

15th ESBS Congress June 2024

Abstract book



EUROPEAN
SKULL BASE
SOCIETY



5 – 8 June 2024 Maastricht, The Netherlands

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Time schedule Free Paper sessions

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Wednesday 5 June: Session 1: 13.30 - 15.00: Video abstracts

Minimally invasive contralateral endoscopic endonasal approach for a true intracavernous epidermoid cyst resection

Type of abstract:

abstract for video presentation

Authors:

Arianna Fava, Jerold Justo, Jonathan Chainey, Rosaria Abbritti, Thibault Passeri, Sébastien Froelich

Department of Neurosurgery, Hôpital Lariboisière, Assistance Publique - Hôpitaux de Paris, Paris, France

Presenting author:

Arianna Fava

Topic:

Anterior/central skull base

Introduction:

True intracavernous epidermoid cysts are rare pathologies which develop inside the cavernous sinus deforming the normal anatomy and neurovascular relationships. Thus, it remains a surgical challenge and the approach selection should be tailored to each patient to reduce the risk of cranial nerves (CNs) and vascular injuries maximizing tumor resection.

Methods:

A 23-year-old male presented with a progressive ptosis and diplopia due to a lesion located inside the left cavernous sinus compatible with an epidermoid cyst. The surgical goal was to decompress CNs to improve patient's symptoms emptying the cyst content while keeping the tumor capsule to reduce the risk of neurological deficits, also considering the potential postoperative radiosurgery.

The choice of surgical corridor through a minimally invasive contralateral EEA was based on anatomical window created by the tumor itself between the paraclival ICA and the CNs pushed laterally. Neuronavigation, intraoperative CNs monitoring and microdoppler were set up.

Results:

With a one nostril contralateral approach as well as neuronavigation and neuromonitoring, a safe corridor to the cavernous sinus can be opened preserving CNs function and reducing mucosal trauma. Angled endoscopes and suctions were key allowing to "look around the corners" maximizing tumor resection. The capsule was left to not damage neurovascular structures. The patient showed a postoperative improvement of the ptosis and diplopia with no additional CNs deficits.

Conclusion:

Lesions growing into the cavernous sinus remain a surgical challenge. The knowledge of tumor histology and how it could modify the relationships between internal carotid artery and CNs are key to choose the best surgical strategy maximizing tumor resection while reducing surgical risks and morbidities.

Combined petrosal approach (CPA) for petroclival tumours: a practical and training-oriented perspective

Type of abstract:

abstract for video presentation

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Topic:

Lateral skull base

Introduction:

The combined anterior and posterior petrosal approach (CPA) has evolved to achieve radical resection with minimized risks and wider exposure of the petroclival region for tumour resection. We documented a step-by-step video description of the CPA approach.

Methods:

The combined petrosectomy represents an epidural transtentorial-transpetrosal neuro-otological surgical technique refined for granting retrolabyrinthine presigmoidal and anterior

petrosal approaches in one stage. The sequential steps of this complex approach are documented through video recording and illustrated by labelled illustrations and cadaveric references. This approach includes critical steps comprehending mastoidectomy, temporo-suboccipital craniotomy, drilling of the petrous ridge, opening Meckel's cave, mobilization of the trigeminal nerve, and petrous apex drilling to obtain maximal exposure.

Results:

The CPA provides multiple skull base corridors to the sphenopetroclival region and ventrolateral brainstem, sparing critical neurotological structures in the petrous temporal bone. The anterior and posterior bony removal toward the Dolenc-Kawase rhomboid, presigmoid area and petrous ridge represents vital steps. The meticulous microdissection technique is required to preserve the semicircular canal and cochlear integrity in the extradural part, the fourth cranial nerve, and draining veins during the intradural-transtentorial part. A reproducible and procedural perspective toward complex approaches like CPA should be fostered to improve surgical outcomes and training in dedicated skull base teams.

Conclusion:

This technique offers a balanced approach to achieving maximal tumour control while preserving the integrity of vital neurovascular structures and minimizing postoperative complications. Challenges include maximisation of exposure, neurovascular preservation, multidisciplinary integration of efforts but also training of younger skull base surgeons.

Endoscopic trans-ventricular approach for cystic craniopharyngioma- a technical case report

Type of abstract:

abstract for video presentation

Authors:

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Skull base team, Department of Neurosurgery, Queen's Hospital, Barking, Havering and Romford University Hospitals Trust, London, UK

Presenting author:

Ariadni Georgiannakis

Topic:

Anterior/central skull base

Introduction:

Craniopharyngiomas are a relatively rare entity in the neurosurgical intracranial pathology. They are benign suprasellar lesions with incidence of 0.2 per 100,000 people and comprise 0.8% of all intracranial tumours or 13% of all suprasellar tumours.

Methods:

In this technical video case report, we present a patient who presented to our accident and emergency department with a two-month history of morning headaches, recent visual disturbances, and memory decline and obtundation. He had no gross features of any pituitary dysfunction. He had a CTH which demonstrated a giant suprasellar lesion with solid and cystic components occluding both foramina of Monro with signs of acute hydrocephalus. Considering acute presentation and clinical deterioration, we opted to perform right frontal endoscopic septum pellucidostomy, cyst drainage using paediatric NG tube via endoscope and insertion of right frontal ventriculoperitoneal shunt.

Results:

Post operatively his pituitary profile was unremarkable. He had a significant improvement in his cognition and vision after this procedure.

Conclusion:

A planned two staged procedure in giant craniopharyngioma with acute hydrocephalus is safe. This will facilitates later planned extended trans sphenoidal approach safe and consent process more robust.

Cranio-orbitozygomatic approach for resection of spheno-orbital meningioma with infratemporal fossa extension

Type of abstract:

abstract for video presentation

Authors:

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Presenting author:

Leonardo Tariciotti

Topic:

Anterior/central skull base

Introduction:

Skull base involvement is a frequent finding in spheno-orbital meningiomas. Their distinct disposition along the sphenoid wing favors invasion of structures such as the orbital apex, superior orbital fissure, sphenoid sinus, and infratemporal fossa (ITF). Due to their complex pattern of extension, gross-total resection can be surgically challenging.

Methods:

A 49-year-old female presented with a large left spheno-orbito-cavernous extra-axial mass causing left exophthalmos and facial numbness. MRI evidenced a lesion centered in the left cavernous sinus with extension across the midline to the suprasellar space, laterally into the middle cranial fossa, and posteriorly along the tentorial incisura. The lesion also extended

into the sphenoid sinus and orbital apex, with encasement of the left internal carotid artery. Involvement of Meckel's cave and ITF was noted with affection of both foramen ovale and rotundum. Surgery was recommended due to tumor size and optic nerve compression.

Results:

Through a cranio-orbitozygomatic approach, the frontotemporal dura was mobilized from the orbit and sphenoid ridge. An anterior clinoidectomy was performed followed by orbital apex decompression. Metaplastic osteosis of the maxillary and mandibular struts was observed. Drilling at this level gained access to the ITF and the tumor was tracked along V2 through the foramen rotundum. The extracranial component was debulked by sharply dissecting away from the pterygoid muscles. Tumor attached to the temporal dura was resected en-bloc. Partial debulking of the cavernous component was achieved due to adherence to the carotid artery. Pathology revealed a meningioma CNSWHO grade1.

Conclusion:

Decompression of affected skull base structures is fundamental in management of sphenoidal meningiomas. Gross-total resection can be difficult to attain due to stretch contact with critical neurovascular structures. In this case, extracranial extension of the lesion into the ITF was adequately controlled through the transcranial approach.

Left Occipital Artery to Right P3 Bypass with Radial Interposition Graft and Trapping of P3 Aneurysm

Type of abstract:

abstract for video presentation

Authors:

Bhuvic Patel, University of Pittsburgh Medical Center Department of Neurological Surgery

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurological Surgery

Presenting author:

Georgios Zenonos

Topic:

Lateral skull base

Introduction:

A middle aged male presented with a right PCA aneurysm not endovascularly treatable due to inflow stenosis, . The aneurysm had a long neck and daughter aneurysm, precluding clip reconstruction of the parent vessel. We performed occipital artery to right PCA bypass with radial interposition graft and trapping of the aneurysm.

Methods:

The patient was positioned in the park bench position with his left forearm exposed for radial artery harvest. The left occipital artery was identified and preserved to be used as a donor site. A craniotomy and interhemispheric dissection was performed to expose the aneurysm. The calcarine branch of the PCA distal to the aneurysm was chosen as the recipient site for the bypass. The radial artery was harvested and used to connect the occipital artery to the calcarine artery. The aneurysm was trapped with proximal and distal clips. Indocyanine green angiography was performed, verifying flow through the bypass.

Results:

Post operative angiography showed good flow through the bypass and complete exclusion of the aneurysm from circulation. The patient tolerated the procedure well. He did have temporary hemianopsia and left arm weakness post operatively that ultimately resolved.

Conclusion:

Bypass with radial interposition graft can be used to trap and bypass aneurysms that are otherwise difficult to reconstruct or clip directly.

Far Medial Approach for Clipping of Ventral Ruptured PICA Aneurysm

Type of abstract:

abstract for video presentation

Authors:

Bhuvic Patel, University of Pittsburgh Medical Center Department of Neurological Surgery

Carl H. Snyderman, University of Pittsburgh Medical Center Department of Otolaryngology

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurological Surgery

Presenting author:

Georgios Zenonos

Topic:

Anterior/central skull base

Introduction:

A 53 year old female presented to the emergency department with Hunt Hess 4 subarachnoid hemorrhage. After placement of an external ventricular drain, angiography showed a very medial right ventral PICA aneurysm. The configuration of her aneurysm was not favorable for endovascular occlusion and therefore surgical clipping was indicated.

Methods:

The mid and lower clivus was drilled and the clival dura and paraclival carotid arteries were exposed. The dura was opened and dissection around the aneurysm was performed to expose the neck of the aneurysm. During the dissection an intraoperative rupture occurred and temporary clips were placed to trap the aneurysm. A clip was placed to occlude the aneurysm and the temporary clips were removed. Doppler ultrasound and indocyanine green angiography were used to verify flow in the PICA and complete occlusion of the aneurysm. A multi-layer reconstruction was performed with placement of abdominal fat and nasoseptal flap.

Results:

The patient tolerated the procedure well, with complete occlusion of the aneurysm on post operative angiogram. The EVD was weaned and removed however the patient presented with CSF leak likely secondary to post hemorrhagic hydrocephalus 3 weeks later. The leak was repaired endonasally with a small abdominal fat graft and placement of a ventriculoperitoneal shunt.

Conclusion:

Endonasal clipping of medially located ruptured aneurysms is a safe and feasible means of treating selected pathology.

Extra-axial hemangioblastoma of the cerebellopontine angle

Type of abstract:

abstract for video presentation

Authors:

Rodas A, Emory University

Tariciotti L, Emory University

Vuncannon JR, Emory University

Zohdy YM, Emory University

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Porto E, Emory University

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Pradilla G, Emory University

Presenting author:

Leonardo Tariciotti

Topic:

Lateral skull base

Introduction:

Hemangioblastomas are benign, vascular intra-axial tumors that primarily locate at the posterior cranial fossa, within the cerebellum. Extra-axial cases, located in the cerebellopontine angle (CPA) are rare and can be easily misdiagnosed as vestibular schwannomas based on their location and similarity on imaging studies.

Methods:

A 46-year-old female presented with an 8-month history of left-sided tinnitus and severe sensorineural hearing loss. Imaging revealed a 14 mm homogeneously enhancing lesion arising from the internal auditory canal (IAC) and projecting into the CPA. Initially diagnosed as a vestibular schwannoma, the lesion was assigned a Koos stage III. Cranial nerves (CN) were grossly intact except for the sloping sensorineural hearing loss on the left. Access to the CPA was achieved through a retrosigmoid approach.

Results:

Following a suboccipital craniotomy, arachnoid dissection at the CPA revealed a bright, orange-colored tumor, which appeared to arise from the inferior vestibular nerve. Following the Tübingen line, the IAC was identified and drilled until the distal fundus of the canal could be palpated. The dura of the IAC was divided, exposing the tumor on the inside. The tumor evidenced capillary bleeding and was reflected inferiorly, producing a clear view of CN VII. Once dissected from the porus acusticus, the lesion was completely elevated from CN VII and VIII. Pathology revealed a hemangioblastoma.

Conclusion:

Hemangioblastomas are a rare but possible differential diagnosis of vestibular schwannomas. Distinction between both lesions may be apparent until the time of surgery. Hemangioblastomas pose a surgical challenge considering they are hypervascular lesions and careful coagulation is crucial during dissection.

Cranio-orbitozygomatic approach for resection of spheno-orbital meningioma with infratemporal fossa extension

Type of abstract:

abstract for video presentation

Authors:

Rodas, A, Emory University

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Presenting author:

Leonardo Tariciotti

Topic:

Anterior/central skull base

Introduction:

Skull base involvement is a frequent finding in spheno-orbital meningiomas. Their distinct disposition along the sphenoid wing favors invasion of structures such as the orbital apex, superior orbital fissure, sphenoid sinus, and infratemporal fossa (ITF). Due to their complex pattern of extension, gross-total resection can be surgically challenging.

Methods:

A 49-year-old female presented with a large left spheno-orbito-cavernous extra-axial mass causing left exophthalmos and facial numbness. MRI evidenced a lesion centered in the left cavernous sinus with extension across the midline to the suprasellar space, laterally into the middle cranial fossa, and posteriorly along the tentorial incisura. The lesion also extended

into the sphenoid sinus and orbital apex, with encasement of the left internal carotid artery. Involvement of Meckel's cave and ITF was noted with affection of both foramen ovale and rotundum. Surgery was recommended due to tumor size and optic nerve compression.

Results:

Through a cranio-orbitozygomatic approach, the frontotemporal dura was mobilized from the orbit and sphenoid ridge. An anterior clinoidectomy was performed followed by orbital apex decompression. Metaplastic osteosis of the maxillary and mandibular struts was observed. Drilling at this level gained access to the ITF and the tumor was tracked along V2 through the foramen rotundum. The extracranial component was debulked by sharply dissecting away from the pterygoid muscles. Tumor attached to the temporal dura was resected en-bloc. Partial debulking of the cavernous component was achieved due to adherence to the carotid artery. Pathology revealed a meningioma CNSWHO grade1.

Conclusion:

Decompression of affected skull base structures is fundamental in management of sphenoidal meningiomas. Gross-total resection can be difficult to attain due to stretch contact with critical neurovascular structures. In this case, extracranial extension of the lesion into the ITF was adequately controlled through the transcranial approach.

Wednesday 5 June: Session 2: 13.30 - 15.00: (facial) Nerve

Cranial nerve dysfunction in patients with an occipital condyle fracture: a 14-year retrospective observational study.

Type of abstract:

abstract for oral presentation

Authors:

Madelon Thevis a b d, Jolanda Derks a b, Thijs Jansen a b, Allard J. F. Hosman c, Dirk Kunst a b d.

a Dutch Academic Alliance Skull Base Pathology, Radboud University Medical Centre, Maastricht University Medical Centre+, Nijmegen/Maastricht, the Netherlands

b Department of Otorhinolaryngology - Head and Neck Surgery, Radboud University Medical Centre, Geert Grooteplein Zuid 10, 6525, GA, Nijmegen, the Netherlands

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d Department of Otorhinolaryngology - Head and Neck Surgery, Maastricht University Medical Centre+, P. Debyelaan 25, 6229, HX, Maastricht, the Netherlands

Presenting author:

Madelon Thevis

Topic:

Lateral skull base

Introduction:

Occipital condyle fractures (OCFs) and the potential cranial nerve dysfunction (CND) following them are both rare and underdiagnosed, leading to a minimal number of research studies and absence of discussing them in international guidelines. This study evaluates the incidence and course of CND in OCF patients, leading to clinical advice.

Methods:

All cases admitted with an OCF during a 14-year period to a Level-I trauma centre were selected. Of the survivors, patients with either diagnosed CND (confirmed by clinical examination) or expected CND (reported observations high suspicious for CND) were selected for detailed data collection. Differences in CND occurrence for patients with- and without concomitant skull base fractures were evaluated.

Results:

Of the 183 admitted OCF cases, 119 were included as surviving OCF population. One third of

this population had CND (34%, n=40/119). Thereof 75% had more than one CN affected with a median of three cranial nerves (CNs). One in eight patients presented with at least one diagnosed CND (10%, n=12/119), whereof the facial nerve was the most common. One in four patients presented with at least one expected CND (24%, n=29/119). Half of all CND cases had chronic CND sequelae (58%), which was one in six of all surviving OCF cases (16%).

Conclusion:

Head-/upper spine injury patients with an OCF often present with multiple and chronic CND. Testing all the CNs in these patients in time is therefore crucial. Patients must be counselled about the risk on chronic CND sequelae and be potentially referred to a (para-)medical subspecialty for further treatment options.

Tear production in relation to intermediate nerve function and vestibular schwannoma surgery

Type of abstract:

abstract for oral presentation

Authors:

WMA van Vollenhoven (MD) ENT/ Neurosurgery department, N de Boer (MD) ENT department, RW Koot (MD, PhD) Neurosurgery department, EF Hensen (MD, PhD) ENT department, MJA Malessy (MD, PhD) Neurosurgery department

Affiliation of all authors: Leiden University Medical Centre, Leiden, The Netherlands

Presenting author:

WMA van Vollenhoven

Topic:

Lateral skull base

Introduction:

A lesion of the intermediate nerve during vestibular schwannoma surgery may result in a reduced tear production, leading to a dry eye thereby diminishing the quality of life. We objectively quantified tear production both before and after surgery, and investigated factors that may be related.

Methods:

This prospective cohort study comprised of 111 patients who underwent resection of a vestibular schwannoma between 2015 and 2022. Tear production was assessed with Schirmer tests before and after surgery. Eye complaints and the number of patients using eye care medication postoperatively was assessed. Tear production was correlated with the House-Brackmann (HB) score of facial nerve function, tumour size and extent of surgery.

Results:

Tear production varied considerably between patients pre-and post-surgically. At the operated side, tear production decreased in 80 patients (72%), increased in 22 patients (20%), remained unchanged in 9 patients (8%), with a mean time after surgery of 1.9 months (SD 2.47, range 0-13). Eye lubricants were used by 74 (67%) patients postoperatively. The HB score was 1 in 55 (50%) of the patients scored 1-6 months postoperative. The mean tumour size was 24 mm (SD 8.3, range 4-44 mm). Total or near total resection was obtained in 94 (85%) of the patients.

Conclusion:

Tear production decreased in approximately three-quarters of patients after vestibular schwannoma surgery. Patients should be informed before surgery that it is highly likely they develop a dry eye postoperative. Correlations with the House-Brackmann (HB) score of facial nerve function, tumour size and extent of surgery will be presented.

A retrospective study of facial nerve function preservation in large acoustic neuroma: A Young Doctor's Experience

Type of abstract:

abstract for oral presentation

Authors:

Authors: Zhengnong Chen, Jingjing Wang, Zihan Lou, Boya Zhang, Yibing Hu, Shankai Yin;

Affiliation: Department of Otolaryngology-Head and Neck Surgery, Shanghai Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200233, China.

Presenting author:

Zhengnong Chen

Topic:

Lateral skull base

Introduction:

Summarizing clinical features in 102 patients with large vestibular schwannomas undergoing microsurgery via enlarged translabyrinthine approach. Investigating factors influencing short-term and long-term facial nerve function post-surgery, aiming to enhance patient quality of life.

Methods:

Retrospective study of 102 cases with large vestibular schwannomas undergoing microsurgery via enlarged translabyrinthine approach at the ENT Head and Neck Surgery Department, Sixth People's Hospital affiliated with Shanghai Jiao Tong University School of Medicine, from April 2015 to April 2022. Patients underwent temporal bone CT and enhanced MRI. Routine neuroelectrophysiological monitoring was employed during surgery. Facial nerve functions were assessed using the House-Brackmann grading system before surgery, within 2 weeks, and 1 year post-surgery. Statistical analysis of factors influencing postoperative facial nerve function was conducted using SPSS26.0 software.

Results:

Study on 102 vestibular schwannoma patients: mean age 49.9 ± 11.4 , 56.9% women, 40.2% left-sided tumors, avg diameter 3.5(0.5)cm, max 5.0cm. Follow-up 1-8 years, no perioperative deaths. Gross total resection rate 90.2%, near-total 7.8%, subtotal 2%. Cystic schwannomas (41.2%) had 88.1% gross total resection, solid tumors (58.8%) 91.7%. Early and long-term good facial nerve function rates 73.5% and 87.3%. No correlation found between function and resection extent or tumor type; correlated with facial nerve detection threshold at surgery end.

Conclusion:

Surgery-related short and long-term facial nerve function correlated with intraoperative facial nerve detection threshold. Intraoperative threshold $\leq 0.05\text{mA}$ predicts favorable postoperative facial nerve recovery.

Delayed facial nerve palsy after vestibular schwannoma surgery during the Covid-19 pandemic.

Type of abstract:

abstract for oral presentation

Authors:

Zdenek Fik, Ales Vlasak, Lenka Peterkova, Karolina Hrubá, Kristyna Pospisilova, Vladimir Koucky, Jan Lazak, Eduard Zverina, Jan Betka

Presenting author:

Zdenek Fik

Topic:

Lateral skull base

Introduction:

Facial nerve palsy is the most common complication after vestibular schwannoma surgery, and in a small group of patients it can manifest later than 72 hours after surgery – delayed palsy. The purpose of this study is to focus on its possible association with SARS-CoV-19 infection.

Methods:

Only patients with primary surgery without a history of irradiation were included. Delayed palsy was defined as a new occurrence of facial nerve palsy after more than 72 hours after surgery, with respect to the House-Brackmann classification. The results were correlated with information from the database of the Institute of Health Information and Statistics of the Czech Republic.

Results:

From January 2017 to December 2022 in total 168 patients were operated for vestibular schwannoma. Delayed facial nerve palsy occurred in 9 patients and more frequently in the covid-related years, compared 2017-2019 to 2020-2022, the ratio is 1:8 ($p = 0.0046$)

Interestingly, there was a difference in the age of patients with and without delayed palsy (44.0 years vs 49.9 years; $p = 0.04$). The distribution of patients coincided with the overall appearance of SARS-CoV-19 infection in the population divided by age.

Conclusion:

Delayed facial nerve palsy is a rare entity after vestibular schwannoma surgery. The increase in its incidence during the covid pandemic is evident and corresponds to the general epidemiological situation, with respect to the age distribution.

Facial Nerve Function after Incomplete Resection of Vestibular Schwannomas that Failed Initial Stereotactic Radiosurgery

Type of abstract:

abstract for oral presentation

Authors:

Othman Bin-Alamer, Hussam Abou-Al-Shaar, Anthony Tang, Tritan Plute, Georgios A. Zenonos, Andrew A. McCall, Ajay Niranjani, Constantinos G. Hadjipanayis, L. Dade Lunsford, Paul A. Gardner, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Paul A. Gardner, MD

Topic:

Lateral skull base

Introduction:

Surgical management of vestibular schwannomas (VS) following stereotactic radiosurgery (SRS) progression is challenging, particularly regarding facial nerve function. The aim of this study is to assess whether subtotal resection impacts surgical and facial nerve outcomes following failed SRS.

Methods:

16 patients with VS post-SRS progression underwent surgery. Patients were categorized into near-total resection (NTR [n=9], 95-99% tumor resection) and subtotal resection (STR [n=7]) groups. The primary outcomes were facial nerve function and recurrence.

Results:

5 patients in the NTR group had worsening of House-Brackmann (HB) score (3, Grade III or less) and no patients in the STR group worsened. Adjusting for tumor volume and SRS margin dose, NTR patients had significantly higher odds of developing facial weakness than STR patients (OR: 24, 95% CI: 1 - 115, p = 0.04). The NTR group trended toward a higher number of complications compared to the STR group (P=0.15).

After surgery, both groups had 100% tumor control with comparable follow-up (NTR, median = 61 months [3-86]; STR, median = 51 months [36-71]).

Conclusion:

The extent of resection of post-SRS VS progression is a critical determinant of facial nerve outcomes but not tumor control. STR is associated with better facial nerve preservation,

lower complication profile, and similar tumor control rate compared to NTR, underscoring the importance of conservative surgical strategies in these cases.

Two-year outcome of delayed facial palsy after resection of vestibular schwannoma

Type of abstract:

abstract for oral presentation

Authors:

Authors: Yoichi Uozumi, MD, PhD¹, Yuichi Fujita, MD, PhD¹, Nobuyuki Akutsu, MD, PhD^{1,2}, Takashi Sasayama, MD, PhD¹, Eiji Kohmura, MD, PhD^{1,3}

Affiliations:

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Presenting author:

Yoichi Uozumi

Topic:

Lateral skull base

Introduction:

Delayed facial palsy (DFP) is a unique complication after resection of vestibular schwannoma (VS). This retrospective study aimed to clarify the clinical impact of DFP on the two-year functional outcome of the facial nerve after VS resection.

Methods:

We retrospectively reviewed 276 sporadic VS patients who met the inclusion criteria between January 2002 and January 2022. All the patients were treated through retrosigmoid approach. DFP was defined as newly deterioration of facial nerve function by a House–Brackmann (HB) grade of ≥ 1 more than 72 h postoperatively. The incidence of DFP after VS resection and its impact on two-year facial nerve function were analyzed.

Results:

DFP developed in 40 patients (14.5%). When facial nerve function was normal immediately postoperatively, the rate of two-year favorable outcome (HB grade 1–2) was 100% for all DFP patients. When facial nerve dysfunction was present immediately postoperatively, the rate of two-year favorable outcome was significantly lower in patients with DFP than in those without DFP (77.8% vs 100% in patients with HB grade 2 immediately postoperatively,

p=0.001; 50.0% vs 90.3% in those with HB grade 3 immediately postoperatively, p=0.042). The treatment for DFP did not affect the outcomes.

Conclusion:

DFP can be inconsequential when normal facial nerve function is observed immediately after surgery. However, when facial nerve dysfunction occurs immediately after surgery, the long-term prognosis for facial nerve function is significantly worse in patients with DFP than in those without DFP.

A Cross-over study comparing the effects of Lactated Ringers (LR) vs. Normal Saline (NS) irrigation on Multi-Modality Intra-operative Neuromonitoring during skull base Surgery involving the facial nerve

Type of abstract:

abstract for oral presentation

Authors:

Hussam Abou-Al-Shaar, University of Pittsburgh Medical Center Department of Neurosurgery, Allyson Eismont, University of Pittsburgh Medical Center Department of Neurosurgery, Joshua Sunderlin, University of Pittsburgh Medical Center Department of Neurosurgery, Andrew McCall, University of Pittsburgh Medical Center Department of Otorhinolaryngology, Philip Perez, University of Pittsburgh Medical Center Department of Otorhinolaryngology, Jeffrey R. Balzer, University of Pittsburgh Medical Center Department of Neurosurgery, Paul Gardner, University of Pittsburgh Medical Center Department of Neurosurgery, Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery

Presenting author:

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery

Topic:

Lateral skull base

Introduction:

LR has proven advantages over NS in decreasing neuronal hyperexcitability in intra-axial brain surgery and is the irrigation of choice for abolishing seizures. We postulated that these same effects may be beneficial in decreasing detrimental facial nerve hyperexcitability during skull-base surgery requiring significant manipulation of the nerve.

Methods:

We performed a cross-over study in 26 skull base procedures involving facial nerve manipulation (15 vestibular schwannoma resections and 9 microvascular decompressions for hemifacial spasm) where warm NS and subsequently LR irrigation were used sequentially in each surgery to study the effects on multimodality neuromonitoring. Specifically, we evaluated facial nerve free-run electromyography (f-EMG) a) during irrigation, and b) during dissection close to the nerve, the facial nerve electromyography (EMG) threshold at the brainstem with each irrigation, as well relative interference of protracted f-EMG with reliably following brainstem auditory evoked potentials (BSAERs).

Results:

In all cases, NS irrigation resulted in protracted facial nerve f-EMG. Significant f-EMG was also seen during dissection close to the facial nerve while using NS. Protracted f-EMG interfered with the ability to reliably follow ipsilateral BSAERs (performed in all MVDs and one VS resection). Switching to LR during NS irrigation nearly instantaneously abolished or significantly decreased facial nerve f-EMG activity which facilitated concomitant BSAER monitoring. The calming effects of LR extended beyond the time of active irrigation to subsequent dissection close to the nerve. The facial nerve EMG threshold at the brainstem was not affected.

Conclusion:

Our findings suggest that warm LR is superior to NS as irrigation in skull base surgery involving the facial nerve as it decreases the nerve's detrimental hyperexcitability and facilitates the reliability of multi-modality neuro-monitoring without decreasing its sensitivity.

The mini-combined transpetrosal approach for skull base tumors: indications and surgical outcomes

Type of abstract:

abstract for oral presentation

Authors:

Arianna Fava, Jerold Justo, Jonathan Chainey, Rosaria Abbritti, Thibault Passeri, Sébastien Froelich

Department of Neurosurgery, Hopital Lariboisière, Paris, France

Presenting author:

Arianna Fava

Topic:

Lateral skull base

Introduction:

The mini-combined transpetrosal approach (mini-CTPA) is a modification of the standard one developed to reduce soft tissue trauma, cosmetic issues, time-consuming bony work, and neurological risks. Here we reported our experience with the mini-CTPA applied to different skull base tumors.

Methods:

A retrospective study of skull base tumors surgically treated with mini-CTPA from 2020 to 2023 was conducted. Preoperative characteristics, postoperative results, and clinical outcomes were analyzed. The surgical technique was detailed. The mini-CTPA was performed in 23 patients (18 women and 5 men) affected by: sphenocavernous-petroclival meningiomas in 9 patients (39%), petroclival meningiomas in 7 (30%), epidermoid cysts 3 (13%), chordomas 2 (8.7%), chondrosarcoma 1 patient (4.3%), and trochlear nerve schwannoma 1. The mean age at surgery was 51 years (range 23-69 years).

Results:

The GTR, NTR, and STR rates resulted: 22%, 11%, 67% for sphenocavernous-petroclival meningiomas, 14% GTR and 86% NTR for petroclival meningiomas, 100% GTR for epidermoid cysts, 50% GTR and 50% STR for chordomas, NTR for the chondrosarcoma, and GTR for trochlear schwannoma. Two patients presented with transient pseudomeningocele and one patient was treated for meningitis. None had wound or cosmetic complications. Postoperative impairments included transient cranial III nerve paresis in 2 patients, trochlear nerve palsy in 3, facial hypoesthesia in 3, abducens nerve paresis in 5 (transient in 3), transient facial paresis in 3, and hypoacusia in 2 patients.

Conclusion:

Although the lesser soft tissue dissection and bony opening decrease the surgical window, the mini-CTPA provides a sufficient exposure for different skull base lesions centered in petroclival area with the aim to decrease the invasiveness and approach-related morbidities.

Facial Nerve Decompression: the Cambridge and London experience.

Type of abstract:

abstract for oral presentation

Authors:

Daniele Borsetto, Rupert Obholzer

Presenting author:

Daniele Borsetto

Topic:

Lateral skull base

Introduction:

Complete facial nerve palsy is a debilitating condition. Bell's palsy, Ramsay-Hunt, Facial Schwannomas and temporal bone fractures are common causes of acute facial palsy, with recurrent idiopathic paralysis and Melkersson-Rosenthal syndrome accounting for a smaller subset of cases. Properly selected patients may benefit from facial nerve decompression.

Methods:

Joint experiences from 2 Skull Base Centres in the UK: Addenbrookes, Cambridge University Hospital and Guy's and St Thomas', London

Results:

The surgical technique together with the outcome of 40 patients that underwent a facial nerve decompression will be discussed.

Conclusion:

Appropriately selected patients with facial paralysis may benefit from facial nerve decompression. Patients should be counselled regarding the risks of decompression VS conservative management and that the return of maximal facial nerve function may be delayed.

Wednesday 5 June: Session 3: 15.30 - 17.00: Vestibular schwannoma

British Skull Base Society Evidence-Based Consensus on Vestibular Schwannoma Surveillance.

Type of abstract:

abstract for oral presentation

Authors:

British Skull Base Society

Presenting author:

Daniele Borsetto

Topic:

Lateral skull base

Introduction:

Surveillance plays a crucial role in managing patients with Vestibular Schwannomas (VS).

Consensus is lacking on the optimal duration, frequency, and modality of imaging.

Standardising this approach would ensure safe and effective care, reduce patient distress, and promote consistency in management decisions among clinicians.

Methods:

In July 2022, a multi-disciplinary Delphi consensus was conducted at the British Skull Base Society Meeting. Expert UK-based skull-base surgeons and neuro-radiologists, were presented semi-systematic literature reviews summarising current evidence on VS management.

Anonymised opinions were collated, presented to the group, and discussed to reach a final consensus.

Results:

Recommendations for VS managed by surveillance are: (1) surveillance frequency should decrease as the risk of growth diminishes over time; (2) surveillance may be discontinued when the remaining lifetime risk of VS growth is below 0.5% (~8.5-years post-diagnosis); (3) Factors such as age, size, VS location, and cystic components should be considered. Surveillance after surgery or radiotherapy has limited evidence but recommendations are: (4) surveillance should be adjusted based on residual tumour size or nodular enhancement. Imaging modality and sequences are recommended to be (5) high-resolution MRI with T1, T2, FIESTA / CISS is considered sufficient.

Conclusion:

This consensus and literature review provide an evidence-based guide to help clinicians with the surveillance of patients with VS. Further research should focus on better understanding the

dynamic nature of growth risks and the growth characteristics of post-intervention VS to enable

personalised growth risk stratification.

Surgery for recurrent vestibular schwannoma – is it safe?

Type of abstract:

abstract for oral presentation

Authors:

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1 Department of Neurosurgery, 2nd Medical Faculty, Charles University, University Hospital Motol, Prague, Czech Republic

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Presenting author:

Vlasak Ales

Department of Neurosurgery, 2nd Medical Faculty, Charles University, University Hospital Motol, Prague, Czech Republic

Topic:

Lateral skull base

Introduction:

The effort to preserve cranial nerve function is usually the main reason for non-radical vestibular schwannoma resection. This appears to be even more difficult in case of recurrent tumors after primary microsurgical treatment or stereoradiotherapy. In this study we present our results of revision surgeries for large tumor recurrences.

Methods:

We analyzed the group of patients operated between 2004 and 2022. During this period, we performed 549 primary operations and 17 revision surgeries. Six of these patients had first surgery in our department, 11 were reported from elsewhere. The indication criterion to revision surgery was tumor growth and development or progression of clinical symptoms. The average follow-up time was 81 months.

Results:

Our main approach for revision procedures was retrosigmoid approach, in 1 case we used the translab and in 2 combined approach. Radicality was, as expected, lower than for primary surgeries - 13 gross total, 2 near total and 2 subtotal. In 10 patients, we failed to preserve the anatomical continuity of the facial nerve. One of these patients underwent hypoglossofacial anastomosis already after the primary procedure. All other patients with

disrupted nerve underwent a reanimation technique - Darrouzet's hypoglossofacial anastomosis 8 patients, 1 great auricular and 1 sural nerve neurorrhaphy. Average definitive facial nerve function was HB 3.5.

Conclusion:

Our study shows that even in the case of revision surgeries for vestibular schwannoma recurrence, very good radicality can be achieved with satisfactory definitive function of the facial nerve. It is essential that these procedures are performed by an experienced surgical team familiar with reanimation techniques

Continuous education in interdisciplinary vestibular schwannoma surgery

Type of abstract:

abstract for oral presentation

Authors:

C. Matthies 1, M. Breun 1, C. Stetter 1, M. Löhr 1, R.-I. Ernestus¹, R. Hagen², M. Scheich²

1Würzburg University Hospital, Department of Neurosurgery, Würzburg, Germany,

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Presenting author:

C. Matthies

Topic:

Lateral skull base

Introduction:

To investigate the surgical and functional outcomes in an interdisciplinary oto- and neuro-surgical setting by the middle fossa (MF) and retro-sigmoid (RS) approaches.

Methods:

From 2005 to 2021, 1,075 tumor resections were performed in 1,035 patients under continuous neuro-monitoring, via MF approach in 353 VS and via RS in 722 VS, by an interdisciplinary oto-neuro-surgical team, led by four experienced neurosurgical skull base surgeons and four oto-surgeons. Standardized documentation of auditory and facial functions before and after surgery, of intra- and postoperative sequels and complications was the basis for this analysis. Parameters of analysis were facial nerve function by House-Brackmann-Scale (HB), auditory function by AAO classification, tumor extension with and without brainstem involvement.

Results:

Complete resections were achieved in all MF and in 93% of RS approaches. Functional facial outcome was similar in 600 small tumours (T1 to T3a) by both approaches with HB[°]1-2 by the MF in 96%, by RS in 89% at 1 year, and 83% in RS in 475 large tumors. Auditory preservation at classes A and B was achieved in 214 of 396 small tumour cases (54%) and in 39 of 198 (22%) patients with large tumours.

Every 4th to 3rd surgery is a teaching procedure with comparable rates of sequels and slightly better facial nerve outcome.

Conclusion:

The well-established setting of interdisciplinary patient care and surgery is a milestone and a

base for ongoing teaching in schwannoma surgery. This is highly needed in view of increasing patients numbers at advanced tumor stages.

Surgical outcomes of the multidisciplinary treatment of Koos grade IV vestibular schwannomas

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Fernando Ruiz Juretschke

Topic:

Lateral skull base

Introduction:

Microsurgical resection is the first line treatment for large and giant vestibular schwannomas compressing the brainstem (Koos IV) with the goal of achieving maximal resection, facial nerve preservation and minimal morbidity. The present study focuses on the surgical outcomes and complications of a multidisciplinary approach to Koos IV vestibular schwannomas.

Methods:

A review of a prospectively kept database of all vestibular schwannomas (VS) operated on between 2008 and 2024 by a multidisciplinary team from the departments of Otolaryngology and Neurosurgery at the University Hospital Gregorio Marañón in Madrid is presented. Clinical presentation, surgical outcomes and complications for Koos IV vestibular schwannomas are reported and compared to the results in small to large VS in the same series.

Results:

From a total of 447 consecutive VS operated during the study period, 95 were Koos IV. As compared to the rest of VS, Koos IV schwannomas initially presented with a higher rate of non-serviceable hearing (85% vs 70%), cranial nerve deficit (42% vs 8%) and hydrocephalus (19% vs 1%). The preferred surgical approach was translabyrinthine (83%) achieving a lower rate of complete resection than for Koos I-III tumors (74% vs 91%). Good facial nerve outcome (House-Brackman grades I-III) could be achieved in fewer patients (58% vs 92%), while more neurological complications were reported (26% vs 8%).

Conclusion:

Koos grade IV vestibular schwannomas represent large space occupying lesions of the posterior fossa with sometimes life-threatening brainstem compression. Therefore, multidisciplinary skull base teams must beware of the higher risk of facial nerve palsy and other neurological complications when planning the surgical approach and the extent of resection.

Impact of Covid-19 pandemic and surgeon retirement on skull base caseload and vestibular schwannoma surgery outcomes.

Type of abstract:

abstract for oral presentation

Authors:

Brendan Davis, Nathan Creber, Juliette Buttimore, Giandomenico Basile, Patrick Axom, Neil Donnelly, Daniele Borsetto, James Tysome, Mathew Guilfoyle, Robert Macfarlane, Richard Mannion

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Presenting author:

Brendan Davis

Topic:

Lateral skull base

Introduction:

In the wake of the COVID-19 pandemic, the landscape of skull base surgery has undergone significant transformations, further compounded by an evolving demographic shift in surgeon retirements. We aim to explore the impact of these phenomena on patient care, surgical practice, and the sustainability of skull base expertise.

Methods:

Retrospective analysis of posterior fossa skull base cases over a 5-year period. We divided the cases into three groups to establish a control group (January-2019 – February-2020) and groups affected by COVID-19 pandemic (March-2020 – January-2022) and the retirement of the senior skull-base neurosurgeon (January 2022 onwards). Data collected included patient demographics, waitlist duration, delayed surgical start time, surgical duration, length of stay, extent of resection and facial nerve outcomes.

Results:

Both the COVID-19 pandemic and senior surgeon retirement resulted in reduced operative caseload compared to baseline (2.43, 2.87 and 3.6 cases/month respectively). There was a reciprocal increase in tumour size and surgical wait time after the onset of the pandemic due to restricted access to theatre. The pandemic resulted in persistently delayed surgical start time by >30 minutes compared to the baseline group. This is due to increased pre-operative safety checks and forced theatre relocation causing less streamlined pre-operative workflow. Subject to statistical analyses, we will present the clinical outcomes across the groups.

Conclusion:

The COVID-19 pandemic and the retirement of a senior skull base neurosurgeon both had an impact upon skull base caseload. Knowledge of this allows for effective contingency planning for future worldwide events and subspecialty succession planning through targeted fellowships and continuation of training through mentorship beyond consultant appointment.

Vestibular schwannoma surgery: surgical approach based on tumor dimension.

Type of abstract:

abstract for oral presentation

Authors:

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Giulia Bertoli, ENT Department, Parma.

Enrico Liaci, ENT Department, Parma.

Filippo Di Lella, ENT Department, Parma.

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Presenting author:

Giovanni Pepe, ENT Department, Parma.

Topic:

Lateral skull base

Introduction:

Vestibular schwannoma (VS) resection may be handle through different surgical approaches, mainly based on two factors: pre-operative hearing and tumor size.

Methods:

A retrospective review of all VS patients, operated on between January 2015 and February 2024 at our institution, is conducted.

Results:

Tumors greater than 1.5 cm in diameter and with non-serviceable hearing are usually address through an enlarged trnaslabyrinthine approach (ETLA). The anterior or posterior extension of the mass, or the growing diameter may dictate the need for the adjunct of a subtotal petrosectomy or a transotic/transcochlear approach.

Conclusion:

We present our experience in the management of VS, especially those of great dimension that usually require modification or alternative to the ETLA to be successfully handled.

Untreated vestibular schwannoma: A systematic review on growth determinants.

Type of abstract:

abstract for oral presentation

Authors:

Cheng Yang*, Daniel Alvarado*, Pawan Kishore, Dirk Kunst, Max Keizer, Koos Hovinga, Yasin Temel.

All authors are affiliated to the Department of Neurosurgery, Maastricht UMC+, Maastricht, The Netherlands.

*These two authors contributed equally to this work.

Presenting author:

Daniel Alvarado

Topic:

Oncology

Introduction:

Vestibular schwannoma is the most common benign tumor in the adult cerebellopontine angle. The growth rate of vestibular schwannoma shows a great variability among individuals. The objective of this study is to understand key factors that influence the growth rate of this kind of tumors.

Methods:

This review was conducted according to the PRISMA guidelines. A systematic review of 3 databases (PubMed, Cochrane Library, EMBASE) was performed to identify growth factors of vestibular schwannomas. The search was limited to studies reported between January 2000 and January 2024. We conducted a systematic review of the literature to understand the variables that contribute to the growth of vestibular schwannomas.

Results:

Five studies indicated that no factor could predict growth. Three articles have shown that age has a certain predictive effect on growth behavior, while no research has shown that gender and the tumor side have an impact on tumor growth. Three articles indicated that the growth in the first year can predict subsequent growth. Most positive results are focused on the location of the tumor, initial tumor size, and clinical symptoms such as hearing loss and imbalance. Posture swing tests and MRI signal intensity are new predictive factors.

Conclusion:

The most significant factors associated with tumor growth were tumor location, initial tumor size and vestibular symptoms. In the last years, MRI signal intensity and posture test has been strongly linked as a predictive factor in vestibular schwannoma growth. These findings might help in the future of vestibular schwannoma treatment.

Cerebral venous sinus thrombosis post vestibular schwannoma resection

A Case Series

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Mr Alireza Shoakazemi

Topic:

Lateral skull base

Introduction:

Post operative cerebral venous sinus thrombosis (pCVST) is observed to be a significantly frequent postoperative complication in various lateral skull base approaches, 38% post translabyrinthine approach and 30% post retrosigmoid approach to vestibular schwannoma.

Methods:

We present a retrospective single centre case series of 48 patients who underwent translabyrinthine or retrosigmoid approach for vestibular schwannoma resection. Our cohort demonstrated 0% incidence rate of clinical and/or radiological post-operative venous sinus thrombosis. All translabyrinthine approaches were done by the same ENT and neurosurgical team, Bill's island method was utilised to avoid injury or occlusion of the sigmoid sinus and

fixed retraction of the sinuses was avoided. There was one small sinus injury in the cohort which was easily controlled with haemostatic agents. We used lumbar drain in majority of our translabyrinthine cases.

Results:

The authors' series has looked into risk factors well documented in literature, such demographics comorbidities, surgical approach, surgical technique and tumour properties, and found no statistically significant correlation for developing pCVST.

Conclusion:

The combination of ENT involvement utilising the Bill's island method, and the routine protective lumbar drain insertion are two factors further to be studied in larger scale to confirm their protective function against pCVST.

Shifting management strategies in 30 years of multidisciplinary vestibular schwannoma care: an evaluation of 3141 patients

Type of abstract:

abstract for oral presentation

Authors:

Nick P. de Boer, Radboud W. Koot, Martijn J.A. Malessy, Heiko Locher, Jeroen C. Jansen, Erik F. Hensen.

Presenting author:

Nick P. de Boer

Topic:

Lateral skull base

Introduction:

To evaluate 30 years of multidisciplinary treatment and the survival for all patients with a vestibular schwannoma presenting at the Leiden Skull Base Team, Leiden University Medical Center. All treatment strategies, i.e., active surveillance, radiotherapy and surgery, were evaluated over time with a focus on shifts in management strategies.

Methods:

Cancer registries of the Leiden University Medical Center and the Integraal Kankercentrum Nederland (IKNL) between 1990 and 2020 were reviewed. Data from all patients with a vestibular schwannoma data on demographics, tumor size, treatment modality and survival were included.

Results:

In total 3141 patients were included for analysis, with an average follow-up of 139 months. Between 1995-1999 patients were initially surgically treated, in over 54%, compared to 10% between 2015-2020. Nowadays primary surgery is indicated for large vestibular schwannomas (98% of all operated tumors are >25mm, on average 32mm). Radiotherapy, in all periods, varied between 2-12%. Since 2000-2004 active surveillance is most often initially indicated, up to 89% in 2015-2020. Overall, 25% of all patients will undergo radiotherapy or surgery after a period of active surveillance, and 75% of all patients are not treated.

Conclusion:

The treatment paradigm has shifted from primary treatment to a more conservative regiment with active surveillance. Surgery remains an important treatment modality, especially in large and rapid growing vestibular schwannomas.

Wednesday 5 June: Session 4: 15.30 - 17.00: Anterior/Central Benign tumors & General

Craniopharyngiomas: a personal surgical experience supporting endonasal resection

Type of abstract:

abstract for oral presentation

Authors:

Eduard Voormolen UMC Utrecht, Michelle Grouls UMC Utrecht, Virginia Levrini UMC Utrecht, Cecile Hannen UMC Utrecht, Hans Thomeer UMC Utrecht, Ivonne Ligtenberg UMC Utrecht, Sander de Ru UMC Utrecht, Digna Kamalski UMC Utrecht

Presenting author:

Eduard Voormolen

Topic:

Anterior/central skull base

Introduction:

To explore the difference in surgical outcomes in relation to surgical approach - endonasal vs. pterional craniotomy – in adult craniopharyngioma patients.

Methods:

Consecutive adult patients with craniopharyngiomas were included in this single center and single surgeon series. Patient characteristics and craniopharyngioma characteristics (location, geometry and volume) were extracted from the hospital electronic patient system. Documented decision making process on surgical approach type, and surgical outcome measures (extent of resection, cranial nerve deficits, hormone status, hypothalamic function), application of radiation therapy, were also extracted.

Results:

Six cases were included. Three patients received a standard open pterional craniotomy and microsurgical resection and three patients were treated by an endonasal transtuberulum approach with angled endoscopes. Patients treated via craniotomy had less extent of resection, and more frequent cranial nerve deficits, more frequent need for post-operative radiotherapy, and more hormonal function loss compared to patients treated via an endonasal approach. Other complication rates, including cerebrospinal fluid leak, were similar.

Conclusion:

Albeit in a limited amount of cases, this personal surgical experience demonstrates significantly better surgical outcomes in craniopharyngioma patients treated through endonasal approaches, over patients receiving a craniotomy.

Endocavitary treatment of cystic craniopharyngiomas with interferon alpha 2b.

Type of abstract:

abstract for oral presentation

Authors:

Samir Amine Benbouali / Department of Neurosurgery, Oran, Algeria

Kamilia Ghazi / Department of Neurosurgery, Oran, Algeria

Presenting author:

Topic:

Oncology

Introduction:

Craniopharyngioma is a disease of life. Many authors agree to use the term of remission rather than cure. Microsurgical excision, radiosurgery and endocavitary treatments being different therapeutic choices which must be complementary. Endocavitary treatment with interferon alpha 2b currently occupies a crucial place in the therapeutic arsenal for craniopharyngioma cysts.

Methods:

Fourteen patients were treated with this even less invasive and structurally less aggressive technique of adjacent vessels and nerves. Interferon alpha 2b is currently recognized as the least neurotoxic product among various molecules to be instilled. The placement of the subcutaneous reservoirs, whether Rickham or Omay, is carried out under stereotactic conditions under MRI, assisted by neuronavigation allowing a better study of the trajectory and structures from the entry orifice to our deep target.

Results:

Our series of cystic craniopharyngiomas treated with interferon alpha allowed us a satisfactory tumor control rate close to control by nearly 80% with an interest in recurrent forms, in comparison to other published series in literature.

Conclusion:

This technique, practiced with a view to inhibiting the secretion of tumor fluid by the internal wall of the cyst, without significantly damaging the adjacent vascular and neural structures, is currently recognized, and applied as the treatment of this serious chronic pathology.

The experience with the Inside-Out Technique for resection of Craniopharyngiomas during Endoscopic Endonasal Approaches (EEAs)

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Georgios A. Zenonos, University of Pittsburgh Medical Center

Topic:

Anterior/central skull base

Introduction:

Craniopharyngiomas are often erroneously approached as extra-axial lesions resulting in microvascular injury and subsequent infarcts causing hypothalamic or visual dysfunction. We discuss the inside-out concept during resection of craniopharyngiomas and present our experience with this technique aiming to facilitate resection while preserving the microvasculature.

Methods:

Contrary to an extensive subarachnoid dissection, after a wide exposure the stalk is dissected, but the subarachnoid space is left otherwise intact. Much analogous to vestibular schwannoma resection, after internal debulking from an entry point where the tumor comes to the surface, the dissection plane with the normal stalk is established early and propagated from the inside of the tumor towards the tuber cinereum, hypothalamus, and the chiasm (inside-out). The correct plane usually results in a thin tissue layer left with the suprasellar microvasculature thereby protecting it. The experience with this technique during the last 5 years is presented.

Results:

During the last 5 years, 44 consecutive patients with craniopharyngiomas were treated at our institution using the inside-out technique during EEA. Thirty-five tumors were adamantinomatous, 7 were papillary, whereas two were not specified. Gross total resection was achieved in 36 patients. Complete preservation of pituitary function was possible in two patients, whereas partial preservation (either no need for DDAVP or no need for steroids) was possible in 10 additional patients. Two patients had slight visual field deterioration, with one returning to baseline, and no patient had evidence of a hypothalamic infarct on immediate post-operative MRI imaging.

Conclusion:

The inside-out technique is safe and effective in treating craniopharyngiomas. This technique facilitates more complete resections as the correct plane can be extrapolated higher in the third ventricle which is harder to reach, and increases safety as it decreases the possibility of microvascular injury to the hypothalamus and chiasm.

Endoscopic transclival approach to brainstem cavernomas: our preliminary experience and the role of diffusion tensor imaging with tractography

Type of abstract:

abstract for oral presentation

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Presenting author:

Alessio Iacoangeli

Topic:

Anterior/central skull base

Introduction:

Brainstem cavernous malformations are benign subset of cerebral cavernous malformations; their annual incidence of hemorrhage is higher than other angiomas and they are more symptomatic given their proximity to critical fiber tracts. Endoscopic endonasal and diffusion tensor imaging techniques have been used for the removal of ventral skull base lesions.

Methods:

3 cases of patients with evidence of hemorrhage from a ventrally located pontine cavernoma, treated with an endoscopic endonasal transclival approach in the last two years were retrospectively reviewed; clinical-radiological findings, recurrence rate, surgical technique and radicality were analyzed. In all cases tractography with diffusion tensor imaging (DTI), magnetic resonance imaging (MRI), frameless stereotactic navigation, and intraoperative neuromonitoring was used.

Results:

In all cases hemiparesis was the major clinical onset. Gross total resection was achieved. None of the patients experienced major complications. In 1 case a transient worsening of preoperative neurological deficits occurred (facial nerve palsy, hemiplegia and strabism) with subtotal resolution within 8 weeks. No direct injury to the surrounding neurovascular structures nor cerebrospinal fluid leak were observed. Postoperative neuroimaging confirmed complete removal and patients were routinely followed up by the ENT with a 1 – 2 and 4 week post operative outpatient endoscopic control.

Conclusion:

Our analysis showed that, in selected patients, the endoscopic transclival approach for ventrally located pontine cavernomas, is feasible and safe and improves surgical outcomes and resection. The use of Preoperative DTI could represent an additional tool to increase radicality and select the best surgical strategy for this challenging anatomical area.

Surgical management and treatment outcome of patients with juvenile nasopharyngeal angiofibroma: a multicenter retrospective study

Type of abstract:

abstract for oral presentation

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Presenting author:

Walter Szweryn

Topic:

Anterior/central skull base

Introduction:

Surgical management of juvenile nasopharyngeal angiofibroma (JNA) remains a challenge due to local aggressive behaviour and intraoperative haemorrhage. Recurrence is still an issue within treatment populations. Aim of this study was to describe outcomes of midfacial degloving (MFD), to evaluate prognostic factors for recurrence and formulate a generalized treatment strategy.

Methods:

Design: Multicentre retrospective cohort study between 1993 and 2023.

Setting: Two tertiary skull base centres.

Participants: 43 male patients, median age 16 (range 10-39 years).

Main outcome measures: Intra-operative blood loss, local control and adverse events.

Secondary outcomes included the prognostic value of age, tumour stage and tumour sites for recurrence.

Results:

Overall recurrence rate was 20.9% and for MFD 23.5% (n=34). Adverse events were seen in 45.7% of patients treated with MFD and in 50% related to the other surgical approaches. Risk factors associated with recurrence are tumour stage (Radkowski stage IIIB (p=0.032)) and a significantly higher degree of recurrence in patients aged ≤ 16 years compared to patients aged >17 years (36% vs. 0% recurrence, p=0.006) after MFD. Invasion of the pterygoid process and the infratemporal fossa were associated with recurrence at the concurrent subsite (p=0.028 and p=0.048, respectively).

Conclusion:

MFD is an appropriate treatment modality in the management of advanced stage ($>IIC$) JNA. There is an acceptable degree of recurrence. Adverse events after MFD were comparable to other surgical approaches. Higher degree of recurrence was seen in patients with age <16 years, and those with a stadium IIIB tumour.

Long term follow-up of multidimensional health-related quality of life after endoscopic endonasal surgery for pituitary adenomas using the endoscopic endonasal sinus and skull base surgery questionnaire

Type of abstract:

abstract for oral presentation

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Presenting author:

Gonneke Joustra

Topic:

Anterior/central skull base

Introduction:

Social functioning is an important factor in the evaluation of postoperative health-related quality of life (HRQoL) for pituitary adenoma patients. In a long term prospective cohort study multidimensional HRQoL of non-functioning (NFA) and functioning (FA) pituitary adenoma patients were evaluated.

Methods:

The endoscopic endonasal sinus and skull base surgery questionnaire, a HRQoL questionnaire (EES-Q), was prospectively completed by 52 patients preoperatively and postoperatively (2 weeks, 3 months, 12 months, 102 months). Preoperative and postoperative scores were compared. A generalized estimating equation analysis was

performed to identify significant HRQoL changes related to selected covariates during follow-up.

Results:

Two weeks postoperatively, physical ($p < .001$) and social ($p < .01$) HRQoL are worse and psychological ($p < .001$) HRQoL improved compared with preoperatively. Three months postoperatively, psychological HRQoL ($p < 0.05$) trended back to baseline and no differences in physical or social HRQoL were reported. One year postoperatively, psychological ($p < .02$) HRQoL improved while physical and social HRQoL remained stable. Long term follow-up shows a significant improvement in psychological ($p < 0.01$) and social HRQoL ($p < 0.05$) compared with preoperatively. No significant difference was found in physical HRQoL.

Conclusion:

Social functioning remains the most difficult area in which to achieve improvements. Despite the relatively modest sample size, there is some indication that the FA group continues to improve after 3 months, when most other parameters reach stability. The EES-Q provides meaningful information to improve patient-centred health care.

The "candy wrapper" of the pituitary gland: a road map to the parasellar ligaments and the medial wall of the cavernous sinus

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Simona Seriola

Topic:

Anterior/central skull base

Introduction:

The anatomy of the medial wall of the cavernous sinus (MWCS) and parasellar ligaments (PLs) has acquired increasing importance in endoscopic endonasal surgery of the cavernous sinus, including resection of the MWCS in functioning pituitary adenomas (FPAs).

Methods:

Forty-two CSs from twenty-one human heads were studied. Eleven specimens were used for EE dissection; five underwent a microscopic dissection. Five specimens were used for histomorphological analysis.

Results:

Two groups of PLs with a fan-shaped appearance were encountered. The anterior group included the periosteal ligament (55% sides) and the carotico-clinoid complex (100% sides), formed by the anterior horizontal and the carotico-clinoid ligaments. The posterior group was formed by the posterior horizontal (78% sides), and the inferior hypophyseal ligament (34% sides).

The ligaments related to the ICA form part of the adventitia.

Conclusion:

The "candy wrapper" model adds further details to the previous descriptions of the PLs. Understanding this complex anatomy is essential for safe CS surgery, including MWCS resection for FPAs.

The Oculomotor Cistern and Pituitary Adenomas (PitNETs): Anatomical and Clinical Study

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Simona Seriola

Topic:

Anterior/central skull base

Introduction:

The oculomotor cistern is a meningeal cuff filled with cerebrospinal fluid, which contains the oculomotor nerve (CN III) at the level of the lateral wall of the cavernous sinus (LWcs). Few studies have investigated the involvement of OMC by pituitary adenomas (PitNETs).

Methods:

Ten hemisellae from formalin-fixed specimens were studied with three μm sections. A digital image analysis software (QuPath v0.2.3) was used for morphological and quantitative assessments.

Clinical, radiological, surgical, and histological data of patients undergoing endoscopic transsphenoidal surgery for PitNETs between 2014 and 2021 were recorded. OMC involvement was graded as not involved, compressed, and invaded. The same surgical team operated on all patients.

Results:

The OMC had an elliptical shape with an average area of 3.1 mm² and a length of 5.5 mm. No cisternal points of weakness were recognized in the histomorphological study. Of 315 patients, 246 had complete data: apoplexy and CN III palsy were documented in 6.9% and 8.5%, respectively. OMC compression and invasion were recorded in 106 (43%) and 23 (9%) patients. Significant associations between OMC involvement and PitNETs dimensions, Knosp's grade, preoperative oculomotor palsy, Ki-67%, and recurrence/progression of residual were found.

Conclusion:

Significant OMC involvement by PitNETs might be under-recognized, can be treated with the endoscopic transsphenoidal approach, and impacts patients' outcomes.

Radiotherapy and Surgery for Vestibular Schwannomas: A Retrospective Analysis of a Single Center

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

To report our results on tumor control and hearing preservation after linear accelerator (LINAC)-based stereotactic radiotherapy or surgery for vestibular schwannomas (VS) in a tertiary referral center.

Methods:

All patients who presented with VS in our center between 2010 and 2021 and who were treated with LINAC-based radiotherapy or surgery were retrospectively analyzed. Pure tone average and speech discrimination score represented hearing outcome, pre- and postradiotherapy. A Gardner-Robertson grade I or II hearing represented functional hearing. Postoperative complications were collected, especially facial nerve function.

Results:

35 patients were treated with LINAC-based radiotherapy. 24 patients were treated with radiosurgery and eleven patients with fractionated stereotactic radiotherapy. 18% translabrynthine schwannoma resections showed post-operative growth with a follow-up of 14,5 months (range 7-39). Five out of the nine (55,6%) retrosigmoid schwannoma resections showed post-operative growth at a median follow-up of 25,5 months (range 8-122). Patients with preoperative acceptable facial nerve function (HB grade ≤ 2) at 1 year follow-up (n=30) maintained this function in respectively 58,9% and 69,2% after the translabrynthine and retrosigmoid resection. Tumor control was 95%

Conclusion:

These data emphasize that although the rate of tumor control (the primary goal of radiotherapeutic treatment) is high after radiotherapy, hearing preservation on long term is limited. Gross total resection and tumor control in larger tumors (grade 3 and 4) is more frequently attained in translabyrinthine compared to retrosigmoid resection.

Thursday 6 June: Session 5: 08.30 - 10.00: Vestibular & General

Investigating the role of [18F]-FDG PET-imaging in the treatment of necrotizing external otitis

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

Previous research indicates that imaging with [18F]-FDG-PET has added value in treatment evaluation of necrotizing external otitis. This study aims to analyse observations on the maximum standard uptake value from previous research in a new cohort, and to explore treatment criteria by correlating these results with clinical findings.

Methods:

For this retrospective study, patients of two university medical centers were included. A total of 13 new patients (group I) and 8 patients, previously analysed in another study, (group II) were included. All patients had a proven necrotizing external otitis (NEO) and at least two PET-scans over the course of their treatment. Maximum standard uptake values (SUVmax) were measured on the unaffected side and the affected side.

Results:

A statistically significant decrease was found in the SUVmax of the affected side, at baseline versus post-treatment, in both groups. Unlike the SUVmax on the unaffected side. After treatment, statistically significant differences remain between the SUVmax on the unaffected side and the affected side, in both groups. The average SUVmax on the affected side post-treatment, in group I, was 3.00 with 95%CI [2.50 - 3.50]. In group II, the average SUVmax on the affected side was 3.47 SUV-bw with 95%CI [2.44 - 4.51]. None of the patients had recurrence of disease.

Conclusion:

When using hybrid imaging with [18F]-FDG-PET and MRI/CT in NEO, normalization of SUVmax on the affected side may not need to be achieved for safe discontinuation of treatment. This study suggests possible factors that could guide establishment of cut-off criteria in terms of standard uptake values.

Restoring vestibular function with a vestibular implant - Current challenges and an update on the second generation device

Type of abstract:

abstract for oral presentation

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Presenting author:

Joost Stultiens

Topic:

Lateral skull base

Introduction:

The peripheral vestibular system is key for at least three bodily functions: balance, gaze stabilization, and spatial orientation. For patients with bilateral vestibulopathy, no cure is available in current clinical care. The vestibular implant aims to compensate the lack of motion information by electrical current from implanted electrodes.

Methods:

Fifteen patients have been implanted with a first generation vestibulocochlear implant. Since 2021, 11 patients were implanted with the second generation device. Here, all vestibular electrodes stimulate the individual ampullary nerves after insertion through fenestrations in the semicircular canals (intralabyrinthine technique). Effects were evaluated using various quantifying and functional tests. Challenges towards developing a clinically applicable implant were identified.

Results:

The implant was able to partially restore the vestibulo-ocular reflex (video head impulse test, HIT), leading to improved functional results during walking on a treadmill (dynamic visual acuity test) or during fast head movements (functional HIT). Also postural responses were elicited. During home use (another prototype, JHU Baltimore) quality of life improved.

Despite these advancements, challenges persist. For example, in patients with good hearing there is a risk of hearing deterioration. Potential hearing loss during vestibular implantation is being investigated in patients undergoing translabyrinthine removal of a vestibular schwannoma. Also, precise electrode placement near the sensory epithelium remains crucial.

Conclusion:

A vestibular implant was shown feasible as a device for patients with bilateral vestibulopathy. Overcoming certain challenges could pave the way for a clinically applicable vestibular implant. This might benefit not only patients with bilateral vestibulopathy but also individuals with unilateral hypofunction or intermittent vertigo in the near future.

Vestibular implantation and obstructions of the semicircular canals

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

A vestibular neuroprosthesis, placed in the semicircular canals, can partially restore vestibular function by providing motion information electrically. Surgical challenges arise from potential obstructions in the canals. The aim was to relate preoperative imaging to intraoperative findings of semicircular canal obstructions during vestibular implantation and develop surgical strategies.

Methods:

Patients were recruited from an active clinical trial investigating effects of a second generation vestibulocochlear implant and were included when preoperative imaging (high resolution CT and MRI) indicated an obstruction in one or more semicircular canals, but not in the ampulla. During surgery, the semicircular canals were extensively bluelined to reveal the course of the canals and potentially the location of the obstruction. When the location was identified, surgical techniques were applied to facilitate proper electrode positioning. Effect was evaluated intraoperatively with microscopic inspection and postoperatively with CT.

Results:

Three patients with bilateral vestibulopathy due to DFNA9 were included. There was an absent or low intensity T2 weighted MRI signal and normal density on CT in the superior semicircular canal (one patient), the posterior canal (one patient), or both canals (one patient), suggesting soft tissue obstructions. During surgery, a 'whiteline' instead of blueline appeared at these locations. After identification, different surgical procedures were applied, i.e. using a dummy electrode to probe, removing the obstructive tissue, and creating a

bypass fenestration. Eventually, all electrodes could be implanted in the semicircular canal ampullae. A diagnostic and surgical guide was developed.

Conclusion:

Conclusions

Obstructions of the semicircular canals may impede implantation of the semicircular canals. However, preoperative imaging and intraoperative bluelining can help determine the locations of these obstructions. Consequently, proper surgical techniques can be applied to facilitate electrode insertion. From these experiences, a diagnostic and surgical guide was developed.

Vestibulocochlear implant (VCI) stimulation in bilateral temporal bone fractures to manage hearing loss and vestibulopathy: a case series

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Bernd Vermorken

Topic:

Lateral skull base

Introduction:

Temporal bone fractures are the most common traumatic injuries that can cause loss of hearing and vestibular function. This study evaluates the feasibility and efficacy of vestibular stimulation in order to restore vestibular function in patients suffering from bilateral vestibulopathy caused by bilateral temporal bone fractures.

Methods:

This study reports two cases, both 63 years old, with sensorineural hearing loss and bilateral vestibulopathy caused by bilateral otic capsule-violating temporal bone fractures due to severe head injury. Both cases were unilaterally implanted with the newest multichannel vestibulocochlear implant (VCI) prototype. One case was implanted with a CI on the contralateral side. After regular CI fitting, the vestibular implant was fitted and activated. The effect on vestibulo-ocular reflexes (VOR), balance and self-motion perception was evaluated using different stimulation parameters.

Results:

VCI implantation was scheduled within 2 months after head trauma, to prevent potential loss of patency of the end-organs. Multichannel implantation was feasible with electrode positions within 1.5 mm of the target zone. Initial acute vestibular stimulation resulted in eye movements and movement perceptions following Ewald's law. Prolonged vestibular

stimulation resulted in a reduction of oscillopsia and decreased self-motion perception thresholds. Hearing performance did not differ compared to general CI users.

Conclusion:

VCI stimulation provided effective aural rehabilitation, signs of VOR restoration and decreased self-motion perception thresholds in two patients with bilateral temporal bone fractures.

Subtotal Petrosectomy in children: what can be learned from a multicenter study?

Type of abstract:

abstract for oral presentation

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Presenting author:

Prof. Dr. med. Thomas Linder

Topic:

Lateral skull base

Introduction:

To evaluate indications and surgical outcome of subtotal petrosectomy (SP) in the pediatric age and to focus on surgical issues under 2 years of age.

Methods:

A multicenter retrospective review was performed of 33 pediatric patients (≤ 16 yrs) that underwent 42 SPs in the last 17 years in 4 international centers, using the same Fisch surgical technique. We analyzed the demographic data, the extent of disease/indication for SP, the details of surgery, the post-operative complications, and follow-up.

Results:

The majority of children (90%) had no serviceable hearing and simultaneous cochlear implantation was performed in 60% of the cases. In small children the main reasons were inner ear or other ear malformations, often associated to recurrent otitis media, OME or anatomical issues, in older patients the most common cause was extensive cholesteatoma. The mean duration of surgery was 3.5 hours. Various sites had to be identified to harvest the fat for obliteration. Minor complications occurred in < 5%. Mean follow-up was 4.5 years, with no evidence of recidivism at the last follow-up.

Conclusion:

Even in the pediatric age, SP helps in managing complex anatomical situations and chronic ear disease in cochlear implant recipients. Preoperatively, various aspects must be considered, e.g. sequential versus simultaneous treatment in bilaterally diseased children, intraoperative blood loss, as well as the site of fat harvesting for obliteration.

The effect of intratympanic gentamicin as a prehabilitation strategy for objective and subjective vestibular function in patients undergoing microsurgery for a unilateral vestibular schwannoma

Type of abstract:

abstract for oral presentation

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Topic:

Lateral skull base

Introduction:

A significant percentage of patients with vestibular schwannoma suffers from dizziness, which jeopardize their quality of life. The use of intratympanic gentamicin could help to ameliorate the dizziness after their surgery.

We aimed to review the effects of intratympanic gentamicin treatment in vestibular schwannoma patients undergoing surgery.

Methods:

A systematic literature search was conducted up to March 2023 in Pubmed, Embase, Cochrane, Web of Science, Academic Search Premier, Google Scholar and Emcare databases.

Review methods: Articles on the effect of intratympanic gentamicin followed by vestibular schwannoma surgery were reviewed. Data on objective vestibular function and subjective outcomes were compiled in tables for analysis. Relevance and methodological quality were assessed with the Methodological Index for Non-Randomized tool.

Results:

A total of 281 articles were identified. After screening and exclusion of duplicates, 13 studies were reviewed for eligibility, of which 4 studies could be included in the review. The posturography test, the subjective visual horizontal test and the optokinetic nystagmus test showed decreased vestibular function in the group of patients that received intratympanic gentamicin before microsurgery compared to the group of patients without gentamicin.

Other objective tests did not show significant differences between patient groups. Subjective vestibular outcomes, as evaluated by questionnaires on quality of life and/or dizziness, did not seem to improve from intratympanic gentamicin pretreatment.

Conclusion:

Vestibular schwannoma patients under intratympanic gentamicin before surgery performed better in the posturography test, subjective visual horizontal test and the optokinetic nystagmus test afterwards. However, studies that also evaluated subjective outcomes; dizziness, anxiety, depression, and balance did not show a positive effect of intratympanic gentamicin on the vestibular complaints.

ANATOMICAL CHALLENGES OF THE EXTRALABYRINTHINE APPROACH FOR VESTIBULAR IMPLANTATION

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

Bilateral vestibular areflexia is a growing public health problem. A hope is brought by electrical stimulation for restoring vestibular function. Current studies are promising. But one challenge is the ideal positioning of the electrodes within the extralabyrinthine approach.

Methods:

Study of morphological measurements of semicircular canals and semicircular canal ampulla relationships from 50 petrous bone CT scans, combined with a morphological study of ampullary nerves on a 3D vestibular model developed from a micro-CT reconstruction of a petrous bone prepared with osmium tetroxide. Finally, dissection and search for ampullary nerves in 10 fresh or frozen specimens.

Results:

Various measurements of the ratios of the semicircular canal ampullae and morphological analysis of the 3D model aided dissection, with the singular nerve found 8 times out of 10, and the superior and lateral ampullary nerves found 1 time out of 10. The incudostapedial joint was in front of the superior and lateral ampullae in 100% of cases, and the facial nerve was never damaged.

Conclusion:

Ampullary nerves are fine, fragile structures, and seeking them during an extra-labyrinthic approach based only on anatomical knowledge may result in their destruction. In order to preserve their function, their approach must be planned on a preoperative CT scan, and assisted by intraoperative methods of detection.

NECROTIZING OTITIS EXTERNA

A New Protocol for outpatient management and reducing hospital stay

Type of abstract:

abstract for oral presentation

Authors:

Salman Hashmi, Mansour Hussain, Mohamed Elmorsy, Noweed Ahmad

Presenting author:

Salman Hashmi

Topic:

Lateral skull base

Introduction:

Necrotising otitis externa is an aggressive and potentially fatal infection of the external auditory canal and skull base for which there are no established management guidelines. It has a Disease specific mortality of around 14%. In Recently around 6 fold increase has been reported with more common treatment failure

Methods:

A prospective analysis of the cases after implementing a new outpatient based , Multidisciplinary protocol was done. The out comes measures were successful outpatient treatment, Length of hospital stay and disease recurrence. A comparision was made with our pre protocol cohort of patients

Results:

77% of the patients were treated as an out patient successfully and lenght of stay was reduced from mean 16 days (pre) to mean. 2 days. Relapse was reduced from 28% to 2.8%. 70% of the patients were treated with oral ciprofloxacin only. There was slightly low rates of cranial nerve palsies seen but statistically not significant.

Conclusion:

Early multidisciplinary team approach during the course of patient management is the key feature and the main pillar which our protocol is built on. Most patients can also be treated with oral antibiotics throughout the course of the disease with out any adverse features

Thursday 6 June: Session 6: 08.30 - 10.00: Oncology

Two Decades of Skull Base Chondrosarcoma Management: Insights from Lariboisière Hospital

Type of abstract:

abstract for oral presentation

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Presenting author:

Jonathan Chainey

Topic:

Anterior/central skull base

Introduction:

Chondrosarcomas (CS) are rare malignant skull base tumors and primarily treated by surgical resection and adjuvant radiotherapy. In this study, the authors present their experience in managing skull base chondrosarcomas over a 21-year period.

Methods:

A retrospective study of skull base chondrosarcomas surgically treated at Lariboisière Hospital from 2002 to 2023 was conducted. Patients' demographics, clinical presentation, preoperative MRI characteristics, extent of resection (EOR), postoperative course, administration of adjuvant therapy (proton beam radiotherapy (PBRT) and/or photons radiation therapy) and follow-up information were collected.

Results:

74 surgeries were performed in 67 patients. Tumor location influenced the EOR ($p = 0.018$) and new or worsened postoperative cranial nerve palsy was associated with higher EOR ($p=0.04$), however, EOR did not affect recurrence rates. 5-year PFS rate was 68.4%. WHO grade 1, tumor locations, and absence of postoperative radiotherapy were associated with recurrence ($p=0.022$, $p=0.0002$, and $p=0.0352$, respectively). OS rate was 87% and was improved in grade 2 tumors and patients receiving PBRT or a combination of photons/protons radiotherapy postoperatively ($p<0.0001$ and $p=0.0222$, respectively).

Conclusion:

Chondrosarcomas have low mortality yet significant recurrence rates, mitigated by postoperative radiation. This study questions prioritizing EOR over quality of life, given associated cranial nerve injuries without clear recurrence benefits. Interestingly, higher WHO grades didn't predict worse outcomes suggesting molecular markers might offer superior prognostic value than histological grading.

Skull base chordomas and chondrosarcomas-long terms outcomes using 3600 approach and multimodal treatment

Type of abstract:

abstract for oral presentation

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Topic:

Anterior/central skull base

Introduction:

Skull base chordomas and chondrosarcomas remain pathologies challenging to treat despite maximal surgical resection and radiotherapy (RT).

The aim of our study was to assess the role of radiologic risk factors of recurrence, and the role of gross total resection (GTR) on survival outcomes of these skull base tumors.

Methods:

We analyzed the clinical, radiological, and histopathology data of patients operated in our center for skull base chordoma, chondrosarcoma or parachordoma from 1998 to 2024. Sekhar's chordoma score was assessed.

The chi-square test, ANOVA, ROC curve analysis, and logistic regression were used to identify predictors of GTR and progression-free survival (PFS). Kaplan-Meier and Cox proportional hazards modeling were performed.

The study includes 40 patients who underwent surgery: 30 (75%) with chordomas, 9 (22.5%) with chondrosarcoma, and 1 (2.5%) with parachordoma.

Results:

The study included 40 patients. GTR was achieved in 10 patients (25%), the adjuvant radiotherapy was used in 32 patients. GTR increased with endoscope.

Significant predictors of radicality of surgery: tumor volume and Sekhar's score ($p=0.026$; 0.009 , respectively).

Prediction of the PFS: initial tumor volume, chordoma score, residual volume, extent of surgery were significantly associated with better PFS ($p=0.12$; 0.012 ; 0.02 ; 0.033 , respectively). Cut-off value of chordoma score was " >8 ".

Kaplan-Meier analysis revealed significantly better PFS-probabilities for chondrosarcoma and GTR, but no difference for the modality of RT.

Conclusion:

Our rate of GTR increased to 27% since introduction of endoscope. Factors significantly impacting PFS are radical resection, volume of the tumor, and its extent, but not modality of RT. We are persuaded that Sekhar's chordoma score reflects the extent and technical difficulty of chordomas, thus having prognostic value.

Radiomics in prediction of histology of skull base chordomas and chondrosarcomas

Type of abstract:

abstract for oral presentation

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Topic:

Anterior/central skull base

Introduction:

Skull base chordomas and chondrosarcomas are slowly growing, locally invasive malignancies. Due to surgical complexity, the recommended management of chordoma integrates biopsy, frequently leading to local dissemination.

The aim of our study was to predict the histologic features using radiomics of preoperative-MRI imaging, and reduce the necessity for biopsy.

Methods:

We analyzed the clinical, radiological, and histopathology data of patients operated in our center for skull base chordoma, chondrosarcoma. Our dataset included 36 patients with preoperative MRIs (28 chordomas, 8 chondrosarcomas).

The radiomics was based on pre-processed and segmented preoperative MRI (T1wMRI, T2wMRI, FLAIR imaging). Dataset was split (0.3 testing). Our algorithm included extraction of >4000 combined features, training and classification models (e.g. XGBoost, 3-layer CNN,..) designed in Python.

The metrics of the binomial model was evaluated as accuracy, MAE, and model loss/accuracy in CNN. Shapley method extracted the most significant features for the final model.

Results:

The study included 36 patients with complete preoperative imaging: 28(77%) with chordomas, and 8(23%) with chondrosarcoma.

The best performing radiomics model integrating all 3 sequences was XGBoost. After tuning it achieved accuracy of 79% (95%CI 0.71-0.84) in prediction/distinction between chordoma/chondrosarcoma. AUC from ROC curve analysis was 0.78. T2-based features were among the most significant from this integrated model.

Machine learning :3-layer convolutional neural network achieved validation accuracy of 0.722.

The prediction capacity of these models is severely limited by small number of patients and heterogeneity of imaging protocols.

Conclusion:

Despite very low number of analysed tumors, our models distinguishes the chordoma from chondrosarcoma with the accuracy of 72-79%. We hope to collaborate with other centers in order to increase model's robustness, allowing us to better plan the resection of these invasive skull base tumors.

Cervical chordomas: results and factors influencing prognosis and survival in a single center case series.

Type of abstract:

abstract for oral presentation

Authors:

Rosaria Abbritti Lariboisière University Hospital, Thibault Passeri Lariboisière University Hospital, Yuri Ceccaroni Lariboisière University Hospital, Gonzague Guillaumet Lariboisière University Hospital, Konstantina Kavoura Lariboisière University Hospital, Emmanuel Mandonnet Lariboisière University Hospital, Sebastien Froelich Lariboisière University Hospital

Presenting author:

Rosaria Abbritti Lariboisière University Hospital

Topic:

Lateral skull base

Introduction:

Cervical chordomas (CC) account for approximately 6-7% of all chordomas and represent challenging lesions due to their close relationship with critical surrounding neurovascular structures. Thus, CC are mostly grouped with cranio-cervical junction chordomas in several series. In this study, the authors present their experience in treating pure CC.

Methods:

We presented a single center retrospective study carried out on 31 patients with CC (level C3-C7) treated from January 2002 to June 2023 on a series of 350 chordomas. This study analyzed the potential factors influencing the extent of resection (EOR) and the factors predicting survival and prognosis.

Results:

Thirty-one patients were included. They were divided in 3 groups according to the previous treatment. Chordomas was in high cervical level (C3-C4) in 24 (77,4%) patients and low cervical level (C5-C7) in 7 (22,6%) patients. Gross total resection was achieved in 17 (54,8) % of patients, near total resection in 11 (35,5%), subtotal resection in 2 (6,5%) and partial resection in 1 (3,2%). The 5-year PFS and OS were 51,1% and 79,7%, respectively. High cervical level correlated with a longer PFS (p=0.006).

Conclusion:

The treatment strategy of cervical chordomas remains challenging and controversial. Due to the rarity and complexity of this pathology patient's treatment should be attempted in an experienced multidisciplinary skull base center.

11 cases of sinonasal intestinal-type adenocarcinoma with spontaneous regression

Type of abstract:

abstract for oral presentation

Authors:

Dominiek Monserez, Senada Koljenovic, Jose Hardillo

Presenting author:

Dominiek Monserez

Topic:

Oncology

Introduction:

Although not a rare phenomenon, literature on spontaneous regression (SR) of head and neck cancers is scarce. In a period of 43 years 15 occasions of SR were documented in 11 patients with intestinal type adenocarcinoma (ITAC).

Methods:

Retrospective analysis of the medical records of these 11 patients treated in the Erasmus Medical Center.

Results:

All patients had a follow up, ranging from 76 to 394 months, and developed a total of 27 recurrences. In this group with high local failure there is only one disease related death. Two patients showed SR at presentation. In the other cases the median time between initial treatment and SR ranged from 8 to 278 months. Three times SR was noted during clinical follow up without any other intervention than the biopsy. On 12 occasions the biopsy was followed by surgery. In two thirds SR was not infinite and new recurrences developed after a median time of 29 months.

Conclusion:

The ITAC in this patients developed like a chronic disorder, warranting a lifelong follow up and repeatable treatment, minimalizing related morbidity. The principle of chronic inflammation promoting tumor progression versus acute inflammation leading to tumor regression could be a signpost for new secondary preventive, adjuvant and/or palliative treatment strategies.

**SINONASAL, NASOPHARYNGEAL, UPPER ORAL AND OROPHARYNGEAL CAVITY
ADENOID CYSTIC CARCINOMA: AN INTERNATIONAL MULTI-CENTER
RETROSPECTIVE STUDY ON 457 PATIENTS**

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

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Topic:

Anterior/central skull base

Introduction:

The study has the following aims: 1) define the best treatment strategy for patients suffering from adenoid cystic carcinoma (ACC) of the sinonasal tract, nasopharynx, upper-oral and upper-oropharyngeal cavity; 2) identify a new definition of recovery for ACC, given its unique behavior.

Methods:

Primary or secondary sinonasal, nasopharyngeal, upper oral and oropharyngeal cavity ACCs treated at the hospitals of Padua, Brescia, Paris, Varese, Houston were included. A pseudonymized database was created to collect patient-, treatment- and follow up-related data. A univariate survival analysis was performed in terms of overall survival (OS), disease-specific, progression- and recurrence-free survival (DSS, PFS, RFS). Local treatment strategies were compared to each-other and to the most relevant prognostic variables. Symptoms burden change after retreatment and cumulative incidence of adverse effects were calculated.

Results:

The study included 457 patients. The survival analysis demonstrated the prognostic validity of disease stage, grade, treatment intent, residue, response after treatment and margin status. The multivariate analysis demonstrated that cT, cM and Perzin/Szanto grade are independent prognostic factors. The analysis of symptoms burden change after retreatment demonstrated that, mostly, is higher. The cumulative incidence analysis showed that 40% of patients experienced at least one G3/G4 event at 120 months.

Conclusion:

The study demonstrated that: gross total resection w/o adjuvant radiotherapy provides higher DSS; patients who undergo treatment with non-curative intent are associated with worst prognosis; burden of symptoms and toxicity caused by retreatments are considerable despite limited prognostic gain; metastases can occur years after the primary treatment.

Immunotherapy in the Management of Sinonasal Mucosal Melanoma: A Systematic Review

Type of abstract:

abstract for oral presentation

Authors:

Anthony Tang, Suchet Taori, Sophia Dang, Paul Gardner, Georgios Zenonos, Diwakar Davar, Edward Kuan, Carl Snyderman, Eric Wang, Garret Choby, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Garret Choby, MD

Topic:

Anterior/central skull base

Introduction:

The aim of this work is to comprehensively review and synthesize the literature related to sinonasal mucosal melanoma (SNMM) treatment with immune checkpoint inhibitor (ICI) therapy, including potentially targetable genetic mutations, survival outcomes, and adverse events.

Methods:

The study protocol was designed according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. Databases were searched from inception through May 23, 2023, including Embase, Cochrane, Scopus and Web of Science. Outcomes including treatment response, overall survival (OS) and recurrence-free survival (RFS) are reported.

Results:

Genetic mutations for 876 patients were reported including 8.2% (95% CI: 7.7-8.7), 19.3% (95% CI: 18.5-20.1), and 9.9% (95% CI: 9-10) for BRAF, NRAS, and KIT mutations, respectively. The presence of brisk tumor-infiltrating lymphocytes was associated with improved RFS and OS. Six studies reported a combined 5-year OS after adjuvant immunotherapy treatment of 42.6% (95% CI: 39-45). Thirteen studies encompassing 117 patients reported a positive adjuvant ICI response rate of 40.2% (95% CI: 36-43). Tumors with Ki67<40% may respond better to ICI's.

Conclusion:

ICI therapy can be an effective in select SNMM patients, especially those with advanced/metastatic disease.

Pathologic Dural Invasion is Associated with Regional Recurrence in Esthesioneuroblastoma: A Multi-Institutional Study

Type of abstract:

abstract for oral presentation

Authors:

Anthony Tang, Paul Gardner, Carl Snyderman, Eric Wang, Georgios Zenonos, Garret Choby, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Garret Choby, MD

Topic:

Anterior/central skull base

Introduction:

Olfactory neuroblastoma (ONB) is a sinonasal malignancy that arises from the cribriform region. Neck metastases and recurrences are poor prognostic factors in ENB. We aim to evaluate the prognostic value of dural invasion (DI) in predicting rates of neck metastases and recurrence with large, multi-center database of ONB patients.

Methods:

This modern-era multi-center data originated from the retrospective review of electronic health records (EHRs) of all patients who presented with ENB between 2005 and 2021 at nine academic, tertiary care centers within North America. Clinicopathologic features including modified Kadish staging systems, margin status, treatment modalities, Hyams grading, follow-up time, overall survival and recurrence-free survival (RFS).

Results:

189 patients met inclusion criteria. Patients with pathologic DI had higher Hyams grade ($p = 0.02$), AJCC staging ($p < .001$), and modified Kadish staging ($p < .001$) compared to patients without pathologic DI. The 10-year RFS were 74.7% and 36.0% ($p=0.006$) while the 10-year regional RFS was 85.7% and 61.8% ($p=0.018$) for patients without and with pathologic DI, respectively. Cox multivariate analysis found pathologic DI to have a hazard ratio of 9.44 (95% CI; 1.01-88.1, $p=0.049$) for regional RFS after controlling for confounding factors.

Conclusion:

Patients with pathologic dural invasion were more likely to recur regionally in the neck. Future studies exploring the benefit of elective neck dissection for patients with pathologic DI are needed.

The Utility of lateral Temporal Bone Resection (LTBR) in locally advanced External Auditory Canal Carcinoma /VS concurrent chemoradiotherapy CCR: case report and literature review

Type of abstract:

abstract for oral presentation

Authors:

ASMA Talbi * Daoudi Abdoualjalil * Bouguettaya amina ** Naoun Lilia ***

*: ENT departement Annaba .Algeria

**: oncology departement Annaba .Algeria

***: radiotherapy departement Annaba .Algeria

Presenting author:

Assistant professor on ENT departement .Algeria

intersts : cancerology of Head and neck , vestibular medecine

first steps on skull base surgery

Topic:

Lateral skull base

Introduction:

Temporal bone carcinoma is a rare disease ., As a result of technical complexety , Subtotal TBR is being performed in relatively few hospitals and is replaced by (CCRT) in the treatment of advanced tumors.

we aimed to evaluate the treatment outcomes of EAC carcinoma: STBRV VS LTBR VS Concurrent chemo radiation .

Methods:

A 49yr-old man suffered from consistent otorrhea 1 yr earlier. Following a histopathological diagnosis of squamous cell carcinoma in the specimen, . Computed tomography revealed a disrupted external auditory canal and magnetic resonance imaging indicated a carcinoma equivalent to Pittsburg stage T3. The patient underwent lateral LTBR with total parotidectomy , facial nerve preservation and lymph node dissection

. His postoperative course was uneventful.

At one yr postoperative, , no recurrence was noted, and his facial nerve function was restored to House-Brackmann Grade III.

Results:

Recent results showed that the treatment outcome of T3 EAC carcinoma differed greatly according to the treatment strategy (CCRT or LTBR) :The 3-year DFS rate after CCRT for T3 tumors (0%) was significantly lower than that of LTBR (80%) .

Also T4 patient who received LTBR may died due to early local recurrence. These results suggest that LTBR but not STBR can be considered for limited cases with T3 patients, while it would not be suitable for T4 patients , so negative surgical margins would be important for obtaining a successful result by LTBR in T3/T4 tumors.

Conclusion:

'-For limited cases of T3 cases, LTBR achieved negative margin showed good survivals when combined with preoperative chemotherapy and/or postoperative RT/CCRT.

- the prognosis of T3 patients who could not undergo surgery and T4 patients was very poor. Even those who undergo a full protocol of concurrent chemo radiation .

Thursday 6 June: Session 7: 13.30 - 15.00: Anterior/Central General

Anatomical step-by-step dissection of complex skull base approaches for trainees: surgical anatomy of the microsurgical and endoscopic approaches to and through the orbit

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Yohan Alexander

Topic:

Anterior/central skull base

Introduction:

The orbit, housing intricate neurovascular structures, has been accessed through various surgical techniques, from traditional approaches to modern endoscopic methods. This study aims to deliver a didactic description of both microsurgical and endoscopic orbit access, providing step-by-step guidance anchored in anatomical foundations, tailored for skull base surgery trainees.

Methods:

Six cadaveric head specimens underwent modular dissections, encompassing endoscopic transorbital approaches (ETOAs) like preseptal lower eyelid, lateral cantotomy, precaruncular, and superior eyelid crease. Endoscopic endonasal approaches (EEAs) covered medial and inferior orbit, and endoscopic optic canal decompression. Additional approaches included Caldwell-Luc, orbitotomies, and cranio-orbitotomies. A 0-degree, 30-degree, and

45-degree endoscope (4 mm, 18 cm, Hopkins II, Karl Storz, Tuttlingen, Germany), attached to a high-definition camera were utilized for dissection. After each step was completed, the specimens were 3D photo-documented.

Results:

ETOAs provide a direct subperiosteal corridor along the orbital walls. Each approach follows anatomical landmarks, including ethmoidal arteries, optic foramen, orbital fissures, and the meningo-orbital fold. Selective drilling opens orbits to cranial fossae and extracranial regions. EEOAs provide access to medial orbital aspects with aesthetic advantages, minimal displacement of orbital structures, and enhanced visibility. Caldwell-Luc employs the maxillary sinus to reach the orbit floor with guidance from inferior and lateral rectus muscles. Orbitotomies and cranio-orbitotomies afford a comprehensive view, aiding precise manipulation and resection of orbital lesions, benefiting from well-established landmarks and adaptability for diverse pathologies.

Conclusion:

This study succinctly elucidates intricate surgical anatomy and procedural steps of orbit access methods, emphasizing their variants and applications. Designed for skull base surgery trainees, it aims to enhance comprehension and facilitate the learning journey in navigating neurovascular structures.

Origin and course of the branches of the cavernous internal carotid artery from the endoscopic endonasal perspective: a cadaveric study

Type of abstract:

abstract for oral presentation

Authors:

Edoardo Agosti, MD^{1,2,3}; A. Yohan Alexander, BA^{1,2,4} Danielle Dang MD⁵, Luciano Leonel, PhD^{1,2}; Carlos Pinheiro-Neto, PhD, MD^{1,6}; Maria Peris-Celda, MD, PhD^{1,2}

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Presenting author:

Yohan Alexander

Topic:

Anterior/central skull base

Introduction:

The rising use of endoscopic endonasal approaches (EEAs) for cavernous sinus lesions demands precise knowledge of cavernous internal carotid artery (cICA) branches to avoid inadvertent avulsion and intraoperative ICA rupture. Our goal is to document cICA branch origin and course from an endoscopic endonasal perspective, providing surgical guidance.

Methods:

Thirty formalin-fixed latex-injected specimens were dissected to identify the origin, course, and localization of cICA branches, including inferolateral trunk (ILT), meningo-hypophyseal trunk (MHT) from which the inferior hypophyseal artery arises, anterior and inferior McConnell's capsular arteries (MCAs), and superolateral trunk (SLT).

Results:

The ILT and MHT were consistently present, with anterior and inferior MCAs appearing in 28% and 25%, respectively. The MHT primarily originated 8.9 mm anterior to the foramen lacerum and 3.8 mm superior to the sellar floor, mostly from the medial side of the cICA posterior bend. The ILT started 6.4 mm from the MHT. The MCAs emerged at a mean distance of 5.3 mm and 4.8 mm from ILT for anterior and inferior MCAs, respectively. The SLT was the second cICA branch, with a mean distance of 5.1 mm from the MDT.

Conclusion:

The MHT is situated 4 mm superior to the sellar floor and 9 mm anterior to the paraclival ICA, while ILT 2.3 mm above the sellar floor and 6 mm anterior to the MHT. They respectively originate on the medial and lateral side of the horizontal cICA.

The Endoscopic Endonasal Surgery to The Lateral Compartment of Cavernous Sinus: Step-by-step Surgical Technique, Anatomical Considerations and Clinical Experience

Type of abstract:

abstract for oral presentation

Authors:

I-sorn Phoominaonin, University of Pittsburgh Medical Center Department of Neurosurgery, Eric Wang, University of Pittsburgh Medical Center Department of Otolaryngology, Garrett Choby, University of Pittsburgh Medical Center Department of Otolaryngology, Carl Snyderman, University of Pittsburgh Medical Center Department of Otolaryngology, Paul Gardner, University of Pittsburgh Medical Center Department of Neurosurgery, Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery

Presenting author:

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery

Topic:

Anterior/central skull base

Introduction:

Endoscopic endonasal approaches (EEA) have reinvigorated surgical treatment of pathology within the cavernous sinus. However, the lateral compartment remains a challenging area to operate in. Herein we describe a step-by-step anatomical and surgical considerations of the technique, as well as our experience with EEA in this compartment.

Methods:

The surgical technique involves a wide sphenoidotomy and a transpterygoid approach. The bone overlying the carotid is removed as well as the bone overlying the superior orbital fissure, Meckel's cave, and the pituitary gland. After hemostasis, the dural opening extends from the foramen lacerum inferiorly to the proximal dural ring superiorly. The dissection continues aiming to identify the abducens nerve, and separate it from the horizontal cavernous carotid. The inferolateral trunk is coagulated and divided to untether the carotid and allow medial mobilization. Six cadaveric dissections were performed. Our institutional experience over the past-decade was reviewed.

Results:

An approach to the lateral compartment was undertaken in 18 patients, including 11 pituitary adenomas, 3 chondrosarcomas, 2 chordomas, and 2 meningiomas. Postoperative abducens nerve and trigeminal nerve paresis occur in 4 and 1 patients, respectively. Vascular

injury involving the carotid occurred in 2 patients without permanent sequelae early in the series, but evolution of the technique has minimized complications in later years without any vascular injury.

Conclusion:

Although accessing the lateral compartment endonasally is still challenging, refinement of the surgical technique has made it safer and more effective. Appropriate case selection and intra-operative decision making remains crucial.

Pushing the Limits of the Anterior Petrosectomy : Extension into the Clivus (Landmarks, Techniques and Limitations)

Type of abstract:

abstract for oral presentation

Authors:

Jerold Justo, MD-MBA; Tancredo Alcantara, MD; Tingting Jiang MD, Jonathan Chainey, MD, Arianna Fava, MD; Norio Ichimasu, MD; Rosaria Abbritti, MD; Thibault Passeri, MD; Sebastián Froelich, MD

Assistance Publique - Hopitaux de Paris (Hopital Lariboisière)

Presenting author:

Jerold Justo, MD-MBA

Topic:

Anterior/central skull base

Introduction:

The anterior petrosal approach provide access to the posterior surface of the petrous bone through an subtemporal anterolateral and downward trajectory. This study aims to explore the extension of the drilling to the clivus medial to the petrous apex volume as well as describe critical landmarks, surgical techniques and limitations.

Methods:

5 Cadaveric formalin-fixed and injected specimens were used. Dissections have been performed in the experimental neurosurgical laboratory of Lariboisiere Hospital. Pre and post dissection scans were done to quantify drilled clival volumes and other relevant anatomical measurements. A standard anterior transpetrosal approach with a full anterior petrosectomy was performed . Under the microscope the clivus was further drilled. Limitations, drilled volumes as well as drilling trajectories were defined thereafter.

Results:

Predissection clival volumes ranged from 7.4 cm³ to 9.1 cm³ (Mean=8.12cm³). Clival drilling was divided into three drilling trajectories that we named: superior, contralateral and ipsilateral clival trajectories. Postdissection volumes drilled ranged from 1.54cm³ to 2.1cm³ (Mean= 1.8cm³) reaching a mean percentage of 22.4% (Range 19-26%) total volume drilled using these corridors. During our laboratory investigation, we took note of target structures as landmarks, limiting structures, and surgical maneuvers using these individual corridors to aid the neurosurgeon when drilling this area.

Conclusion:

This study demonstrated that significant clival volume can be drilled through the anterior petrosectomy. There are maneuvers that we can use to maximize our trajectory to this region as well as several limitations to drilling. It is however important to tailor each approach to the patient's pathology and anatomy.

Minimally Invasive Lateral Orbitotomy Approach for Middle Fossa and Orbital Lesions

Type of abstract:

abstract for oral presentation

Authors:

Bhuvic Patel, University of Pittsburgh Medical Center Department of Neurosurgery, Maria Karampouga University of Pittsburgh Medical Center Department of Neurosurgery, David Fernandes Cabral, University of Pittsburgh Medical Center Department of Neurosurgery, Anna K Terrarosa, University of Pittsburgh Medical Center Department of Ophthalmology, Gabrielle R Bonhomme, University of Pittsburgh Medical Center Department of Ophthalmology, Susan Stefko University of Pittsburgh Medical Center Department of Ophthalmology, Paul A Gardner University of Pittsburgh Medical Center Department of Neurosurgery, Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery.

Presenting author:

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery.

Topic:

Lateral skull base

Introduction:

Transorbital skull base approaches have been gaining popularity given the favorable surgical footprint. A lateral orbitotomy approach through a small lateral canthus incision is particularly appealing as it utilizes the eyes natural opening in the incision. We review our experience with this approach over the past decade.

Methods:

We performed a retrospective review of all patients treated with lateral orbitotomy approach at our institution over the last decade. The technique included a 1-2 cm incision in the lateral acanthus and utilization of the natural eye opening in the surgical corridor. The lateral orbital rim was removed from just above the orbitozygomatic suture to the inferior orbital fissure. The temporals muscle was elevated and the sphenoid wing was reduced. Peeling of the temporal dura from the lateral cavernous sinus was performed as needed. Reconstruction often included the use of an abdominal fat graft.

Results:

Forty-eight patients treated via lateral orbitotomy were identified. Pathologies included 27 meningiomas, 7 schwannomas and 14 others (e.g metastasis and juvenile angiofibroma). Four were purely, 13 intracranial, with the remainder involving both. Of the 34 cases in

which complete tumor resection was intended, this was achieved in 24 and near total in 9. Five patients experienced complications: one infection, one venous infarct, one oculomotor palsy, one transient encephalopathy and one partial retinal artery occlusion. No patient developed pulsatile enophthalmos, exophthalmos, or globe injury. The median post-operative length of stay was three days.

Conclusion:

The lateral orbitotomy through a minimally invasive lateral canthus incision is a more cosmetic alternative to traditional anterolateral approaches for pathologies involving the middle fossa and orbit or a combination of the two. In appropriately selected cases this can be as effective and safe as traditional approaches.

Cavernous sinus walls: an anatomical study of the dural layers

Type of abstract:

abstract for oral presentation

Authors:

Arseniy A. Pichugin, Cleiton Formentin, Yun-Kai Chan, Albert Trondin, Eric E. Wang, Carl H. Snyderman, Paul A. Gardner, Georgios A. Zenonos

Presenting author:

Georgios A. Zenonos

Topic:

Anterior/central skull base

Introduction:

Objective: To integrate previous knowledge about CS anatomy, review several anatomic hypotheses of CS walls, and create a comprehensive concept of the structure of CS walls using cadaveric dissections.

Methods:

Materials and methods: Bilateral stepwise dissections of CS on fifteen fresh adult cadavers (30 sides) were performed. Five specimens were dissected from lateral approaches, five specimens were cut in the axial plane, and five were dissected via endoscopic endonasal approaches.

Results:

Based on histologic and embryologic data, we developed several anatomic concepts and investigated them:

- 1) Bones of a skull are covered by periosteum both on the exocranial and endocranial surfaces without any interruption between them.
- 2) All neuraxis structures are covered by a meningeal layer of the dura.
- 3) The cranial nerves (CNs) become ensheathed by one layer of meningeal dura when they pierce it exiting the cranial cavity.
- 4) Fibers of the periosteal layer that are strained between the nearby bony structures form a periosteal "ligamentous" layer.
- 5) At the sites of the skull base foramina, dural layers fuse.

Conclusion:

Single-layer dura is found on the medial, anterior, inferior walls, and clinoidal compartment of the superior wall. A double layer is found on the posterior wall and oculomotor compartment of the superior wall, while a triple-layer is found on the lateral wall of the CS.

Optimizing neurovascular-protective transposition of the pterygopalatine fossa through orbito-ptyerygo-sphenoidal ligament release and descending palatine canal decompression: Anatomical principles and surgical strategies

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Yohan Alexander

Topic:

Anterior/central skull base

Introduction:

The endoscopic endonasal transpterygoid approach (EETPA) offers versatility for accessing intracranial and extracranial regions. The pterygopalatine fossa (PPF) neurovasculature constrains surgical trajectory. To overcome this, we present anatomical foundations and surgical techniques for neurovascular-sparing PPF transposition via orbito-ptyerygo-sphenoidal (OPS) ligament release and descending palatine canal (DPC) decompression.

Methods:

EETPA was performed on twelve sides of six specimens. 0-degree and 30-degree endoscopes were used. Two measurements were obtained to assess PPF transposition rate: inferior PPF transposition, defined as the distance from the superior margin of the base of the pterygoid (BPP) to the superior margin of the PPF, recorded before and after maximal inferior retraction following OPS ligament release; lateral PPF transposition, defined as the distance

from the Eustachian tube to the lateral margin of the PPF, documented before and after DPC decompression and maximal lateral retraction. The ImageJ® image processing program was utilized for measuring.

Results:

The bony landmarks were meticulously drilled, exposing the PPF periosteal sac, pharyngeal artery, and vidian nerve. Removal of the palatine bone's orbital process unveiled the infraorbital fissure and OPS ligament. Maintaining OPS ligament integrity, a 5 mm (2-7 mm) inferior PPF displacement was recorded. After OPS incision, a 7 mm (4-11 mm) increase in inferior transposition occurred, totaling 12 mm (6-15 mm). Lateral PPF transposition averaged 9 mm (6-15 mm), further increased by 11 mm (8-15 mm) post-inferior turbinate removal and DPC decompression. Preservation was upheld for PPF and all neurovascular structures.

Conclusion:

The EETPA with the preservation of PPF content emerges as a viable technique. The release of the OPS ligament and the decompression of the DPC yield significant advantages in effecting PPF transposition and facilitating the opening of the surgical pathway through the inferolateral recess of the sphenoid sinus.

Anatomical step-by-step dissection of complex skull base approaches for trainees: surgical anatomy of the endoscopic endonasal superior ethmoidectomy

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Yohan Alexander

Topic:

Anterior/central skull base

Introduction:

The conventional endoscopic anterior cranial base resection involves complete removal of ethmoidal cells, impacting nasal volume and airflow. Our study systematically details an anatomically based, step-by-step endoscopic endonasal superior ethmoidectomy for skull base surgery trainees, addressing clinical cases and indications to enhance understanding and training in this technique.

Methods:

Six formalin-fixed latex-injected cadaveric head specimens were dissected. In each specimen the endoscopic endonasal superior ethmoidectomy was performed. A 0-degree, 30-degree, and 45-degree endoscope (4 mm, 18 cm, Hopkins II, Karl Storz, Tuttlingen, Germany), attached to a high-definition camera were utilized for dissection. After each step was completed, the specimens were 3D photo-documented with endoscopic techniques on an illustrative specimen.

Results:

On the right side, nasoseptal flap was harvested and stored in the nasopharynx, with rescue flap prepared on the left. Bilateral sphenoidotomies preserved flap pedicle integrity. A Draf III frontal sinusotomy was performed, extending superior septectomy anteriorly to the sphenoid rostrum. Removal of the rostrum and intersphenoidal septum allowed access to the superior ethmoids. The vertical attachment of the middle turbinate was removed for broader exposure of the anterior cranial base. Lateral dissection identified the 90-degree angle between the medial orbital wall and cranial base, with preservation of uncinate processes, ethmoid bullae, middle turbinates, and attachments on both sides.

Conclusion:

The endoscopic superior ethmoidal approach ensures safe anterior cranial base resection while preserving vital nasal structures like middle turbinates and osteomeatal complexes. It offers optimal access to the anterior skull base, suitable for pathologies that spare nasal structures.

Thursday 6 June: Session 8: 13.30 - 15.00: Anterior/Central General

A case series of intracranial aneurysms treated via the extended endonasal corridor in a single center. Indications, outcomes, and technical considerations.

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Georgios A. Zenonos

Topic:

Anterior/central skull base

Introduction:

The endoscopic endonasal approach (EEA) provides a ventral surgical corridor, which can be advantageous in the clipping of appropriately selected cerebral aneurysms. Herein we present our clinical experience to better delineate the indications and limitations of these procedures.

Methods:

The clinical records of patients undergoing EEA for clipping of aneurysms from October 2005 to June 2023 were retrospectively reviewed. The study cohort comprised 29 patients (23 females), with a mean age of 52 years. Six patients had multiple aneurysms clipped during the same procedure, while another six had a sellar tumor excised in the same setting. Out of 35 aneurysms 7 were ruptured, 4 were pseudoaneurysms, 25 were located in the paraclinoid region, 9 in posterior circulation and 1 emanated from the petrous carotid artery.

Results:

In two cases a staged endovascular/ endoscopic approach and a combined endoscopic/ open procedure were performed respectively. Two patients underwent EEA due to post-coiling recanalization, whereas in 12 either endovascular treatment was not deemed safely feasible

or there was relative contraindication. In 5 aneurysms a questionable residual was noticed post-operatively that remained stable without requiring retreatment in all cases, but one treated via pipeline. 7 patients experienced cerebrospinal fluid leak, 3 meningitis, 2 clip exposure, 3 stroke with one causing mild disability, and 3 cranial nerve palsies that partially improved or resolved. No EEA-related deaths were observed.

Conclusion:

The ventral surgical corridor through an EEA can be advantageous for appropriately selected aneurysms, either because of concomitant sellar pathology or because of their location closer to the midline. Cerebrospinal fluid leaks and reconstructive challenges remain the main limitation.

A comparative study of six different transorbital approaches. Skull base exposure and qualitative traits.

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Maria Karampouga

Topic:

Anterior/central skull base

Introduction:

This study compares: 1) The eyebrow supraorbital craniotomy (SupraOrb) with its extension (SupraTransOrb), 2) the eyebrow modified orbitozygomatic craniotomy (ModOzEyB), 3) the palpebral modified orbitozygomatic craniotomy (ModOzPalp), 4) the lateral orbitocraniotomy through lateral canthotomy (LatOrb), 5) the Transorbital NeuroEndoscopic Surgery (TONES), and 6) the medial eyelid transfrontal orbitocraniotomy (MedOrb).

Methods:

Cadaveric dissections were performed in 6 formalin-fixed heads, namely two sides allocated to each approach. Annotation points with their axial coordinates were taken at the borders of the skull base exposure via image-guidance and illustrative maps were created. Lateral sphenoid wing (LatSW) drilling was performed in all cases to maximize the exposure. The main quantitative variables measured were the anterior cranial fossa (ACF) and middle cranial fossa (MCF) exposure. Qualitative traits included the feasibility of anterior clinoid process removal (ACPRem), the surgical trajectory, and the visualization of the superior orbital fissure (SOF) and optic canal roof (OCR).

Results:

SupraOrb provides ACF exposure. The ACPRem is feasible, without direct observation of the SOF and MCF access can be attained when LatSW is drilled (SupraTransOrb). ModOzEyB accesses ACF and MCF, while its superior to inferior trajectory like SupaOrb makes them appropriate for even contralateral lesions. ModOzPalp exposes ACF and MCF, but its inferior to superior trajectory favors less medial ACF access. LatOrb is versatile in MCF, whilst ACF exposure is confined above the sphenoid ridge. The ACPRem is performed without OCR visualization. ACF and MCF access in TONES is delimited by the opticocarotid region, whereas MedOrb excels in medial ACF.

Conclusion:

Despite the growing popularity of transorbital approaches there is a lack of comparative studies on their indications. Meticulous case selection based on the distinctive characteristics of each approach, as they are herein described, is essential to safely accomplish the surgical goals.

Transorbital Neuroendoscopic Surgery (TONES), the Latin American Experience. Indications Beyond tumoral pathology.

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Sara Gomez-Niebles

Topic:

Anterior/central skull base

Introduction:

TONES is a technique that uses the orbit to access the skull base. While the literature supports its use for skull base tumors, its applications in other pathologies remain underexplored. We have successfully applied TONES to a broader spectrum of conditions and aim to share our experience.

Methods:

The authors report a case series of consecutive patients from February 2021 to September 2023, where TONES was performed via the superior eyelid crease in 14 patients to treat eight tumors, three transorbital brain injuries (TOBI), one carotid-cavernous fistula and one left frontal mucocele. Additionally, we included a case of a combined TONES plus craniotomy approach to treat an intraosseus meningioma. The procedures were performed in six different high-complexity institutions in Colombia. We made a retrospective analysis of the cases. Demographic variables, pathology, length-of-stay, and postoperative outcomes were recorded.

Results:

The patients were categorized into four groups. Group A: Four sphenoorbital meningiomas, two epithelial tumors, one adenoid cystic carcinoma, and one plasma cell neoplasia. We also included a patient with an intraosseous meningioma who underwent a combined approach. Gross total resection was achieved in 7 patients. Group B, two patients had an orbital roof fracture, one with an associated epidural hematoma, treated through TONES. The third patient presented with a penetrating injury that reached the pterygopalatine fossa. In group C, we treated a patient with an indirect carotidcavernous fistula, and in group D, we treated a left frontal mucocele.

Conclusion:

TONES proves to be versatile, extending beyond the treatment of skull base tumors. The authors share their experience addressing other conditions with favorable results and no complications.

Extended Endoscopic Endonasal Approaches for Traumatic or Inflammatory Lesions of C1-C2: Retrospective Analysis of a 10-Years Case Series

Type of abstract:

abstract for oral presentation

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Presenting author:

Maurizio Iacoangeli

Topic:

Anterior/central skull base

Introduction:

Extended endoscopic endonasal (EEA) approaches achieved increasing popularity in the treatment of various anterior cranio-vertebral junction (aCVJ) pathologies. These include conditions such as bulbar compression related to rheumatoid arthritis, basilar invagination in complex CVJ malformations and unconsolidated CII-type odontoid fractures.

Methods:

Retrospective analysis of 23 patients with aCVJ disorders who underwent EEA either alone or in combination with conventional surgical approaches at from January 2013 to December 2023. 10 patients underwent combined C1-C2 EEA and transcervical anterior classical screw fixation approach for non-consolidated odontoid fractures. 3 patients with CVJ malformations underwent fully endoscopic decompression and C1-C2 fusion. 10 patients with irreducible bulbar compression due to migrated odontoid process and/or retro-periodontal inflammatory process underwent EEA odontoidectomy preserving the C1 anterior arch for C1-C2 anterior screw fixation. Regular follow-up was performed for at least 10 years.

Results:

Nurick's scale improvement was observed in all cases. Radiologically, effective bulbar decompression was routinely achieved and maintained. Two patients underwent posterior occipito-cervical fixation for cervical instability, with no subsequent complications. In cases of C1-C2 anterior endoscopic fixation, clear bony fusion was demonstrated. Two patients experienced cerebrospinal fluid leakage postoperatively, while two others exhibited mucosal incision dehiscence, both complications resolved secondarily and were confirmed during endoscopic follow-up. Long-term clinical and instrumental follow-up confirmed good functional and clinical outcome.

Conclusion:

EEA is a promising alternative to conventional approaches to address aCVJ disorders in selected cases. Advantages: reduced invasiveness, enhanced maneuverability with direct working angle, potential preservation of C1 anterior arch; additionally, EEA facilitates decompression and endoscopic C1-C2 anterior fixation/fusion, reducing the risk of cranial settling and vertebral instability.

The extended endoscopic endonasal transplanum optic canal decompression. Surgical technique in steps and anatomical considerations.

Type of abstract:

abstract for oral presentation

Authors:

Maria Karampouga¹, Anna K Terrarosa², Kyle Affolter¹, Tonya S Stefko², Garret W Choby³, Eric Wang³, Michael M. Mcdowell¹, Carl H. Snyderman³, Paul A. Gardner¹, Georgios A. Zenonos¹,

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Presenting author:

Maria Karampouga

Topic:

Anterior/central skull base

Introduction:

The decompression of the optic canal (OC) from an endoscopic endonasal approach is limited mainly superiorly and laterally. In this study, we describe a stepwise technique that maximizes the degree of the decompression and allows for expanded superolateral optic nerve decompression. The surgical technique is analyzed in 5 phases.

Methods:

Anatomical dissections were performed on both sides of two cadaveric heads to comprehensively describe the technique and to identify anatomical landmarks. Validation of the degree of OC decompression relied on image guidance and the superolateral limit was confirmed through a trans-cranial approach on each side. The procedure was divided in the following 5 phases: 1) Sinonasal- orbital phase, 2) sella- tuberculum- planum phase, 3) OC- carotid- medial opticocarotid recess (MOCR) phase, 4), lateral opticocarotid recess (LOCR)- optic roof (OR) phase, and 5) anterior clinoid process (ACP) phase.

Results:

1. Middle turbinectomy, posterior septosphenoidectomy and medial antrostomy

facilitate higher endoscope position and medial orbital wall resection. 2. The bone overlying the sella, tuberculum, and ipsilateral planum sphenoidale is removed 3. The OC is egg-shelled with copious irrigation and the carotid is exposed. The MOCR is removed after disconnection from the optic, tuberculum, carotid and sella. 4. The LOCR corresponding to the optic strut is hollowed out and outfractured, maximizing OC decompression. Mobilization of the planum dura facilitates OR decompression using drilling and Kerrison rongeurs. 5. ACP removal is possible when sufficient OR hyperostosis enables exposure into the ACP.

Conclusion:

The extended endoscopic extradural OC decompression is an effective and applicable technique that should be incorporated into the contemporary surgeon's arsenal. Implementation of the abovementioned stepwise technique in our clinical practice has favored clinical outcomes.

Thursday 6 June: Session 9: 15.30 - 17.00: Tumor biology

Craniofacial Retraction Embryology: Beyond Cranial Base Evolution to the Power of the Mandible

Type of abstract:

abstract for oral presentation

Authors:

Alexandra Kunz MD, Research, Data Management Working Group, Harvard Medical

Presenting author:

Alexandra Kunz MD

Topic:

Basic science

Introduction:

Craniofacial (CF) paradigms in cranial-base evolutionary studies are typically posited as initiating from cranial-base or face-size, cranial-base angle or length, even locomotion changes. Evolutionary primate-embryology reveals the mandible, along with ancestor hominin's mandibles, as valued key.

Methods:

Here, evolutionary primate embryological CF-thresholds are explored to show the pivotal power of the mandible.

Results:

Six thresholds-jumps are primate-species manifested for CR-retraction: prosimians-(55Mys), simians-(45Mys), great-apes-(20Mys), extinct-hominin Australopithecus-(6Mys), extinct-hominin Homo-(2.2Mys), Homo sapiens- (0.2Mys). Neurogenesis-rotations all extant primates as days-lengths in Carnegie-stages 7-23: prosimians-(27), simians-(27-29), great-apes-(NA), Homo sapiens-(40-44) may each be of a few millimeters longer; this embryological change is mandible manifested, exposing new species' modular relationships of increased CF-retraction, as double pantograph visualizations show embryonic neurulation rotation-points' connections with mandibular-rami, and even hominin's evolutionary contributions can be appreciated.

Conclusion:

Lamentably, current empirical studies of CF retraction still confirm all CF-modules as threshold-significant: endocranial shape Homo vs Homo sapiens $0 < 0.01$, face shape

Pleistocene Homo vs Homo sapiens (PC1, 19.5%; PC2, 12.4%), middle cranial-base fossa primates (apes) vs Homo-Homo sapiens, $p < 0.01$.

Developmental gene expression in skull-base chordomas and chondrosarcomas

Type of abstract:

abstract for oral presentation

Authors:

Cas Vanderheijden (1,2), Youssef Yakkoui (2,3), Thomas Vaessen (4), Remco Santegoeds (2,5), Yasin Temel (1,2), Govert Hoogland (1,2), Koos Hovinga (1,2)

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Presenting author:

Koos Hovinga

Topic:

Basic science

Introduction:

Chordomas are malignant tumors occurring in the skull base that are notorious for their poor treatment response. Differentiating these tumors from less malignant chondrosarcomas is crucial. Chordomas derive from notochordal remnants and chondrosarcomas from mesenchymal cells. We evaluated the differential expression of developmental transcription factors in these skull base tumors.

Methods:

Histopathologically-confirmed tumor biopsies were obtained from 12 chordoma and 7 chondrosarcoma patients. Following RNA extraction, samples were submitted to real-time quantitative PCR (RT-qPCR) for the evaluation of 32 evolutionary conserved genes that are known to associate with notochord, mesoderm, and axial spine development. Gene expression levels were normalized to housekeeping genes ACTB and RS27a.

Results:

Fifteen genes were either exclusively expressed (n=12) or overexpressed (n=3; 2.21-4.43 fold increase) in chordoma, compared to chondrosarcoma. Brachyury and CD24 were highly and exclusively expressed in chordoma. Other novel genes exclusive to chordomas included chordin, HOXA5 and ACAN. Vice versa, ten genes were either exclusively expressed (n=2) or overexpressed (n=8; 0.01-0.66 fold increase) in chondrosarcoma, compared to chordoma.

Conclusion:

As chordoma patients demonstrate a worse prognosis compared to chondrosarcoma patients, the differential expression of chordin, HOXA5 and ACAN and CD24 could be relevant for the pathophysiology of chordomas and may have diagnostic and treatment value. Further study on role of these genes in tumorigenesis is therefore warranted.

Genomics analysis reveals molecular patterns of tumorigenesis in HPV-associated and HPV-independent sinonasal squamous cell carcinoma

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Nyall R. London Jr., MD PhD

Topic:

Oncology

Introduction:

Mechanisms of tumorigenesis in sinonasal squamous cell carcinoma (SNSCC) remain poorly described due to its rare nature. We hypothesized that performing the first large high-throughput sequencing study of SNSCC would reveal molecular mechanisms of tumorigenesis driving HPV-associated and HPV-independent SNSCC and identify targetable pathways.

Methods:

High-throughput whole-genome or whole-exome sequencing was performed on 64 patients with HPV-associated and HPV-independent sinonasal carcinomas and mutation annotation, viral integration, and copy number analyses were performed. The first reported HPV-associated SNSCC cell line was developed and validated.

Results:

HPV-associated SNSCC possessed similar mutational patterns including lack of TP53 mutations and the presence of known hotspot mutations in PI3K and FGFR3. Further similarities included APOBEC enrichment, viral integration at known hotspot locations, and frequent mutations in epigenetic regulators. Additional newly identified recurrent mutations were identified in HPV-associated SNSCC including KMT2C, UBXN11, AP3S1, MT-ND4, and MT-ND5. Mutations in KMT2D and FGFR3 were associated with decreased overall survival. We developed the first known HPV-associated SNSCC cell line and utilized small molecule inhibitors including PI3K pathway to validate important molecular pathways for tumorigenesis in HPV-associated SNSCC.

Conclusion:

HPV-associated SNSCC and HPV-independent SNSCC are driven by molecularly distinct mechanisms of tumorigenesis. Combinatorial blockade of YAP/TAZ and vertical inhibition of the PI3K pathway may be useful in targeting HPV-associated SNSCC whereas targeting MYC and horizontal inhibition of RAS/PI3K pathways for HPV-independent SNSCC.

Patient-derived Vestibular Schwannoma explants: a 3D in vitro model.

Type of abstract:

abstract for oral presentation

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Presenting author:

J.L.W. Meijvogel

Topic:

Basic science

Introduction:

To study potential treatments for vestibular schwannoma (VS), a patient-derived in vitro model is preferred. 3D explant cultures have successfully been used. Application of this explant culture model has never been described for VS. This study aims to develop an 3D patient-derived in vitro VS explant model.

Methods:

VS tumor samples were surgically obtained and processed to construct VS explants. VS explants were compared to their respective tumor sample by immunohistochemistry for expression of S100 and SOX10. The viability of the VS explants was assessed over time by alamarBlue assay and hematoxylin and eosin (H&E) staining. Whole exome sequencing (WES) was performed on VS explants and their corresponding VS tumor.

Results:

We developed and optimized the protocol that enables generation of VS explants from VS tumors. The VS explants could be maintained in culture up to 5-9 weeks and H&E staining showed viable VS explants up to 9 weeks in culture. The metabolic activity of the VS explants, assessed by alamarBlue assay, showed no significant changes over 9 weeks in culture. Compared to the original tumor, the VS explants expressed comparable expression of S100 and SOX10.

Conclusion:

We describe the first establishment of patient-derived VS explants from VS tumors. This in vitro VS explant culture system could provide a promising model to research potential therapeutics for VS.

The Vestibular Schwannoma Tumor Slice Model for Pharmacological Testing

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Cordula Matthies

Topic:

Oncology

Introduction:

With regards to systemic treatment approaches, a 3D tumor model of schwannomas should be developed and tested by pharmacological interventions.

Methods:

Tissue samples from 16 vestibular schwannoma patients were sectioned into 350 µm slices, cultivated in vitro and evaluated for culturing time, survival, microenvironment characteristics, morphology, apoptosis, and proliferation rates. Standard schwannoma cell cultures were used for reference. Spontaneous tumor evolution was compared to tumor slices treated by Lapatinib, Nilotinib, and Bevacizumab by CC3 as an apoptosis marker and Ki67 for proliferation.

Results:

The tumor slices remained morphologically stable for three months, and their tumor microenvironment for 46 days. Pharmacological testing proved feasible for up to three weeks, maintaining consistent apoptosis and proliferation rates. Observed medication effects were less pronounced in tumor slices than in standard cell culture. MEK inhibitors appeared more effective than Bevacizumab.

Conclusion:

The 3D schwannoma slice model appears advantageous compared to cell culture investigations, as its behavior is closer to in vivo tumour biology and offers new options of individual investigations before clinical application.

Dinstinct gene expression in ten Vestibular Schwannoma tumors versus tumor-associated nerves

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Philipp Morgner

Topic:

Basic science

Introduction:

Vestibular Schwannoma (VS) are benign tumors originating from the vestibulocochlear nerves. Currently, there are no established medical treatments for sporadic VS. Therefore, the gene expression pattern of the VS was compared with the respective corresponding tumor-associated nerve in order to identify new targets for drug treatment.

Methods:

RNA from ten VS tumors and the corresponding tumor-associated nerves was isolated. These ten pairs were selected for bulk RNA sequencing (RNAseq). RNAseq data were obtained from 1 µg of RNA using the Illumina Novaseq6000 system. Subsequently, the data were further processed with the Galaxy Server. We searched for differential gene expression using the Qlucore Omics Explorer. Additional pathway analysis was performed using the PANTHER classification system.

Results:

We found 524 statistically significantly more than 2-fold up-regulated and 842 down-regulated genes ($p < 0.05$). The ten most up-regulated and down-regulated genes were selected for further validation. Using PANTHER classification, we concluded that the majority of differentially expressed genes belong to the class of binding proteins (nerves 38.2 %, tumors 33.8 %) and proteins with catalytic activity (nerves 26.0 %, tumors 25.4 %).

Conclusion:

Notably, some of the most highly over- or under-expressed genes we identified are already known to be associated with tumor progression. Since none of these genes have been associated with VS, a more in-depth analysis is recommended to better understand the pathology and identify possible future treatment options.

Proteomic analysis of vestibular schwannoma

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Zdeněk Fík

Topic:

Basic science

Introduction:

Vestibular schwannoma is the most common benign neoplasm of the cerebello-pontine angle. The objective of this study was to depict the proteomic characteristic of the tumour itself and even to find differences in specific parts of the tumour.

Methods:

Tumour samples were collected from the end of the internal auditory canal, fundus (FU), and the opposite area in the cerebello-pontine angle (CPA). As control tissue (CTRL), the great auricular nerve was harvested from patients who underwent block neck dissection. Those tissues were treated using in-sample specific protein digestion with trypsin followed by processing on the Maxis Impact ESI- QToF mass spectrometer connected to a Dionex Ultimate3000 RSLCnano UHPLC chromatograph. The results were analysed using discrimination analysis.

Results:

There was identified a considerable number of proteins in all three examined areas (FU, CPA, CTRL). Not surprisingly, there was a statistically significant difference in protein expression between tumour samples and control samples. Moreover, we observed a trend to find expression differences even between both tumour areas (FU vs. CPA). Interestingly, the regulation pattern of particular proteins differs, when compared to their presence in other tumours, in most cases.

Conclusion:

Vestibular schwannoma shows signs of different molecular structures in specific parts of the tumour. It may be related to its distinct tumour behaviour. Proteomic analysis is a valuable tool to study vestibular schwannoma biology; however, it must be related to other experimental tools.

Impact of immunomodulatory cytokines on tumor volume in sporadic vestibular schwannoma

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Sandra Leisz

Topic:

Basic science

Introduction:

Sporadic vestibular schwannomas (VS) often exhibiting slow or negligible growth. Nevertheless, some VS increase significantly in volume within a few months or grow continuously. Recent evidence indicates a role inflammation in promoting VS growth. Therefore, the aim of our study was to identify cytokines, which are associated with larger VS.

Methods:

The mRNA expression of different cytokines in VS tumor samples and VS primary cultures was investigated using quantitative real-time polymerase chain reaction and RNAseq. Additionally, the concentration of cytokines in cell culture supernatants of VS primary cultures, cerebrospinal fluid (CSF) of VS patients and healthy controls was determined using multianalyte enzyme-linked immunosorbent assay. Correlation analysis of cytokine level with tumor volume, growth rate, Koos grade, age and hearing was examined with Spearman's-rank test.

Results:

The mRNA expression of CC-chemokine ligand (CCL) 2, CCL18, growth differentiation factor (GDF) 15 and interferon regulatory factor 4 correlated positively with tumor volume. Moreover, the cytokines GDF15 and the transforming growth factor beta (TGFB) 1 secreted by the primary cells correlated positively with tumor volume. The concentrations of CCL2, CCL5, CCL18 and TGFB1 in the CSF of the patients were significantly different from those in the CSF controls.

Conclusion:

Our results suggest that macrophages are attracted to the tumor by the cytokines and this may promote the progression of VS size. Inhibition of immune cell infiltration could be a putative approach to prevent and control VS growth.

Thursday 6 June: Session 10: 15.30 - 17.00: Radiotherapy

Routinely postoperative radiotherapy for pT1- and pT2-classified Squamous Cell Carcinoma of the External Auditory Canal

Type of abstract:

abstract for oral presentation

Authors:

Cindy H. Nabuurs MD^{1,2}, Wietske Kievit PhD^{1,2,3}, C. René Leemans MD PhD⁴, Conrad F.G.M. Smit MD PhD⁴, Michiel W. M. van den Brekel MD PhD⁵, Robert J. Pauw MD PhD⁶, Bernard F.A.M. van der Laan MD PhD^{7,8}, Jeroen C. Jansen MD PhD⁹, Martin Lacko MD PhD¹⁰, Weibel W. Braunius MD¹¹, Chunfu Dai MD PhD¹², Xunbei Shi MD¹², Giovanni Danesi MD PhD¹³, Jan Bouček MD PhD¹⁴, Daniele Borsetto¹⁵, Shravan Gowrishankar¹⁵, Romain Kania¹⁶, Clément Jourdaine¹⁶, Jansen Thijs T.G. MD PhD^{1,2}, Robert P. Takes MD PhD^{1,2}, Henricus P.M. Kunst MD PhD^{1,2,10}

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Presenting author:

Cindy Nabuurs (CH Nabuurs)

Topic:

Oncology

Introduction:

There is no consensus regarding the routine use of postoperative radiotherapy (PORT) for T1- and T2-classified squamous cell carcinoma (SCC) of the external auditory canal (EAC). Aim of our study was to evaluate whether routine PORT provides additional benefits for radically resected pT1- and pT2-classified EAC SCC.

Methods:

We collected retrospective data from fourteen international hospitals, including patients with primary radically resected pT1- and pT2-classified EAC SCC. The disease-free survival (DFS) outcomes for EAC SCC treated with and without routinely PORT were analyzed and the presence of aggressive histological features were assessed.

Results:

A total of 112 patients with radically resected early stage EAC SCC were included, with 48 patients receiving PORT. Tumors treated with PORT more frequently exhibited perineural and angioinvasive growth compared to those without PORT. However, routine PORT did not statistically significantly improve the 5-year DFS outcome for radically resected pT1N0- and pT2N0-classified EAC SCC (92.9% and 76.9%, respectively) compared to tumors without PORT (100% and 90.9%, respectively), with p-values of 0.999 and 0.526 respectively. Eighteen patients experienced complications related to radiotherapy.

Conclusion:

Our study suggests that routinely using PORT for early-stage radically resected EAC SCC

might be indicated only when the tumor displays perineural or angioinvasive growth. This approach helps mitigate the negative impact on quality of life and the high risk of complications associated with radiotherapy.

Repeat gamma knife radiosurgery for trigeminal neuralgia.

Type of abstract:

abstract for oral presentation

Authors:

Chitti Bhargava Northwell Health/Department of Radiation Oncology, Anuj Goenka Northwell Health/Department of Radiation Oncology, Ashwatha Narayana Northwell Health/Department of Radiation Oncology, Danilo Silva Northwell Health/Department of Neurosurgery.

Presenting author:

Danilo Silva, MD

Topic:

Radiotherapy

Introduction:

Gamma Knife (GK) radiosurgery for trigeminal neuralgia is an efficacious therapy, with durable pain control rates up to 80%. Some patients may experience return of their pain, prompting re-treatment. Here we review our experience with repeat Gamma Knife radiosurgery for trigeminal neuralgia.

Methods:

We queried our institutional database for patients who underwent repeat Gamma Knife radiosurgery for trigeminal neuralgia. Date and time of each course of radiosurgery a patient received were recorded and their outcomes reviewed. We determined the Barrow Neurological Institute (BNI) pain scores pre- and post-repeat treatment, prescription dose, Visual Analog Scale (VAS) ratings, distribution of pain. Logistic analysis of post-treatment BNI pain scores and VAS were performed, analyzing factors associated with response. A subset analysis was performed to determine factors associated with a post-treatment BNI score of III-a versus III-b.

Results:

24 patients were identified who underwent repeat GK from 2015-2023. Mean prescribed dose was 75 Gy. Median age was 70. All patients at presentation, had BNI score of at least III-b. 80% of patients had decrease in pain to III-a. Median decrease in VAS score was 8/10. On logistic analysis, we didn't find factors, such as dose at first treatment ($p = 0.07$), re-treatment dose ($p = 0.52$), total dose ($p = 0.82$), age at re-treatment ($p =$), gender ($p =$) to be significantly associated with BNI score after repeat radiosurgery ($p = 0.143$).

Conclusion:

Trigeminal neuralgia is a debilitating condition. Gamma Knife radiosurgery is not only an effective first line therapy, but as our institutional experience demonstrates, it is an effective salvage therapy. On our logistic analysis, we did not find any factors to be associated with the noted reduction in BNI scale score.

Cochlear-optimised treatment planning in photon and proton radiosurgery for vestibular schwannoma patients

Type of abstract:

abstract for oral presentation

Authors:

Kimberley S Koetsier MD, Michelle Oud MSc, Erik de Klerck, Erik F Hensen MD PhD, Marco van Vulpen MD PhD, Anne van Linge MD, Peter Paul van Benthem MD PhD, Cleo Slagter MD, Steven MJ Habraken PhD, Mischa S Hoogeman PhD, Alejandra Méndez Romero MD PhD

Presenting author:

Kimberley S Koetsier MD

Topic:

Radiotherapy

Introduction:

Unilateral hearing loss and tinnitus have a substantial impact on patients' social lives and overall well-being and are therefore an important aspect in vestibular schwannoma management. This study assesses the potential to reduce the cochlear dose with robotic photon radiosurgery or intensity-modulated proton therapy planning for vestibular schwannomas.

Methods:

Clinically delivered photon radiosurgery treatment plans were compared to five cochlear-optimised plans: one photon and four proton plans (total of 120). A 1x12 Gy dose was prescribed. Photon plans were generated with Precision (Cyberknife, Accuray) with no PTV margin for set-up errors. Proton plans were generated using an in-house automated multi-criterial planning system with three or nine-beam arrangements, and applying 0 or 3mm robustness for set-up errors during optimisation/evaluation (+3% range robustness). The sample size (n=24) was based on a reduction of cochlear Dmean >1.5 Gy(RBE) from the clinical plans.

Results:

Compared to the clinical photon plans, a reduction of cochlear Dmean >1.5 Gy(RBE) could be achieved in 11/24 cochlear-optimised photon plans, and 4/24 and 6/24 cochlear-optimised proton plans without set-up robustness for three and nine-beam arrangement, respectively, and in 0/24 proton plans with set-up robustness. The cochlea could best be spared in cases with a distance between tumour and cochlea. Resulting in a cochlear dose decrease of approximately 1 Gy/Gy(RBE) per mm distance. Using nine proton beams resulted in a reduced dose to most organs at risk.

Conclusion:

Cochlear dose reduction is possible in vestibular schwannoma radiosurgery while maintaining tumor coverage. With current set-up robustness, proton therapy is capable of providing lower dose to organs at risk located distant to the tumor, but not for organs adjacent to it. Consequently, photon plans currently provided better cochlear sparing.

Tumour shrinkage and good facial nerve function after planned partial resection and Gamma Knife radiosurgery in Koos 4 vestibular schwannoma

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Max Keizer

Topic:

Lateral skull base

Introduction:

Facial nerve function is a quality of life determining factor in surgery for large vestibular schwannoma. To preserve facial nerve function, planned partial resection followed by stereotactic radiosurgery is increasingly applied. We report our clinical and radiological outcome in a cohort with Koos 4 vestibular schwannoma.

Methods:

Volumetric analysis of the tumour volumes before surgery, after surgery (before radiation), and at follow-up time-points after radiation was performed. Clinical data on facial nerve function and complications were collected. Approximately 6 months after surgery, all patients were treated with a single fraction of SRS using the Gamma Knife radiosurgery with a mean marginal dose of 12.9 Gy to the residual tumour volume.

Results:

Mean tumour volume was 11.64 cm³ which was reduced to a mean volume of 4.17 cm³ after partial resection. After a mean follow-up of 100 months, residual tumour showed a decrease in volume in 20 patients, stable disease in one patient and two patients showed progressive tumour volume requiring a second operation in one patient. Facial nerve function was preserved in all patients. One patient suffered from a trigeminal neuralgia after radiation.

Conclusion:

Planned partial resection followed by radiation for patients with Koos 4 vestibular schwannoma is an effective strategy to preserve facial nerve function and achieve tumour control. Residual tumours after planned partial resection showed a mean decrease in volume of 50% at the last follow-up time point.

Skull-Base Chondrosarcoma: A Systematic Review of the Role of Postoperative Radiotherapy

Type of abstract:

abstract for oral presentation

Authors:

Pawan Kishore Ravindran [1,2], Max E. Keizer [1,2], Henricus (Dirk) P. M. Kunst [2,3,4], Inge Compter [2,5], Jasper Van Aalst [1,2], Daniëlle B. P. Eekers [2,5] and Yasin Temel [1,2]

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Presenting author:

Max E. Keizer

Topic:

Anterior/central skull base

Introduction:

Chondrosarcomas of the skull base account for approximately 1% of these cases and mostly arise de novo. Surgery and radiotherapy are key elements to the treatment of skull-base chondrosarcomas; however, there is currently no consensus regarding whether or not adjuvant radiotherapy has to be administered.

Methods:

This study searched the EMBASE, Cochrane, and PubMed databases. Studies were included if they were peer-reviewed original articles reporting the prognosis of patients with skull-base chondrosarcomas who have undergone surgery alone or received postoperative adjuvant radiation therapy. After reviewing the search results, a total of 22 articles were selected for this review. Quality of studies were evaluated as per the ROBINS-tool and JBI quality assesment tool. As a result of this heterogeneity, we resorted to reporting a systematic review without a meta-analysis

Results:

A total of 1388 patients were included. Surgical treatment provided progression-free survival (PFS) rates ranging between 83.7%-92.9% at 3 years, 60.0%-92.9% at 5 years, and 58.2%-64.0% at 10 years. Postoperative RT provides PFS rates ranging between 87%-96.2% at 3 years, 57.1%-100% at 5 years, and 67%-100% at 10 years. Recurrence varied from 5.3%-39.0% in the surgery-only approach and between 1.5%-42.90% for the postoperative RT group.

Conclusion:

Surgery has been the primary treatment option chosen for patients harboring a skull-base chondrosarcoma, with recent literature supporting the use of an endoscopic approach. This review shows promising results in terms of long-term prognosis and recurrence rate favoring the use of postoperative radiotherapy.

Friday 7 June: Session 11: 08.30 - 10.00: NF2 / Other schwannomas / QoL

Quality of life in surgically treated vestibular schwannoma patients

Type of abstract:

abstract for oral presentation

Authors:

Cordula Matthies, Sophia Deininger, Eva Rampeltshammer, Robert Nickl, Ralf-Ingo Ernestus, Maria Breun

Department of Neurosurgery, Würzburg University Hospital, Würzburg, Bavaria

Presenting author:

Cordula Matthies

Topic:

Oncology

Introduction:

Despite the benign nature of vestibular schwannomas, patients suffer from a variety of symptoms, most frequently cranial nerve deficits. This study focusses on the importance of cranial nerve symptoms on quality of life (QOL) before, early, and long-term after surgical treatment.

Methods:

From December 2016 to September 2021, 115 patients (51 males, 64 females, mean age 52y) with retro-sigmoid CPA surgery participated in this prospective study, with clinical evaluation before, early, 3 months and 1 year after surgery. QOL was examined by SF36 and Penn Acoustic Neuroma Quality-Of-Life (PANQOL) questionnaires and correlated, by a regression model, with facial, intermedius, auditory and vestibular symptoms and tumour extension.

Results:

In this cohort, 7 patients suffered from small (T1/2), 64 from medium (T3A/T3B) and 44 from large (T4A/T4B) tumours. QOL investigations by PANQOL and SF 36 physical health showed decreased scores before surgery, a further decrease early afterwards and a recovery at follow-up (f-u) testing, while the SF36 mental health sub-score showed early and ongoing improvement. Early and after 1 year, intermedius dysfunction remained the most important disturbance for QOL in the physical sub-scores of PANQOL and SF36, while the SF36 mental sub-score was not affected by any cranial nerve deficits.

Conclusion:

Different to expectations, facial or auditory dysfunctions did not exert any significant influence on physical ratings of PANQOL and SF36, while dizziness shows the strongest impact on patients' life quality during the recovery period 3 months after surgery, and intermedius nerve dysfunction holds a persistent impact on QoL.

update on functional results of microsurgery via the middle fossa approach in small vestibular schwannomas (VS)

Type of abstract:

abstract for oral presentation

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Topic:

Lateral skull base

Introduction:

Besides radiotherapy or wait-and-scan protocols, microsurgery via the middle fossa approach (MFA) can be a treatment option for growing VS. Delayed surgery of larger VS is often associated with higher morbidity and poorer functional outcomes. We present an update on hearing preservation and facial nerve function.

Methods:

We analysed a series of 364 consecutive patients with microsurgery via the middle fossa approach. There were 165 intracanalicular (T1) tumors and 199 intra/extrameatal tumors (T2) without contact to the brainstem. Preservation of hearing and facial nerve function, quality of life and postoperative complications were evaluated.

Results:

Functional results were very satisfactory with a facial nerve function preservation rate (HB I+II) of >90% and a hearing preservation rate (AAO-HNS A+B) of 60-70%. The most common complication was CSF leakage in less than 10%, which could be managed conservatively in most cases. Revision surgery for bleeding or CSF leakage was required in only 1% of cases. Postoperative quality of life was stable.

Conclusion:

Our results from a seventeen year period show that microsurgery via the middle fossa approach is an option with good functional results in the treatment of small vestibular schwannomas. It may be the therapy of choice to achieve definitive cure while preserving function and quality of life.

Health-related quality of life in patients with a stable or growing vestibular schwannoma managed by wait and scan or stereotactic radiosurgery

Type of abstract:

abstract for oral presentation

Authors:

Ineke M.J. Pruijn, MD^{1,2}; Merve Parmaksiz, MD¹; Jeroen B. Verheul, MD, PhD³; Jef J.S. Mulder, MD, PhD^{1,2}; Wietske Kievit, PhD⁴; Henricus P.M. Kunst, MD, PhD^{1,2,5}

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Presenting author:

Ineke M.J. Pruijn

Topic:

Lateral skull base

Introduction:

To assess the effect of wait and scan (W&S) and stereotactic radiosurgery (SRS) on health-related quality of life (HRQoL) over time in patients with a stable vestibular schwannoma (VS) and growing VS.

Methods:

Changes in HRQoL, measured with the PANQOL, and the physical and mental component summary scores (PCS and MCS, respectively) derived from the SF-36, were compared among patients managed by W&S and SRS between 2017 and 2022. Secondly, HRQoL over time in patients with a growing VS was compared between W&S and SRS.

Results:

Differences in PANQOL total and subdomain scores, PCS and MCS scores over time in the W&S (n= 73) and SRS (n= 170) group were non-significant and on average did not exceed the

minimal clinically important differences (mean difference of -2.56 (PANQOL total), 1.22 (PCS) and -1.76 (MCS); all $p > 0.05$). In growing VS, comparison of W&S (n=29) and SRS (n=154) also revealed no significant difference (mean difference of 1.19 (PANQOL total), 1.83 (PCS) and -0.12 (MCS); all $p > 0.05$).

Conclusion:

Differences in HRQoL in patients with VS are minor and not significantly different or clinically relevant between patients managed with W&S or SRS. Similarly, patients with a growing VS managed with W&S or SRS exhibit no significant or clinical relevant difference in HRQoL during follow-up.

Longitudinal assessment of quality of life in patients with NF2-related schwannomatosis treated with Avastin

Type of abstract:

abstract for oral presentation

Authors:

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Anna Nather, Department of Skull Base Surgery, Addenbrookes Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK.

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Presenting author:

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Topic:

Lateral skull base

Introduction:

This study aimed to perform a longitudinal analysis of the quality of life (QoL) in individuals diagnosed with NF2-related Schwannomatosis. Additionally, the study sought to investigate the impact of Avastin treatment on QoL dynamics in this patient population.

Methods:

Employing a longitudinal study design, we utilized the Neurofibromatosis Type 2 Impact on Quality-of-Life score (NFTIQoL) to gauge diverse QoL dimensions. NF2-related Schwannomatosis participants underwent periodic NFTIQoL assessments, supplemented by data on disease progression, Avastin treatment, and relevant variables extracted from medical records. Statistical analyses, encompassing regression modeling and trend analyses, were applied to unravel patterns in NFTIQoL scores and discern significant predictors of QoL variations, including the potential influence of Avastin treatment.

Results:

The cohort, comprising 195 patients with 50 undergoing Avastin treatment, showed an average follow-up of 60.5 months (\pm 47.9). Avastin-treated individuals exhibited a notable trend, with higher NFIQoL scores, indicating poorer QoL. Pre-Avastin, they displayed a faster QoL deterioration rate, which, post-Avastin initiation, plateaued to a level akin to standard care patients. Notably, those with higher initial NFIQoL scores (indicating worse QoL) were more likely to experience improvements after commencing Avastin treatment. These findings underscore Avastin's impact on QoL dynamics in NF2 patients.

Conclusion:

Analyzing QoL in NF2-related Schwannomatosis, Avastin-treated patients (n=50) showed higher scores, indicating poorer QoL. Pre-treatment, they experienced a faster decline, stabilizing post-Avastin, aligning with standard care. These findings have implications for managing NF2-related Schwannomatosis and underscore Avastin's potential efficacy in symptom mitigation.

Efficacy of bevacizumab in patients with neurofibromatosis 2-related vestibular schwannomas

Type of abstract:

abstract for oral presentation

Authors:

Vladimír Koucký¹, Michaela Jirkovská², Aleš Vlasák³, Jan Lazák¹, Eduard Zvěřina¹, Jan Plzák¹, Jan Betka¹, Zdeněk Fík¹

1. Department of Otorhinolaryngology, Head and Neck Surgery, First Medical Faculty and Motol University Hospital, Prague

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3. Department of Neurosurgery, Second Medical Faculty and Motol University Hospital, Prague

Presenting author:

Vladimír Koucký

Department of Otorhinolaryngology, Head and Neck Surgery, First Medical Faculty and Motol University Hospital, Prague

Topic:

Lateral skull base

Introduction:

Neurofibromatosis 2 (NF2) patients are predisposed to develop multiple peripheral and central nervous tumors including bilateral vestibular schwannomas. Decision on patient management might be challenging concerning possible treatment-related complications and quality of life. Systemic treatment with bevacizumab was reported to reduce VS growth and improve hearing of patients.

Methods:

Single center retrospective analysis of 17 NF2 patients with morphologically diagnosed unilateral or bilateral vestibular schwannomas indicated for systemic maintenance therapy with bevacizumab (5mg/kg every 2 weeks) in 2015-2022. Change in tumor growth, size and hearing level were evaluated before and after the first line of bevacizumab treatment.

Results:

17 patients (6 male, 11 females, mean age at the start of the therapy 30y, mean no. of bevacizumab cycles 35) and 27 tumors were evaluated. Radiologically significant (>20% from the baseline) tumor volume reduction was observed in 2 patients. Interestingly, in these

patients with bilateral schwannomas only tumor on one side loss its volume. In 1 case the second tumor was stable and in 1 patient the second side tumor progressed. Concerning hearing, only in 1 patients there was objective improvement in hearing level tresholds and 1 patient experienced significant decrease in hearing.

Conclusion:

Bevacizumab treatment in NF2 patients might have positive effect on tumor size and hearing stabilization. However, the response is unpredictable and tumor volume reduction and hearing improvement is observed only in a minority of patients.

Long-Term Tumour Control Rates in Vestibular Schwannoma Treated with Radiotherapy – a multi-centre, international study.

Type of abstract:

abstract for oral presentation

Authors:

Daniele Borsetto, Mantegh Sethi

Presenting author:

Daniele Borsetto

Topic:

Lateral skull base

Introduction:

Management of Vestibular Schwannomas (VS) comprises surveillance, radiotherapy, and surgery. Those irradiated VS are followed up to monitor for treatment failure, defined as tumour re-growth. We aim to describe long-term VS control rates following radiotherapy and determinant factors for risk of treatment failure.

Methods:

International multicentre retrospective analysis of prospectively collected databases from 8 tertiary referral units. Inclusion of adult patients with sporadic, unilateral, growing VS primarily treated with radiotherapy between 2000 and 2023, with at least one post-treatment MRI measuring maximal intracranial tumour diameter at the cerebellopontine angle. Patient demographics, treatment information, and follow-up surveillance were collected. Survival analysis was undertaken to determine the time to treatment failure, defined in two ways: (1) growth of 3mm within 2 years of follow-up or 2mm thereafter, or (2) conversion to surgery. Cox-proportional hazards modelling identified covariates predictive of treatment failure.

Results:

A total of 1883 patients were included in the study, with majority extra-canalicular VS (81.4%), mean size at treatment 15.3mm (range 2-50mm), and mean follow-up duration of 50 months. Treatment included LINAC (8.6%) and SRS (91.4%). With the pragmatic definition of growth, 5-year tumour control rate of 80.6% and 10-year tumour control rate of 76.7%. With conversion to surgery as the defined endpoint, 5-year tumour control rate of 95.3% and 10-year tumour control rate of 92.6%. Cox-proportional hazards modelling identified covariates predictive of treatment failure.

Conclusion:

This multi-centre, international study evaluates the long-term control rates of VS primarily treated with radiotherapy. Data from this large cohort of patients can be used to better inform patients of their risk of growth post-radiotherapy.

Friday 7 June: Session 12: 08.30 - 10.00: Anterior/Central General

Use of the Vascularized Lateral Nasal Wall Flap for Closure of Complex Skull Base Defects

Type of abstract:

abstract for oral presentation

Authors:

Bhuvic Patel, Brandon Rosvall, Garret Choby, Georgios Zenonos, Eric Wang, Paul Gardner, Carl Snyderman, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Carl H. Snyderman, MD, MBA

Topic:

Anterior/central skull base

Introduction:

The lateral nasal wall flap (LNWF) allows for vascularized reconstruction in endoscopic endonasal surgery (EES), especially in revision surgery. We present a 15-year single-institutional experience with use of the LNWF, focusing primarily on its role of providing durable closure after complex intradural endoscopic endonasal tumor resection.

Methods:

We performed a retrospective review of all EES in which a LNWF was used over the past 15 years at a single institution. The lateral nasal wall flap is an axial transposition flap based off the inferior turbinate artery and its branches. The mucosal flap is harvested in the submucoperichondrial layer overlying the inferior turbinate and lateral nasal wall. For reconstruction of large skull base defects, the flap may be modified to include the nasal floor and the nasal septum. Primary outcome measures included post-operative flap necrosis and cerebrospinal fluid (CSF) leak.

Results:

56 EES cases reconstructed with a LNWF were identified, with an average follow-up of 30 months. Most LNWF (54/56, 96%) were performed after one or more prior EES, and most often to reconstruct a clival defect (44/56, 79%). LNWF was performed due to lack of suitable nasoseptal flap (NSF) pedicle in 32 (57%) cases and to rescue a failed NSF reconstruction in 24 cases (43%). Postoperative CSF leak occurred in 14/49 (28.5%) cases with intraoperative leak. Necrosis of the LNWF requiring debridement occurred in 6/56 (10.7%) cases.

Conclusion:

The LNWF provides an additional, versatile means of vascularized closure after complex EES. It was used most often to reconstruct a clival defect and in many cases to rescue a failed NSF. The most common adverse outcomes associated with LNWF closures included CSF leak and flap necrosis.

Live Demonstration of Skull Base Surgery Performed by Visiting Surgeons at International Sites: Is It Safe?

Type of abstract:

abstract for oral presentation

Authors:

Carl Snyderman, Eric Wang, Paul Gardner, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Carl Snyderman, MD, MBA

Topic:

Anterior/central skull base

Introduction:

Skull base surgery is occasionally performed at international sites by visiting surgeons as part of global education. Data is limited on both patient complications and potential obstacles encountered by surgeons at these sites. The primary aim of this study was to better understand the challenges and outcomes of international surgery.

Methods:

Patients who underwent skull base surgery at eight international sites by a multidisciplinary surgical team were included. Hosting surgeons at these sites were surveyed postoperatively. Our primary outcomes were postoperative patient complications and obstacles experienced by the surgical team. Additional factors, including patient demographics, surgical time, and length of stay were also evaluated.

Results:

Seventeen patients undergoing skull base surgery at international sites were evaluated, including pituitary adenomas, chondrosarcomas and sinonasal undifferentiated cancer. The mean age of the patients was 40 (range 12-65 years). The average duration of surgery and length of stay was 3.3 hours and 8.7 days, respectively. Complications included diabetes insipidus in 3/17 patients (all transient) and postoperative cerebrospinal fluid (CSF) leak in 2/17 patients. One patient required additional surgery for repair of CSF leak. The most significant international obstacles were the lack of neurophysiological monitoring/expertise in 5/17 patients and limited instrumentation.

Conclusion:

With proper preparation, endoscopic endonasal skull base surgery can be safely performed at international sites by an experienced surgical team without an increased risk of

complications. A variety of obstacles may be encountered including incomplete or inaccurate medical history and inadequate instrumentation.

Skull Base Neurosurgery in the Pediatric Population: A Single-Center Case Series

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Paul A. Gardner, MD

Topic:

Anterior/central skull base

Introduction:

Endoscopic endonasal surgery (EES) in the pediatric population provides a unique corridor for skull base pathologies despite the unique challenges of this population. The long-term outcomes of this approach, use of adjuvant approaches, and complications are presented over a 23-year period.

Methods:

A single center retrospective review of all patients with skull base pathologies treated with EES at a tertiary pediatric hospital between 1999 and 2022.

Pathologies included JNA (n=52, 21%), craniopharyngioma (n=33, 14%), chordoma (n=32, 13%), pituitary adenoma (n=20, 8%), encephalocele (n=18, 7%), Rathke cleft cyst (n=18, 7%), odontoid disease (n=9, 4%). 54 were recurrent.

Results:

There were 243 patients with median age of 14 years(1-18).

EES was combined with anterior transmaxillary approach (n=25), craniotomy (n=17), transcervical (n=4), or transoral approach (n=1). CSF diversion was performed in 28%. 45% had vascularized flaps. Gross total resection was achieved in 75% of tumors (n=177).

CSF leak occurred in 20 patients. Other complications included hemorrhage (n=6), vascular injury (n=4), vasospasm (n=2), and stroke (n=1). 21 patients (9%) suffered cranial nerve deficits and 4 (2%) visual decrement. A small proportion developed permanent DI (8%) or panhypopituitarism (8%), mostly craniopharyngiomas.

Conclusion:

This large study with long term follow-up demonstrated the efficacy of EES for diverse pediatric skull base pathologies. EES in selected patients may allow for superior surgical outcomes with lower neurovascular complication rates than traditional open approaches. CSF leak remains a common, but manageable complication of pediatric EES.

Real-time evaluation of the vascular supply of the optic apparatus comparing indocyanine green video angiography in correlation to intraoperative visual evoked potential

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Stefan Linsler

Topic:

Anterior/central skull base

Introduction:

Our study evaluates the effectiveness and safety of using intraoperative ICG-angiography to predict postoperative visual outcomes and preserve vision in cases involving mass lesions near the optic apparatus. We hypothesize that improvements in visual function following tumor removal may be attributed to changes in optic nerve blood supply.

Methods:

Ten patients with various perichiasmatic pathologies underwent imaging studies including enhanced MRI, CT, ophthalmological examination, and ioVEP. Three control patients with normal pial support of the optic nerve (ON) were selected post-aneurysmal clipping. Intraoperative ICG was administered at 0.2mg/kg via peripheral vein access, followed by rapid injection of 10ml NaCl 0.9%, before and after tumor resection. Flow analysis software (Means of Flow 800 software, Kinevo, Carl Zeiss Co) was used to measure intervals between the first appearance of ICG in the ICA and pial circulation of the ON to full saturation, pre- and post-resection.

Results:

Preoperatively, nine of ten patients had impaired visual fields. All underwent minimally invasive microsurgical supraorbital approach. Postoperatively, all showed improved visual outcomes. Intraoperatively, prolonged VEP latency was observed in all, with mean prolonged P100 latency of 0.31 ± 1.01 ms (right eye) and 3.81 ± 1.98 ms (left eye). Peak time differences in ICG-angiographie of ICA-ON were 2.77 ± 2.65 ms before tumor resection and 2.9 ± 2.33 ms

after ($r=0.863$, $p>0.05$). Mean ON to ICA time improvement was 0.0389 ± 1.34 ms. No ICG-related complications occurred.

Conclusion:

Flow 800 seems to make a reproducible measurement to evaluate not only the real time perfusion of the ON but also could provide information about improvement of blood circulation after tumor resection. iVEP tends to prolong latency even if the optic nerve is not involved by a pathology, directly.

SUTURE AS A RECONSTRUCTION METHOD FOR SKULL BASE AFTER TRANSNASAL ENDOSCOPIC SURGERY

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

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Topic:

Anterior/central skull base

Introduction:

Transsphenoidal surgery is considered as safe and effective for the removal of pituitary adenomas and many other parasellar tumors. During surgery and after tumor removal, an effective strategy is required to avoid postoperative cerebrospinal fluid (CSF) leak. However, It remains the most serious and a life- threatening complication.

Methods:

The pituitary tumor database of the Jikei University Hospital, Tokyo Japan was retrospectively reviewed for patients undergoing standard or extended endonasal transsphenoidal tumor removal. The extracted patients` operative notes, pre-surgical and follow-up clinical data were reviewed for demographic data, tumor pathology, CSF leak grade and repair method, and complications. All procedures were performed by the senior surgeon. The study was approved by the Jikei University Hospital committees on human research and research ethics.

Results:

In grade 3 intra-operative CSF leaks, closure was performed in: 39 patients (57.4%) by suturing and fascia lata, 11 patients (16.2%) – by suturing, fat and fascia lata, 9 patients (13.2%) by suturing and fascia, 2 patients (3%) by suturing and fat, 2 patients (3%) by suturing, fascia lata and collagen sponge and 2 patients (3%) – by suturing, collagen sponge and Fat. In the other hand of the results obtained; 1 (1.5%) in Suturing + collagen sponge, 1 (1.5%) Sutuing + Fascia + PGA and 1 (1.5%) suturing + Fascia + Fat.

Conclusion:

In most cases, the complication of grade 2 and 3 CSF occurs, most of which are repaired with suture. The suture of choice for these trans-surgical repairs was suture and fascia lata, demonstrating that this repair method is the most effective in the presence of trans-surgical CSF leak.

EXPERIENCE IN THE SURGICAL TREATMENT OF PATIENTS WITH A DIAGNOSIS OF CUSHING'S DISEASE IN CECANOT RELATING TO 12 CASES

Type of abstract:

abstract for oral presentation

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Topic:

Oncology

Introduction:

Cushing's disease is characterized by elevation of the cortisol, presenting a moon face, centripetal obesity, and violet-colored stretch marks. It can cause hypertension, bone loss and type II diabetes. The presentation of the disease is 60% due to a pituitary adenoma, which by releasing ACTH produces hypercortisolism.

Methods:

It is a retrospective cross-sectional study from secondary sources. The population was 12 patients with a diagnosis of Cushing's disease, in whom a chemical cure was observed after the resection of the pituitary adenoma treated at the CECANOT clinical center. A collection instrument was used for data on sociodemographic characteristics, tumor pathology, pre- and post-surgical hormonal levels and evolution of the clinical picture.

Results:

A significant improvement was observed in all patients after surgical resection of ACTH-producing adenomas. These resulted in a decrease in their round facies, a decrease in centripetal obesity and a decrease in hypertensive blood pressure levels. In subsequent clinical studies, they showed normalization of ACTH, cortisol and glycemia, as well as a decrease in insulin resistance and factors that enhance metabolic syndrome. Post-surgical images showed the absence of functional adenoma, which meant a complete resection.

Conclusion:

The removal of functional pituitary adenomas is the ideal treatment to improve the clinical symptoms of patients diagnosed with Cushing's disease. This intervention represents a safe

decrease in the hormonal levels of ACTH and consequently of cortisol in the blood. This represents a gradual regression of the disease.

Safety and efficacy of intrathecal fluorescein administration for cerebrospinal fluid leak diagnosis in the sellar region

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Anterior/central skull base

Introduction:

This retrospective study evaluates the safety and efficacy of intrathecal fluorescein in detecting cerebrospinal fluid (CSF) leaks in the sellar region, with a specific focus on gender, age, and diagnostic context, including spontaneous leaks and postoperative application after endoscopic resections of anterior skull base tumors.

Methods:

Between 2012 and 2022, 54 patients (25 males and 29 females, ranging from 26 to 80 years with an average age of approximately 51 years) at KBC Zagreb, Croatia, received intrathecal fluorescein for suspected CSF leaks. The study analyzed fluorescein's diagnostic success and safety across diverse patient demographics and different clinical indications, including spontaneous CSF leaks and postoperative follow-ups after tumor resections.

Results:

Intrathecal fluorescein effectively identified CSF leaks in 46 cases (85%), with 8 patients (15%) showing no visible fluorescein in the nasal cavity despite symptoms of CSF rhinorrhea. The diagnostic technique's efficacy varied slightly across different patient groups and diagnostic contexts, with no significant adverse effects directly attributable to fluorescein. Reported side effects included one case of transient limb numbness and tingling and four cases of headache and nausea, alongside the anticipated complications of lumbar puncture.

Conclusion:

This study highlights the technique's utility in both spontaneous leak scenarios and postoperative evaluations after anterior skull base tumor resections. Further research is recommended to optimize administration protocols, particularly in cases with non-visual nasal fluorescein despite evident rhinorrhea, to enhance detection sensitivity and patient care.

The Coexistence of Carotico-Clinoid Foramen and Interclinoidal Osseous Bridge: An Anatomico-Radiological Study with Surgical Implications.

Type of abstract:

abstract for oral presentation

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Presenting author:

Simona Seriola

Topic:

Anterior/central skull base

Introduction:

The coexistence of complete carotico-clinoid foramen, an ossification between the anterior and the middle clinoid, and an interclinoidal osseous bridge, between the ACP and the posterior clinoid, represents an uncommonly reported anatomical variant. If not adequately recognized, osseous bridges may complicate open or endoscopic surgery.

Methods:

Two hundred high-resolution non-contrast CT scans (400 sides) and forty-one dry skulls (82 sides) were analyzed to identify the different morphology of sellar bridges, focusing on the coexistence of complete CCF and ICB. Two embalmed latex-injected heads with coexisting

CCF and ICB were dissected step-by-step to show the anatomical relationship with the surrounding structures from an endoscopic and microscopic perspective.

Results:

The analysis of 200 CT scans revealed a rate of coexistence in 4% of the cases, all encountered in Caucasian white females. Two different types of interclinoid bone bridges were identified based on the degree of bone mineralization. Both endoscopic and macroscopic step-by-step dissections highlighted variability in morphology and consistency of the sellar bridges and the close relationship with the cavernous sinus neurovascular structures.

Conclusion:

The coexistence of CCF and ICB is an anatomical variation found in 4% of cases. Preoperative knowledge of the degree of mineralization and its relationship with surrounding structures is essential to performing safe surgery, and minimizing cranial nerve and vascular injuries.

Friday 7 June: Session 13: 13.30 - 15.00: Imaging

The transposition of the V3 segment of the vertebral artery in the surgery of craniocervical junction: anatomico-radiological study and clinical implications.

Type of abstract:

abstract for oral presentation

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Presenting author:

Simona Seriola

Topic:

Lateral skull base

Introduction:

Transposition of the vertebral artery in approaches to the craniocervical junction is a maneuver not frequently performed, but it may be necessary to safely access the ventral portion of the CCJ, especially in posterolateral pathologies with a component that extends towards the C1, and the odontoid process.

Methods:

Two hundred high-definition CT scans were analyzed to define the total length of the vertebral artery, from its origin from the subclavian artery to termination at the basilar artery. Ten embalmed specimens were dissected to measure the mean length of the vertebral artery from the dural entry point to the C2 transverse foramen and the C3 foramen transverse (after the opening of the C2 transverse foramen). In three injected specimens, an extreme lateral transcondylar trans odontoid approach was performed to illustrate a step-by-step dissection. A clinical case for the treatment of ventral craniocervical junction sarcoma is presented.

Results:

The morphometric study on the CT scans revealed an average length of 23.7 cm (V1 segment: 3.91 cm, V2 segment: 6.58 cm, V3 segment: 5.37 cm, and V4 segment: 3.01 cm). A step-by-step dissection of the surgical approach is described in detail. The hemilaminectomy of C1 and subsequent opening of the transverse foramen of C1 exposed the atlanto-occipital joint and ipsilateral nerve root, obtaining a mobilization rate of 24.77% (5.87 cm) of the VA.

Conclusion:

The treatment of skull base tumors of the low clivus and the CCJ may require transposition of the vertebral artery to perform tumor resection. Transposing the VA with the opening of the transverse foramen of C1 allows a safe surgical corridor.

Automated measurement of vestibular schwannoma on MRI

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

O.M. Neve

Topic:

Imaging &, interventional radiotherapy

Introduction:

Validation of an automated measurement and growth detection tool of volume and two dimensional (2D) diameters of vestibular schwannomas on magnetic resonance imaging (MRI).

Methods:

MRI data from 214 patients in 37 centres were retrospectively analysed. Volume measurement on T1+contrast and T2 sequences was performed, using a new trained convolutional neural network (CNN). Quantitative analysis, including Dice index and surface-to-surface distance (S2S) was used to compare the computer and the human delineations. In addition, the volume model was validated using an external dataset. Automatically derived 2D measurements of the maximal extrameatal diameters were compared to measurements by 2 human observers. Intra- and interobserver variabilities were calculated using the intraclass correlation coefficient (ICC), agreement on tumour progression using Cohen's kappa.

Results:

The volume model showed state-of-the-art performance, with a mean S2S distance of less than 0.6 mm and Dice index was 0.92 for T1+contrast MRI. T2-weighted images had a mean S2S distance less than 0.6 mm and Dice index was 0.87. The external validation showed S2S of 0.4 and Dice index of 0.8. For 2D measurement the human intra- and interobserver variability showed a high correlation (ICC: 0.98-0.99) and limits of agreement of 1.7 to 2.1 mm.

Conclusion:

Automated volume and diameter measurements and growth detection of vestibular schwannomas are at least as accurate as human measurements. In clinical practice, measurements of the maximal extrameatal diameters of vestibular schwannomas provide important complementary information to total tumor volume measurements. Combining both in an automated measurement algorithm facilitates clinical adoption.

Vestibular Schwannoma growth, comparison of volumetric analysis and linear measurements.

Type of abstract:

abstract for oral presentation

Authors:

Salman Hashmi, KHODIER, Khalid, HEMMAD, Aayushi

, Noweed Ahmad, Nitin Mukherjee

Presenting author:

Salman Hashmi

Topic:

Lateral skull base

Introduction:

Vestibular schwannoma growth pattern is the most important factor in determining the wait and watch versus active treatment. It has been long debated that linear measurements don't give exact description of true growth volume. We analysed our first cohort of patients which we applied volumetric analysis

Methods:

Analysis of 30 patients who have been detected growth on sequential scanning will be taken. Comparison will be made between percentage increase as per the linear measurements on contrast enhanced MRI scan and volumetric analysis using 3D slicer. Closed surface volume which uses the smoothed surface model and an integration of the volume based on the triangulated surface will be used for analysis of volume.

Results:

On comparison of both significant difference was noticed in percentage increase in size of the tumour when volumetric analysis was made.

Conclusion:

One should use volumetric analysis in monitoring growth especially if the linear measurements are only showing very minor growths, as this can alter the perception of growth.

Defining tumor growth in vestibular schwannomas: a volumetric inter-observer variability study in contrast-enhanced T1-weighted MRI

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Imaging &, interventional radiotherapy

Introduction:

For patients with vestibular schwannomas (VS), the need for reliable volumetric tumor monitoring is important. Currently, a volumetric cutoff of 20% increase in tumor volume is widely used to define tumor growth in VS. This study investigates the volumetric limits of agreement (LoA) of VS by an inter-observer study.

Methods:

This retrospective study included 100 VS patients who underwent contrast-enhanced T1-weighted MRI. Five observers volumetrically annotated the images. Observer agreement and reliability was measured using the LoA, estimated using the limits of agreement with the

mean (LOAM) method, and the intraclass correlation coefficient (ICC). Influence of imaging parameters and tumor characteristics were assessed using univariable and multivariable linear regression analysis.

Results:

The 100 patients had an average median tumor volume of 903 mm³ (IQR: 193-3101). Peritumoral cysts were found in 6 patients. Patients were divided into four volumetric size categories based on tumor volume quartile. The smallest tumor volume quartile showed a LOAM relative to the mean of 26.8%, whereas for the largest tumor volume quartile this figure was found to be 7.3% and when excluding peritumoral cysts: 4.8%. Of all imaging parameters and tumor characteristics, only tumor volume was associated with the LoA (adjusted B=-0.001 [P=0.003]).

Conclusion:

Agreement limits within volumetric annotation of VS are affected by tumor volume, since the LoA improves with increasing tumor volume. As a result, for tumors larger than 200 mm³, growth can reliably be detected at an earlier stage, compared to the currently widely used cutoff of 20%.

Long-term natural history and patterns of sporadic Koos grade 4 vestibular schwannomas: A single-institution volumetric analysis of 215 patients

Type of abstract:

abstract for oral presentation

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Presenting author:

Sammy Schouten

Topic:

Lateral skull base

Introduction:

Volumetric natural history studies specifically on large vestibular schwannomas (VSs), commonly classified as Koos grade 4, are lacking. The aim of the current study is to present the volumetric tumor evolution in sporadic Koos grade 4 VSs and possible predictors for tumor growth.

Methods:

Volumetric tumor measurements and tumor evolution patterns from serial MRI studies were

analyzed from 215 selected consecutive patients with Koos grade 4 VS undergoing initial wait-and-scan management between January 2001 and July 2020. The significant volumetric threshold was defined as a change in volume of $\geq 10\%$.

Results:

Growth was observed in 147 tumors (68%) and shrinkage in 75 tumors (35%). Growth-free survival rates at 1, 2, 5, and 10 years were 55%, 36%, 29%, and 28%, respectively, and did not significantly differ in tumors >20 mm (Chi-square=.40; P-value=.53). Four tumor evolution patterns (% of total) were observed: continued growth (60); growth then shrinkage (7); continued shrinkage (27); and stability (5). Good hearing (adjusted HR 2.21; $P<.001$) and peritumoral edema (adjusted HR 2.22, $P=.01$) were significantly associated with an increased likelihood of growth.

Conclusion:

Koos grade 4 VSs show a wide variety in size and growth. Due to variable growth patterns, an initial wait-and-scan strategy with short scan intervals may be an acceptable option in selected tumors, if no significant clinical symptoms of mass effect that warrant treatment are present.

Dynamic-contrast enhanced and diffusion MR imaging for predicting short-term tumor growth of sporadic vestibular schwannomas: a prospective study

Type of abstract:

abstract for oral presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

Advanced MR imaging, such as MR diffusion and dynamic contrast-enhanced (DCE) imaging, may provide valuable non-invasive information on intrinsic tumor biology. This study aims to assess Apparent Diffusion Coefficient (ADC) and DCE-MRI-derived microvascular parameter values as potential predictors for future sporadic VS behavior.

Methods:

In this prospective cohort study, 147 patients with newly diagnosed unilateral sporadic VS and initial wait-and-scan strategy were enrolled between January 2021 and January 2023. Patients underwent a single timepoint comprehensive MRI protocol, including axial diffusion-weighted- (DW) and DCE-MRI sequences. The estimated values of ADC, K_{trans}, v_e and v_p were calculated using established pipelines on a pixel-by-pixel basis within the delineated tumor region of interest. Associations of the estimated parameter values with volumetric growth were evaluated in uni- and multivariable logistic regression and survival analyses.

Results:

One hundred and ten patients were analyzed. Of these, 69 tumors (63%) exhibited growth during follow-up. A significant correlation was primarily observed between the DCE-MRI-derived parameters and VS growth. The combination of mean K_{trans} ($p < 0.001$) and v_e ($p < 0.001$) tumor values provided an internally validated model with an AUC of 0.85 for growth, yielding a sensitivity of 89%, specificity of 73%, respectively, at the optimized cutoff value. Mean ADC values were only found to be significantly lower in shrinking tumors ($p = 0.04$).

Conclusion:

The significant and robust correlation observed between VS growth and K_{trans} and v_e tumor values indicates great potential of the non-invasive DCE-MRI for individualized VS management in clinical practice. External validation is needed to further substantiate these findings.

Computer-aided prediction of short-term tumor growth in sporadic vestibular schwannomas using both structural and dynamic-contrast enhanced MR imaging

Type of abstract:

abstract for oral presentation

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Presenting author:

Stefan Cornelissen

Topic:

Imaging &, interventional radiotherapy

Introduction:

Recent studies have demonstrated that microvascular parameters derived from dynamic-contrast enhanced (DCE) MR imaging significantly correlate with tumor growth in vestibular schwannomas (VS). Other studies provide evidence that the use of artificial intelligence (AI) on structural MR data provides similar predictive value for tumor growth.

Methods:

This prospective study investigates the combination of structural and DCE imaging data for AI to predict short-term tumor growth in VS. A total of 110 newly diagnosed unilateral sporadic VS patients underwent both T2-weighted and DCE MR imaging. Established pipelines were used to estimate the values of DCE-derived parameters K_{trans} , v_e , and v_p . Subsequently, tumors were delineated and only voxel values within the delineation were considered for the AI model development. Radiomic features were extracted from both the structural images and DCE-derived parameter maps. A classifier was trained on the radiomic features to predict tumor growth.

Results:

Growth was observed in 69 (63%) of the 110 patients during follow-up. A support vector machine (SVM) model was trained on K_{trans} and v_e radiomic features using five-fold-cross-validation. This model resulted in an accuracy of 82.5%, sensitivity of 81.2%, specificity of 82.9%, and area-under-the-curve of 0.85. The predictive value of structural MR imaging features is currently under investigation, as well as the use of more complex AI models. It is hypothesized that the addition of structural features and increase in model complexity will improve the model's predictive power.

Conclusion:

Preliminary results have shown that DCE-derived parameter values exhibit a high predictive value for tumor growth prediction in sporadic VS. Other radiomic features and model types will be analyzed in order to investigate whether they improve the current AI model. These results will be presented during the conference.

Analysis of prognosis and influencing factors of 151 cases of external auditory canal cancer

Type of abstract:

abstract for oral presentation

Authors:

Wei Wang 1, Jingtai Zhi1#, Wang Zhao 1, Mei Wei 1, Li Li 1, and Peng Lin 1

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Presenting author:

Wei Wang

Topic:

Oncology

Introduction:

Due to its low incidence and complex anatomical location, the prognosis of patients with temporal bone tumors and the factors influencing it are unclear. This study explores the prognosis of patients with external auditory canal cancer to provide a reference for the treatment.

Methods:

In this study, we collected clinicopathological information and prognostic follow-up information of 151 patients with cancer of the external auditory canal who visited our hospital from 2001 to 2022, and analyzed the prognosis of the patients and the independent influencing factors related to the prognosis with the survival curve analysis and multifactorial analysis.

Results:

Survival curve analysis showed that advanced T stage, invasion of the parotid gland, and invasion of the inner ear were significantly associated with an increased rate of recurrence, and multifactorial analysis showed that invasion of the parotid gland was an independent risk factor for recurrence. In addition, advanced T-stage, squamous carcinoma, invasion of the skull base, and invasion of the inner ear were significantly associated with increased mortality; multifactorial analysis showed that advanced T-stage, invasion of the parotid gland, the skull base, the facial nerve, and the inner ear were the independent risk factors for patients' mortality.

Conclusion:

Our study reveals that based on a large sample reveals the prognostic information of patients with external auditory canal cancer and their independent risk factors related to recurrence and death, and provides a theoretical basis for clinical grading.

Friday 7 June: Session 14: 13.30 - 15.00: Lateral General

Cerebrospinal fluid leakage in lateral skull base: surgical approach and treatment strategy

Type of abstract:

abstract for oral presentation

Authors:

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Robert Stokroos, UMC Utrecht, Otolaryngology

Tristan van Doormaal, UMC Utrecht, Neurosurgery

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Presenting author:

HGXM Thomeer MD PhD, UMC Utrecht, Otolaryngology Skull Base Surgery

Topic:

Lateral skull base

Introduction:

describe a cohort of patients with spontaneous cerebrospinal fluid (sCSF) otorrhea. To report surgical outcome and provide a treatment algorithm

Methods:

Between 2015 and 2023 all patients presenting with sCSF were collected and data assessment was performed including clinical symptoms (hearing loss, aural fullness, meningitis, recurrent otitis media), preoperative audiometry, CT and MRI scanning. According to the site and size of the dural defect, different surgical approaches were applied

Results:

A total of 40 patients were included. Four of these had a history of meningitis. All BTP testings were positive. These patients were treated with different surgical approaches: middle fossa approach (10 patients), transmastoid approach with bony obliteration of the cavity (26 patients) and 4 patients underwent a subtotal petrosectomy procedure. Two cases underwent revision surgery (MFA) due to residual disease (CFS leakage). After follow up duration of 12 months (6.5 months SD), no recurrence was observed. Transient word finding disorder (spontaneous recovery time period 2 days after onset) occurred in one patient after MCFA.

Conclusion:

Spontaneous cerebrospinal fluid leakage is a rare but manageable pathology with severe possible complications without treatment. In time diagnosis, laboratory testing and imaging is primordial to obtain the best treatment option with optimal patient outcome.

Characteristics and clinical management strategy of petrous apex cholesterol granulomas

Type of abstract:

abstract for oral presentation

Authors:

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† Equally contributed as first author

Presenting author:

Walter Szweryn

Topic:

Lateral skull base

Introduction:

To evaluate the clinical characteristics of petrous apex cholesterol granulomas (PACG) and assess outcomes after different treatment strategies.

Methods:

A consecutive case series of 34 patients with a PACG, diagnosed in the Radboud University and Maastricht University Medical Centers. The main outcomes were PACG growth, symptoms and the outcomes of different treatment options: wait and scan (WS) (n=21) management and surgical drainage (n=13).

Results:

Twenty-one patients (61.7%) showed symptoms, mostly more than one. Most reported were cranial nerve palsy (58.8%) and headache (35.3%). Symptoms were stable in 26 (76.5%) patients.

After surgery 84.6% (11/13) reported partial recovery of symptoms. Adverse events occurred in five out of 13 patients that underwent surgery, all with full recovery.

In the solely WS group one (4.8%) developed new symptoms, and two (9.5%) reported symptom progression despite a stable granuloma size. In this solely WS group, two (9.5%) showed granuloma growth on follow up scans without symptom progression.

Conclusion:

This study confirms that PACG are slow-growing lesions with a low risk of adverse events. WS treatment is a safe option for patients without or with mild symptoms and no substantial PACG growth. For the other patients, surgical treatment may be considered.

Middle Cranial Fossa Approach: The Incudomalleolar Joint as a Reliable Landmark

Type of abstract:

abstract for oral presentation

Authors:

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Susan D. Emmett (Department of Head and Neck Surgery and Communication Sciences, School of Medicine, Duke University, Durham, NC, United States)

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Presenting author:

Salman Hashmi

Topic:

Lateral skull base

Introduction:

Middlefossa approach is still used for resurfacing of superior semicircular canala and for decompressing the labyrinthine part of facial nerve.

We have evaluated the incudomalleal joint (IMJ) as a key landmark for identifying the superior semicircular canal (SSC) and to get oriented along the floor of the middle cranial fossa.

Methods:

A combination of 20 temporal bone dissections and Computerized tomographic scans were analysed to verify this land mark in terms of reliability and consistency.

Results:

The blue line of the SSC is consistently identified along the prolongation of a virtual line through the IMJ and the angulation toward the root of zygoma within 5 to 9 mm. The average distance from the root of zygoma toward the IMJ ranged from 1.60 to 1.90cm.

Conclusion:

The close and consistent relationship of IMJ and SCC is a very reliable landmark and can be used in all middle cranial fossa approaches especially if it's a combined trans mastoid trans-temporal approach

Management and clinical outcomes of glomus jugulare with cervical extension: Our Institution's Experience

Type of abstract:

abstract for oral presentation

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Solares CA, Emory University

Presenting author:

Leonardo Tariciotti

Topic:

Lateral skull base

Introduction:

Glomus jugulare (GJ) are rare skull base lesions that represent a significant challenge due to their variable pattern of invasion. Particularly, GJ with cervical extension require thorough surgical planning due to the anatomical complexity of the craniocervical region. Multidisciplinary evaluation is required to dictate the best course of management.

Methods:

A retrospective chart review conducted at our institution identified 32 patients treated for GJ with cervical extension from March 2009 to December 2023. Variables related to demographic data, clinical presentation, treatment modality, and clinical outcomes were collected from each patient.

Results:

A cohort of 32 patients with GJ with cervical extension were treated at our institution. Cervical involvement was more prominent along the carotid space, parapharyngeal space, and infratemporal fossa. Tumor extension into the carotid canal and hypoglossal canal were also prominent among this group. Treatment varied across patients, with stereotactic and proton radiotherapy being the most common modalities, followed by surgical excision. Survival outcomes were also reported.

Conclusion:

Management of large GJ is controversial. Lesions with craniocervical extension are rarely considered for surgical management due to their hypervascular nature and the surgically challenging anatomical location. Nonetheless, individualized cases may benefit from surgical resection, particularly recurrent or progressing cases that have failed control with radiation.

Intracranial complications due to otogenic and sinogenic infections in pediatric cases

Type of abstract:

abstract for oral presentation

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Presenting author:

Tamar Boot, MD

Topic:

Lateral skull base

Introduction:

This study will examine pediatric cases with intracranial complications from otogenic and sinogenic skull base infections. Complications include abscesses, meningitis, thrombosis, and skull base osteomyelitis, stemming from middle ear or sinus infections. It aims to understand prevalence, symptoms, hospitalization duration, antibiotic use, and potential impacts of Covid-19 on incidence.

Methods:

A retrospective study of 57 patients consisting of children between (0-18) was performed. Patients were treated in the Maastricht University Medical Centre. The search tool Ctcue was used to assemble the files of patients admitted between February 2013 and December 2023. Data were collected from the patient records in Castor.

Results:

From the preliminary results, an increase of complicated otogenic and sinogenic infections can be confirmed over the past years. Furthermore, we will present on patient demographics, treatment duration compared to complication type, anticoagulant use for thrombogenic complications and radiological surveillance.

Conclusion:

Sinusitis and acute otitis media can potentially cause intracranial suppurative complications like cerebral venous sinus thrombosis and skull base osteomyelitis.

Recognizing patterns of complications and prevalence of frequent pathogens are crucial for effective disease management, especially since there is a diverse clinical presentation associated with challenges in diagnosis and treatment.

360° to the petrous apex: comprehensive surgical anatomy and limitations of open and endoscopic endonasal approaches to the petrous apex

Type of abstract:

abstract for oral presentation

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Maria Peris-Celda, Mayo Clinic Departments of Neurosurgery and Otorhinolaryngology

Presenting author:

A. Yohan Alexander

Topic:

Lateral skull base

Introduction:

The contemporary skull base surgeon must understand both transcranial and expanded endonasal approaches (EEAs) to the petrous apex (PA) and how to remove it to access multi-compartmental lesions. We provide a comprehensive anatomical overview and comparison of the main approaches to the PA through illustrative anatomical dissections.

Methods:

Transcranial approaches were performed under microscopic magnification and EEAs were performed using 0-degree, 30-degree, and 45-degree endoscopes. 3D images documented each key step. Each approach was performed on eight sides of four specimens. Transcranial approaches performed were the retrosigmoid approach with suprameatal extension, the transcochlear approach, and the anterior petrosectomy. EEAs were the transclival approach and its contralateral transmaxillary (CTM) extension. We provide two illustrative cases with operative videos to highlight nuances in approach selection for PA lesions.

Results:

PA from retrosigmoid is defined by superior petrosal sinus (SPS) superiorly, CN VI medially, and axial and sagittal planes of internal auditory canal (IAC) inferiorly and laterally, respectively. PA from transcochlear is bounded by inferior petrosal sinus medially and

inferiorly, posterior fossa dura posteriorly, petrous internal carotid artery (ICA) anteriorly, and SPS superiorly. For anterior petrosectomy, PA is defined by petrous ridge posteriorly, IAC estimation laterally, greater superficial petrosal nerve anteriorly, and V3 medially. From an EEA, PA is a triangle formed by CN VI posteromedially, cavernous ICA anterolaterally, and pterygosphenoidal fissure inferiorly – CTM extension afforded access to IAC fundus.

Conclusion:

Through anatomical dissections and representative clinical cases, we describe different exposures of PA as afforded through open approaches and EEAs, and how to manipulate the PA from these approaches to access multi-compartmental skull base lesions.

NIR indocyanine-white light overlay visualization mode for neuro-otovascular preservation in the anterior transpetrosal approach: technical note for tailored MDK rhomboid drilling

Type of abstract:

abstract for oral presentation

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Topic:

Lateral skull base

Introduction:

We describe our preliminary investigation on microscopic real-time near-infrared indocyanine (NIR-ICG) fluorescence and white light overlay modality in anterior transpetrosal approaches. We aimed to test its feasibility and accordance with anatomical

landmarks for planning posteromedial (Kawase) rhomboid drilling in ex-vivo and clinical scenarios.

Methods:

The technique involves using a robotic microscope (ZEISS KINEVO 9000) and the built-in FLOW800 and INFRARED800 functions with fluorescence capabilities to provide ocular overlay of NIR indocyanine and white light images. Intraprocedural frames were collected, and technical nuances, surgical time, operator feedback, and outcomes were discussed. Ex vivo exposure was achieved in an injected adult specimen receiving an ICG bolus injection to examine the visualization properties and in a silicon-injected adult specimen to review critical landmarks. We described our experience using NIR indocyanine and white light overlay technology for subtemporal anterior petrosectomy in a single case (petroclival meningioma).

Results:

ICG administration in the non-injected specimen was feasible, and NIR fluorescence noted. A thicker middle fossa floor and a bone layer covering GSPN required additional drilling that led to ICA exposure. ICG fluorescence allowed consistent tracing of the ICA course from posterior genu to the petrolingual ligament. In the clinical scenario, it represented a valuable adjunct in enhancing the surgeon's ability to identify or confirm the location of the carotid canal, derive critical landmarks (Cochlear line and distance, Cochlear safety line), superior petrosal sinus, greater superficial petrosal nerve, Gasserian ganglion and trigeminal branches with improved precision and safety.

Conclusion:

This adjuvant technique offers the surgeon a comprehensive view of the overall surgical field and petrous ICA course, thereby contributing to safer surgical planning of posteromedial rhomboid drilling beyond static anatomical landmarks, favouring neuro-oto-vascular preservation in selected cases. However, further investigation is required to justify a wider adoption.

Friday 7 June: Session 15: 15.30 - 17.00: General

The Inter-Maxillary-Mandibular Approach to the Upper Parapharyngeal Space: Anatomic Basis and Clinical Case

Type of abstract:

abstract for oral presentation

Authors:

Anthony Tang, Sophia Dang, Xinni Xu, Kyle Affolter, Paul Gardner, Carl Snyderman MD MBA, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Carl Snyderman, MD, MBA

Topic:

Anterior/central skull base

Introduction:

Current approaches to the upper parapharyngeal space (UPPS) provide inadequate visualization and access with significant morbidity. We describe a novel inter-maxillary-mandibular [IMM] approach to the UPPS in anatomical dissections. A case example of the IMM approach for resection of a V3 schwannoma is presented.

Methods:

Endoscopic dissections were performed in 3 freshly injected cadaver heads. Transcervical, endoscopic preauricular, and endoscopic IMM approaches were performed. The length of the surgical corridor was measured using CT scans and navigation to show proximity of each approach. Quantitative measurements for width of surgical field, length of corridor, and maximal angles access were averaged across cadavers and analyzed. The advantages and disadvantages are discussed based on the anatomic nuances of each of these approaches. A clinical case of a large V3 schwannoma involving the UPPS is presented to demonstrate the utility of the IMM approach.

Results:

All three approaches can access the UPPS. However, unlike the transcervical approach, both the preauricular and IMM approaches could completely mobilize the ICA as it enters the skull base. The transcervical approach permits a large inferior corridor, although there is poor visualization of the UPPS due to limitations imposed by the mandible. The endoscopic preauricular approach provides a direct corridor to address lesions in the UPS; however, this technique has limited access depending on the width of the mandibular condyle and ramus. The endoscopic IMM approach provides greatest skull base visualization including the ICA entering the carotid canal.

Conclusion:

Access to the UPPS is difficult due to critical structures and the bony confines of the mandible, maxilla, and skull base. The novel IMM approach provides access to the entire UPPS and allows mobilization of the ICA. We demonstrate clinical utility for a tumor of the UPPS.

Introduction to the volume of operative manoeuvrability (VOM) as a novel metric in microneurosurgical anatomical research: toward a reproducible data-driven measurement perspective in complex skull base corridor computation.

Type of abstract:

abstract for oral presentation

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Topic:

Basic science

Introduction:

Neuroanatomical research employs several methodologies to elucidate the underlying rationale of various neurosurgical interventions. However, the heterogeneity in the metrics

used hampers establishing a unified experimental language. We introduce the "Volume of Operative Manoeuvrability" (VOM) alongside an overview of its application in modelling operative skull base corridors.

Methods:

The VOM is calculated as the ellipsoidal-based volume defined by the surgical entry point and target areas, determined using stereotaxic coordinates. Areas were transformed into ellipses to address irregular surface vertex mismatch issues and facilitate geometrical computation; this conversion utilized spatial principal component analysis (PCA) for optimization and a tailored cost function to represent original three-dimensional surface characteristics accurately. The corridor's height, termed the "target distance", and a fixed VOM set at 10 mm from the target area, designated as "standardized VOM" (sVOM), were calculated.

Results:

A synthetic skull scaffold and an adult embalmed, injected specimen were used. Following registration with a neuronavigation system, a frontotemporal craniotomy was executed on the scaffold, and a fronto-orbito-zygomatic (FOZ) approach was applied to the specimen. Coordinates from both entry and target areas were recorded. This abstract presents a detailed computation and application of these metrics (VOM, sVOM, and target distance), including measurements and discussions of attack angles and surgical freedom for comparable targets.

Conclusion:

These novel metrics offer a quantitative approach to assessing surgical exposure's feasibility, moving beyond traditional qualitative illustrative methods. This aligns with contemporary "data-driven" principles in skull base surgery. Additional validation and comparative analysis with existing metrics are essential to substantiate our preliminary findings and facilitate wider adoption.

Introduction to the visuo-operative angle (VoA) as a novel parameter in microneurosurgical anatomical research: toward a reproducible data-driven measurement perspective in intraoperative microscopic and endoscopic visualization

Type of abstract:

abstract for oral presentation

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Topic:

Basic science

Introduction:

To determine the reproducibility and safety of microneurosurgical procedures, a detailed

understanding of the operative field visibility is paramount. We introduce the concept of the visuo-operative angle (VoA), a novel metric to quantitatively assess the degree of surgical visibility and exploration towards a target area.

Methods:

The VoA represents the angle between the vector of surgeon's trajectory (i.e. line from the surgical entry area to the target surface centroids) and the perpendicular vector of the target area toward the operator. It provides a quantifiable measure of the visual accessibility and potential manoeuvrability within the surgical field measured in native 3D space. Stereotaxic coordinates were collected after frameless navigation system registration (tolerance < 2 mm) for measuring entry and target areas, which were then approximated into ellipses through a principal component analysis (PCA) method to address issues of irregular surface vertex mismatch and facilitate geometrical computation.

Results:

First, a frontotemporal craniotomy was designed in a synthetic skull scaffold, and the VoA was computed for reliable bony landmarks. Then, the VoA was measured during a fronto-orbito-zygomatic and an endoscopic endonasal approach in an injected, embalmed specimen for relevant bony structures. The consistency of VoA across all measurements collected in synthetic and cadaveric models suggests that this metric might first 1) quantitatively account for a determinant operative feature toward irregular, non-perpendicularly oriented surfaces in the surgical field, and 2) adjust the reliability of other manoeuvrability measurements in light of the visualization granted with specific approaches.

Conclusion:

The VoA might represent an adjunct parameter in microneurosurgical anatomical investigations to further assess the feasibility of novel techniques, especially minimally-invasive approaches, with the potential of subsequent clinical implementation in real scenarios. Further studies are recommended for validation and comparative analysis with existing visual assessment methods.

Multidisciplinary Treatment of Skull Base Pathologies: CMF-ENT-NSY Collaboration Experience of a New Center

Type of abstract:

abstract for oral presentation

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Topic:

Oncology

Introduction:

This work aims to report the experience of multidisciplinary collaboration in the treatment of skull base pathologies, recently implemented since the establishment of the new Maxillofacial Surgery Department at Circolo e Fondazione Macchi Hospital in Varese.

Methods:

From October 2021 to January 2024, a total of 25 patients were treated by a joint Maxillofacial-Otolaryngology-Neurosurgery team: 14 patients underwent anterior skull base demolition, exenteratio orbitae and hemimaxillectomy, 8 anterior skull base demolition and exenteratio orbitae, 3 anterior skull base demolition and ethmoidectomy. Reconstruction, performed concurrently with the demolition phase, involved microsurgical flaps in 17 patients: latissimus dorsi flap in 12 cases and ALT flap in 5 cases. The temporalis flap was used in the remaining 8 cases.

Results:

No major complications occurred (only 3 cases reported seroma at latissimus dorsi donor site and 3 cases local infections). Latissimus dorsi and ALT microsurgical flaps confirmed to be the best reconstructive options for large surgical defects. They ensure a physical barrier to the intracranial content, filling of dead spaces, prevention of cerebrospinal fluid leak, and wound dehiscence even in cases subjected to radiation therapy, either pre or post-surgery.

The extensive tissue supply also makes them suitable for subsequent prosthetic dental and ocular rehabilitation.

Conclusion:

The multidisciplinary approach continues to play a central role in the treatment of complex skull base pathologies. Despite a limited follow-up due to the recent collaboration, the results are encouraging, providing a satisfactory restoration of quality of life, with a favorable outcome in terms of aesthetics and function.

Deskeletonizing the sigmoid sinus is noncompulsory in skull base surgery: 3D modeling of the translabyrinthine approach

Type of abstract:

abstract for oral presentation

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Djenghiz Samlal, University Medical Center Utrecht, Department of Otorhinolaryngology and Head & Neck Surgery

Topic:

Lateral skull base

Introduction:

Objective: Sigmoid sinus (SS) compression and injury is associated with postoperative SS occlusion and corresponding morbidity. Leaving the SS skeletonized with a thin bony protection during surgery might be favourable. This study quantifies the operative exposure in the translabyrinthine approach and assess the feasibility of retracting a skeletonized SS.

Methods:

Methods: Twelve translabyrinthine approaches were performed on cadaveric heads with varying SS retraction: skeletonized stationary (TL-S), skeletonized posterior retraction (TL-R), and deskeletonized collapsing of the sinus (TL-C). High-definition 3D reconstruction of the resection cavity was obtained. The primary outcome, 'surgical freedom' (mm²), was the area at the level of the craniotomy from which the internal acoustic porus could be reached in an obstructed straight line. Secondary outcomes include the 'exposure angle', 'angle of attack' and pre-sigmoid depth.

Results:

Results: During TL-R, surgical freedom increased by a mean of 41% (range: 9-92%, SD: 28) when compared to no retraction (TL-S). Collapsing the SS in TL-C provided a mean increase of 52% (range: 19-95%, SD: 22) compared to TL-S. In most cases the exposure is the greatest when the sigmoid sinus is collapsed. In 40% of the specimens, the provided exposure while

retracting (TL-R) instead of collapsing (TL-S) the sinus is equal or greater than 50% of other specimens in which the sinus is collapsed.

Conclusion:

Conclusions: In cases with favourable anatomy, a translabyrinthine resection in which the skeletonized sigmoid sinus is retracted, provides comparably sufficient exposure for adequate and safe tumor resection.

Enhancing Neuroanatomical Dissection and Simulation Training Through Indocyanine Green Fluorescence in Embalmed Human Specimens: A Procedural Overview

Type of abstract:

abstract for oral presentation

Authors:

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Topic:

Basic science

Introduction:

We described a systematic protocol for employing indocyanine green (ICG) dye in embalmed human head specimens to augment neuroanatomical dissection and hyper-realistic

simulation training for skull base and neurovascular interventions. This study aimed to transfer near-infrared (NIR) fluorescence implementation to neuroanatomical research and cadaver-based training.

Methods:

The methodology entails a standardized preparation of non-injected human head specimens. This process comprehends 1) meticulous anterolateral neck dissection, isolation of the internal carotid artery, and occlusion of the external carotid artery; 2) exhaustive evaluation of vessel patency is conducted, succeeded by an extensive washing protocol; 3) a 25 mg solution of ICG is prepared and administered, ensuring its thorough distribution through the arterial vascular system. Employing NIR-white light overlay technology, this method facilitates superior visualization of neurovascular structures. Rigorous documentation and validation of each procedural step are undertaken to guarantee the technique's fidelity and reproducibility.

Results:

The use of ICG dye in embalmed specimens might provide a significant enhancement of neurovascular anatomy under NIR-white light overlay visualization. The clarity and contrast enhancement afforded by ICG fluorescence markedly improved the delineation of critical anatomical structures during dissection, with effective visualization depths reaching up to 8-10 mm beneath bone and 20 mm under soft tissue. Despite ICG's role as an inert fluorescent dye, its distribution pattern has yielded valuable insights into vascular orientations and variants, pivotal for replicating realistic clinical scenarios. Furthermore, the technique offers a heightened and hyper-realistic training experience for physicians.

Conclusion:

The integration of ICG fluorescence represents a feasible advancement in neuroanatomical dissection and simulation-based training. It provides an enhanced visual experience, essential for comprehending intricate neurovascular relationships and improving neurosurgical interventions' safety and precision. Further studies are warranted to validate our findings.

Friday 7 June: Session 16: 15.30 - 17.00: Meningiomas

Predictive factors for internal carotid narrowing in anterior clinoidal meningiomas: a retrospective study.

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Alexandros Moniakis

Topic:

Anterior/central skull base

Introduction:

Despite the advances of the anterior and middle skull base approaches, anterior clinoidal (AC) meningiomas remain challenging lesions to resect safely due to their intimate relationship with vital neurovascular structures. In this study, we assess the relationship between the meningiomas' characteristics with the internal carotid artery (ICA) classification by Goel.

Methods:

35 consecutive patients with anterior clinoidal meningiomas who were surgically treated between January 2019, and December 2023, were reviewed retrospectively. AC meningiomas were classified based on Al Mefty's and Goel's classification by assessing preoperative Magnetic Resonance Imaging (MRI) and Computed Tomography angiography, respectively. 14 out of 35 were classified as group I, 12 as group II, and the rest were in group III. All three groups were classified based on tumor size, intraoperative consistency, WHO grade, and ICA classification.

Results:

Preliminary results suggest that both type I of clinoidal meningiomas and hard consistency identified intraoperatively were strongly associated with ICA narrowing. Interestingly, results have not yielded any statistical association regarding meningioma size and WHO grade.

Conclusion:

In surgery of AC meningiomas, various clinicoradiological factors are related to resection grade and complication rate. In this study, a positive correlation between tumor consistency and type of AC meningiomas with ICA narrowing was identified, a relationship that has not been studied before based on current literature to this extent.

Stepwise differentiation of visual device in minimally invasive transcranial approaches for anterior skull base meningiomas.

Type of abstract:

abstract for oral presentation

Authors:

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Kentaro Watanabe, The Jikei University School of Medicine, Neurosurgery,

Michihiro Tanaka, Kameda medical center, Neurosurgery,

Yuichi Murayama, The Jikei University School of Medicine, Neurosurgery,

Presenting author:

Nobuyuki Watanabe

Topic:

Anterior/central skull base

Introduction:

Minimally invasive transcranial approaches, such as the eyebrow supraorbital approach (Eyebrow-SOA) and lateral supraorbital approach (Lateral-SOA), are employed for anterior skull base meningiomas. With the increasing prevalence of endoscope-assisted surgeries, this study examines the differentiation between endoscope and exoscope.

Methods:

In the past 5 years, among 15 cases of anterior skull base meningiomas, visual devices were utilized as follows: microscope alone in 8 cases, exoscope alone in 2 cases, endoscope alone in 1 case, and a combination of exoscope and endoscope in 4 cases. The full endoscope case was a 30mm olfactory groove meningioma (by Eyebrow-SOA). The combination of exoscope and endoscope cases included a 40mm olfactory groove meningioma (by Lateral-SOA), a 30mm Planum sphenoidale meningioma (by Eyebrow-SOA), and two 25mm Tuberculum sellae meningiomas (by Eyebrow-SOA).

Results:

Gross total resection was achieved in all cases.

Whether through Eyebrow-SOA or Lateral-SOA, the detachment direction for anterior skull base meningiomas remains parallel to the visual axis. This alignment ensured the reliable devascularization of feeding arteries with the clear visualization provided by exoscope.

On the other hand, during internal debulking from the central portion and the dissection between the tumor and the brain, endoscope providing internal observation exhibited less frontal lobe retraction compared to exoscope.

For olfactory groove meningioma, Eyebrow-SOA posed angular challenges in handling the tumor's anterior aspect. Hence, Lateral-SOA demonstrated superior maneuverability.

Conclusion:

Taking advantage of the clear visualization provided by the exoscope and the panoramic view from the endoscope, there is utility in selectively employing visual devices at each step of anterior skull base meningioma surgery.

Particularly those localized anteriorly, the Lateral-SOA seems to be superior in terms of maneuverability.

3-D Printing for Customized Reconstruction in Spheno-Orbital Meningiomas

Type of abstract:

abstract for oral presentation

Authors:

Simona Seriola¹, Alberto Pietrantonio², Alberto Benato³, Marco Galeazzi³, Pierpaolo Mattogno³, Liverana Lauretti^{3,4}, Alessandro Olivi^{3,4}, Marco Fontanella¹, Francesco Doglietto^{3,4}

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4 Neurosurgery, Catholic University School of Medicine, Rome, Italy

Presenting author:

Simona Seriola

Topic:

Anterior/central skull base

Introduction:

The treatment of spheno-orbital meningiomas may require extensive bone resections, creating significant bone defects. The reconstruction represents a fundamental step to be planned pre-operatively and specifically customized to the patient anatomy, reducing infectious complications and optimize long-term aesthetic results.

Methods:

We retrospectively analyzed four consecutive patients who underwent spheno-orbital meningioma resection and one-step 3-D PEEK customized reconstruction from 2019 to 2023. Furthermore, a systematic review of 3D printing customized implants is offered.

Results:

Four patients underwent microsurgical resection. In one case, it was recurrence of disease. Intraoperative neuromonitoring was mandatory in two cases considering the invasive features of the lesion. No orbital implant malposition or infectious complications were documented after the surgery. Post-surgical exophthalmos and palpebra ptosis were persistent in one and two cases, respectively. Improvement of the vision was reported after three months in all cases.

Conclusion:

The single-step reconstruction with 3-D PEEK customized prosthesis for sphenoidal meningiomas offers excellent both cosmetic and functional results at low cost.

Long-term Outcomes of Endoscopic Endonasal Resection for Tuberculum Sella Meningiomas: A Single-Center Study

Type of abstract:

abstract for oral presentation

Authors:

Anthony Tang, Othman Bin-Alamer, Tritan Plute, David T. Fernandes Cabral, Bhuvic Patel, Hussam Abou-Al-Shaar, Garret W. Choby, Eric W. Wang, Carl H. Snyderman, Georgios A. Zenonos, Paul A. Gardner, Center for Cranial Base Surgery, University of Pittsburgh Medical Center

Presenting author:

Paul A. Gardner, MD

Topic:

Anterior/central skull base

Introduction:

Tuberculum Sella Meningiomas (TSMs) constitute 5-10% of all intracranial meningiomas and often present surgical challenges due to their location near critical neurovascular structures including the optic chiasm.

Methods:

A retrospective review of all TSMs treated via the endoscopic endonasal approach (EEA) at a skull base center was performed. The Magill-McDermott (M-M) grading scale was employed for evaluating tumor characteristics: tumor size (1–2), optic canal invasion (0–2), and arterial encasement (0–2).

Results:

74 consecutive patients with TSMs underwent EEA from 2012 to 2022, 11 were recurrent. Median maximum tumor diameter was 3 cm. Medial optic canal involvement was present in 42 patients (57%), and 13 (18%) had tuberculum bony involvement. Gross total resection (GTR) was achieved in 54 cases (73%). CSF leak occurred in 6 (8%) cases. 38 of 47 patients with visual field testing (81%) and 33 of 44 with visual acuity testing (75%) improved and no patients objectively worsened. Seven patients (9%) experienced recurrence (median follow-up 42 months) only 2 of whom had GTR.

Conclusion:

This single-institution study affirms that the endoscopic endonasal approach is a safe and effective primary treatment for TSMs, yielding a high gross total resection rate and improved visual outcomes. CSF leak remains a concern but has decreased with time.

The experience with treating Diaphragma Sellae Meningiomas at the University of Pittsburgh Medical Center

Type of abstract:

abstract for oral presentation

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Presenting author:

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurosurgery.

Topic:

Anterior/central skull base

Introduction:

True diaphragma sellae meningiomas are rare and should be distinguished from tuberculum and planum meningiomas given their unique relationship with the stalk, the optic chiasm, as well as the suprasellar microvasculature, which make them uniquely challenging.

Methods:

Out of the extensive experience with suprasellar meningiomas at the University of Pittsburgh Medical Center, we identified 30 patients with true diaphragma sellae meningiomas. These were defined as tumors with an epicenter mainly based on the diaphragma sellae. Tuberculum, planum and other meningiomas with secondary involvement of the diaphragma were excluded. A detailed retrospective review of this cohort was performed.

Results:

All 30 patients were treated with an endoscopic endonasal resection. Twenty-five (83.3%) presented as first-time diagnosis and 5 (26.7%) were recurrences after open surgery elsewhere. Twenty six presented with visual symptoms and four had asymptomatic but growing tumors. The stalk was displaced posteriorly in 19 patients, anteriorly in 1 patient and was circumferentially enveloped in the rest. A gross total resection was achieved in 28 patients. All were WHO Grade 1 tumors. Three patients (10%) developed new permanent

diabetes insipidus and one had complete hormonal insufficiency. Twenty one had vision improvement and 9 had no improvement.

Conclusion:

Diaphragma sellae meningiomas are rare tumors with unique challenges. The endoscopic endonasal corridor offers optimal visualization of the microvasculature and the stalk.

Nonetheless, these tumors are associated with with higher rates of pituitary insufficiency and no visual improvement than other suprasellar meningiomas.

Surgical management of tuberculum sellae meningiomas: single center experience of different surgical approaches

Type of abstract:

abstract for oral presentation

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Presenting author:

Andrii Naboichenko

Topic:

Anterior/central skull base

Introduction:

Tuberculum sellae meningioma (TSM) is a challenging skull base pathology. Many approaches can be used for such tumors removal, but most surgeons choose only one of them as the “routine” one.

Methods:

We conducted a retrospective analysis of 91 consecutive patients with TSM were operated between December, 2013 -November, 2023 (F/M 73/18, mean age 51±9.0 years). Mean tumor size was 32±4.5 mm. Virtual 3D models and 3D plastic models were created in 76 cases as a preoperative planning stage. We used: supraorbital/lateral subfrontal «key hole» approach in 25 (27.5%) cases, pterional – 17 (18.7%), modified FTOZ - 22 (24.2%), endoscopic- transsphenoidal transtubercular – 27 (29.6%). Endoscopic controlled microsurgery was used in 41 cases. Extradural optic canal unroofing and clinoidectomy was performed in 43 patients

Results:

Gross total resection was achieved in 82 (90,1%) patients. Vision improved in 72.5% (66/91), unchanged 19.8% (18/91), deteriorated 7.7% (7/91). In 1 cases CSF-leak occurred after pterional approach and was successfully treated with lumbar drainage and 1 case of CFS-leak required reoperation. Two patients with tumor recurrence was observed during follow-up (range 1-72 months)

Conclusion:

The present series confirms a favorable visual outcome and radicalism after TSM surgery via different surgical approaches. Skull base surgeon should have all spectrum of surgical approaches and technologies in armamentarium for selection the optimal one in every particular case in patients .

A Systematic Comprehensive Classification for Skull Base Meningiomas

Type of abstract:

abstract for oral presentation

Authors:

Cecile Hannen, UMC Utrecht

Eduard Voormolen, UMC Utrecht

Presenting author:

Cecile Hannen

Topic:

Imaging &, interventional radiotherapy

Introduction:

Skull base meningiomas can be hard to classify due to the numerous classifications that are available. The aim of this article is to combine all published anatomic classifications of quality into one comprehensive classification that is clinically relevant and facilitates future research.

Methods:

A systematic review was conducted using Pubmed, Google Scholar, and Embase. All articles were screened on the title, abstract and text. Included articles provided a proper description of one of the different/ various types of skull base meningiomas and their anatomical location. Through this process, 29 articles were included. Data extraction was performed in a systematic fashion. The MeVisLab software suite was used to create a 3D atlas image of the anatomical locations. From this, a 2D colour-coded overview was generated for easy reference.

Results:

14 distinct classes of skull base meningioma were identified. The anatomical boundaries of each class were translated into a high resolution 3D atlas image in which each voxel was labelled accordingly. Color coded 2D/3D visual representations have been created and are accessible online.

Conclusion:

We present a new comprehensive clinically relevant classification of skull base meningiomas with unprecedented detail, extracted in a systematic and all-encompassing fashion from the literature. This classification can improve the research and treatment of skull base meningiomas.

Paradigm shifts in skull base meningioma treatment over the last five decades

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

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Topic:

Basic science

Introduction:

Skull base surgery is a resource-demanding and complex field which has witnessed evolutionary leaps driven by scientific and technological advances. Our aim is to investigate the evolution of treatment strategies of skull base meningiomas (SBMs) over the last decades and its relationship to scientific research on the subject.

Methods:

A comprehensive bibliometric analysis, via a systematic review of peer-reviewed publications, on SBM research and clinical reports of SBM cases. Bibliometric analysis consists of a quantitative arm (authors, countries, and publications over time), and a qualitative arm (coauthorship and co-occurrence analysis of thematic clusters and their substructure). Analysis of clinical reports included type of treatment (open surgery, endoscopy, radiotherapy, or a combined treatment), size of cohort, publication year, and country.

Results:

We identified 3258 items published from the 1970s onwards, majority of which in the last decade. Skull base meningioma research can currently be described as evolving in four separate fields (anterior skull base and endoscopy, oncology, posterior fossa and open surgery, radiosurgery) and is being driven by three broadly cooperating groups of authors, mostly from USA, Europe and East Asia. Clear lines of development (such as endoscopic surgery from pituitary surgery or radiotherapy from head and neck pathology) can be traced over time. Clinical reports follow the same geographical distribution, with an expected time delay between research and clinical application.

Conclusion:

Skull base meningioma treatment has undergone several phases of development over the last fifty years, to become more conservative and functionality oriented. . The complexity of the field is reflected in the multimodality of treatment options, diversity and collaborativeness among interdisciplinary research groups and delayed peak productivity in research.

Endoscopic assisted microsurgical meningioma resection of the skull base via minicraniotomy: is there a difference of radicality and outcome between anterior skull base and posterior fossa?

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Stefan Linsler

Topic:

Anterior/central skull base

Introduction:

Keyhole approaches are currently under investigation for skull base tumor surgery. They are expected to have a lower complication rate with the same successful resection rate compared to standard procedures. In this study, the authors compare their series of skull base meningiomas resected via an endoscopic assisted microsurgical keyhole approach.

Methods:

Between 2013 and 2019, 71 of 89 patients were treated using an endoscopic assisted microsurgical procedure. 42 meningiomas were localized at the anterior skull base and 29 meningiomas in the posterior fossa. The surgical techniques and use of the endoscope were analyzed and compared concerning complications, surgical radicality, outcome and recurrences in patients' follow up.

Results:

The two different cohorts yielded similar rates of GTR (anterior skull base 80% versus posterior fossa 82%). Complication rate was 31% for posterior fossa and 16% for anterior skull base respectively. An endoscope was used in 79% of all cases. Tumor remnants were detected by endoscopic visualization in 58.6% of posterior fossa and 33% of anterior skull base meningiomas. The multivariate analysis revealed a significantly higher benefit of the endoscope in the posterior fossa cohort ($p < 0.05$).

Conclusion:

The results revealed that the endoscope was beneficial in in both locations. Thereby, the identification of remnant tumor tissue was clearly higher in the posterior fossa. The usage of endoscopic assistance is a very helpful tool to increase the radicality with a better anatomical overview during meningioma surgery.

Saturday 8 June: Session 17: 08.30 - 10.00: Video Abstracts

Functional preservation surgery in Giant skull base cholesteatoma involving jugular foramen

Type of abstract:

abstract for video presentation

Authors:

Salman Hashmi, Noweed Ahmad

James Cook University Hospital, Middlesbrough, UK

Presenting author:

Salman Hashmi

Topic:

Lateral skull base

Introduction:

Giant petrous bone cholesteatoma are rare entity and surgery can be challenging especially if hearing and lower cranial nerves are preserved at presentation. We intend to present a case of a middle age man with a giant skull base cholesteatoma with no functional compromise.

Methods:

After multiple discussion in joint neurosurgical MDT. It was decided to perform functional preservation surgery. Whole disease was removed except some left intentionally over basal turn to preserve hearing. pt has excellent response and no he

Results:

No decline in hearing thresholds, and all cranial nerve functions were preserved. 3 months post operatively, patient remain stable.

Conclusion:

Functional and hearing preservation can be achieved if being meticulous. Proper planning and discussing the pros and cons of radical excision should be discussed with the patient.

Endoscopic Endonasal Clipping of Left carotid Cave Aneurysm

Type of abstract:

abstract for video presentation

Authors:

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Eric Wang, University of Pittsburgh Medical Center Department of Otolaryngology

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurological Surgery

Presenting author:

Georgios Zenonos

Topic:

Anterior/central skull base

Introduction:

A 47 year old female who presented with an irregular, medially projecting ophthalmic artery aneurysm in the carotid cave and new, recurrent headaches. She was not eligible for a endovascular treatment due to chronic menometorrhagia. Given the location and configuration of the aneurysm, endonasal clipping of her aneurysm was performed.

Methods:

A right sided nasoseptal flap was raised for closure by the otolaryngology team. The sella dura and parasellar carotid arteries were exposed. The right cavernous sinus was exposed and packed with injectable hemostatic agent. The cavernous sinus was opened and the carotid artery exposed with a site chosen for temporary clip placement. The dura was opened and the distal dural ring was circumferentially dissected to expose the aneurysm. A clip was then placed across the aneurysm to occlude it. The surgical site was closed with placement of an abdominal fat graft and nasoseptal flap.

Results:

The patient tolerated the procedure well and post operative CT angiogram demonstrated complete clip occlusion of the patient's aneurysm. She experienced no post operative complications.

Conclusion:

Endonasal clipping is a safe and potentially optimal means of treating otherwise difficult to reach aneurysms.

Minimally Invasive Lateral Orbitotomy for Resection of Trigeminal Schwannoma

Type of abstract:

abstract for video presentation

Authors:

Bhuvic Patel, University of Pittsburgh Medical Center Department of Neurological Surgery

Anna K Terrarosa, University of Pittsburgh Medical Center Department of Ophthalmology

Susan T. Stefko, University of Pittsburgh Medical Center Department of Ophthalmology

Georgios A. Zenonos, University of Pittsburgh Medical Center Department of Neurological Surgery

Presenting author:

Georgios Zenonos

Topic:

Anterior/central skull base

Introduction:

A 23 year old female presented with shooting pains in her forehead and cheek and diplopia on left gaze. Workup with MRI revealed a contrast enhancing lesion in Meckel's cave consistent with a trigeminal schwannoma. We performed a minimally invasive lateral orbitotomy via lateral epicanthal incision for tumor resection.

Methods:

After mapping of the frontalis branch of the facial nerve, a 2-3cm incision was made. A lateral orbital rim craniotomy was performed. The greater wing of the sphenoid was drilled. The lateral wall of the orbit was also removed, exposing the superior orbital fissure. Next the dura was peeled with division of the meningoorbital band. Meckel's cave was opened and the tumor was dissected away from the trigeminal nerve. An abdominal fat graft was placed separating the periorbita from the dura, and the lateral orbital rim was fixed in place with low profile titanium plates.

Results:

The patient tolerated the procedure well. She had expected swelling of her left eye post operatively but this resolved over time. She had minimal scarring of her incision and experienced no visual deficits or injuries. She did develop trigeminal neuropathy post operatively which responded to gabapentin and gradually improved. She had no diplopia post operatively.

Conclusion:

Lateral orbitotomy is a safe, minimally invasive means of treating a wide variety of middle fossa pathologies including trigeminal schwannoma.

Endoscopic-assisted anterior petrosectomy for a recurrent petrous chondrosarcoma in Ollier disease

Type of abstract:

abstract for video presentation

Authors:

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5 Department of Neurosurgery, Lariboisière Hospital, Assistance Publique - Hôpitaux de Paris, University of Paris-Cité, 2 rue Ambroise Pare, 75010, Paris, France

Presenting author:

Jerold Justo, MD-MBA

Topic:

Lateral skull base

Introduction:

Ollier disease (OD) and Maffucci syndrome are rare conditions characterized by the development of multiple chondrosarcomas. Management of chondrosarcomas poses significant challenges due to the imprecise definition of lesion boundaries within the extensive pathological bone. The aim of surgical interventions is maximal resection with functional preservation.

Methods:

We present a 2D step-by-step video detailing the management of recurrent petrous apex chondrosarcomas in a patient with OD. The video elucidates surgical indications, discusses the advantages and disadvantages of potential approaches, and outlines the surgical anatomy and challenges associated with the endoscopic-assisted anterior petrosal approach. The patient consented to the surgical procedures.

Results:

A 13-year-old female with OD had incidental diagnosis of a right petrous apex chondrosarcoma. Conservative management was initially pursued, but due to the progression of symptoms and tumor growth, surgery was indicated. Given the limited sphenoid sinus pneumatization and the lateral location of the lesion, an endoscopic-assisted anterior petrosal approach was chosen. A two-stage endoscopic-assisted resection was performed, leaving a tumor remnant below the internal auditory canal during the first stage. Given the surgical remnant growth, a second surgery was planned. Postoperative follow-up revealed gross total resection and no surgical complications.

Conclusion:

In managing petrous chondrosarcomas, endoscopic-assisted anterior petrosal approach can contribute to achieving gross total resection with functional preservation. However, the complexity of these cases underscores the importance of careful selection of treatment modalities, particularly in the context of the challenging anatomy involved.

Extra-axial hemangioblastoma of the cerebellopontine angle

Type of abstract:

abstract for video presentation

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Presenting author:

Leonardo Tariciotti

Topic:

Lateral skull base

Introduction:

Hemangioblastomas are benign, vascular intra-axial tumors that primarily locate at the posterior cranial fossa, within the cerebellum. Extra-axial cases, located in the cerebellopontine angle (CPA) are rare and can be easily misdiagnosed as vestibular schwannomas based on their location and similarity on imaging studies.

Methods:

A 46-year-old female presented with an 8-month history of left-sided tinnitus and severe sensorineural hearing loss. Imaging revealed a 14 mm homogeneously enhancing lesion arising from the internal auditory canal (IAC) and projecting into the CPA. Initially diagnosed as a vestibular schwannoma, the lesion was assigned a Koos stage III. Cranial nerves (CN) were grossly intact except for the sloping sensorineural hearing loss on the left. Access to the CPA was achieved through a retrosigmoid approach.

Results:

Following a suboccipital craniotomy, arachnoid dissection at the CPA revealed a bright, orange-colored tumor, which appeared to arise from the inferior vestibular nerve. Following the Tübingen line, the IAC was identified and drilled until the distal fundus of the canal could be palpated. The dura of the IAC was divided, exposing the tumor on the inside. The tumor evidenced capillary bleeding and was reflected inferiorly, producing a clear view of CN VII. Once dissected from the porus acusticus, the lesion was completely elevated from CN VII and VIII. Pathology revealed a hemangioblastoma.

Conclusion:

Hemangioblastomas are a rare but possible differential diagnosis of vestibular schwannomas. Distinction between both lesions may be apparent until the time of surgery. Hemangioblastomas pose a surgical challenge considering they are hypervascular lesions and careful coagulation is crucial during dissection.

Transclival resection of petroclival chondrosarcoma

Type of abstract:

abstract for video presentation

Authors:

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Presenting author:

Leonardo Tariciotti

Topic:

Anterior/central skull base

Introduction:

Chondrosarcomas are potentially aggressive lesions and gross-total resection significantly influences progression-free survival. The petroclival synchondrosis is a critical area where these lesions can arise. Surrounding neurovascular structures pose an anatomical challenge and modified transclival or transpterygoid endoscopic approaches may be required to enhance visualization and surgical maneuverability.

Methods:

A 36-year-old female with previous history of seizure disorder presented to the emergency department with a syncopal episode. No additional neurologic deficits were observed. CT scan revealed an incidental erosive lesion arising from the left petroclival synchondrosis, extending along the posterolateral clivus and into the posterior fossa. On MRI, mass effect on the midbrain, left inferior pons, and left cranial nerves VI, VII, and VIII was noted. An

expanded endoscopic endonasal transclival approach was selected for resection.

Results:

A complete sphenoidotomy was fashioned and the middle third of the clivus was drilled on its left aspect. The bone overlying the left paraclival internal carotid artery was drilled thin and removed to allow its complete mobilization. Dissection was continued in the paraclival space to reach the petrous apex. Using microsurgical techniques, the tumor within the left petrous apex and retrocarotid space was removed. Postoperative enhancement along the pre-pontine dura was noted on MRI. This was consistent with expected postoperative changes. The final pathology was consistent with grade 2 chondrosarcoma, and the patient underwent treatment with adjuvant radiotherapy.

Conclusion:

Lesions that arise from the petroclival synchondrosis harbor particular challenges. Endoscopic endonasal resection has been proven to be feasible, yet surgical planning must take into consideration the surgical team's expertise, as lateralization of the internal carotid artery in a transclival approach can be difficult to achieve.

Saturday 8 June: Session 18: 08.30 - 10.00: General

Automatic self-supervised deep learning pipeline for monocular depth estimation and landmark distances in the surgical field: a proof of concept in skull base procedures

Type of abstract:

abstract for oral presentation

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Topic:

Basic science

Introduction:

Several self-supervised deep learning models offer an innovative computer vision approach by generating accurate monocular depth estimations from high-definition monocular frames only; their use in surgery, however, is still speculative. This study aims to investigate the consistency of these models in estimating depth in complex skull base procedures.

Methods:

We collected high-definition photographic frames and videos during dissections of four distinct skull base approaches (retrosigmoid, fronto-orbito-zygomatic, extradural subtemporal, and endoscopic endonasal) in a neuroanatomy laboratory. A comprehensive pipeline comprising several candidate models was developed to generate depth maps for each frame. We established reliable anatomical markers, extracted their estimated depth values, and conducted a comparative analysis with depth measurements from five fixed landmarks on craniotomy margins. Additionally, stereotaxic 3D neuronavigation coordinates for each landmark were acquired, facilitating a comparative evaluation of distances and overall depth estimations.

Results:

The analysis revealed a significant correlation between the depth estimations derived from self-supervised deep learning models and the anatomical measurements obtained via stereotaxic coordinates. The proposed methodology demonstrated robustness in assessing the depth of anatomical landmarks under varying microscopic and endoscopic lighting conditions and exposure angles. Overall, these self-supervised depth estimation models show promise as a valuable asset in microneurosurgical cadaveric dissections, particularly for morphometric and advanced quantitative analysis.

Conclusion:

Integrating this algorithm with neuronavigation for 3D depth triangulation enriches morphometric data beyond what is achievable with standard stereotaxic systems. Implementing these algorithms could streamline data collection in anatomical studies, ensuring reliability and generalizability. This, in turn, can enhance collaborative research across multicentric institutions.

Toward a new data-driven workflow to compute, compare and share anatomical metrics during microneurosurgical dissections: an open-source python library

Type of abstract:

abstract for oral presentation

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Topic:

Basic science

Introduction:

To address limitations in anatomical laboratories, including scarcity and cost constraints of human specimens, open-source tools and reproducibility are mandatory. We developed an open-source Python library to enhance morphometric research investigations in

neurosurgery, particularly during dissections, by optimizing time and resource utilization in these specialized facilities.

Methods:

Our Python library provides a comprehensive suite of functions for analyzing anatomical data. It supports data import from prevalent neuronavigation systems, processing stereotaxic coordinates for ease of use. Key functionalities include calculating neuroanatomical distances, areas, angles of attack, and landmark triangle analyses in native 3D space. Additionally, it features innovative skull base surgical simulations: the Volume of Operative Maneuverability (VOM) and Visuo-operative angle (VoA). These allow quantification of the surgical corridor and exposure angles via an advanced geometrical transformation process, adaptable to various 3D targets and entry points.

Results:

Implementing our open-source library in neurosurgical anatomy labs has shown significant accuracy and efficiency improvements. The package's interactive plotting capabilities effectively display the spatial relationships between surgical targets and landmarks in 3D, simplifying complex surgical corridor visualization. Its flexible pipeline customizes neuroanatomical studies to specific research needs, reducing manual data collection and processing labour. This minimizes potential errors and offers clear, disseminable outputs. The tool's adaptability to different surgical scenarios underscores its practical utility in neurosurgical research and education.

Conclusion:

This package offers a robust toolset for neurosurgical anatomy labs, aiming to improve the reliability of experimental results, enhance surgical precision and foster collaboration between institutions. Future development will focus on validating measurement algorithms and expanding the tool's scope to encompass a more comprehensive array of neurosurgical procedures.

Application of internal carotid artery stent in skull base surgery

Type of abstract:

abstract for oral presentation

Authors:

Authors: Zhengnong Chen, Jingjing Wang, Zihan Lou, Boya Zhang, Yibing Hu, Shankai Yin;
Affiliation: Department of Otolaryngology-Head and Neck Surgery, Shanghai Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200233, China.

Presenting author:

Zhengnong Chen

Topic:

Lateral skull base

Introduction:

To report the experience of the application of internal carotid artery stent in skull base surgery, and to clarify the important role of internal carotid artery stent in skull base surgery.

Methods:

Retrospective study of 22 skull base neoplasm cases with internal carotid artery stents in the ENT Head and Neck Surgery Department, Sixth People's Hospital affiliated with Shanghai Jiao Tong University, from July 2019 to January 2021. Among 17 males and 5 females, aged 33 to 75 years, 5 cases were on the left, 16 on the right, and 1 on both sides. Diagnoses included 4 jugular paragangliomas, 1 chondrosarcoma in the jugular foramen, 1 carotid body paraganglioma, and 16 nasopharyngeal carcinomas post-radiotherapy.

Results:

Internal carotid artery erosion degree assessed by CTA, MRI, and DSA in 22 patients pre-surgery. All showed varying involvement, leading to preoperative internal carotid artery stent implantation. Tumor surrounded the artery to varying degrees. Total or subtotal tumor resection was complication-free. Post-op follow-up (5 months to 2 years) revealed no bleeding, pseudoaneurysm, stenosis, or occlusion in the internal carotid artery stent segment for all cases.

Conclusion:

For patients with skull base tumors, preoperative imaging indicates the limited involvement of the internal carotid artery, and internal carotid artery stent implantation before surgery is a safe and effective treatment.

Long-term results and technology-assisted presigmoid retrolabyrinthine approach for the treatment of medium to large vestibular schwannomas: our experience

Type of abstract:

abstract for oral presentation

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Presenting author:

Denis Aiudi

Topic:

Oncology

Introduction:

EAPRA offers a direct and comprehensive approach to the anatomical region of interest, ensuring visualization of intracanalicular portion of the schwannoma. Aim of this study is to evaluate the long-term outcomes of the endoscopy-assisted presigmoid retrolabyrinthine

approach for treating medium to large vestibular schwannomas, incorporating exoscope and piezosurgery.

Methods:

We conducted a retrospective study involving 31 patients with large sporadic vestibular schwannomas (diameter >3 cm) treated with EAPRA. Ten patients underwent "cosmetic" mastoidectomy and craniotomy using a piezo-electric device, while an exoscope-assisted approach was employed in four cases.

Results:

Complete tumor removal was achieved in 27 out of 31 patients. Transient facial nerve function impairment occurred in three cases, with hearing deterioration observed in two patients. No severe complications occurred, and the average hospitalization duration was less than 7 days. Among the four patients treated with the exoscope, three achieved complete schwannoma resection without additional complications, although it did not replace the advantages of endoscopic visualization.

Conclusion:

EAPRA preserves labyrinthine complex and hearing function, potentially minimizing cerebellar retraction. Exoscope enhances visualization but it does not substitute the benefits of endoscopy. Piezosurgery proves safe and effective, improving cosmetic and functional reconstruction. This combined approach demonstrates promise in achieving optimal functional preservation and medium to large vestibular schwannoma removal.

A new streamlined grading system for the transverse, sigmoid and superior petrosal sinus configuration with possible outcome predictive value based on a preliminary case series.

Type of abstract:

abstract for oral presentation

Authors:

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Presenting author:

Maria Karampouga

Topic:

Lateral skull base

Introduction:

The transverse/ sigmoid/ superior petrosal sinus (TSSPS) morphology is widely acknowledged as the primary constraint in retrosigmoid procedures. This study seeks to present a simple and practical grading system for the TSSPS configuration, based on a clinical series' metrics.

Methods:

The clinicoradiological records of patients who underwent retrosigmoid craniectomy for tumors during June 2016- June 2023 were reviewed. The analysis focused on two parameters on MRI angiographies, namely the transverse sinus width protruding below the tentorium or Tp (0-4mm=0 points, >4mm=1 point), and the sigmoid sinus width medially to the superior petrosal sinus or Sp (0-8mm=0 points, >8mm=1 point), measured the closest to the sinus junction on the coronal and axial planes respectively. Cutoffs were based on Tp, Sp mean values and 3 grades (0, 1, 2) were designated by the total points' summation.

Results:

After excluding 10 cases with either combined procedures or unreliable data, 82 patients (44 females) were enrolled. Mean age was 55.6y and 84.1% harbored either schwannomas or meningiomas. Grade 0 (= 0 total points) TSSPS morphology was found in 18 patients, Grade 1

(=1 total point) in 32 and Grade 2 (=2 total points) in 32. Average transverse and sigmoid sinus total widths were 9.52mm and 11.83 respectively. Five sinus-related complications were observed in one Grade 1 and four Grade 2 patients, including 4 sinus thrombosis and one injury. (Spearman's rho 0.21, $p=0.053$).

Conclusion:

Reflecting on the applicability of this classification system, the correlation between the grade and postoperative sinus-related complications almost reached statistical significance.

Notably, the surgical view is dependent on the TSSPS configuration and could possibly affect sinus manipulation, thus compromising the outcomes.

A case report of Canida Albicans central osteomyelitis : The role of long term fluconazole therapy in association with surgical debridement

Type of abstract:

abstract for oral presentation

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***: neurology departement

****: ophtalmology departement

Presenting author:

Assistant professor on ENT departement . Algeria

interests : cancerology of head and neck , vestibular medecin

first steps on skull base surgery

Topic:

Anterior/central skull base

Introduction:

central skull base osteomyelitis (CSBO) is a rare , life threatening condition , the diagnosis may be challenging .

a CSBO due to Candida albicans is exceptional. Although debridement was once considered the cornerstone of treatment, long-term systemic antimicrobial therapy has sincereplaced surgery as the first-line therapy.

Methods:

a 54-year-old female patient, , whose previous medical history

included diabetis type 2 .The symptoms had begun at four months before her consultation in our departement and consisted of headach , ptosis , left visual loss and facial pain .

the patient had received an IV antibiotherapy and anti coagulant treatemnt on neurology departement for carotid thrombosis without improvement .

The CT scan showed areas of osteolytic rarefaction affecting the sphenoid , clivus , ethmoidal cells and anterior skull base

the diagnosis of central skull base associated with orbital cellulitis and vascular thrombosis was made

Results:

The patient was operated by endoscopic approach, confirming the

bone destruction of the sphenoid , ethmoidal cells , and was completed with

by sphenotomy and milling until a flat area of healthy bone tissue was obtained

Culture of all three samples (bone, soft tissue) was positive for *C. albicans* , The patient was given a five weeks cycle of Fluconazole and treatment was subsequently completed with fluconazole (400 mg every 24 h) orally for one

month and topical cleaning of nasal cavity .

. A follow-up CT scan one year later showed the complete normalisation of the anatomy of sphenoid , clivus and skull base

Conclusion:

Given nonspecific clinical presentation and findings on imaging, of CSBO due to *Candida Albicans* , A mycology swabbing and culture of both bony and tissue samples must be done to guide timely diagnosis and treatment.

Awareness of Skull Base pathologies in Emergency and Intensive Care physicians in Slovenia. A pilot study.

Type of abstract:

abstract for oral presentation

Authors:

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Jure Urbančič, Department of Otorhinolaryngology and Cervicofacial Surgery, UMC Ljubljana, Slovenia

Presenting author:

Jure Urbančič

Topic:

Anterior/central skull base

Introduction:

The knowledge of skull-base diseases and the complex reconstruction following the surgical treatment may be limited. However, physician's and healthcare workers' direct exposure to the skull base is broader. To prevent the disastrous iatrogenic skull-base trauma via these procedures, general knowledge of the skull-base is fundamental.

Methods:

The pilot study included surveying (1) physicians practicing emergency medicine and (2) physicians practicing intensive care medicine with a questionnaire that encompassed ten closed questions (yes/no). The survey was disseminated (1) in person at the Emergency Medicine Congress (Slovenian Junior Emergency Doctors Meeting, Laško, Slovenia, 2023) and (2) via the Slovenian Intensive Medicine Society, encompassing Internal medicine and Anesthesiology, by using the Google platform.

Results:

Forty-nine professionals were involved: 55.1% from emergency services, 28.6% from general practice, 16.3% from tertiary ICU. 95.9% know the basics of the Skull base, 91.8% think they know the location of the Skull base, 63.3% see a disease involving the Skull base, 79.6% believe that they could access the intracranial area, 95.9% perform a process involving the nose, 81.6% think they may be dangerous in patients with Skull base pathology, 95.9% answered that there would be considerable benefit in identifying patients with previous skull base disease and reconstruction.

Conclusion:

We have confirmed the importance of increased awareness of possible iatrogenic skull base breaches in the abovementioned patients. As well as the need to provide more care to the patients, their relatives, and other medical specialties by starting an initiative to allow them to present more information to their caregivers.

A challenging case of lateral osteomyelitis mimicking malignancy lesion : the utility of leucocytes scintigraphy

Type of abstract:

abstract for oral presentation

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Presenting author:

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interests : cancerology of head and neck , vestibular medecin

first steps on skull base surgery

Topic:

Lateral skull base

Introduction:

Skull base osteomyelitis (SBO) is an uncommon i, life threatening nfection , typically due to otologic infection . sometimes the diagnostic is difficult and challenging especially in formes mimiking a malignant lesion of petrpus apex and upper part of parapharyngeal space .

Methods:

A 61year-old diabetic man was referred to the ENT departemnt

with a five month history of headache , left ear discharge (with no evidence of active ear disease previously)and substantial weight loss. Clinical examination revealed a granuloma of external auditory canal . no cranial nerve palsy was found . the diagnostic of SBO was suspected .

CT/MRI, scan of t the skull base evoked a malignancy lesion of petrous apex , infratemporal fossa , upper part of parapharyngeal space that englobe completely the intra petrous carotid canal .

Results:

to ovoid a biopsy on such dangourous area , a copmlementary imaging were necessary ; A PET scann was unfotunately expensive and unavailable ;

Leucocytes scintigraphy was done and concluded on the inflammatory origin of the tumor

.

the patient was put under intra venous antibio therapy (three monthes)

no surgical debridement was needed

the leucocytes scintigraphy after 6 monthes was negative , no active inflammatory disease was noted

Conclusion:

taking on cosideration this case , we beleive that leucocytes scintigraphy should be considered as useful tool for the assessment of SBO, both at diagnosis and for the assessment of response to treatment, even if more studies in these settings are warranted.

Poster presentations

Endonasal endoscopic resection of a recurrent dermoid cyst of Meckel's cavum by transpterygoid approach

Poster number 1

Type of abstract:

abstract for poster presentation

Authors:

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Vincent Patron, MD, Department of Head and Neck surgery, Caen University Hospital

Presenting author:

The basic skull team in Normandy, made up of neurosurgeons and ENT specialists, as in this presentation

Topic:

Anterior/central skull base

Introduction:

Dermoid cysts affecting Meckel's cavity are very rare tumors. They can be difficult to resect transcranially, and are nowadays best removed by endoscopic endonasal surgery.

Methods:

We describe the case of a 49-year-old woman presenting with left trigeminal neuralgia for several months. The patient underwent a transcranial operation 10 years ago and a second operation 5 years ago, using a peritoneal approach to partially remove the dermoid cyst of Meckel's cavum. She has had abducens nerve palsy since the first operation. Clinically, she presents with abducens nerve palsy since the first surgery, as well as trigeminal neuralgia in the V1 and V2 territories.

Radiological findings showed an enlarged dermoid cyst, which explains the symptomatology.

We decided on surgical management.

Results:

We used a left trans-pterygoid approach to allow GTR of the dermoid cyst. We performed a medial maxillectomy, unilateral ethmoidectomy, complete sphenoidotomy and drilling of the pterygoid root. We exposed vidian canal, pterygopalatine fossa, lateral cavernous sinus and Meckel's cave. We opened the dura above Meckel's cave to aspirate the cyst and cholesterol granuloma. We then removed the capsule to prevent recurrence. Closure was achieved using a fat graft, biological glue, a synthetic dural substitute and a nasoseptal flap.

Postoperatively, the patient experienced a rapid reduction in symptoms, with hemifacial hypesthesia at V1 and V2.

Conclusion:

The transpterygoid approach is the best and safest for Meckel cavity lesions such as dermoid cysts, and should be used in preference to the transcranial approach. As far as cyst resection is concerned, wall resection is debatable in cases of recurrence, implying a greater risk of cranial nerve damage.

Staged management of Giant pituitary adenomas

Poster number 2

Type of abstract:

abstract for poster presentation

Authors:

Adamantios Ioannis Statyris¹, Dace Dimante², Mr Jonathan Pollock³, Alireza Shoakazemi⁴

1 - Research fellow, Barking, Havering and Redbridge university Hospital

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3 - Consultant Neurosurgeon, Barking, Havering and Redbridge University Hospital

4 - Consultant Neurosurgeon, Barking, Havering and Redbridge university Hospital

Presenting author:

Mr Alireza Shoakazemi

Topic:

Anterior/central skull base

Introduction:

Pituitary tumours comprise 15-20% of all the intracranial tumours. They can present with a variety of symptoms, most commonly with headaches, symptomatology related to hormonal hypersecretion or deficiency and symptoms related to mass effect. Management of giant invasive pituitary adenomas remain challenging.

Methods:

We present a 21-year-old male autistic male with a giant invasive pituitary adenoma. He presented with right sided headache, diplopia and blurred vision. He was experiencing deteriorating balance and slurred speech. He initially underwent an endoscopic transsphenoidal debulking with complete recovery of 3rd nerve palsy. He developed deteriorating balance, worsening slurred speech. MRI scan showed interval tumour growth and cyst formation causing hydrocephalus and brainstem compression. Following failed attempt to insert an omaya reservoir, he underwent a craniotomy and debulking of the tumour and direct insertion of Ommaya reservoir into cyst. Following recovery he underwent Proton Beam Radiotherapy.

Results:

He recovered 3rd nerve palsy after first operation. Following second operation his pre existing severe gait problem, confusion improved. He has proceeded with Proton beam Radiotherapy for remnant of tumour

Conclusion:

This case report emphasises the importance of staged strategic approach to giant invasive pituitary adenoma. In this pathology, preservation of patient performance status and reduction of morbidities is of paramount importance.

Endoscopic vascularised flap reconstruction of skull base osteoradionecrosis in radiated nasopharyngeal carcinoma

Poster number 3

Type of abstract:

abstract for poster presentation

Authors:

Xinni Xu, Yew Kwang Ong

Department of Otolaryngology - Head & Neck Surgery, National University Hospital

Presenting author:

Xinni Xu

Topic:

Anterior/central skull base

Introduction:

Nasopharyngeal carcinoma (NPC) is treated primarily with radiotherapy. NPC patients are at risk of skull base osteoradionecrosis (ORN), a late complication of radiotherapy associated with poor quality of life and survival outcomes. Endoscopic debridement and reconstruction with vascularised flaps may reduce progression of ORN and improve survival.

Methods:

Radiated NPC patients with skull base ORN managed at a single tertiary institution from June 2011 to December 2023 were reviewed. Skull base ORN was defined as positive symptoms plus nasoendoscopic findings of exposed bone at the nasopharynx. Patients with skull base ORN and had tumour recurrence that could not be treated with curative intent were excluded. Patients who underwent endoscopic flap reconstruction were compared with those who were conservatively managed. Primary outcome measures were flap success, subsequent carotid blowout and survival.

Results:

Twenty-four patients were identified. The commonest symptom was bleeding (n=19). Eight patients underwent surgery (7 nasoseptal flaps, 1 lateral nasal wall flap). Six flaps (75.0%) survived. The incidence of carotid blowout in flap reconstruction patients was 25.0% versus 62.5% in conservatively-managed patients (p=0.08). Following the diagnosis of ORN, flap reconstruction patients had significantly higher survival rates (75.0% vs 25.0%, p=0.019) and a trend towards improved survival (6.8 [4.6-10.4] years versus 3.3 [1.6-6.4] years, p=0.06).

Conclusion:

Endoscopic vascularised flap reconstruction may reduce the risk of carotid blowout and improve survival in radiated NPC complicated by skull base ORN.

Pituitary metastasis of thyroid carcinoma

Poster number 4

Type of abstract:

abstract for poster presentation

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García-Ferreiro P, Neurosurgery, Hospital del Mar Barcelona

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Muñoz F, Neurosurgery, Hospital del Mar Barcelona

Presenting author:

Pérez Giraldo A, Neurosurgery, Hospital del Mar Barcelona

Topic:

Anterior/central skull base

Introduction:

The pituitary region is an extremely rare location for the implantation of metastatic lesions. These account for less than 1% of tumors in this region, with the most frequent being lung and breast, followed by much rarer ones such as thyroid or kidney.

Methods:

We present the case of a 36-year-old male with a history of follicular thyroid carcinoma treated with total thyroidectomy and subsequent radioiodine therapy in 2022, disease-free during follow-up. He presented to our center's emergency department with headache and incomplete left third cranial nerve palsy. Suspecting pituitary apoplexy, an MRI study revealed a 3cm aggressive lesion in the sellar region, invading both cavernous sinuses and extending into the suprasellar cistern with compression of the optic chiasm. Subsequent positron emission tomography-computed tomography (PET-CT) failed to demonstrate any additional foci of metastatic activity

Results:

Resection of the lesion was performed via endoscopic transsphenoidal approach, with good postoperative evolution and resolution of the third cranial nerve palsy. Subsequent postoperative imaging confirmed near-complete resection with consequent decompression

of the optic pathway. Histopathological analysis definitively established the nature of the lesion as metastatic follicular thyroid carcinoma. The patient received radioiodine therapy followed by fractionated radiotherapy as adjuvant treatment.

Conclusion:

With advancements in oncological treatments and the possibility of better control of the primary disease, surgery for pituitary metastases is increasingly playing a significant role. In our case, surgery was effective in controlling symptoms, visual disturbances, and obtaining a definitive oncological diagnosis.

Fronto-orbital monobloc approach for intra-orbital intra-conal tumor removal.

Poster number 5

Type of abstract:

abstract for poster presentation

Authors:

Samir Amine Benbouali / Department of Neurosurgery, Oran, Algeria.

Kamilia Ghazi / Department of Neurosurgery, Oran, Algeria.

Presenting author:

Samir Amine Benbouali

Topic:

Anterior/central skull base

Introduction:

The surgical management intra-conal intra-orbital lesions poses a great challenge, given the intricate vascular, neural, and oculomotor structures involved and the difficult access points. The aim is to illustrate the value of the monobloc fronto-orbital approach in effectively removing these lesions.

Methods:

A 14 -year- old female presenting with an intra-conal cavernous hemangioma, clinically manifesting as exophthalmos in the right eye, decreased visual acuity, and oculomotor impairment. Brain MRI reveals the intra-conal lesion.

We opted for a fronto-orbital monobloc approach, which allowed us a better exposure of the lower frontal intra cranial region and the superior part of the orbital cavity.

Additionally, we performed a medial intra-conal approach, involving a gradual dissection to expose the tumor, dissect its various poles, address the optic nerve at its lower section, and ultimately achieve total monobloc removal of the lesion.

Results:

This surgical strategy enabled us to achieve a total removal of the lesion while preserving visual functions, with no postoperative impairment of the oculomotor function. No secondary reconstruction of the orbital roof was needed, as it was included in the bony flap.

Exophthalmos reduction was observed, and no post-operative enophthalmos.

Conclusion:

Neurosurgical approach targets the posterior two-thirds of the orbit and encompass superior, lateral, and superolateral paths.

Superior approaches, whether subfrontal with or without superior orbital rim removal, offer optimal exposure to the orbit.

Intraconal approaches follow the exposure of the orbital bony framework for lesions located inside the cone.

Fungal Fury- A Rare Case of Extensive Skull Base Destruction by Paranasal Sinus Fungus Ball in a Young Adult

Poster number 6

Type of abstract:

abstract for poster presentation

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Presenting author:

Nina Wenda

Topic:

Anterior/central skull base

Introduction:

We present a challenging case of a fungus ball of the paranasal sinuses with extensive destruction of the skull base in a 20-year-old refugee from Afghanistan. The patient reported symptoms of nasal obstruction, increasing headaches, and loss of smell and taste persisting for over 2 years.

Methods:

Endoscopy showed a polypoid mass subtotally obstructing the nasal cavity. Diagnostic imaging, including CT and MR scans, unveiled a profoundly destructive mass in the nasal cavity, anterior, and middle skull base. The destructive process extended to various anatomical structures, such as the anterior wall of the frontal sinus, anterior skull base with erosion of the left internal carotid canal and extraconal infiltration of both orbits with protrusion toward the frontal lobe. There was no evidence of brain infiltration. Furthermore, expansion towards the middle fossa with destruction of the sphenoid sinus and the clivus reaching the pons was revealed.

Results:

Intraoperative exploration through endoscopic endonasal surgery confirmed classical signs of a fungus ball, and complete removal was achieved. The surgical approach allowed for thorough examination of the extent of bony erosion, reaching the atlantooccipital joint. Notably, the dura of the anterior and middle skull base presentend thickened but intact, lacking any signs of liquorrhea.

The patient's swift recovery post-surgery was accompanied by a clear decrease in symptoms. Follow-up imaging at 8 weeks postoperatively demonstrated complete removal of the fungus ball without signs of recurrence. The patient is currently in ongoing follow-up without evidence of recurrent symptoms.

Conclusion:

Endoscopic endonasal resection provided a definitive diagnosis and resulted in complete removal of the fungus ball. It is crucial to acknowledge that similar cases are fortunately infrequent in Western Europe, owing to the accessibility of healthcare facilities. Our patient endured two years of flight during which comparable healthcare was denied.

Anatomical step-by-step dissection of complex skull base approaches for trainees: medial cavernous sinus wall resection

Poster number 7

Type of abstract:

abstract for poster presentation

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Presenting author:

A. Yohan Alexander

Topic:

Anterior/central skull base

Introduction:

Resecting the medial cavernous sinus wall (MCSW) maximizes chances of biochemical cure in patients with functioning pituitary adenomas. This technique, however, may be challenging for trainees to understand given its complex surgical steps and anatomy. This study aims to provide an anatomically oriented, step-by-step guide for MCSW resection.

Methods:

On four sides of two formalin-fixed, latex-injected specimens, endoscopic endonasal transsellar-transcavernous approaches followed by resection of the MCSW were performed using a 0-degree endoscope. Key surgical steps were documented in 3D on illustrative specimens. Dissections were supplemented with representative case applications.

Results:

Steps involved in resecting the MCSW include a sphenoidotomy, a sellar osteotomy exposing the periosteal dura overlying the MCSW ipsilateral to the lesion, an inferior intercavernous incision that begins in midline and is carried laterally to expose the ipsilateral cavernous sinus, incising the meningeal dura covering the pituitary gland, removal of tumor (simulated by removing the lateral one-third of the pituitary gland), incisions at the roof and floor of meningeal layer that meet posteriorly (thus freeing the MCSW from its medial attachments), and, lastly, sharp disconnection of the sellar ligaments which tether the MCSW laterally. MCSW is then removed.

Conclusion:

An understanding of the sellar and parasellar anatomy is critical for safe entry into the medial cavernous sinus compartment. Subsequently, the MCSW can be safely removed with an in-depth knowledge of the associated surgical steps and anatomy.

The Sellar Barrier Concept as a Predictor Variable of Intraoperative CSF Leak in Endoscopic Endonasal Surgery for Pituitary Adenomas

Poster number 8

Type of abstract:

abstract for poster presentation

Authors:

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Presenting author:

R. Sánchez

Topic:

Anterior/central skull base

Introduction:

The concept of sellar barrier (SB) defines the interface between a pituitary tumour and the suprasellar cerebrospinal fluid (CSF). SB subtype has been related to the risk of intraoperative CSF leak during endoscopic endonasal approach (EEA).

Methods:

This study aims to assess the association between SB subtype and the risk of intraoperative CSF leak in our cohort of patients.

A retrospective analysis was performed in a cohort of consecutive patients diagnosed with pituitary adenoma who underwent EEA between 2018 and 2024. Demographic, clinical and radiological data were obtained. Preoperative MRI scans were examined to establish SB subtype (weak, mixed or strong). We assessed the presence of intraoperative and postoperative CSF leak.

Results:

85 patients (41 men and 44 women) with a mean age of 55 years [15 - 88] were included. Intraoperative CSF leak was observed in 26 patients (30.6%), and postoperative CSF leak in only 4 patients (4.7%).

In the intraoperative CSF leak group, weak SB was observed in 38.5% of cases, while it was mixed in 50% cases and strong in 11.5%. 42.4% of patients without intraoperative CSF leak had a weak SB, 32.3% mixed SB and 25.4% strong SB. However, these differences were not statistically significant ($p=0.199$).

Conclusion:

Although strong SB proportion was clearly lower in patients presenting with intraoperative CSF leak, our study showed no statistical association between SB subtype and the risk of CSF leak during EEA surgery.

A simple and rapid skull base reconstruction after endoscopic clival surgery: a technical note

Poster number 9

Type of abstract:

abstract for poster presentation

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Presenting author:

Max Keizer

Topic:

Anterior/central skull base

Introduction:

Skull base chordomas, challenging due to their proximity to critical structures, have seen treatment advancements, notably the transnasal endoscopic approach. Traditionally, closure after tumor removal involved complex techniques.

Methods:

Our report presents three cases diverging from tradition, utilizing a simplified closure method employing autologous fat tissue alone after modified bony resection.

Results:

All three cases underwent successful endoscopic resection, followed by fat tissue placement to cover defects. Although one case experienced a transient cerebrospinal fluid (CSF) leak 4 days after the surgery, the other two cases showed no complications during the 24-month and 3-month follow-ups after surgery, respectively.

Conclusion:

These cases demonstrate the efficacy of the simplified closure technique, including bony resection, prompting its integration into our surgical approach for skull base chordomas.

Combined transnasal and transmaxillary approach to petrous apex cholesterol granuloma

Poster number 10

Type of abstract:

abstract for poster presentation

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Presenting author:

Albert Trondin

Topic:

Anterior/central skull base

Introduction:

Managing petrous apex lesions poses challenges due to proximity to critical neurovascular structures, especially the petrous internal carotid artery.

Transcranial approaches remain effective and still required in cases with far lateral extension.

Methods:

But transcranial approaches may lead to complications such as cranial nerves palsy, jugular foramen syndrome, infarcts, cerebrospinal fluid leak, hydrocephalus, wound infection, pneumonia, and pulmonary embolism.

Endoscopic endonasal approaches offer a less invasive option, eliminating the need for durotomy and brain retraction. However, accessing the lateral petrous apex endoscopically is challenging due to anatomical constraints working lateral and inferior to the petrous ICA, resulting in poorer outcomes and higher recurrence rates. To address this limitation, the endoscopic contralateral transmaxillary approach was developed. In this report, we detail a case of a petrous apex cholesterol granuloma successfully treated with this approach.

Results:

A 32-year-old male presented with diplopia over the past year. On examination, he was found to have an isolated right abducens palsy. MRI revealed a expansile well-marginated lesion without enhancement at the apex of the right temporal bone with compression of the right abducens nerve.

Conclusion:

Surgery involved a combined transnasal and contralateral transmaxillary approach. Subtotal

removal was performed, leaving part of capsule firmly attached to the abducens nerve. Final pathology diagnosed a cholesterol granuloma. The abducens nerve paralysis resolved in one month.

How to prevent postoperative enophthalmos after surgery for intraorbital tumours.

Poster number 11

Type of abstract:

abstract for poster presentation

Authors:

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Presenting author:

Yoshihiro Natori

Topic:

Anterior/central skull base

Introduction:

In most cases of surgery for intraorbital tumours, postoperative enophthalmos occurs if appropriate precautions are not taken. In this report we describe the development of a method to reduce orbital volume and prevent enophthalmos using ceramic paste.

Methods:

Preoperatively, bilateral orbital volume and tumour volume were measured. The target orbital volume was the average of the orbital volume of the diseased side minus the tumour volume and the healthy side. The amount of ceramic paste used was the difference between the volume of the healthy side and the target orbital volume.

After tumour removal, the ceramic paste was applied to the inside of the orbital wall bone valve and fixed in its original position after setting. Three months and one year after surgery, eye protrusion was measured

Results:

Immediately after surgery, the exophthalmos had not improved, but by the first year, the exophthalmos had improved, with no difference between the two eyes.

Conclusion:

Conventional methods of preventing exophthalmos were based on empirical evidence. The orbital wall sometimes tethered the external eye muscles, resulting in postoperative diplopia. With the present method, the inside of the bony flap was smoothed and no diplopia was observed.

Nimodipine treatment protects Schwann cells and neuronal cells but not tumor cells from cisplatin induced cell death

Poster number 12

Type of abstract:

abstract for poster presentation

Authors:

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Presenting author:

Saskia Fritzsche

Topic:

Basic science

Introduction:

Nimodipine has received increased attention in recent years due to its neuroprotective effect. This effect has been demonstrated in clinical studies and under various stress conditions in cell models. The aim of this study was focused on the effect of nimodipine on neuronal cells and Schwann cells under cisplatin treatment.

Methods:

Schwann cells (SW10) and neuronal cells (RN33B) were used to investigate the neuroprotective effect of nimodipine, as well as the two tumor cell lines A549 (non-small cell lung cancer) and SAS (squamous cell carcinoma) to exclude a protective effect on the tumor. To investigate the influence of pretreatment with nimodipine under cisplatin therapy on cell survival, lactate dehydrogenase activity was used as a marker for cell death. The immunofluorescent dyes propidium iodide to detect dead cells and CellRoxGreen to visualize oxidative stress were utilized. In addition, the protein level of LMO4 and known interacting proteins were analyzed.

Results:

The cytotoxic effect of cisplatin is reduced by up to 38% in neuronal cells and up to 60% in Schwann cells by pretreatment with nimodipine, while a reduction of dead cells and oxidative stress under nimodipine was also evident. No decrease, rather a tendency of increase in apoptosis could be triggered in the tumor cell lines by nimodipine. The down regulation of LMO4 induced by cisplatin was counteracted by nimodipine pretreatment; at the same time, an activation of antiapoptotic signaling pathways was visible. The opposite effect could be demonstrated in the tumor cell lines.

Conclusion:

Nimodipine pretreatment led to a neuroprotective effect without reducing the desired cytotoxic effect. Considering all the proven effects of nimodipine, this shows a potential for further areas of application, not only to improve the patient's quality of life, but also to optimize therapies and surgery by reducing neuronal damage.

Characterization of immune cell infiltrate in vestibular schwannoma

Poster number 13

Type of abstract:

abstract for poster presentation

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Presenting author:

Sandra Leisz

Topic:

Basic science

Introduction:

Vestibular schwannoma (VS) is the most common benign tumor in the cerebellopontine angle. Macrophage infiltration has been suggested to influence tumor progression. In comparison, the infiltration of other immune cells less investigated. Therefore, the aim of study was to characterize the immune cell infiltrate quantitatively and topologically in the VS.

Methods:

Cryosections tumor samples from VS patients with different tumor volume were examined. The abundance of 18 immune cell markers and two tumor markers were detected using multi-epitope ligand cartography, which can be used to stain over 100 antigens on a tissue section. The microscopic images were subsequently analyzed using ImageJ and CellProfiler software.

Results:

In addition to S100B⁺ and CD56⁺ VS tumor cells, numerous CD68⁺ and CD163⁺ macrophages were detected in the image sections. CD14⁺, CD16⁺, and CD40⁺ macrophages were also identified. Double positive cells were shown for CD3 and CD4 as well as CD3 and CD8, representing T helper cells and cytotoxic T cells. In addition to the T cell markers, CD80⁺, CD86⁺, and CTLA-4⁺ cells were also identified, which might play a role in immune escape by tumor cells. Furthermore, detection of cells that were stained with antibodies against PD1 and PDL1 were observed.

Conclusion:

There are more distinct immune cells in the VS sections than previously known. The results suggest that these immune cells can influence each other in activity and function, which could promote the progression of VS. These findings may contribute to the development of a therapeutic option for VS.

A rare observation of bilateral non chromaffin tympano jugular paraganglioma treated by exclusive radiation : case report

Poster number 14

Type of abstract:

abstract for poster presentation

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Assistant professor on ENT departement . Badji Mokhtar university .Algeria

main interests : cancerology of head and neck . vestibular medecine

intereseted on making first steps on skull base surgery

Topic:

Lateral skull base

Introduction:

Tempral bone paragangliomas are rare and typically benign .

An exceptional case of bilateral tympano-jugular paraganglioma is reported. We discuss and redefine the roles of surgery , radiotherapy on the management of these rare benigne tumors

Methods:

A 38 -year-old female consult for slowly progressed right facial nerve palsy.. The patient had consulted previously a surgeon because of the swelling in his neck that was intimately associated with carotid artery pulsation.

Otologic examination revealed that the upper quadrant of the tympanic membrane on both left and right side was bulging and bluish. . There was no other creanial nerve palsy .

Bilateral angio CT scann :the diagnosis bilateral non-chromaffin tympano- jugular paraganglioma was made.

Radiotherapy was offered as the treatment of choice (Class C and D TJPs) because they were deemed inoperable

Results:

Angio CT scanner two years after finishing radiation showed a partial regression of left side and stable volume of the right side

A new carotid paraganglioma on the left side was diagnosed, the decision of surgical excision was made.

Conclusion:

Notwithstanding the very limited number of pooled cases extracted from the literature to support the assertion made about the favorable effects of irradiation, contemporary RT can safely achieve extended tumor regression and prevent progression of these generally held benign neoplasms.

Exoscope-assisted combined transtemporal and transcervical resection of glomus jugulare

Poster number 15

Type of abstract:

abstract for poster presentation

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Topic:

Lateral skull base

Introduction:

Glomus jugulare are rare and locally aggressive tumors that can cause both intracranial and extracranial involvement. Radical surgical excision becomes challenging considering the anatomical complexity of the temporal bone and craniocervical region. A comprehensive understanding of cranial nerve disposition at the high-cervical region is crucial to decrease postoperative morbidity.

Methods:

A 35-year-old female presented with recurrence of a right glomus jugulare, which had been surgically excised 9 years prior to her current consultation. Following initial resection, the patient developed right facial paralysis. Due to facial swelling, a CT scan was performed, revealing postoperative changes, including an obliterated external auditory canal (EAC), absent middle ear ossicles, and canal wall-down mastoidectomy. A 1.9 by 1.5 cm, contrast-

enhancing mass was evident occupying the middle ear cavity in its entirety and was continuous with enhancing soft tissue at the jugular foramen. Infratemporal fossa extension was also noted.

Results:

An exoscope-assisted combined transtemporal and transcervical resection was performed. A vascular tumor filling the jugular foramen and mesotympanum with extension through the eustachian tube into the infratemporal fossa was observed. Selective level IIa, IIb, and III neck dissection was performed to rule out malignant paraganglioma. Involvement of cranial nerves X and XII was noted and had to be sacrificed. The infratemporal fossa component was excised first. To enhance exposure, a limited suboccipital craniectomy was performed. The internal jugular vein was ligated, and the sigmoid sinus compressed. The tumor was then removed from the jugular bulb and mesotympanum.

Conclusion:

Glomus jugulare tumors with a cervical extension into the infratemporal fossa can cause great lower cranial nerve morbidity. Surgical management should be individualized and tailored based on the extension of the tumor.

Endoscopically-assisted presigmoid approach for parenchymal brainstem lesion excision : a case-report

Poster number 16

Type of abstract:

abstract for poster presentation

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Presenting author:

Alexandros Moniakis

Topic:

Lateral skull base

Introduction:

The presigmoid approach provides a surgical corridor of maximal exposure of the lateral and ventral view of the brainstem while preserving the cochlea and semicircular canals. In our case, the presigmoid endoscopically-assisted approach was performed for the excision of an intrinsic pontine lesion, achieving maximal safe resection.

Methods:

A 41 year-old female presented to our department with right VI nerve palsy and a left hemiparesis. She underwent Magnetic resonance imaging of the brain (MRI) which revealed an intrinsic pontine lesion located at the basilar part and the tegmentum,with a maximum diameter of 1 cm and no contrast enhancement.

Results:

A presigmoid endoscopically-assisted approach was performed, which resulted safe resection of the lesion.Postoperative Computed tomography (CT) of the brain revealed complete resection of the lesion.Finally, her postoperative course was uneventful and she was discharged with no new neurological deficits to a neurohabilitation facility center.

Conclusion:

As demonstrated in our case report the presigmoid approach is a viable option not only for skull base tumors but also for accessing well-selected intrinsic brainstem lesions with a widened ventral view by the use of the endoscope. This corridor allows minimal retraction while preserving the patient's hearing.

Quality of life in patients with vestibular schwannoma – comparison of surgical treatment and wait and scan strategy

Poster number 17

Type of abstract:

abstract for poster presentation

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Presenting author:

Lazak J.

Topic:

Lateral skull base

Introduction:

The aim of the study was to compare the quality of life in patients with vestibular schwannoma who underwent surgical removal of the tumor and patients who were observed.

Methods:

Patients with unilateral sporadic occurrence of vestibular schwannoma and tumors up to a maximum extrameatal size of 15 mm were included in the prospective questionnaire study

(2018–2021). The operated group consisted of patients who underwent surgery via suboccipital-retrosigmoid approach. Patients after previous Leksell gamma knife irradiation (or other methods of stereotactic radiosurgery) were excluded. Quality of life was assessed using 10 validated questionnaires that were distributed preoperatively / at the beginning of the observation and 1 year after.

Results:

25 patients were indicated for surgical treatment, 48 were included in the „wait and scan“ group. Operated patients suffered from more frequent headaches 1 year after the surgery. In both operated and non-operated patients headache was associated with a higher incidence of anxiety and occurred more often in women. A statistically significant difference was found in the Facial Disability Index (FDI) between the operated and non-operated groups of patients. Patients indicated for surgery were more prone to depression preoperatively and 1 year after surgery compared to patients in the „wait and scan“ group.

Conclusion:

Despite the normal postoperative function of the facial nerve in most cases, we found a deterioration of quality of life according to FDI in operated group of patients. A significantly higher incidence of depression and postoperative headaches were found in operated patients.

The surgical treatment of tinnitus associated with neurovascular compression syndrome of eighth cranial nerve

Poster number 18

Type of abstract:

abstract for poster presentation

Authors:

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Presenting author:

Zuzana Urbaniova

Topic:

Lateral skull base

Introduction:

The neurovascular compression syndrome of the eighth cranial nerve is a highly controversial subject in terms of its possible etiopathogenesis. One of its clinical presentation is tinnitus. This study focuses on analysing the efficacy of microvascular decompression as a treatment for tinnitus associated with neurovascular compression syndrome.

Methods:

Four patients with bothersome unilateral tinnitus underwent microvascular decompression at the Department of Otorhinolaryngology, Third Faculty of Medicine, Charles University, and University Hospital Kralovske Vinohrady. Preoperative assessments included audiological and neuro-otological evaluations, along with imaging to identify the pathological relationship between n.VIII and adjacent vessels. A preoperative carbamazepine test was conducted. The study assessed the impact of microvascular decompression on tinnitus and related difficulties using THI, HHI, VHI, and GAD-7 questionnaires administered preoperatively and one month postoperatively.

Results:

In our study group half of the patients showed support for the diagnosis of neurovascular compression syndrome through the preoperative carbamazepine test. Intraoperative findings in all patients confirmed the pathological relationship between the eighth cranial nerve and the anterior inferior cerebellar artery. Microvascular decompression positively influenced tinnitus-related difficulties in three out of four patients. One patient experienced no relief and developed an intracranial complication three weeks postoperatively. Postoperatively, no new cases of hearing loss or vestibular difficulties were observed.

Conclusion:

Microvascular decompression of the eighth cranial nerve remains a highly controversial as a therapeutic intervention for tinnitus. Comprehensive assessment is crucial for surgical planning. Most of the patients experienced a relief of the symptoms after treatment.

Standardized questionnaires are helpful in evaluating treatment outcomes.

transsigmoid approach to complex parabrainsstem tumors

Poster number 19

Type of abstract:

abstract for poster presentation

Authors:

Yusuke Kinoshita Tesseikai Neurosurgery Hospital/Neurosurgery, Masashi Yoshikawa Tesseikai Neurosurgery Hospital/Neurosurgery, Naoki Omura Tesseikai Neurosurgery Hospital/Neurosurgery, Yoko Matsushita Tesseikai Neurosurgery Hospital/Neurosurgery, Atushi Doi Tesseikai Neurosurgery Hospital/Neurosurgery, Toru Ikenaga Tesseikai Neurosurgery Hospital/Neurosurgery, Shinichi Nishimura Tesseikai Neurosurgery Hospital/Neurosurgery, Masahiko Wahibuchi Osaka Medical and Pharmaceutical University/Neurosurgery, Toshihiko Kuroiwa Tesseikai Neurosurgery Hospital/Neurosurgery, Takanori Fukushima Duke University/Neurosurgery

Presenting author:

Yusuke Kinoshita

Topic:

Lateral skull base

Introduction:

The surgical management of complex tumors of the posterior fossa poses a formidable challenge in neurosurgery. The transsigmoid approach provides wider and shallower surgical fields; however, there have been few clinical and no cadaveric studies on its usefulness. We describe the transsigmoid approach in clinical cases and cadaveric specimens.

Methods:

For this clinical study, we retrospectively reviewed the medical records and operative charts of patients surgically treated for parabrainsstem tumors using the transsigmoid approach between 1997 and 2019. We analyzed the patients' demographic and clinical data, as well as surgical and clinical outcomes. In the cadaveric study, we compared the surgical views obtained in different approaches (retrosigmoid, presigmoid, retrolabyrinthine and transsigmoid) and we measured the sigmoid sinus width at the level of the endolymphatic sac and the distance between the anterior edge of the sigmoid sinus and the endolymphatic sac on 35 sides in 19 cadaveric specimens.

Results:

A total of 21 patients were included in the clinical study: 6 males and 15 females. Gross-total, near-total, and subtotal removal were achieved in 8 (38.1%), 5 (23.8%), and 8 (38.1%) patients, respectively. In the cadaveric study, we used 19 cadaveric specimens. The sigmoid sinus was cut in the middle, and the incision was extended from the retrosigmoid to the

presigmoid dura. The results indicated that this technique can widen the operative field anteriorly by approximately 2 cm as compared to the retrosigmoid approach and provides a better view anterior to the brainstem.

Conclusion:

The transsigmoid approach is a useful approach for complex parabrainsstem tumors because it provides a wider and shallower operative view with less retraction of the cerebellum. This enables safer tumor removal with less damage to important structures in the posterior fossa, resulting in better operative and clinical outcomes.

Foramen of Luschka Choroid Plexus Meningioma - A case report and review of literature

Poster number 20

Type of abstract:

abstract for poster presentation

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Presenting author:

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Topic:

Lateral skull base

Introduction:

The incidence of cranial meningiomas is the highest amongst all primary cranial tumours. Contrary to this, meningiomas of the posterior fossa are rare, and meningiomas arising from the posterior fossa choroid plexus, with no dural attachment are even more rare.

Methods:

In this report we present a case of a CPA tumour which presented primarily with glossopharyngeal neuralgia, initially presumed to be a lower cranial nerve Schwannoma, but intra operative findings and neuropathology confirmed the diagnosis of foramen of Luschka choroid plexus meningioma. The perioperative period was largely uneventful aside some post operative hoarseness of voice and swallowing difficulties that eventually resolved with complete resolution of preoperative symptoms and near total resection of the tumour.

Results:

It is important to understand this rare pathology as it can pose different preoperative planning or result into surprising intraoperative complications that meningiomas entail compared to schwannomas which are high in the differential diagnosis list. Reporting of these cases can factor into the research of the causes of meningioma tumorigenesis.

Conclusion:

Our case report emphasises the importance of detailed neuro radiological examination of preoperative MRI scans and interpretation of imaging findings in the context of clinical picture.

Venous sampling helps in differentiation of a suspected phosphaturic mesenchymal tumor of the skull base

Abbreviations:

- **FGF23 = fibroblast growth factor 23**
- **TIO = tumor induced osteomalacia**
- **PMTs = phosphaturic mesenchymal tumors**

Poster number 21

Type of abstract:

abstract for poster presentation

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Topic:

Lateral skull base

Introduction:

Patient presented with renal hypophosphatemia & increased serum levels of FGF23. TIO, caused by PMTs, was considered. Additional imaging showed small hotspot in his skull base, suspect for meningioma/TIO. Only curative treatment of TIO is resection, however small meningioma would not be removed. To certify diagnosis we explored other options.

Methods:

Systemic FGF23 venous sampling has been reported in the work up of localizing PMTs by Takeuchi et al. (2004). Based on the principle that tumors are theoretically located near the site where FGF23 concentration in serum is highest, they successfully identified 7 PMTs out of 10 TIO patients.

We designed a protocol for sequential sampling; experienced designated radiologist performed venous sampling using a catheter inserted in both femoral veins in an outpatient treatment setting under local anesthetics. Blood samples were taken from 24 sites, cranial to caudal, and a venous sample of each site was sent to a specialized laboratory.

Results:

No apparent FGF23 gradient was detected and all FGF23 levels were within the normal range. We concluded the CPA tumor was not a PMT and a watchful waiting regimen was justified. Follow up MRI showed no growth of the lesion.

Because the patient was regarded to have a TIO with unknown localization, the national indication committee approved the initiation of burosumab, a recombinant human monoclonal antibody directed against FGF23. Treatment with burosumab led to normalization of both serum phosphate and urinary phosphate excretion, while symptoms disappeared.

Conclusion:

No FGF23 gradient was detected, indicating that CPA tumor is probably a meningioma, high risk surgery was avoided. Performing sequential FGF23 venous sampling using our protocol can help in diagnosis of PMTs. Especially when high risk (skull base) surgery is considered, this can be of great value when weighing risks/benefits.

Long-term management of epidermoid cysts in a series of 55 patients - 20 years of experience in balancing the extent of resection and functional preservation

Poster number 22

Type of abstract:

abstract for poster presentation

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Topic:

Oncology

Introduction:

Surgical treatment of intracranial epidermoid cysts can be challenging due to adherence to neurovascular structures, particularly when localized deep at the skull base. Their tendency for recurrence requires balancing surgical radicality and neurological morbidity. The study correlates surgical outcome and recurrence with extent of resection during long-term follow-up.

Methods:

The monocenter retrospective study involved 55 patients being operated for epidermoid cysts between 2000 and 2021. A detailed analysis of their clinical, surgical, and neuroradiological data was performed, with special interest on long-term symptom development and changes in imaging.

Results:

Epidermoid cysts were predominantly cerebellopontine angle/prepontine lesions. Dizziness and trigeminal affection were most common (29% each), followed by hearing difficulties and gait disturbances. Postoperative MR imaging showed remnants of restricted diffusion <10 mm in 28%, and remnants >10 mm in 7% (not-total removal). Progression after not-total removal occurred in 64.0%, and after total removal in 20.5%. Immediate postoperative symptom development was similar after total vs. not-total removal, and after one year, the

rate of symptom improvement was higher after total removal. The rate of surgery-related new cranial nerve deficits and complications was similar.

Conclusion:

A more radical resection without remnants of restricted diffusion on imaging was associated with a higher rate of long-term symptom improvement and less recurrence. However, functional preservation should remain priority in epidermoid management. Long-term follow-up is always mandatory, as recurrences were regularly observed even after total removal.

Neuronavigation in the Surgery of Tumors in the Sellar and Suprasellar Region

Poster number 23

Type of abstract:

abstract for poster presentation

Authors:

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Topic:

Oncology

Introduction:

Functioning as true GPS in the operating room, neuronavigation is a computerized tool that assists in locating a lesion or calculating an intracerebral trajectory.

It has been applied to tumors in the sellar and suprasellar region.

Methods:

Tumors operated on in our department mainly include meningiomas of the tuberculum sellae and suprasellar craniopharyngiomas. Medical imaging is typically performed within 48 hours before the surgical procedure, involving cerebral CT with angiography sequences and cerebral MRI.

The fusion of CT and MRI images is done on the neuronavigation workstation.

Intraoperatively, depending on the surgical stage, we have access to CT images with bone window and angiography sequences, as well as MRI images.

Results:

This tool not only provides us with a multimodal 3D representation of the targets to be reached but also tumor critical zones to be respected. It allows real-time visualization of the position of surgical instruments, progressively guiding and assisting in the surgical procedure.

Skull base surgeries are the best indication due to the absence of 'Brainshift.'

Conclusion:

Navigation has involved into a crucial tool, guiding, and refining the surgical procedure while

reducing the risk of complications through better orientation and identification of sensitive structures, thus minimizing the invasive nature of interventions.

Combined endoscopic transoral and far lateral approach for the excision of a craniocervical chordoma:case illustration.

Poster number 24

Type of abstract:

abstract for poster presentation

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Topic:

Oncology

Introduction:

Craniocervical chordomas represent a great challenge for surgeons, as they often demand difficult skull base approaches. In this study, we present a case of a patient with a craniocervical chordoma, who underwent two-stage surgery including a far-lateral skull base approach and an endoscopic transoral approach.

Methods:

A 62-year-old patient presented to our Department with a 2-month history of difficulty in swallowing.MRI of the brain revealed a large lesion 5,5 cm x 6,4 cm at the region of lower third of the clivus and C1 anterior arch, producing mass effect at the level of the oropharynx. Preoperatively,CT angiography was also performed to evaluate the vertebral arteries and the existence of any vascular abnormalities.

Results:

The patient underwent a two-stage surgery (7 days apart) which included a right far lateral approach for posterior debulking and unilateral occipitocervical fixation and an endoscopic transoral approach for further excision of the lesion.During his hospital stay, both tracheostomy and gastrostomy were performed and the patient after 2 weeks was discharged to a neurohabilitation facility. Histopathological examination revealed the presence of a craniocervical chordoma.

Conclusion:

Craniocervical chordomas are categorized amongst the most challenging lesions for skull base surgeons due to their commonly inaccessible locations. The combination of endoscopic

and various microscopic skull base corridors remain essential tools for the armamentarium of skull base surgeons.