But access to the lesion inside the frontal sinus is quiet challengeable to physician outside-in Draft 3, especially in the situation lacking navigation system guiding. Some techniques was developed to overcome the dilemma.

Outside-in Draft 3 approach can early define dissection limits and avoid entering frontal recess initially.

Methods: We report on a 46 - year- old male with right sinonasal squamous cell carcinoma, infiltrating ethmoid, maxillary, frontal sinus and nasolacrimal duct was verified. Endoscopic medial maxillectomy combining outside-in Draft 3 was done, adjuvant radiotherapy was scheduled for perineural invasion.

Results: This patient have followed up for 18 months without local recurrence.

Conclusion: Outside-in Draft 3 approach is a reliable method to manage frontal sinus malignant lesion without navigation aiding.

P-47 A case of intractable skull base mesenchymal chondrosarcoma

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We present a male 27-year-old patient, with intractable skull base mesenchymal chondrosarcoma. 9 years ago, skull base tumor was subtotally removed. Remnant tumor in the left cavernous sinus was treated by SRS. After 3 years, he was referred to us with recurrent tumors in the left skull base and nasal cavities. The tumor was subtotally removed using a combined endonasal endoscopic and orbitozygomatic approaches. Next 5 years, he had refused radical resection and underwent several salvage surgeries and SRT. Finally he accepted radical resection. Tumor

extended in the skull base and his eye function was deteriorated. We performed left anterior and middle cranial base resection, removal of nasal and intradural tumors, high flow bypass, en bloc resection of left cavernous sinus and clivus, and reconstruction with an abdominal flap. Main tumors were removed with surrounding safety margins, but tumors around the right optic nerve was removed piece by piece to preserve his right eye function. 6 months after the radical resection, small recurrent tumors in the right orbital apex were treated by SRS. Mesenchymal chondrosarcoma should be radically removed as early as possible.

P-48 Epidermoid cyst of posterior cranial fossa: Our experience of 27 cases

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Between 2009 and 2015, 27 cases (8 recurrent ones) of posterior fossa epidermoid cysts were diagnosed preoperatively by CT and MRI. Most common symptoms in our series were headache, and trigeminal neuralgia was seen in 18 cases, auditory disturbance in 8 cases. The localization of the epidermoid was cerebellopontine angle in 23 cases, and extended supratentorial region in 4 cases. 25 cases were operated on via the retrosigmoid approach. Sixty percent of the tumors were completely removed. A higher total removal rate was achieved in primary surgical cases. Transient cranial nerve deficits occurred in 18.5%. The overall morbidity was 4.7%, one patient had a cerebral infarction and the other one resulted in permanent hearing loss. The role of initial surgery should aim for total resection without cranial nerve deficits but resection of recurrent epidermoid cysts could be very difficult due to adhesions and scarring, and unexpected worsened outcome maybe encountered. We emphasize that partial tumor resection would be more beneficial to the patient with recurrent tumor when visibility of the tumor is poor at surgery and when we want to avoid neurological dysfunction.

P-49 Treatment of ectopic sphenoid sinus pituitary adenoma (ESSPA) with normal pituitary gland: Two cases with a review of the literature

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Ectopic sphenoid sinus pituitary adenoma (ESSPA) are very rare disease entity and frequently misdiagnosed as other neuroendocrine or epithelial neoplasms which may develop in this site (olfactory neuroblastoma, neuroendocrine carcinoma, sinonasal undifferentiated carcinoma, paraganglioma). Two patients with ESSPA identified in patients with normal pituitary glands with intact dura of the sella turcica were retrospectively retrieved of the authors' institution and clinical records were reviewed. Both of the patients were intact homonal status. The tumors were centered within the sphenoid sinus and invaded the paranasal sinuses bone with a normal sella turcica dura. Curative surgery was done at both cases. In conclusion, ESSPAs are rare, affecting middle aged patients with non-specific symptoms, showing characteristic light microscopy and immunohistochemical features of their intrasellar counterparts. When encountering a tumor within the sphenoid sinus, ectopic pituitary adenoma must be considered, and pertinent imaging, clinical, and immunohistochemical evaluation undertaken to exclude tumors within the differential diagnosis.

P-50 Withdrawn

P-51 Chromosomal aberrations in chordoid meningioma – a study of 15 cases

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Background: Chordoid Meningiomas (CM), although categorized as grade II, behave more aggressively with an increased likelihood of recurrence similar to grade III tumors.

Material and Methods: Fifteen histopathologically confirmed cases of intracranial CMs were included in the study and had a median follow up of 28 months. Tumor tissues were subjected to immunohistochemistry for MIB-1, Vimentin, Glial Fibrillary Acidic Protein (GFAP) and Epithelial

Membrane Antigen (EMA). Fluorescent *in situ* hybridization was performed for all 4 loci.

Results: Recurrence during follow up was noted in 5 of the 15 cases. All 15 cases were positive for EMA, Vimentin and negative for GFAP and had a mean MIB-1 labeling index of 3.5%. All cases showed complete or partial deletion of 22q, 14q and 1p loci. Complete deletion of all 4 chromosomal loci was noted in 4/5 (80%) cases which subsequently recurred, while 9/10 (90%) non-recurrent cases showed either partial deletion or intact status.

Conclusions: This is the first study to evaluate combined chromosomal status of 22q, 18p, 14q and 1p in CMs and shows that there is a higher propensity of recurrence in cases with complete deletion in all four loci.

P-52 Management of invasive giant prolactinomas

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Object: Invasive Giant prolactinomas (IGPs) are rare and their treatment has not been clarified. The authors report the patients with IGPs treated with dopamine agonist.

Methods: Five patients of IGPs were treated with dopamine agonist in author's institute and we reviewed their data retrospectively. The criteria of the IGPs were 1) tumor diameter greater than 4cm and invading parasella space, 2) serum prolactin (PRL) level greater than 1000ng/ml. Four patients were treated bromocriptine initially and one patient treated medical treatment followed by partial tumor removal. All the patients showed decreased in size of tumor and lowered serum level of PRL. The tumor volume was markedly decreased in 3 patients, partially decreased in 2. Visual symptoms improved in all patients. Four patients had normal PRL level. During the bromocriptine therapy, CSF leak occurred in one patient who discontinued medication.

Conclusions: Dopamine agonist medications for IGPs reduced the tumor volume effectively and improved clinical symptoms. It should be used for the IGPs as a first-line therapy.

P-53 Hemangiopericytoma located on skull base

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Object: Intracranial hemangiopericytoma presents a high incidence of local recurrence and metastasis.

The purpose of this study was to evaluate the outcome and response to various treatment modalities after surgery for skull base hemangiopericytoma. **Methods:** Patients with hemangiopericytoma were identified from histopathological records since January 2000.

Results: Of the 22 patients, 8 patients had skull base hemangiopericytoma and 2 of them were lost during follow-up period. Of 6 patients, 4 were female. Median age was 39 year old (range, 30-66 year old) at first operation. The mean follow-up period was 70 months (range, 2-181 months). Two patients experienced gross total removal and no recurrence. One patient underwent near total removal and the tumor recurrence was controlled for 29 months after gamma knife surgery. Partial removal was achieved in 3 patients, and their tumors were controlled by gamma knife surgery or carbon ion radiotherapy. **Conclusion:** Our result showed relatively well controlled hemangiopericytoma located in skull base. Adjuvant radiotherapy may be effective in case gross total removal was not achieved or recurrence was recognized.

P-54 Development of vestibular schwannoma xenograft zebrafish model for in vivo anti-tumor drug screening

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Background: The aim of this study was to establish a rapid, simple, reproducible live zebrafish vestibular schwannoma xenograft model for anti-tumor drug screening.

Methods: We optimized the conditions for the tumor cell xenograft in terms of injected cell numbers, stage of larvae, incubation temperature and incubation time. We used NF2^{-/-} Schwann (SC4) cells. SC4 cells were stained with mCherry fluorescent protein and injected into the yolk sac. Injected embryos were transferred to E3 media and subsequent tumor formation was observed for 5 days. To test our new model, xenografted embryos were treated with RAD001, a known anti-tumor drug.

Results: SC4 cells were successfully grafted into the yolk sac without immunosuppressant treatment. 2 days after injection, xenografted cell formed tumor mass. Differences in injected cell numbers, incubation temperature and larvae stages were reflected in the speed of tumor formation. The preliminary using RAD001 produced >20%

reduction in the SC4 cell number in the yolk.

Conclusion: Our in vivo animal model system should greatly facilitate drug development for acoustic tumor therapy because of its speed, simplicity, reproducibility and live imaging.

P-55 Intracranial pressure monitoring in postoperative management of skull base tumors

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Objective: To explore the safety and efficacy of intracranial pressure monitoring in postoperative management of skull base tumors. **Methods:** Prospective study of intracranial pressure monitoring in postoperative management of skull base tumors between September 2012 to July 2013 in Skull base Unit, Department of Neurosurgery, Beijing Tiantan Hospital, Capital Medical University, China. A total of 20 cases of skull base tumors were enrolled, including petroclival meningioma in 11, parasellar region tumors in 3. **Result:** Fever was found in 3 cases, while there was no evidence of infection and no mortality. Dehydration agents was used in 3 cases according to ICP monitoring. Only 2 of 11 petroclival meningiomas cases received dehydration agents. One case developed high ICP postoperatively indicated prompt repeated CT scan that revealed a distant intracranial hematoma. Two cases of parasellar region tumors had normal ICP. **Conclusion:** It is safe for ICP monitoring after skull base and deep seated tumors resection which is informative for postoperative management, particular for indication for dehydration treatment.

P-56 Pituicytoma; A suspected recurrence of a rare tumour

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Object: Pituicytoma is a rare; primary tumor originating from the glial cells of the neurohypophysis. We present a case of a 71 male with a previous history of sellar meningioma who underwrote surgical resection of pituicytoma by transphenoidal hypophysectomy.

Method: We conducted a literature search using Key words pituitary gland, pituitary, neurohypophysis. Patient records and imaging were obtained from the hospital database.

Case History: A 71 year-old male, with a background of sellar meningioma 16 years previous, was found to have a pituitary fossa tumor on surveillance magnetic resonance imaging (MRI). Differential

diagnosis was pituitary adenoma. Endoscopic transphenoidal hypophysectomy was performed. Histology was consistent with pituicytoma. As a result of this histology from his initial tumor was re-examined and was amended to pituicytoma, indicating a recurrence.

Conclusion: Pituicytoma is a benign, slow growing lesion of the posterior pituitary. It can be mistaken for pituitary adenoma due to the similar clinical presentation. Complete excision of the tumor by transphenoidal hypophysectomy is an effective management as demonstrated in this case.

P-57 Radiological assessment of vestibular schwannoma size and volume

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Objective: To evaluate the inter-rater reliability (IRR), the concordance of volume assessments derived from axial versus coronal magnetic resonance slices, and the correlation between one-dimensional and volumetric measurements.

Methods: Scans of 20 vestibular schwannoma patients (8 sporadic, 12 NF2) were evaluated. Volumetric and one-dimensional measurements of tumor size (n=20) were performed by two independent investigators.

Results: Volume and one-dimensional size measurements showed excellent IRR with ICC=0.999 and ICC=0.950, respectively. There was no statistically significant difference between volumetric measurements derived from axial and coronal slides ($\rho=0.999$ for investigator one and $\rho=0.998$ for investigator two). Despite a strong overall correlation between one-dimensional and volumetric measurements ($\rho=0.922$), diameter measurements did not provide a reliable estimation of actual volume in tumors of irregular shape and multidirectional growth.

Conclusion: Volumetric tumor size assessment is the superior to one-dimensional methods for longitudinal follow-up in VS patients. It is safe to compare tumor volumes from data sets of varying orientation.

P-58 T gene isoform expression pattern in chordomas

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Object: To investigate the role of T gene isoforms in chordomas. **Method:** 22 skull base chordomas, three chordoma cell lines and 9 infant notochords, were collected. The IHC, Western Blot and qPCR

methods were firstly employed to detect the brachyury expression, then the droplet digital PCR (ddPCR) method was used to detect the quantity of the brachyury isoforms. Furthermore, the T gene SNPs site rs2305089, was sequenced in all of the chordoma samples. **Result:** The brachyury was positively expressed in most of the chordoma samples, mostly nuclear expression. The western blot and qPCR showed different isoforms were co-expressed in skull base chordomas. The brachyury isoforms were then categorized into two groups: isoform 1 (T-long) and 2 (T-short). The ddPCR revealed that T-long was dominantly expressed in all chordomas and chordoma cell lines, but not in the notochords. The T-long/T-short ratio was significantly different between the chordomas and the notochords. Association between rs2305089 and T-long/T-short ratio was not significant. **Conclusion:** The distinct expression patterns of these T gene isoforms may contribute to the pathogenesis of skull base chordomas.

P-59 Intracisternal cranial root accessory nerve schwannoma associated with recurrent laryngeal neuropathy

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Object: Intracisternal accessory nerve schwannomas are very rare; only 18 cases have been reported in the literature. In the majority of cases, the tumor origin was the spinal root of the accessory nerve.

Methods: Here, we report a unique case of an intracisternal schwannoma arising from the cranial root of the accessory nerve in a 58-year-old woman.

Results: The patient presented with the atypical symptom of hoarseness associated with recurrent laryngeal neuropathy which is noted by needle electromyography, and mild hypesthesia on the left side of her body. The tumor was completely removed with sacrifice of the originating nerve rootlet, but no additional neurological deficits. In this report, we describe the anatomical basis for the patient's unusual clinical symptoms and discuss the feasibility and safety of sacrificing the cranial rootlet of the accessory nerve in an effort to achieve total tumor resection.

Conclusion: To our knowledge, this is the first case of schwannoma originating from the cranial root of the accessory nerve that has been associated with the symptoms of recurrent laryngeal neuropathy.

P-60 Post traumatic stress disorder and pituitary surgery: Preliminary results

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Object: Pituitary surgery could represent a stressful situation. We try to determine whether postoperative psychological disturbances similar to those of Post Traumatic Stress Disorder (PTSD) occur and try to identify risk factors. **Method:** Between 2014 and 2015, 81 endoscopic pituitary surgeries were performed. A follow-up assessment by auto-questionnaire was conducted after surgery with PTSD Checklist Scale (PCL-S). Patient characteristics and post operative courses were studied. **Results:** 20 women and 27 men gave a written informed consent and were evaluated. Median PCL-S score was 23.5 (+/- 9). 5 patients (10%) presented PTSD with a PCL-S score ≥44. No common characteristics could be highlighted in those 3 men and 2 women: 3 endocrine-active adenomas and 2 macroadenomas with visual impairment. Among the 47 patients, 6 presented post operative morbidities (CSF leaks requiring reoperation, acute heart failure, diabetes insipidus) and 3 were in the group PTSD. **Conclusions:** Endoscopic pituitary surgery seems to be associated with a low risk of PTSD. The main risk factor might be postoperative morbidity requiring a reoperation.

P-61 Foramen magnum meningioma presenting as contralateral hemifacial spasm

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We provide the first report of hemifacial spasm caused by a contralateral foramen magnum meningioma that improved following tumor removal. An 80-year-old woman presented with hemifacial spasm caused by a contralateral foramen magnum meningioma. She presented with a 3-year history of gradual worsening of right-sided hemifacial spasm. Magnetic resonance imaging showed a tumor occupying the left ventrolateral portion of the foramen magnum. The loop of the right anterior inferior cerebellar artery (AICA) extended into the right pontomedullary junction, compressing the root exit zone (REZ) of the right

facial nerve. After tumor removal without attempt of confirmation of vascular compression of the right facial nerve REZ, facial spasm gradually decreased and eventually almost disappeared. Postoperative MRI revealed that the loop of AICA had shifted away from the right facial nerve REZ. Dorsal shift of the AICA loop toward the facial nerve REZ along with dorsal shift of the vertebral and basilar arteries due to the huge contralateral mass located in the ventrolateral portion of the foramen magnum was thus suggested to represent the main cause of facial spasm.

P-62 Comparison of click and CE-chirp-evoked ABR as screening tool in vestibular schwannoma

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Object: Considering features of vestibular schwannoma such as low prevalence, benign, and slow progression, cost effective screening is required in outpatient settings. Click-evoked ABR has been used in screening but has limitations. Chirp stimulus provides enhanced neural synchronicity and faster detection of larger amplitude of wave V. The aim of study is to identify whether CE-Chirp ABR test has benefits than click stimulus in screening.

Methods: 20 patients with vestibular schwannoma confirmed by the MRI scan were enrolled. The click and CE-Chirp ABR were both recorded. I-V interpeak latency, I-V interlatency difference, absolute wave V latency, morphology of wave, tumor size and audiometry were evaluated.

Result: In small tumor, CE-Chirp ABR was useful to detect larger wave V amplitude over Click. However there was no significant difference between Chirp and Click in I-V interpeak latency and I-V interlatency difference.

Conclusion: As CE-Chirp ABR showed clearer information of wave V with shorter measurement time in small tumor. It suggests Chirp ABR as a possible substitute for click stimulus in screening and also as an effective intraoperative monitoring tool.

P-63 A case of presigmoid retrolabyrinthine approach to vestibular schwannoma by use of continuous direct neurophysiological monitoring of facial nerve and cochlear nerve

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Intraoperative monitoring of the facial nerve and the cochlear nerve is essential to achieve preservation of function after surgery to vestibular schwannomas. Recently two novel monitoring methods have been reported to improve preservation of function: continuous direct auditory evoked dorsal cochlear nucleus action potential (AEDNAP) monitoring and facial nerve root exit zone-elicited compound muscle action potential (FREMAP) monitoring (Nakatomi and Miyazaki, et al. 2015). A presigmoid retrolabyrinthine approach is considered to have the advantages of the two major approaches, the retrosigmoid suboccipital and presigmoid translabyrinthine approaches, as a minimally invasive surgical option to vestibular schwannomas, allowing direct access to the cerebellopontine angle and preservation of hearing function (Iacoangeli et al. 2013). Here, we report a case of presigmoid retrolabyrinthine approach to medium vestibular schwannoma by use of continuous monitoring of the facial nerve and the cochlear nerve, as a novel surgical method to achieve a minimally invasive surgery with preservation of function.

P-64 Postoperative headache after retrosigmoid approach for acoustic neuroma

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Objective: To estimate the duration of postoperative headache (*PH*) after surgery for acoustic neuroma (*AN*).

Methods: This study analyzed clinical data from 100 unilateral *AN* patients (*PTS*) undergone the retrosigmoid approach over one year previously. We investigated whether *PTS* had headache (*H*) at hospital discharge during attendance at outpatient clinics. We classified *PH* as grades 1 [None], 2 [Tolerable *H* without medication (*M*)], or 3 [*H* requiring *M*]. The period of *H* was defined as the number of days that elapsed between the date of

surgery and the date when a patient (*PT*) initially developed a grade 1 *H*. The period of *M* for *H* was defined as the number of elapsed days between the date of surgery and the date when a *PT* initially developed a grade 1 or 2 *H*. **Results:** Kaplan-Meier analysis revealed that the median durations of *M* and *H* were 81 and 669 days, respectively. *H* was cured significantly earlier in *PTS* whose surgery involved a C-type skin incision. *H* tended to be cured earlier among *PTS* who underwent a longer surgical procedure. Multivariate analysis confirmed that surgical duration and type of skin incision were independent factors involved in the duration of *PH*.

P-65 The usefulness of diffusion tensor imaging tractography for preoperative identification of facial nerve in vestibular schwannoma surgery

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Introduction: Preservation of facial nerve(FN) function in vestibular schwannoma(VS) surgery is important to patients because of facial nerve palsy is a common complication. The pre-operative visualize the course of FN in relation to VS could help preventing injury.

Materials and Methods: We prospectively studied 19 patients with VS from July 2011 to Dec 2015. Four patients were Koos grade II, and six were grade III, other nine cases were grade IV. All patients performed preoperative DTI for facial nerve.

Results: FN course on preoperative DTI were correlated with intraoperative findings in 89%(17/19 patients). FN was located on the anterior of the tumor in 5 cases, on anteroinferior surface in 7, anterosuperior surface in 5, posterosuperior surface in 1 and posteroinferior surface in 1. Seventeen of nineteen preserved the FN but in two cases. In postoperative facial nerve DTI, preservation of FN were confirmed in all cases. Immediate postoperative facial nerve palsy were grade III in six cases, grade IV in six. Facial nerve function recovered to grade II after 1year.

Conclusion: DTI for preoperative identification FN in VS surgery is very useful in order to preserve FN.

P-66 Gene expression, transduction pathways and functional networks associated with vestibular schwannoma growth

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Objective: To determine gene expression, signal transduction pathways and functional molecular networks associated with vestibular schwannoma (VS) growth rate.

Material and methods: Repeated MRI prior to surgery determined tumor growth rate. mRNA was extracted from 16 sporadic VS. Gene expression was determined by cDNA microarrays (Affymetrix HG-U133A). Differential gene expression between fast and slow growing was determined and matched against established gene ontology. Ingenuity Pathway Analysis identified transduction pathways and molecular networks associated with tumor growth.

Results: 109 genes were deregulated in relation to tumor growth rate, including genes associated with apoptosis, growth and cell proliferation. Fourteen pathways and five functional molecular networks were associated with tumor growth.

Conclusion: Several genes, signal transduction pathways and functional networks are associated with tumor growth. Specific genes involved in apoptosis, cell growth and proliferation were deregulated in fast growing tumors. Fourteen pathways were associated with tumor growth. Generated functional networks underlined the importance of the PI3K family, among others.

P-67 Withdrawn

P-68 Management of facial nerve schwannoma for recurrent facial palsy: A case report and review of the literature

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Facial schwannomas are rare lesions, and reported series are generally small. There is no standard

management of surgery for its complexity of management. To certain extend, Gd-MRI could detect small size tumor. However, careful examinations are needed for precise differential diagnosis in cases of recurrent facial palsy. We report a 41-year-old female case of sudden onset of right facial palsy (House-Brackmann Scale: VI) on 2008 and was diagnosed of intractable Bell Palsy. Facial palsy symptom was subsided after decompression surgery (HB Scale: D). However, it recurred on 2010, 2011, 2014 and 2017 (HB Scale: IV) respectively despite of medication treatment. Facial nerve schwannoma was found by Gd-MRI scan. Middle fossa approach for total removal of facial schwannoma and reconstruction with end-to-side neurotaphy of hypoglossal-facial nerve was performed. Facial function recovery improved gradually with no sign of synkinesis and facial contraction. Since end-to-side nerve grafts show good functional recovery and minor aftereffects, we suggest that end-to-side neurotaphy may be a good option in facial nerve reconstruction in the management of removal facial schwannoma.

P-69 Long-term facial function after facial nerve repair using a VII-XII anastomosis after vestibular schwannoma removal

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The aim of this study is to analyze the recovery of long-term facial function who underwent hypoglossal-facial nerve anastomosis following vestibular schwannoma surgery.

Method: This study included 14 patients with vestibular schwannomas removal. During surgery, the facial nerve was interrupted in and facial reanimation using hypoglossal-facial (VII-XII) anastomosis was performed.

Facial nerve function and tongue atrophy were analyzed upon an average follow-up period of 1.2 years.

Result: 9 patients whose facial nerve had been resected and immediately reconstructed showed better facial nerve recovery than 5 patients who had the interval between tumor resection and reconstruction.

The split XII-VII anastomosis group (n=4) exhibited a marked improvement in their facial function and reduced hemiglossal atrophy compared to end-to-end VII-XII anastomosis group (n=7) which showed marked tongue atrophy. End-to-side VII-XII anastomosis group (n=3) showed poorer facial recovery but no tongue atrophy.

Conclusion: Immediate split hypoglossal-facial nerve anastomosis results in good facial reanimation and recommended in case of iatrogenic

injury during vestibular schwannoma removal.

P-70 Surgical management of trigeminal schwannomas

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Objective: The aim of this study is to better understand the surgical approaches and the prognosis of trigeminal schwannomas (TNs).

Methods: We analyzed the clinical and radiological presentation, tumor characteristics, surgical approaches, and the prognosis of TN.

Results: This study included 83 operations in 77 patients. Tumors were located in the middle fossa in 17, in the posterior fossa in 14, in the extra cranial space in 5, in the middle and posterior fossa in 30, in the middle and extracranial space in 9, and in the middle, posterior, and extracranial space in 4. The most common symptom was facial hypesthesia in 32 patients (41.5%). Since 1990, we have applied three main types of middle fossa skull base approaches including the anterior transpetrosal approach, subtemporal interdural approach (Dolenc), or a combination of these approaches. Total and nearly total tumor resection was achieved in 91.3 % of patients (65/71) after 1990. No surgery-related mortalities occurred in this series. Recurrence was identified in 2 patients.

Conclusion: Appropriate selection of surgical approach according to tumor types is highly important and necessary for good surgical outcome.

P-71 Anatomical constraints of auditory brainstem implants (ABI)

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Objective: Compared to cochlear implants, ABI fail to produce consistent clinical results comparable to the CI.

We have attempted to determine histoanatomical constraints by systematic investigation of the cochlear nuclei in human brainstem specimens.

Methods: 20 variables were analysed in 792 histomorphometric slices with a thickness of 8µm from 33 human cochlear nuclei. All measurements were corrected by factors of 1.13 (12%) for transverse and 1.21 (17%) for longitudinal shrinkage. Three-dimensional renderings of the cochlear nucleus complex have been obtained from a true-to-scale model on basis of the measurements.

Results: Slanted into the depth of the brainstem above the facial nerve entrance its rostral boundary is located more than 7mm off the surface

of the brainstem on average. Maximum extensions of the whole cochlear nucleus complex were 8.01x1.53x3.76 mm. Univariate ANOVA revealed no significant side differences.

Conclusions: To gain tonotopic access to the primary afferents of the anatomically complex human cochlear nucleus with surface and depth ABI electrodes remains a major interdisciplinary challenge even in patients who did not undergo previous surgery.

P-72 Communicating hydrocephalus associated with small to medium sized vestibular schwannomas: Clinical significance of the tumor ADC map

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Object: The postoperative temporal change of the hydrocephalus associated with the small to medium sized vestibular schwannoma was studied and tumor-specific factors related to the association of the hydrocephalus was investigated.

Methods: Among the 77 patients with the vestibular schwannoma smaller than 30 mm, 9 patients were associated with the communicating hydrocephalus. The medical records, CT and MRI images, histopathological specimens were retrospectively reviewed and compared with those of patients with the same sized tumor without hydrocephalus.

Results: The symptoms related to the hydrocephalus improved in all patients after tumor removal. The mean size and ADC value of the tumors demonstrated statistically significant difference between the patients with and without the hydrocephalus.

Conclusion: In most of the cases, the hydrocephalus caused by the mechanisms other than the cerebrospinal fluid flow obstruction can be treated by only removing the tumor. The size and ADC value of the tumor were significantly related to the association of the hydrocephalus. The latter may also serve as an indicator for the intractability of the hydrocephalus after tumor removal.

P-73 頭蓋咽頭腫に対する治療戦略—長期追跡と年代別分類に基づく考察

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頭蓋咽頭腫の手術では内分泌機能温存と根治切除とがしばしば相反する目的となる。そこで1991-2016年まで69症例83手術を年代別分類し検討した結果を示しその治療戦略と手術法を論じる。1) 年代別分類: I群(1991-1999): 視床下部・下垂体柄を温存することを優先目標として且つ全摘を目指した20例、II群(2000-2008): I群とIII群の移行期25例、III群(2009-2016): 視床下部を穿孔land/or下垂体柄を切除してでも全摘を優先目標とした24例。2) 追跡期間は1-25年、平均12年における再発率はI群7/20(35%)、II群2/25(8%)、III群1/24(4%)と後年程再発率は低下。うち5例はGKS後の再発である。3) 視床下部・下垂体柄機能を温存しホルモン補充療法の必要なく全摘でき再発のないものをIdeal total resection(ITR)と定義するとその達成率はI群3/20(15%)、II群5/25(20%)、III群3/24(13%)となり手術侵襲に寄らずほぼ一定の比率である。4) 手術所見と動画から発生部位を確認し得たIII群で腫瘍発生部位を5型に分類した結果、ITRを達成する可能性はDistal typeが一番高いと判明した。5) 以上の分析から腫瘍発生部位を確実に観察してITRを達成できる可能性の高い手術法として経大脳半球間裂法と経側頭葉経脈絡裂法を紹介する。

P-74 Ear pain after gamma knife radiosurgery for acoustic tumor

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Object: After gamma knife radiosurgery (GKS) for acoustic tumor, patients may experience pain around the external auditory canal or mastoid process. We investigated this ear pain and possible mechanisms. **Methods:** We analyzed 143 patients with unilateral acoustic tumor who underwent GKS and were followed regularly at least once every 6 months. Ear pain was investigated focusing on its clinical features and relationship with tumor volume changes. **Results:** Forty-seven cases experienced new (n=34) or worsening (n=13) ear pain; external auditory canal in 33, mastoid process in 14 and ear lobe in 8. Degree of pain was classified by the Wong-Baker's face scale: 1 in 4, 2 in 17, 3 in 22, 4 in 3 and 5 in 1. New or worsening ear pain was observed in accordance with transient tumor expansion in 36. **Conclusion:** New or worsening ear pain was observed in about one-

third of patients after GKS for acoustic tumor. There was a strong correlation with transient tumor expansion, suggesting that the ear pain might be attributed to compression of the sensory facial nerve innervating the area around the ear, as with Hitzelberger's sign.

P-75 再発を認めた petrotentorial meningioma の一例

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41歳女性。平成19年の痙攣発作を初発症状とし、頭部画像診断にて左小脳テント周囲に腫瘍性病変を指摘された。前医で同年に2期的に腫瘍摘出術を施行。病変は、左 petrotentorial lesion を attachment とする transitional type meningioma (MIB-1は1%未満)であった。術後、右上1/4盲と軽度の左側難聴を認めた。残存腫瘍に対して経過観察を行っていた。平成25年、頭部MRI上残存腫瘍の増大所見を認めた。手術目的で平成27年8月、術前塞栓術施行の後、lateral suboccipital approachにより摘出術を施行。脳幹に接している部位は内減圧にとどめた。残存腫瘍に対して同年11月、Lt. subtemporal approachにより摘出術を施行。病理診断の結果はtransitional type meningioma (Ki-67 LI4-5%)であった。最終的な当院退院時のKPSは90であり、残存腫瘍に対してはMRIにて経過観察を行い、γナイフを施行予定である。petrotentorial meningioma に対しては、その腫瘍の進展の状況により、様々な手術approachを組み合わせて手術摘出を施行することになるが、本症例の場合、後頭蓋窩、中頭蓋窩に進展していた腫瘍部分をそれぞれ異なった手術approachで摘出を行い、過去の手術施行で生じたdefectを手術approach routeとして用いることで、手術侵襲を最小限に抑えることが可能であった。再発を認めた petrotentorial meningioma の一例に対して、異なった手術approachで摘出を行った症例を経験した。

P-76 Genomic landscape of pituitary adenomas

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Object: We genetically profiled 42 pituitary macroadenomas to better understand their biologic underpinnings. **Methods:** Whole-exome sequencing was performed to identify somatic copy-number alterations and mutations. **Results:** Pituitary tumors stratified into two classes based upon the

fraction of their genome disrupted: one with rare copy-number alterations and the other with significant disruption of up to 99% of the genome. Levels of genomic disruption were associated with phenotype. Among the less disrupted group, 87% were clinically non-functional adenomas, whereas the majority of the disrupted group were functional or atypical null-cell adenomas. The high and low genomic disruption classes did not differ in mean MIB-1 proliferative index. Frequent loss of chromosomes 11 and 1p were observed. On the whole, adenomas harbored a low rate of mutations. **Conclusions:** Genomic characterization of a large series of sporadic pituitary adenomas reveals two distinct classes of tumor, based on genomic disruption from broad copy-number alterations, and associates with tumor subtype.

P-77 An aggressive hemangioblastomatosis in a 58-year-old woman without VHL gene mutation

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Hemangioblastoma of the central nervous system commonly arise as sporadic lesions or less frequently as a manifestation of von Hippel-Lindau syndrome. Disseminated form non-VHL hemangioblastoma, is an extremely unusual. It has been reported to have very poor prognosis. Most reported patients developed hemangioblastomatosis following resection of the tumor several months or years later.

A 58-year-old woman with a non-VHL hemangioblastoma of brain stem underwent suboccipital craniotomy and gross total resection of the tumor was done 3 years previously. She presented with disseminated leptomeningeal and spinal hemangioblastomatosis with rapidly deteriorating neurological deficits including paraparesis, diplopia, dysphagia and papilledema eventually to become quadriplegic and comatose mentality during 10 months's follow up period of ten months. Bevacizumab (Avastin) was tried three cycles in two weeks interval resulting in mild symptomatic improvement.

Here we report a rare case of hemangioblastomatosis in a VHL gene negative woman with modest effect of bevacizumab.

P-78 Microsurgical treatment of brainstem cavernous malformation : Report of 30 cases

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Objective: To evaluate the microsurgical indication and techniques, the surgical approach for brainstem cavernous malformation.

Methods: A retrospective analysis of clinical data included 30 cases with brainstem cavernous malformation from 2008 to 2015. According to the site of the lesions, surgical approaches were selected following the principle of "the shortest distance between the incision and the lesion". The lesions were removed by the guide of neuroelectrophysiology monitoring and neuronavigation.

Results: Of the 30 cases of BCMs, total resection and subtotal resection was achieved in 28 and 2 cases, respectively. Neurological deficits were improved in 19 patients after operation, no obvious improvement in 5 cases, and became worse in 6 cases at the discharge. There was no recurrence and bleeding occurred in which the lesion was totally resected and no operative mortality.

Conclusion: The correct candidates and individual microsurgical approach, Intra-operative neuroelectrophysiological monitoring are the important prerequisite for BCM. Satisfactory clinical effect of microsurgery for BCMs can be obtained by minimal invasive techniques and careful operative planning.

P-79 Hearing restoration of adults with vestibular schwannoma in the only-hearing ear

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Objective: To explore auditory outcome of cochlear implantation(CI) performed in patients with vestibular schwannoma(VS) in the only-hearing ear.

Methods: A retrospective analysis of three cases is performed. All patients had a long history of hearing loss on one side and a newly-presented hearing loss due to VS on the other side, who received ipsilateral, contralateral or bilateral CI.

Imaging and audiological tests were completed before operation. Hearing outcomes were measured by pure tone audiogram(PTA) and open set speech discrimination score(SDS). Mean follow-up time was 18 months.

Results: None of the patients had a remarkable improvement in SDS, whether got unilateral or bilateral CI. However, PTA showed positive results in all of the cases, which conferred an awareness of environmental sounds. The patient with bilateral CI showed better performance on the open set SDS compared to the other two patients with unilateral CI, especially in noise.

Conclusions: CI meets the goals of lower PTA, improved lip reading and perception of environmental sounds. However, SDS is not significantly improved after CI. Bilateral CI is more beneficial than unilateral CI on either side.

P-80 Feasibility of non-thermal atmospheric pressure plasma as adjuvant treatment modality for acoustic tumor

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Objective: Vestibular schwannoma, usually benign but because of its close location to brain stem and nerve complex, complete resection of tumor may cause permanent complication. But subtotal resection can cause recurrence. Minimizing remnant tumor after subtotal removal may have a positive impact on the patient's wellbeing. Here, None thermal Atmospheric Pressure Plasma (NTAPP) is known to induce apoptosis in tumor cells through production of ROS.

Method: We investigated the apoptotic effect of NTAPP in vitro using a NF2 -schwannoma cells. The cells were incubated for up to 72hrs after NTAPP treatment. MTT assay, protein expression, Annexin V and 7-ADD double staining. We also analyzed the impact of NTAPP to normal tissue.

Result: SC4 cells treated with NTAPP for 5 min; western blot analysis showed that pro-apoptotic protein PARP and Caspase-3 were activated in these cells, as well as an increase in p-p53 activation. FACS analysis revealed apoptosis as the major cause of cell death rather than necrosis.

Conclusion: The results of this experiment suggest that NTAPP treatment can be effectively used as adjuvant modality to eliminate remnant tumor without damage to adjacent organ.

P-81 Dual near-field intra-operative BAEP monitoring

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Objective: To design and test near-field electrodes to monitor the functional integrity of the lower auditory pathway during surgery in the cerebello-pontine angle (CPA).

Method: Stainless-steel, ball-shaped electrodes to attach a) to the tympanic membrane (ECoG), and b) to the the cochlear nucleus were developed in cooperation with *inomed* (Emmendingen, Germany). Dual near-field recording (DNF) with both electrodes in place was applied in a series of 523 patients with lesions in the CPA and internal auditory canal during microsurgery.

Results: Waves I and II of the BAEP were best identified in recordings at the tympanic membrane, wave III to V were largest in recordings at the brainstem or with electrodes places on the cochlear nerve. Compared to far-field recordings, amplitudes were 3 - 4 times larger for ECoG, and 2 - 20 times larger for CABR in patients with functional hearing.

Conclusions: Near-field recording of electrophysiological responses to auditory stimuli is the current gold standard in surgery for lesions in the cerebellopontine angle. DNF adds safety and shortens feedback time to the surgeon, especially with video microscope injection of waveforms.

P-82 Changing intracranial venous drainage patterns in petroclival meningioma

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Object: Knowledge of venous drainage patterns is important to avoid damage to the venous drainage route.

Methods: Venous drainage patterns were assessed using 3D-CTV in 22 primary-operated petroclival meningioma cases (PCMs) and 40 control cases.

Results: The proportion of hemispheres with complete and medial SPS drainage patterns was lower in PCMs. With regard to the superficial middle cerebral vein (SMCV) drainage pattern, the proportion of hemispheres with the cavernous sinus (CS) captured type was decreased and that of the emissary type was increased in PCMs. The proportion of hemispheres multiple greater anastomosis of the SMCV was higher in PCMs without the emissary type and CS capture type patterns. When the venous drainage route of the CS capture type and/or emissary type was

disturbed, in particular, greater anastomosis via the vein of Labbè and Trolard is needed to control venous drainage flow.

Conclusion: In cases of venous drainage impairment by PCM progression, the drainage route changed to the pterygoid plexus route thorough the emissary foramen and/or superior sagittal sinus and transvers sinus route through the greater anastomosis of the SMCV.

P-83 Intraoperative MRI in skull base surgery: A review of 71 consecutive cases

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Object: To provide our experience with intraop MRI (iMRI) for skull base surgery. **Methods:** Patient records were reviewed for all iMRI cases at our hospital between April 2014 and July 2015. **Results:** Over 16 months, the iMRI suite was utilized for 71 skull base tumors. An iMRI scan was performed in 23. Additional tumor resection was pursued after iMRI scan in 7. Mean "scan time" was 40 minutes. Mean procedure length was significantly increased in the scanned group. Non-neurologic complications were significantly higher in the scanned group, particularly for tumors > 3cm. **Conclusion:** Despite the challenges posed by operating on skull base tumors, iMRI can be safely obtained while adding a modest amount of time to the procedure. The major challenge in using the iMRI derives from the shift in surgical decision-making in a manner that de-emphasizes the surgeon's intraoperative impression of "maximum safe resection" in favor of the MRI result. The evidence of residual tumor with a patient still in position to have additional resection may influence the surgeon to alter the surgical plan and attempt further resection in a critical area.

P-84 Microarray analysis revealed variations in meningioma copy number profiles

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Meningiomas are generally thought to progress from low to high grade lesions. However, the molecular mechanisms underlying their pathogenesis is still unclear. We suppose the existence of a correlation between the parameters that will help to predict more precisely their biological behavior. Total DNA was purified from FFPE samples (30 patients and 5 healthy dura maters) followed by QIAmp DNA FFPE Tissue Kit (Qiagen). Microarray analysis was performed using the OncoScan FFPE Assay Kit (Affymetrix), raw data were obtained using Chromosome Analysis Suite (Affymetrix). Our results confirm that del(22q) and del(1p) are the most common (44% and 24% of cases, respectively) deletions in meningiomas. Del(22q) was present in 75% grade 2 meningiomas cases in contrast to 25% in grade 1. Additionally, monosomy of chromosome 6 (12%), 8 (8%), 14 (20%) and 18 (12%) were observed. Surprisingly, chromosomal gains and LOH were found only in small portion of cases (8%). Finally, mutation in TP53 (c.817C>T/A, c.637C>T) and PIK3CA (c.3140A>G) genes were found in 12% of cases.

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P-85 A combined far lateral sublabrynthine-transpetrosal transcervical approach to the jugular foramen, anterior brainstem, and clivus

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Object: Surgical exposure of lesions of the jugular

foramen is particularly difficult when they present with extensive intra- and extracranial extensions. We describe a modified approach to this region that combines a presigmoid sublabrynthine approach with far lateral transcondylar exposure.

Methods: A combined far lateral sublabrynthine-transpetrosal transcervical (cFLS-TT) approach was performed on 10 cadaveric heads. An upper cervical dissection was performed to expose the jugular vein and surrounding structures up to the skull base. A presigmoid mastoidectomy was performed to expose the presigmoid posterior fossa while preserving the labyrinth and a far lateral suboccipital craniotomy was fashioned with partial extradural resection of the occipital condyle and a C1 hemilaminectomy.

Results: The cFLS-TT approach provides excellent exposure of the jugular foramen and its contents. Extradural resection of the occipital condyle improves exposure of the ventral craniovertebral junction.

Conclusion: The cFLS-TT route is a useful alternative that preserves CN VII-VIII function and enables adequate exposure of the anterior brain stem and jugular foramen without additional deficits.

P-86 Surgical treatment of skull base tumors invading the craniovertebral junction

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Objective: Optimization of surgical treatment of skull base tumors, invading the craniovertebral junction (CVJ).

Methods: The study group (SG) included 29 patients with skull base and CVJ chordomas (initial instability-13), who underwent a simultaneous operation – occipitospondylodesis (OSD) and tumor removal (transoral and combined transoral and transnasal approach). The control group (CG) included 21 patients with chordomas (operation without OSD).

Results: In the SG: total removal-27,5%, subtotal-65,5%, partial-7%. In the CG: total removal-0%, subtotal-19%, partial-81%. Clinical signs changes in early postoperative period in SG: improvement-72,4%, no changes-20,7%, impairment-6,9%. In CG: improvement-52,4%, no changes-38,1%, impairment-9,5%. 3-years survival increased from 38%(CG) to 78.6% (SG). 5-years survival increased from 23.8% (CG) to 78.6% (SG).

Conclusion: Using of novel surgical technologies (simultaneous operation OSD (1st step) and tumor removal (2nd step) in surgery of skull base and CVJ

tumors, causing CVJ instability (initial or postoperative) helps to increase radicalism, to speed up the rehabilitation and to improve life quality of patients.

P-87 Minimally invasive approach for anterior skull base lesions

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Objective: The priority in contemporary surgery is to achieve the greatest therapeutic effect while causing the least iatrogenic injury. The evolution of microsurgical techniques enable neurosurgeons to treat different lesions through limited and specific keyhole approaches. The introduction of the endoscope in neurosurgical procedures has brought a further new dimension into the field of intraoperative visualization.

Methods: In 20 years between 1994-2014 a 1205 endoscopic assisted microsurgical procedures was performed including:

Aneurysms 633

Meningiomas 212

Craniopharyngiomas 87

Pituitary adenomas 93

Arachnoid cyst 50

Epidermoid/Dermoid cysts 43

Astrocytomas 69

Results: The postoperative complications associated with the approach were:

permanent partial supraorbital hypesthesia 23 patients

Palsy of frontal branch of facial nerve 21 Pt.

permanent hyposmia 24 patients

wound healing disturbances 7 Pt.

CSF collection&leak 13 Pt .

Conclusion: The supraorbital craniotomy allows a wide exposure for deep seated intracranial areas, it offers equal surgical possibilities with less approach-related morbidity.

P-88 Surgical management of intraventricular meningioma; 22 years experience

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Intraventricular meningioma is rare tumor, only 2% of intracranial meningiomas in adults and about 10% in children.

Located mostly in trigone of the lateral ventricle with left Side preponderance 60%.

There is many surgical approaches for management of these tumors including: transcallosal parietooccipital , transcortical

superior parietal, transcortical middle temporal and transcortical inferior temporal approaches.

Methods: In the period between 1991 and 2013 we operated 43 patients with intraventricular meningioma

27 females, 16 males. Age ranged from 9 to 76 years.

Size ranged from 2.5 to 7 cm, 38 located in lateral ventricle, 3 in III ventricle and 2 in IV ventricle.

Most patients presented with headache followed by signs of increased ICP, visual defects and hemiparesis.

Results: Total excision 97%

No recurrence

No mortality

Karnosky score worse postoperatively in 2 patients

Improvement of preop. Symptoms occur in 80%

In 15% of patients there was no improvement.

Conclusion: Surgery is the best management when indicated.

Judicious preoperative plan, adequate knowledge of anatomy, and use of correct microsurgical techniques are fundamental in achieving complete resection with low morbidity.

P-89 Retrospective analysis of recurrence rate in primary intracranial atypical meningiomas

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Introduction: Current guidelines for the treatment of atypical meningiomas recommend radiotherapy following tumor resection to prevent tumor recurrence. The indication for radiotherapy is however still controversial as this treatment may be associated with significant side effects and may induce malignant progression or secondary malignancy

Methods: retrospective analysis of intracranial meningiomas, treated in our department from 2003 to 2014. 102 patients with atypical meningioma, 52 matched our criteria.

Results: 45 patients (86.5%), Simpson Grade I and II tumor removal could be achieved. 17 patients (31%) received postoperative radiotherapy and 13 patients (24%) were diagnosed with tumor recurrence. There was a disproportionally larger rate of tumor recurrence in patients after radiotherapy in comparison to conservative observational treatment, 41.2% and 17.1%, respectively

Conclusions: We observed a trend to higher recurrence rate in atypical meningiomas after radiation vs. observational clinical and imaging follow-up in primary intracranial atypical

meningiomas. The indication for radiation at least for completely resected atypical meningiomas should be considered carefully.

P-90 One-stage removal of sphenoorbital, convexity and ventricular meningiomas in NF2

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Objective: We present NF2 patient with sphenoorbital meningioma, which was removed together with multiple convexity and ventricular meningiomas.

Patient: A 30-year-old female patient was suffered from progressive left sphenoorbital and ventricular meningiomas. She had undergone radiosurgeries for trigeminal and left vestibular schwannomas, and resection of right vestibular schwannoma.

Methods: In a lateral position, her head was fixed in a Sugita frame. Through a large frontotemporal craniotomy and orbitozygomatic osteotomy, invasive sphenoorbital meningioma and convexity meningiomas were removed. After rotating the frame, ventricular meningioma was removed via a high-parietal approach.

Results and Conclusion: Postoperative course was uneventful. For NF2 patients, we recommend surgical resection of vestibular or spinal schwannomas and meningiomas when these tumors become symptomatic or grow apparently on MRI. Since multiple surgical procedures are required in NF2 patients, it is ideal to remove many tumors in one surgery. In this patient, it was possible to remove two symptomatic and other tumors through orbitozygomatic and high-parietal approaches using rotation of the Sugita frame.

P-91 Chondromas of the skull base: Clinical presentation, surgical technique, and outcome in 3 cases

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Objective: Chondromas of the skull base are very rare tumors arising from cartilage rests of synchondroses of the skull. The clinical presentation, surgical technique, and follow-up of 3 cases are described.

Methods: Between 2010 and 2014, 3 patients (2 female/1 male) were treated. A 35 year old female

presented with massive headaches. A 19 year old female presented with headaches and abducens palsy. In a 55 year old male, a unilateral tongue atrophy was found incidentally.

Results: Subtotal The osteoresection was achieved in 2/3 cases and totally removal in one case. There were no remnant progression during the 54 and 40 months follow up.

standard pterional approach was used in 2/3 cases and an extreme lateral, infralabyrinthine, transcondylar approach in the third case. No new cranial nerve or functional deficit, CSF leak or infection was encountered in neither patient.

Conclusions: According to the location, the neurologic symptoms are variable. In the cavernous sinus chondroma, the abducens palsy resolved completely, indicating that prompt surgery may be considered. A wait and scan policy should be restricted to asymptomatic patients.

P-92 Foramen magnum meningiomas: A modern series of 14 consecutive patients

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Objective: We present our experience in managing foramen magnum meningiomas (FMM) and discuss various surgical approaches and outcome.

Methods: We reviewed 14 consecutive cases of FMM operated between October 2006 and December 2013.

Results: There were 11 female and 3 male patients (mean age: 62.5 years).

Gait disturbances were the most common cause of presentation and was present in 65% of cases. Lateral and midline approaches were performed in 10 and 4 cases, respectively. Total resection was achieved in 85% of cases. With a mean follow up of 36 Months no recurrence or remnant growth was seen. Main complications were transient lower cranial nerve deficits in 5 cases (35%), cerebrospinal fluid fistula and lung embolism in one case (7%) each.

Conclusions: FM meningiomas can be safely resected with excellent oncological and clinical outcome either with a posterior midline suboccipital or far-lateral approaches with minimal condylar drilling.

P-93 Microsurgical Techniqueの伝承

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[目的]われわれは過去20年以上原則的に脳へらを使用せず、助手が両手を術野に出す方法で顕微鏡手術を行ってきた(2&4)。2人とも4つの手を術野から離したくない時は手洗いナースが専用HDモニターを見ながら器具や綿片を術野に入れるよう指導している(3&5)。動脈瘤、腫瘍等ほとんど全ての手術で行うが特に頭蓋底手術で有用である。[方法]頭蓋底髄膜種、聴神経腫瘍、頭蓋咽頭腫のみならず動脈瘤、神経血管減圧術などの症例を提示して本法のセットアップや操作の実際を供覧する。[結語、結論]1.脳へらを長時間同部位に使用しないため、脳挫傷などの有害事象は回避できる。2.深部の血管や神経を吻合する時やクリッピングの瞬間などには短時間、一過性に脳へらを使用する方が良いこともある。3.本法は術者が両手を完全にフリーで操作したい時(両手で先端極細の鑷子を使用する時など)に特に有用である。助手はこの間両手を使用して術野の展開と吸引、洗浄などを行う。時には助手が止血を行うこともある。4.本法は助手のon the job trainingとして極めて有用である。擬似3Dで左右の手を使用することによって両手の立体空間内proprioceptionが鍛えられる。5.本法の訓練を受けたものは専門医資格取得前でも通常動脈瘤の術者として手術を遂行できるようになる。

P-94 Surgical approaches to jugular foramen schwannomas: A cadaveric study

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A number of surgical approaches for the jugular foramen (JF) schwannoma make selection of the surgical approach difficult. The aim of this study was to clarify the steps and classify the elements of the many reported approaches from a microsurgical anatomy perspective using cadaveric dissections. The approaches to JF from the lateral and/or posterior side involve the 3 elements: 1) retrosigmoid, 2) infralabyrinthine mastoidectomy, and 3) cervical exposure. To expose the jugular foramen and bulb, two crucial steps, infralabyrinthine mastoidectomy and resection of the jugular process, may be combined with one or more of the 3 basic approaches. This report aids in understanding the microsurgical anatomy and approaches to JF schwannoma and in reducing the confusion surrounding the approaches to JF.

P-95 前頭蓋底骨折後に発生した前頭洞嚢胞に対する拡大前頭洞手術と工夫について

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前頭蓋底骨折後に発生する副鼻腔や眼窩の嚢胞は、骨折片や頭蓋内容、眼窩内容の逸脱のため手術に難渋することが多い。鼻副鼻腔に発生した嚢胞は経鼻内視鏡下に開窓術を行われるのが一般的である。しかし、外傷後の前頭洞嚢胞などは経鼻アプローチの際に十分なワーキングスペースやドレナージルートが確保できないためいまだ外切開を行うことも多い。近年普及著しい拡大前頭洞手術は、経鼻的にnasofrontal beakを削開し前頭洞排泄路を開大する術式で、外切開が不要となる有用な術式である。今回拡大前頭洞手術と粘骨膜弁を使用した2例を報告する。症例1は骨折後の左前頭洞嚢胞と眼窩内嚢胞の症例で、患側は眼窩内容が逸脱し前頭洞へのアクセスが不十分であるため健側鼻腔、健側前頭洞から患側へアプローチした。眼窩内嚢胞は眉毛部に小切開をおいて内視鏡下に全摘をおこなった。症例2は右前頭洞嚢胞の症例。患側眼窩内側骨折に加え前頭洞後壁の骨折も認めた。前医で外切開とTチューブ留置をうけていたが再発したため拡大前頭洞手術を施行した。健側より主にアプローチしneo ostiumを作成した。経鼻的Tチューブ留置術も併用した。2症例ともに鼻腔側壁から鼻中隔にまたがる外側に茎をもつ粘骨膜弁 (anterolateral septal flap) を用いて骨削開部を被覆した。flapの詳細についても併せて報告する。

P-96 Withdrawn**P-97 Microsurgical and histological analysis of a temporal meningeal and periosteal dural incision zone for interdural exposure of the dorsolateral cavernous sinus**

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Objects: To elucidate the dural architecture related to the interdural exposure of the dorsolateral cavernous sinus wall.

Methods: 20 cadaveric heads were examined. At the site of the trigeminal foramina, the dura was superficially incised to separate periosteal and meningeal layers. The dimensions of the interdural cleavage plane above the trigeminal nerve, ganglion and branches were determined.

The dural layer architecture was investigated histologically.

Results: Incision of the temporal dura lateral to the trigeminal foramina allowed separation of 2 meningeal layers. This interdural incision zone

(IIZ) surpassed the superior orbital fissure and foramen spinosum by 6 and 5 mm, respectively. Separation of the dural layers allowed easy elevation of the temporal meningeal dura and exposure of the cavernous sinus roof. The histological sections revealed a one thick dura layer above and a two-layered dura below the IIZ.

Conclusion: The architecture of the middle fossa temporal dura allows separation of 2 dural layers along the lateral edges of the trigeminal foramina. Opening the cleavage plane through this interdural incision zone facilitates wide exposure of the cavernous sinus roof.

P-98 Digital three-dimensional surgical microscopy in the cerebellopontine angle

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Objective: We compared a 3D system with a conventional microscope during resection of a petrous apex meningioma via the retrosigmoid approach.

Methods: Equipment size, depth of the visual field, image delay, sharpness, obstruction of the surgical field on the technical side, capability of data injection, handling, and comfort on the side of the surgeon were assessed between a current surgical microscope (Pentaro, ZEISS, Germany) and a prototype 3D digital miniature microscope (MMS, 'Supervision', VISIONSENSE, USA). Both systems were applied simultaneously in the same procedure for direct comparison.

Results: Depth of focus and extension of the field with the digital system was superior to the conventional system while intraoperative handling, zoom and focus adjustment of the prototype lagged behind. Surgeons reported less strain on their neck muscles when using the MMS. Endoscopes could be attached to the same light source and LED monitor as the MMS.

Conclusion: 3D digital microscopes relieve surgeons from relative rigid positions during procedures. Exchangeable digital optics will close the current gap between surgical endoscopy and microscopy.

P-99 Trigeminal schwannoma: Importance of dural reflection of middle fossa

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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.

P-100 Petroclival meningioma: Choosing the right approach

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Objectives: The classical petroclival (medial to 5th nerve) and the premeatal anterior petrous meningiomas (medial to 7th & 8th, lateral to 5th nerve) both displace cranial nerves VII and VIII posteriorly and inferiorly. **Methods & Results:** Although petrosal approaches have contributed significantly to improve tumour resectability, experience directed us towards simpler and safer retrosigmoid para-supracerebellar approach whenever feasible. The anatomic space between the cranial nerves is relatively narrow, but large tumors widen this corridor to allow safe manipulation. After internal decompression, the dissection of the tumour is performed in tumour-arachnoid plane. For tumors with significant middle fossa extension, we use extended middle fossa approach. For extensive meningiomas that span both middle and posterior fossa, we advocate removal of the tumor portion in the cerebellopontine angle and clivus first via retrosigmoid approach to decompress the brainstem and a second stage fronto-temporal approach to remove the supratentorial component. **Conclusion:** The standard retrosigmoid supra-para cerebellar approach is presently the first choice of approach to these lesions.

P-101 High vertex lateral oblique positionによる聴神経鞘腫の手術

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各種モニタリングの進歩や神経内視鏡の併用により聴神経腫瘍の手術成績は向上しているが、現在でも最も手術困難な腫瘍であることに変わりはない。座位・半座位による良好な成績の報告もあるが、空気塞栓や術後出血の危険性が高いという短所の重篤さから本邦では側臥位で行うのが一般的である。しかし、側臥位では静脈圧は比較的高く、腰椎ドレナージを留置したり髄液を排除する工夫が必要で、小脳の腫脹も来し易い。最近私達はvertexを高位に保つlateral oblique positionにて手術し良好な結果を得ているので報告する。【対象および方法】2010年1月より9例の聴神経鞘腫に対しhigh vertex lateral oblique positionにて手術した。側臥位から体幹を45度前傾させ、胸部は腰を起点にV字形に約25度挙上する。頭蓋の縦軸はvertex downせず、胸郭の長軸に一致するように維持。側臥位の場合とは逆に頸部を患側に45度回旋し(90度横向きとなる)頭部を固定し手術する。【結果】比較的低い静脈圧下に手術でき、小脳の腫脹は生じなかった。血性髄液による術野の汚染が少なく両手に鑷子を持ちクモ膜の剥離を行うことができた。術中の空気塞栓、術後出血の合併はなかった。8例で近・亜全摘した。術後、2例で一過性に軽度の顔面神経麻痺をきたしたが全例、顔面神経は温存できた。4例で平均聴力60dB未満を維持できたが、神経機能を温存して全摘出するには更なるbreakthroughが必要である。

P-102 Modified pterio-approach to cavernous sinus cavernous hemangiomas

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Objective:The purpose of this study is report our experience of removal of CSCHs through Modified pterio-approach of cavernous sinus hemangiomas. **Methods:**22 patients harboring CaSHs were treated with modified pterio-approach to evacuate the mass. and total resection. And there was no occurrence of postoperative mortality and no recurrence within the average follow up of 5 years. **Results:**Headache and visual impairment were the most common clinical symptoms. Radiographically, CSCHs have a characteristic pattern. Magnetic resonance image (MRI) scans revealed well-demarcated and hypo- to isointense lesions on T1-weighted images and characteristically, markedly hyperintense lesions on T2-weighted images. CaSHs were classified into three types: the intrasellar, parasellar and mixed type. In our group 14 cases are the parasellar type and 8 are the mixed type. The postoperative complications included oculomotor nerve palsy in 17 patients including abducens nerve palsy in 3 patients, and facial paralysis of ipsilateral side in 4 patients.

Conclusion: Using an modified pterio-approach which allows complete tumor resection with an acceptable intraoperative and postoperative complications.

P-103 Limitations in telovelar approach to fourth ventricular tumors

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Object: The objective of this study was to evaluate the clinical and radiological outcome including surgical complications after removal of the 4th ventricular tumors using a telovelar approach.

Methods: Between January 2003 and August 2012, tumor resection via telovelar approach was performed in eleven patients having fourth ventricular tumors including ependymoma (n=7), epidermoid (n=2) and medulloblastoma (n=7), schwannoma (n=1) and astrocytoma (n=1). We retrospectively analyzed clinical data, radiological findings and outcomes of the patients and discuss surgical techniques. **Results:** Grossly total removal (GTR) was achieved in 8 patients (47%). During an early postoperative period (< 1 month), ataxia (n=7), diplopia (n=4), CSF leak (n=2) were noticed. Mutism did not occurred in all patients. Narrow angle between the medullary velum and high location of the tumor were limiting factors for GTR. **Conclusions:** The telovelar approach appears to be effective in removal of the fourth ventricle tumor without inducing surgical injury on the cerebellar vermis. However, it has an inherent limitation for GTR if the patient has narrow angle between the medullary velums.

P-104 Extradural-transcavernous approach

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The cavernous sinus is often thought of as an elusive operative site due to its complex neurovascular anatomy and difficulty in controlling venous bleeding. Direct cavernous sinus surgery was pioneered by Dolenc, Hakuba, and Fukushima in early 1980's. Dolenc contributed to the the direct trans-cavernous surgery, developing the extradural fronto-temporal approach with removal of the anterior clinoid process. After that, the evolution of this approach have made us possible to treat skull base tumors or aneurysms, such as meningioma,

neuroma, pituitary adenoma, cranipharyngioma, chordoma, epidermoid, dermoid, chroidosarcoma, CCF, cavernous giant aneurysm, and syphon giant aneurysm. We recommend 3 steps of the manipulations of this surgical approach. Step1 is the extracranial procedure, step2 is the extradural procedures, and step3 is intradural procedure. In this study, we report our experience of this approach, along with some literature review.

P-105 Endoscopic endonasal removal of skull base tumors invading posterior fossa

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Objective: to analyze results of using endoscopic posterior extended (transclival) approach in the surgical treatment of midline skull base tumors invading posterior cranial fossa.

Methods: 103 patients with skull base tumors of the midline area (49 m, 54 f) aged from 3 to 74 years were operated. Chordomas were in 80 (78%), pituitary adenomas - 9 (8,7%), meningiomas - 5 (4,9%), cholesteatomas - 2 (1,9%), craniopharyngiomas - 2 (1,9%); other tumors - 5 (4,9%). Tumor sizes were: giant (> 60 mm) - 34 (33%), large (36-59 mm) - 56 (54,3%), medium (26-35mm) - 12 (11,7%), small (< 25 mm) - 1 (1%).

Results: chordomas were removal: total-69%, subtotal -22.5%, partial-7.5%. Pituitary adenomas were removal: total-6, subtotal-1, partia -2. Meningiomas: subtotal- 1, partial- 3 and 1 has been removed less than 50%. All other tumor were removed total and subtotal. Postoperative CSF nasal leak were in 8 (7.8%), meningitis were in 8 (7.8%), death was in 1 (0.97%).

Conclusion: endoscopic posterior extended (transclival) approach is minimally invasive and allows to remove mid located skull base tumors with high radicalism, small traumatic, with a few risk of complications and deaths.

P-106 Endoscopic contralateral transmaxillary approach to the petrous apex

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Objective: The benefits of an endoscopic contralateral transmaxillary (CTM) corridor for lateral lesions of the petrous apex was

investigated.

Methods: Anatomical dissections were performed bilaterally in 5 cadaver heads with image guidance. Angles of the trajectory from the sagittal plane and from the axis of the horizontal petrous carotid (HPICA) were measured from navigation images. The clinical application of this approach is demonstrated in several patients with recurrent clival chordoma.

Results: In the sagittal plane, the CTM corridor increased the angle of the trajectory by 25 +/- 3 degrees. When measured from the axis of the HPICA, CTM decreased the angle from 44.8 +/- 2.78 to 20.1 +/- 4.31 degrees in the horizontal plane. In all cases, the CTM corridor provided greater access to the lateral limits of the petrous apex. Similar benefits were noted in clinical cases of clival chordoma.

Conclusions: The CTM corridor augments the endoscopic endonasal approach by providing a safer trajectory and greater access to the lateral limits of the petrous apex. The benefits of this approach have been demonstrated in a surgical setting.

P-107 Minimal invasive approach for intra orbital tumor

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We report our experience about new minimally invasive endoscopic surgery for orbital tumor.

From 2012 to 2016, 10 patients underwent orbital surgery (4 Solitary fibrous tumors of the orbit, 2 schwannomas, 2 epidermoid cysts, 2 optic nerves sheaths meningiomas). We use minimal eyelid or eyebrow approach to minimize the scar. The orbital osteotomy is realized because of the localization of the tumor and its volume. The resection of the tumor is done by microscopic and endoscopic assisted approach. We use polyethylene implants for closing the orbit.

The length of time spent in hospital is reduced (median 4 days).

All patients had transient supra orbital nerve palsy that disappear after 3 weeks.

We had no complications such infections or bad cosmetics results.

The minimal invasive surgery of the orbit is a safe procedure.

P-108 Transglabellar endoscopic approach for anterior skull base surgery

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Fifty consecutive patients underwent endoscopic transglabellar resection of anterior skull base meningioma between 2010 and 2015 by our center. We use an inter-eyebrow, symmetrical skin incision. After a skin incision of 2 cm in front of the glabella, the anterior wall of the frontal sinus is then osteotomized, mucosa is drilled. The frontonasal duct are closed and the sinus is cranialized. The posterior table of the frontal sinus is then removed with a round cutting burr. The debulking of the tumor is done under endoscopic view. The anterior wall of the frontal sinus is then replaced and secured with miniplates to the surrounding frontal bone.

Results: Tumor locations: 14 giants olfactory groove, 14 olfactory groove, 12 tuberculum sellae, 10 jugum. Gross total removal was achieved for all patients (Simpsons 2), with no deaths. 6 patients had postoperative cerebrospinal fluid (CSF) leak. Rate of CSF leak decreased over time with a better procedure of frontonasal duct closing. At the end of follow up (40 months) we didn't find evidence of clinical or radiological recurrence. The cosmetic result is excellent for 40 patients and very good for 10 patients.

P-109 Morphometric analysis of the medial opticocarotid recess for endoscopic surgery

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Object: The medial opticocarotid recess (MOCR) is located in the posterior wall of the sphenoid sinus, medial to the junction of the optic canal (OC) and the carotid prominence (CP). Our aim was to evaluate the morphometric relations of the MOCR to the adjacent structures. **Methods:** The morphometric relations of the MOCR with the surrounding structures were studied in 18 cadaveric specimens after endoscopic endonasal approach (EEA). **Results:** The distance between both MOCR was 11.06 ± 1.14 mm; the distance between the MOCR and the lateral opticocarotid (LOCR) recess was 5.56 ± 0.85 mm; the distance between the MOCR and the suprasellar recess was $3.72 \pm$

0.49 mm; the angle between the MOCR plane and the OC $13.32 \pm 2.30^\circ$; the angle between the MOCR plane and the CP $13.50 \pm 2.68^\circ$ and; the angle between the OC and the CP $26.81 \pm 4.26^\circ$. All measurements showed low variability, with low standard deviation and interquartile range. No relations were found between any of the measurements. **Conclusion:** The MOCR may be used as a reference point for precise location of structures during EEA. Objective measurements may be especially useful in cases with distorted sphenoid bone anatomy.

P-110 Progress of endoscopic endonasal transsphenoidal approach (e.e.t.a.)

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For the last 11 years we treated over 5000 patients by e.e.t.a. The majority of patients had pituitary adenomas (p.a.)-85%. The other tumors: craniopharyngiomas (more 500pts), chordomas, meningiomas, gliomas, etc. Use of endoscopic technique permitted us to considerably broaden indications for transsphenoidal surgery. In particular, this approach allowed removal of p.a. with a smallsize sella, p.a. with secondary nodes, p.a. with a narrow neck between superior and basal parts, and giant pituitary tumors (over 60 mm). Introduction of endoscopic technologies into daily practice permitted to evacuate tumors via anterior extended transsphenoidal approach (e.t.a.) which earlier could be hardly accessed by a transcranial approach: suprasellar and intraventricular craniopharyngiomas, anterior scull base meningiomas, chiasmal and III ventricular gliomas and other suprasellar tumors. Lateral e.t.a. allows safety removal tumors invading cavernous sinus-p. a., chordomas, Trigeminal and oculomotors nerves schwannomas. Via posterior e.t.a. is available the removal clivus meningiomas invading in posterior fossae, clivus meningiomas, some ventral brainstem tumors, clipping aneurism of Basilar artery.

P-111 Endoscopic surgery of pituitary adenomas: Experience with 4000 patients

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Analyzed 4000 patients with p.a. who underwent endoscopic endonasal transsphenoidal adenectomy (EETA) for the last 11 years. Only 19% p.a. was endosellar. A total of 77% of the patients had large (more 3cm) and giant (more

6cm) tumors. 32% - GH-secreting, 5% - PRL-secreting, 3% - ACTH-secreting, 60% -nonfunctioning p.a. The visual disturbances are revelation at 68% patients. Tumor removal was total in 78% patients. Hormonal status was normalized in 73% cases. The improvement of visual functions or without dynamics -96% patients. Postoperative complications occurred in 4%. Advantages of EETA: the panoramic view of an operative wound, good light. That allows precisely view the basic anatomic structures, to lower risk of their damage, radically remove a tumor, to reveal CSF-leakage and to close defect in tumor capsule. The EETA is less traumatic, is more easy transferred by the patients, that reduces period of rehabilitation and term of hospitalization. This approach allowed removal of p.a. with a small-size sella, adenomas with secondary nodes, p.a. with a narrow neck between their superior and basal parts, and giant tumors.

P-112 Extended endoscopic transphenoidal approach for suprasellar craniopharyngiomas

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From the 7 years 139 patients with craniopharyngiomas (suprasellar, intraventricular) underwent removal via extended endoscopic transsphenoidal approach (e.e.t.a). The operation is always performed through bilateral endonasal approach with endoscope as the only instrument of visualization.

Tototal removal - 67,6%. Vision symptoms improved significantly in 46% patients; 9,3% patients worsening vision after surgery. Endocrine dysfunction did not improve after surgery, and endocrine dysfunctions (hypopituitarism and diabetes insipidus) increase after operations in 36% cases. Other main complications: bacterial meningitis – 11,5%, CSF-leaks – 9,4%, mental disorder – 2%. Recurrence rate 12%. Lethality 5%. Mean follow-up is 36 months. The e.e.t.a. for suprasellar craniopharyngiomas may be a really alternative to the transcranial approach in many cases. The data obtained by us suggest, that extraction of suprasellar craniopharyngiomas in e.e.t.a. is a significantly more effective and less traumatic technology, able to provide both eradication of tumour along with high quality of life after surgery, and relatively small values of postoperative complications and lethality.

P-113 Anxiety and depression in skull base surgery: A comparison between endonasal and open transcranial approaches

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Objective: To evaluate the influence of the surgical approach (open vs. endonasal) on the development of affective disorders and changes in quality of life following skull base surgery.

Methods: A prospective study of patients undergoing elective skull base surgery was performed. Evaluation for depression (ADS-K score) and anxiety (STAI - S, STAI -T and ASI- 3 score) were done before and three months after surgery. In addition SF-36 physical composite score (PCS) was completed.

Results: There were 9 (50%) patients in the endonasal and 9 (50%) patients in the open transcranial group. At 3 months follow up abnormal STAI-S, STAI-T and ADS-K scores were encountered in 55.6%, 33.3% and 10% and in the endonasal group and in 50%, 33.3% and 33.3% in the craniotomy group, respectively. These differences were also statistically significant (p=0.001). However, there were no differences in quality of life before surgery and at three months follow up between both groups.

Conclusions: In skull base surgery the endonasal approach is associated with lower rates of affective disorders than with open craniotomy.

P-114 High gross total resection rate in clival chordomas via transnasal pure endoscopic approach

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Objective: In this small series, the personal experience with the pure endoscopic transnasal skull base approach is described.

Methods: Between 2006 and 2015, 11 patients (7 female/4 male, median age 49y, range 28/79) with clivus chordomas underwent 14 resections. A pure extended endoscopic transnasal approach was used in all of the patients. All surgeries were navigated based on CT fused to MRI. A pedicled nasoseptal flap was needed in 7/11 of cases.

Results: Gross total resection was achieved in 10 and subtotal resection in 1 case during primary surgery. No new cranial nerve deficit was encountered, as well as no csf leakage or carotid artery injury. One patient complains prolonged

nasal discomfort with crusting. All patients are alive after a median follow-up of 57 months.

Conclusions: Using the pure endoscopic transnasal approach, an excellent rate (10/11) of gross total resection of clival chordomas was achieved. Furthermore, the approach related morbidity is low, no new cranial nerve deficit was encountered in this series. This technique has become the personal preference for clival chordomas.

P-115 Cerebrospinal fluid leakage after an endoscopic transsphenoidal surgery

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Object: One of the major complications of endoscopic transsphenoidal surgery (eTSS) is cerebrospinal fluid (CSF) leakage. We analyzed patients who required a surgical repair for CSF leakage after eTSS.

Methods: A retrospective analysis was conducted on 115 patients who underwent eTSS for sellar/parasellar tumors at our institute between February 2010 and October 2015. We analyzed post-operative CSF leakages and their repair procedures.

Results: Surgical repair was performed in 3 cases. The diagnosis included 1 case of chordoma and 2 of craniopharyngiomas that needed to open into the cisternal space on tumor removal. The patient with chordoma had late-onset CSF leakage, occurring four years after tumor removal, and heavy ion radiotherapy. Re-repair surgery, in collaboration with otolaryngologists and plastic surgeons, was successfully performed by using the maxillary swing approach with pedicled adipofascial flap. In the other cases, CSF leakages were repaired completely with only free flaps.

Conclusion: CSF leakages after eTSS could be repaired successfully by using appropriate procedures on a case-by-case basis. We consider that surgical collaboration was effective for intractable cases.

P-116 Surgical management of the trigeminal schwannoma: The role of EEA

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Objective: The conventional skull base approaches for trigeminal schwannoma (TS), such as frontotemporal approach (FTA), retrosigmoid approach (RSA), anterior transpetrosal approach (ATP), Zygomatic infratemporal approach (ZIT) have been used to access to the lesions. Recently, the endoscopic endonasal route has been added to the surgeon's option. We discuss the appropriate approaches to each lesion and define the role of endoscopic endonasal approach (EEA) to TS.

Methods: TS can be classified into 4 components, E (Infratemporal fossa/parapharyngeal fossa), M (middle fossa), P (posterior fossa), G (Gasserian ganglion). This classification of tumor locations corresponds well to the surgical applications.

Results: The TS can be removed using the single or multiple surgical techniques. Type M by FTA, Type G by EEA, ATP, FTA, Type P by RSA or ATP, Type E by EEA or ZIT, Type GE and GME by ZIT, Type MP and GMP by ATP, Type MPE and GMPE by ZIT+ATP

Conclusions: In our series, EEA is suitable for TS located in Meckel cave and/or infratemporal fossa. In the case of tumor including multiple locations, the single or multiple conventional skull base approach will be considered.

P-117 Comparative study of ATP with EEA to the petroclival region

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Objective: EEA has provided a less invasive surgery to middle skull base lesion. The aim of this study is to evaluate the feasibility of the purely EEA to tumors located in petrosal apex lesion and to compare EEA with anterior transpetrosal approach (ATPA).

Methods: Fresh cadaver heads were studied with 0- and 30-degree endoscope and the microscope to

develop the surgical approach.

Results: Extradurally, the EEA allows direct access to the medial petrous apex limited by the petrous and paraclival ICA segments laterally. The ATPA offers direct access to the petrous apex blocked by the petrous ICA and abducens nerve inferiorly. Intradurally, the EEA allows a direct view of areas medial to the cisternal segment of cranial nerve VI with limited lateral exposure. The ATPA offers excellent access to the cistern between cranial nerves III and VIII.

Conclusion: The EEA is superior to the ATPA for accessing lesions medial or caudal to the abducens nerve, such as chordomas, chondrosarcomas, and mid-clival meningiomas. The ATPA is superior for lesions located posterior and/or lateral to paraclival ICA segment and lesions with extension to middle fossa and/or infratemporal fossa.

P-118 Evolution of pituitary surgery; A UK hospital experience

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Object: Endoscopic trans-sphenoidal hypophysectomy is now widely recognised as being the chosen method of resecting pituitary gland tumours.

This study reviews a single centre's experience of 242 endoscopic transsphenoidal hypophysectomy procedures and examines the evolution of pituitary surgery over this time.

Method: A retrospective analysis of all patients who underwent an endonasal endoscopic trans-sphenoidal hypophysectomy at The Royal Stoke University Hospital between May 1990 and March 2014.

Patient information obtained included demographics, pre, intra, and postoperative clinical details, pathology and follow-up.

Results: 242 trans sphenoidal hypopysectomy procedures were performed over the 24 year time period. 153/242 (63.2%) of these patients underwent this surgery for macroadenoma. 80.1% were primary cases and 19.9% were revision surgeries.

The number of cases per year and the distribution of pathology have remained consistent throughout the study period.

Conclusion: Over a 20 year period of pituitary surgery we have established a more specialised service with the introduction of modern working practice and technologies to streamline our patients overall care.

P-119 Clinical analysis of endoscopic endonasal transsphenoidal pituitary surgeries

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The endoscopic endonasal transsphenoidal pituitary surgeries (EETPS) has increased in its popularity nationwide. EETPS is minimally invasive and offers a superior close-up view of the surgical area with larger working angle than methods using microscopes. EETPS requires anatomical knowledge of sinonasal cavities as well as facility in endoscopy. While these are expertise of experienced otolaryngologists. There are few reports of EETPS performed in collaboration with otolaryngologists. Here we report a retrospective analysis of 17 cases of EETPS, in which an otolaryngologist and a neurosurgeon collaborated. Generation of surgical corridor is performed by the otolaryngologist. Extirpation of the tumor is performed by two surgeons with 3 or 4 hands from both nasal cavities. The otolaryngologist reconstructs skull base with no pedicle flap. Our analysis indicates that the participation of an otolaryngologist in the EETPS greatly helps preserve the nasal function while providing maximum surgical field. Thus, we conclude that collaboration with otolaryngologists is high recommended in the EETPS and post-operative management.

P-120 Endoscopic endonasal skull base surgery - Our current experience -

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Objectives:Endoscopic endonasal approaches for ventral skull base lesions have recently developed, enabling access to several pathologies. In this study, we discuss our current experience of endoscopic endonasal skull base surgery.

Materials:From April 2014 to December 2015, we performed 35 endoscopic endonasal skull base surgeries. Various pathologies were operated(Pituitary macroadenoma, Meningioma, Craniopharyngioma, Chordoma/Chondrosarcoma, Trigeminal neurinoma, Brainstem glioma, Cholesterol granuloma, Delayed cerebrosplinal

leakage, Traumatic optic neuropathy).

Results: Twenty-three were removed the anterior skull base and six were removed the clivus. Eleven were opened the maxillary sinus. The tumor removal was possible in all cases. No perioperative death occurred. However, two developed postoperative infarction and four developed postoperative hemorrhagic complications. No postoperative CSF leaks occurred.

Conclusion: Endoscopic endonasal skull base surgery has enable effective removal of ventral skull base pathologies. However, we are aware of the possibility of postoperative intracranial hemorrhagic complications after removal of intradural skull base pathologies.

P-121 Extended eTSS for tuberculum sellae meningiomas that occurred around the optic canal

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Introduction: Visual abnormality of tuberculum sellae meningiomas (TSMs) was caused by not only compression to the optic nerve or the optic chiasma directly but also progression into the optic canal. Complete removal of TSMs around the optic canal via pterional approach was very difficult, because medial inferior of the optic nerve was blind spot.

Object & Operative Procedures: We analyzed 4 cases of small TSM around the optic canal that were operated via extended endoscopic endonasal transsphenoidal surgery (eTSS) under visual evoked potential monitoring. After drilling from the floor of sella to the planum sphenoidale, the inner part of optic canal and opticocarotid recess were opened as well. A tumor was detected by incisioning of dura mater along the optic canal. It was possible to resect it without touching the optic nerve compressed to lateral superior side. Visual function was improved postoperatively. **Discussion:** We show extended eTSS for TSMs around the optic canal, especially the tumor occurred medial inferior of the optic nerve, was more effective than other approach. Our operative procedures are described in detail and the crucial points are discussed.

P-122 Withdrawn

P-123 Withdrawn

P-124 Anatomical landmarks for sphenoid ostium during endoscopic approach

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The present study was designed to establish readily identifiable anatomical landmarks for locating the sphenoid ostium. Cadaveric dissection was performed in 30 hemisections of head and neck. The size, shape and position of sphenoid ostium were determined. The mean distance from the supero-lateral angle of the posterior choana to the SO was found to be 21.21 ± 6.02 mm. The mean distance of the SO from the midline was 4.85 ± 2.89 mm. The SO was situated within 1 cm of the midline. The mean distance between the inferior end of the SO and the postero-inferior edge of the superior turbinate was 8.03 ± 3.52 mm. The SO was present on an average distance of 55.1 ± 3.54 mm from the limen nasi. In 93.3% of the specimens the SO was situated between 5 cm to 6 cm of the inferior end of the limen nasi. The angle between the anterior nasal spine and the SO was found to be remarkably constant (25° to 30°). The sphenoid ostium was localized medial to the superior turbinate between 1.5 and 3 cm above the supero-lateral angle of the posterior choana, within 1 cm of the midline and within 1cm of the postero-inferior edge of the superior turbinate.