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PP1.01 Clinical Cost Analysis between Transcutaneous and Percutaneous Bone Conduction Devices

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Objectives

To compare and evaluate the total post-implantation costs between transcutaneous and percutaneous bone conduction devices.

Methods

Retrospective data from 77 patients implanted in a tertiary referral centre with a pBCD (n=34), passive tBCD (tpasBCD; n=34) and active tBCD (tactBCD; n=9) and a reference group who underwent cochlear implantation (CI; n=34), were included in a clinical cost-analysis. Post-implantation costs were determined as the sum of consultation (medical and audiological) and additional (all post-operative care) costs. Median (cumulative) costs per device incurred for the different cohorts were compared at one, three and five years after implantation.

Results

After five years the total post-implantation costs of the pBCD vs tpasBCD were not significantly different (€1550.7 [IQR 1174.6-2797.4] vs €2266.9 [IQR 1314.1-3535.3], p=0.185), nor was there a significant difference between pBCD vs tactBCD (€1550.7 [1174.6-2797.4] vs €1428.8 [1277.3-1760.4], p=0.550). Additional post-implantation costs were significantly highest in the tpasBCD cohort at all moments of follow-up.

Conclusion

Total costs related to post-operative rehabilitation and treatments are comparable between percutaneous and (passive/active) transcutaneous BCDs up to five years after implantation. Complications related to passive transcutaneous bone conduction devices appeared significantly more expensive after implantation due to more frequent explantations.

PP1.02 Intra- and post-operative experiences from 51 surgeries of a new active transcutaneous bone-anchored implant system.

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Objectives
Sentio (Oticon Medical AB, Sweden) is a new active transcutaneous bone-anchored implant system under evaluation for safety and performance in a multi-centre, single-arm, prospective, clinical investigation (Clinicaltrials.gov identifier NCT05166265). The objective of this abstract is to focus on intra- and post-operative variables from 51 surgeries, taking place between February 2022 and November 2023.

Methods
The pre-market, pivotal clinical investigation follows individuals with conductive/mixed hearing losses or single sided deafness for a total period of 24-months after receiving an active transcutaneous bone-anchored implant. To date, recruitment has been completed and all 51 included participants have reached primary outcome assessment at 3 months, which is the first timepoint for analysing cohort data. Surgical variables include pre-operative planning, type of anaesthesia, type of surgical incision, and surgery time (first incision to last suture). A postoperative visit, 2 weeks after surgery was done to remove sutures and to assess wound healing, pain, and numbness.

Results
The cohort represents an adult group with a mean age of 50 (range 24-77) years and with a distribution of the type of hearing loss of 51% conductive, 25% mixed, and 24% single sided deafness on the implanted side. Surgery duration is 58 min (range 23 - 85 min) and general anesthesia is used in most cases. In one case, surgery was done with local anesthesia only. Although pre-operative imaging techniques are part of clinical practice in some clinics, more than half of the surgeries was done without it. There was no case of aborted surgery due to insufficient bone thickness and/or unexpected anatomy. The most used incision type was a stepwise C-type (49%), but 'lazy S' type (33%) and other techniques (18%) were also observed. Surgical wounds heal within 2 weeks and the majority of patients report of low levels of pain and numbness. Performance and safety outcomes are reported elsewhere.

Conclusion
The new active transcutaneous bone-anchored implant is small and minimal invasive to install. It can safely be implanted without preoperative imaging and surgery time could potentially be optimized to below 30 minutes depending on the individual patient's anatomy and prerequisites.

PP1.03 Important factors for the outcomes of cochlear implantation in children

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Objectives
A perfect understanding of the relationship between receptive and expressive language in CI users is still not possible. We know that age at implantation, duration of CI use, unappropriated family environments, inner ear malformations, dysfunction of the synapses in an auditory pathway, or neurocognitive disorder are negatively associated with success in cochlear implantation.

Material and methods
We analyzed speech perception abilities after cochlear implantation in children with prelingual and post-lingual, progressive hearing loss. Children with prelingual hearing loss were divided into 2 groups regarding the age at the implantation. For all participants, we applied a closed and open set for monosyllable words 12 months after implantation, an open set for polysyllable words in quiet and noise 24 and 36 months after surgery, and a sentence perception test 36 months postoperatively.

Results
All participants showed significant improvement in speech perception abilities over time. The lowest speech perception score 1 year after surgery was observed in the group of children implanted between 3 and 5 years of age, but the difference was not significant. Children with post-lingual progressive hearing loss achieved significantly better speech perception scores in all tests two and three years after implantation (89-90,8%) compared with those implanted up to 2 years (73,6 - 81,2%) and between 3 and 5 years of age (63,2-74,8%).

Conclusion
Duration of implant use significantly improves speech abilities in children implanted up to five years of age. Age at the implantation has a positive effect on speech abilities development especially if the listening is in demanding situations like in terms of background noise. Children implanted before two years of age have a gradual, continuous, and more natural improvement in speech abilities. Those who are implanted between three and five years of age expressed delay in listening skills two years postoperatively and significant improvement after this time. Continuance of implant use played a major role and significantly improved speech perception in CI children. The duration of auditory privation is better related to the CI outcomes than the age at which the patient was implanted.

PP1.04 AC102 – Phase I Results and Phase II Initiation for a New Drug Candidate for the Treatment of Sudden Sensorineural Hearing Loss

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Background

Sudden sensorineural hearing loss (SSNHL) has a major socio-economic impact. Preclinically, this small molecule almost completely reversed noise-induced hearing loss, making it a promising drug candidate for the treatment of SSNHL.

Material and method

In the completed phase I study, intratympanic administered AC102 was compared with placebo injections in healthy volunteers. The AC102 was used in increasing concentrations and volumes. End points were safety and tolerability of AC102, including assessment of audiological and vestibular function.

Results

Treatment-emergent adverse events (TEAEs) were equally common in both treatment groups. Most TEAEs were mild and resolved within 1 week. TEAEs included discomfort, ear pain, minor bleeding at the injection site and short episodes of dizziness. The injection hole healed within 4 days at the latest. Short-term reversible conductive loss occurred in both groups, mainly in the higher frequencies. No serious adverse events (SAEs) were observed during the study. The plasma concentration of AC102 was dose dependent and decreased over the 24 hour observation period.

Conclusion

AC102 was safe and well tolerated in healthy volunteers. It caused only mild and transient TEAEs and low systemic drug concentrations. AC102 is currently being evaluated in SSNHL patients in a randomized, blinded, two-arm phase II trial. Thirty European research centers include patients with moderate to severe idiopathic SSNHL. AC102 will be compared with standard treatment with oral steroids.

Disclosure

This sponsor-initiated study is sponsored by AudioCure Pharma GmbH, Berlin, Germany.

PP1.05 Long-term hearing results for otosclerosis patients receiving cochlear implants - Impact of facial nerve stimulation

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Introduction
Otosclerosis is a disease characterized by progressive bone transformation in the middle ear, primarily resulting in conductive hearing loss but potentially leading to mixed and sensorineural hearing loss. Aims: This study aimed to investigate the long-term hearing outcomes following cochlear implantation in otosclerosis patients compared with a typical population receiving a cochlear implant (CI). Also, the impact of programming limitations related to facial nerve stimulation (FNS) was evaluated.

Material and methods
The study included all otosclerosis patients who underwent CI surgery between 2003 and 2018 at the clinic, matched with a control group by age, implant type, preoperative hearing, and sex, with a minimum 5-year follow-up. The phonetically balanced words test (PB) was used to measure hearing outcomes and a mixed linear model was used to compare trends over time.

Results
There were no significant differences in hearing outcomes at 5 years, with PB results of 48.7 vs 47 for cases and controls ($p = 0.747$), or at last follow-up, 49.4 vs 44.3 ($p = 0.317$). However, the mixed linear model showed a statistically significant improvement over time of 1.6 percentage points in the otosclerosis group compared to the control group ($p = 0.005$). FNS incidence did not significantly differ between the groups ($p = 0.693$) and had no significant impact on hearing outcomes ($p = 0.620$).

Conclusions
Despite the complexity of CI surgeries for otosclerosis patients, the long-term hearing outcomes for otosclerosis patients were comparable to the control group.

PP1.06 Advancing Surgical Education and Skill Aquisition with the Exoscope for Cochlear Implantation in a Tertiary Hospital

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The exoscope has emerged as a transformative tool in modern medicine, revolutionizing the way surgeons visualize and perform intricate procedures such as cochlear implant. Compared to traditional microscopes, exoscopes offer enhanced flexibility, superior depth perception, and high-definition imaging capabilities making them assets across various surgical specialties. Their versatility renders them suitable for a wide range of surgical procedures and with training and education, their imaging capabilities allow trainees to observe procedures in real time or review recorded footages later on. Their design and ergonomic set up also minimize clutter in the operating room and provide surgeons with greater freedom of movement. In developing countries, the use of the exoscope is still limited, and advantages and ease of use are often faced with doubts, often leading to misig out on certain opportunities for enhancing surgery and teaching.

Objectives
To demonstrate the efficacy of exoscope integration in otologic surgeries such as cochlear implantation and showcase the benefits of exoscope-assisted training in improving surgical skill aquisition and procedural proficiency. The paper also aims to explore the challenges and considerations associated with integrating exoscopes into surgical training.

Methods
This is a case presentation of the experience of using the exoscope for cochlear implant surgery in a tertiary hospital. The traditional microscope has been the

Results
The surgery was faster and safer with the exoscope, with the surgeon being able to clearly visualize the surgical field in high definition and with improved ergonomics, less fatigue and strain allowed for meticulous dissection and minimal tissue truma. Also, the whole surgical team was able to appreciate the intricacies of cochlear implant surgery, and teaching the residents was more effective, enabling them to appreciate anatomy and landmarks as well as the surgical steps.

Conclusion
The use of exoscopes enables surgeons to develop proficiency in intricate surgical techniques, allows for improved electrode placements and enhances overall procedural efficiency. Integration of exoscopes into surgical programs offers substantial benefits in enhancing surgical education and skill acquisition among young surgeons and trainees alike. Visualization of the anatomy and observance of proper surgical technique ensures optimized surgical outcomes and delivery of high-quality patient care.

PP1.07 Long-term Results of Reverse Fixation Clip Technique on Electrode Migration Rates in a Large Cochlear Implant Cohort

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Objectives

Electrode migration is a common complication following cochlear implantation, particularly in straight electrodes, and often requires revision surgery. The use of a titanium electrode fixation clip was introduced more than 25 years ago. Here, we describe a novel reverse clip fixation technique and investigate the long-term results on electrode migration in a large cochlear implant cohort of more than 1000 patients.

Methods

The use of a titanium electrode fixation clip with a double U configuration incorporating two fixation loops was first described in 1998 (Müller et al., 1998). According to the original description and the manufacturer's instructions, the opening of the bone loop is directed toward the middle ear. In the presented technique, the opening of the bone loop is directed toward the mastoid cavity and closed before the electrode insertion under the surgeon's direct view. A similar approach has been described recently (Morales-Puebla et al., 2024). To evaluate the effect of the fixation clip and the reverse placement technique on electrode migration rates and required revisions, we performed a retrospective analysis of 1052 cochlear implant cases with straight electrodes of a single manufacturer from 2011-2023. The years 2011-2016 served as a historical control group without the use of a fixation clip, whereas in the years 2017-2023, the fixation clip and the reverse placement technique were applied as an institutional standard/

Results

A total of 1052 cases were included, with a median follow-up of 5.7 years. Overall, the clip was not applied in 461 (43.8%) of these cases, and in 591 (56.2%) cases the clip was applied. The cumulative incidence of electrode migration and revision surgery in the non-clip group at 1, 3, and 5 years was 0.2%, 0.7% and 1.1%, and in the clip group was 0%, 0%, and 0%, respectively (log-rank test = 0.051). No fixation clip-related complications were noted.

Conclusion

The reverse fixation clip technique prevented electrode migration and revision surgery and did not notably increase the duration of surgery, require additional surgeon training, or cause intraoperative or postoperative complications.

PP1.08 Audiological performance of the hearing contact lens Vibrosonic® alpha

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Objectives
The hearing lens "Vibrosonic® alpha" is a novel hearing device that directly stimulates the tympanic membrane by vibration. It consists of three components: First, a lens that is placed on the tympanic membrane; second, an ear-canal retainer connected to the lens by a flexible cable; third, a behind-the-ear module that is connected to the ear-canal retainer by a magnetic interface. Here, we investigate restoration of speech-recognition in the first 5 patients of a currently running clinical study.

Methods
Aided speech recognition wearing the hearing lens "Vibrosonic® alpha" was compared with unaided speech recognition before application of the device using three speech-recognition tests: monosyllable discrimination in quiet (Word Recognition Score; WRS; German Freiburger Speech Test), 50% speech-recognition threshold of sentences in quiet (SRT50) and in noise (SNR50) (German version of the International Matrix Test; OLSA).

Results
Mean un-aided pure-tone threshold was 43±5 dB HL (PTA4; 0.5,1,2,4 kHz). Monosyllable discrimination was tested at the 50%-discrimination level of the unaided condition and improved on average by 32% ± 13%. Mean OLSA SRT50 in quiet improved by 17 ± 5 dB in the first fitting from 58 ± 11 dB SPL to 40 ± 1,7 dB SPL. Mean SNR50 in noise improved by 0,9 dB in the first fitting. The maximum equivalent sound pressure was >100 dB SPL and extends from <60 Hz to 10 kHz.

Conclusion
The audiological performance of the hearing lens device in this patient cohort is excellent. Monosyllable discrimination in quiet corresponds to the 75%-quartile of conventional hearing aids.

PP1.09 A prospective multicentre European study investigating a one-step drill system (MONO) for bone anchored hearing procedures – Experience and outcomes at 1 year.

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Objectives

Surgical techniques for insertion of percutaneous bone anchored hearing systems (BAHS) have continuously improved, reducing surgical invasiveness and improving clinical outcomes. The latest advancement, MONO, is the newest technique for further improving and simplifying the surgery. With a novel parabolic drill design, the osteotomy is created with one single drilling step, in contrast to the three-step drilling sequence used conventionally. This study followed patients undergoing the MONO procedure for 12 months, to investigate safety and effectiveness of this BAHS.

Methods

A prospective multicentre, multinational, single-arm, trial at seven centres in the UK, the Netherlands, Denmark and Sweden included 51 adult patients (52 implants) implanted using the MONO procedure (clinicaltrials.gov identifier NCT04606823). Implant stability and usage, soft tissue reactions, pain and numbness, post-operative events and sound processor usage were assessed at all follow-up visits. Hearing related quality of life was evaluated using the Glasgow Benefit Inventory (GBI).

Results

The patients had a mean age of 57 years (range: 19–81), with 49% being over 65 years. Surgical time was short; 10 ± 5 minutes with local anaesthesia used in 69% of cases. No severe intraoperative complications occurred. At 12 months, the sound processor was in daily use in 45 patients with an average usage time of 13 hours. Across all study visits, adverse skin reactions (Holgers ≥ 2) were seen in six patients but there were minor or no skin reactions in 97.4% of all post-operative visits. At 12 months there had been four implant failures; two traumatic failures and 2 spontaneous failures, one of which was surgery-related due to incomplete insertion of the fixture. Surgery was rated as quick and easy, with efficient bone removal. Firm initial pressure of the drill against the bone is recommended. The GBI analysis showed that 96% of the patients experienced an overall improvement in quality of life 3 months after surgery.

Conclusion

The MONO surgical procedure for bone-anchored hearing system implantation provides a safe and efficient surgical technique for percutaneous implantation. Intra-operative and post-operative events reported were few and minor.

PP2.03 Exome variant prioritization in a large cohort of hearing-impaired individuals indicates IKZF2 to be associated with hearing loss and guides future research for unsolved cases

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Objectives
Non-syndromic hereditary hearing loss (HL) is genetically highly heterogeneous, yet at least half of the cases remain unexplained in medical genetic testing. One of several reasons for this is that pathogenic variants can be located in “unknown” deafness genes. With a variant prioritization approach, we aimed to identify novel (candidate) genes for HL.

Methods
Exome-wide sequencing data were collected for subjects with (presumed) genetic HL that remained unexplained in medical genetic testing (gene-panel analysis). Cases in group AD had presumed autosomal dominantly inherited HL (n=124) and in group AR, presumed autosomal recessive HL (n=337). Variants in known or candidate deafness genes (e.g. genes with preferential inner ear expression or mouse deafness genes) were prioritized based on predicted effects of the variants on the protein and on allele frequencies. Selected variants were then tested for their co-segregation with HL. For subjects with variants in known deafness genes suspected to be the cause of HL, the patients’ phenotype (obtained from their Electronic Patient Record) was compared to that documented in the literature. If a variant in a candidate gene was suspected to be the cause of HL, the phenotype of the subjects and affected relatives was extensively assessed through the collection of audiometric data and audiovestibular questionnaires.

Results
After rough filtering on allele frequency and predicted effect of the variants, a total of 61,180 variants in group AR and 61,180 in group AD were analyzed. Our most important finding was the association of IKZF2, a gene not previously identified as a “human deafness gene”, with dominantly inherited non-syndromic HL in three families. A total of nine affected subjects from these families were included in our study, ranging in age from 25 to 62. Their better ear PTA (0.5-4kHz) ranged from 29 (at age 25) to 75 dB HL (at age 56). All subjects reported progressive HL. There were no indications of vestibular symptoms.

Conclusion
Variants of IKZF2 can underlie non-syndromic HL. The abundance of candidate genes for HL stresses the importance of including family members (e.g. for trio analysis) for variant prioritization.

PP2.04 Progressive loss of sensitivity to electrical stimulation after cochlear implantation in X-linked POU3F4 incomplete partition 3 inner ear malformation deafness

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Objectives
Patients with X-linked incomplete partition type III (IP3) inner ear malformation deafness treated with cochlear implants exhibit higher 'Most Comfortable Loudness' (MCL) levels of stimulation and more electrode deactivation than patients with normal morphology. We endeavoured to analyze the progression of the MCL levels and electrode deactivation over time and assess those factors from electronic patient records (EPR) that could have led to deactivation. Furthermore, we aimed to assess whether speech perception was affected by a progressive loss of neural contact.

Methods
All thirteen patients with the IP3 malfomation in our clinical database were analyzed retrospectively with regards to impedance, stimulation levels, deactivated electrodes, and speech perception. A control group of patients with normal anatomy was included.

Results
MCL levels increased over time by 2.5 charge units (qu) per year, which was not seen in the control group. Electrode deactivation was more common in IP3 malformation, and it was estimated that 25% of electrodes would be deactivated by 15 years of age. Impedance was stable but higher in the study population. Speech perception was lower in IP3 malformation generally and was correlated to the number of deactivated electrodes.

Conclusion
Patients diagnosed with IP3 malformation deafness may suffer a greater risk of cochlear implant discontinuation compared to those with normal anatomy. A progressive loss of sensitivity to electrical stimulation may indicate a form of neural degradation in the abnormal cochlea. With time, patients in this group, even with cochlear implant technology, may be unable to perceive open discrimination of speech as they reach adulthood. This has clinical implications for the counselling of parents and the decision regarding hearing loss treatment and choice of communication mode.

PP2.05 Notched cartilage with incus interposition ossiculoplasty combined with cavity obliteration - a novel approach : study of 50 cases.

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Objectives

In chronic suppurative ear disease conductive hearing loss with erosion of ossicular chain pose serious challenge to the otologist . Austin-Kartush Type-A (Malleus and Stapes suprastructure are present with eroded Incus) constitute 60% of all ossicular chain defects in chronic suppurative ear disease. Various ossiculoplasty techniques have been developed till date. Modifications in ossiculoplasty with notched autologous conchal cartilage, incus iterposition and cavity obliteration in selected cases can yield predictably good result.

Methods

The present study includes patients who underwent ossiculoplasty for AUSTIN- KARTUSH type A ossicular defect (M+, S+ , eroded long process of Incus) at North Bengal Medical College Hospital, Darjeeling, between 1st November 2017 to 31st October 2021.All other ossicular chain erosions e.g Austin -Kartush Type-B, C, D were excluded from the study. Preoperative HRCT temporal bone, Pure Tone Audiometry (Preoperative & postoperative) were done in all cases.
Canal wall down mastoidectomy with tympanoplasty was done in all cases. A small piece of autologous conchal cartilage is harvested (Thickness: 0.5mm,Diameter: 4mm). A central notch is fashioned with 0.6 mm diamond bur to accommodate the head of the stapes. The Incus is rotated and the body of incus is placed over the notched cartilage, to raise the height of the assembly up to the level of the horizontal semicircular canal. Big Temporalis fascia is harvested and placed between the anterior part of annulus , and the mastoid cavity, covering the neo ossicular chain. The tympanomeatal flap raised earlier ,is placed over the temporalis fascia. One ineriorly based ,another superiorly based flaps with periosteum and soft tissue around the mastoid cavity are used for cavity obliteration . Wide meatoplasty was done.

RESULTS

N=50, Male 26, Female 24. Atticoantral disease:32 cases, Tubotympanic disease:18 cases. Preoperative average AB GAP : 29.3 dB, Postoperative average AB GAP 20.4 db. Significant improvement in post-operative air bone gap closure ($p < 0.001$) was observed in notched cartilage with incus interposition ossiculoplasty .

Conclusion

72% ossiculoplasty patients achieved post-operative AB GAP within 20 db. Ossiculoplasty with notched autologous cartilage, incus interposition and cavity obliteration is physiological , biocompatible and stable.

PP2.07 Postoperative surgical site infection in cholesteatoma surgery with and without mastoid obliteration, what can we learn?

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Introduction
This study aims to describe the occurrence of postoperative complications related to cholesteatoma surgery and to determine factors influencing the most common complication, i.e. postoperative surgical site infection (SSI) in cases with and without mastoid obliteration.

Materials and methods
Retrospective analyses were performed on surgically treated cholesteatomas in our hospital between 2013 and 2019. Patient characteristics, peri- and postoperative management and complications were reviewed. The cases were divided into two groups based on whether mastoid obliteration was performed or not.

Results
A total of 336 cholesteatoma operations were performed, of which 248 cases received mastoid obliteration. In total 21 complications were observed, of which SSI was the most common (15/21). No difference in occurrence of any postoperative complication was seen between the obliteration and no-obliteration group ($p = 0.798$), especially not in the number of SSI ($p = 0.520$). Perioperative and/or postoperative prophylactic antibiotics were not associated to the development of an SSI in both groups. In the no-obliteration group a younger age ($p = 0.015$), as well as primary surgery ($p = 0.022$) increased the risk for SSI. In the obliteration group the use of bioactive glass (BAG) S53P4 was identified as independent predictor of SSI ($p = 0.008$, OR 5.940).

Discussion
SSI is the most common postoperative complication in cholesteatoma surgery. The causes of SSI are multifactorial, therefore further prospective research is needed to answer which factors can prevent the development of an SSI in cholesteatoma surgery.

PP2.08 En Hamac tympanoplasty and canalplasty for optimal type 1 tympanoplasty outcomes

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Objective
Multiple tympanoplasty techniques have been developed with numerous differences in grafting and approach. This study aimed to improve type 1 tympanoplasty outcomes by using the 'en hamac' technique as well as performing a complete canalplasty for anterior perforations. Method. A retrospective review was performed using the prospective Otology-Neurotology Database tool for otological surgery. All primary type 1 tympanoplasty cases performed for tympanic membrane perforations from 2010 to 2016 were selected for analysis, all performed by one author. Minimal clinical and audiometric follow up was 18 months.

Results
Tympanic membrane perforation closure was achieved in 62 of the patients (96.88 per cent). None of the en hamac cases had residual or recurrent perforation (p = 0.02). The mean remaining air–bone gap was 8.50 dB. The remaining air–bone gap was less than 10 dB in 72.55 per cent, 10–20 dB in 25.49 per cent and more than 20 dB in 1.96 per cent.

Conclusion
Using the en hamac technique for anterior perforations as well as systematically performing a complete canalplasty provides multiple surgical advantages with excellent post-operative results.

PP2.09 External Auditory Canal Cholesteatoma: Clinical Presentation and Management of 22 cases

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Objectives
To evaluate the clinical presentation, management, and outcome of primary and secondary external auditory canal cholesteatoma (EACC).

Methods
Twenty-two consecutive cases of external auditory canal cholesteatoma (seven primary EACC and fifteen secondary EACC) were retrospectively reviewed from January 2012 to March 2024. An online-based Ear Surgery Data software was used for data entry. Pre-operative, per-operative, and post-operative Otoendoscopic or Microscopic findings were documented with photographs and a video recording system. In each case, the clinical data concerning age, sex, presenting symptoms, previous history, lesion side, EACC localization, staging, surgical treatment, outcome, and recurrence were reviewed. Audiological and radiological data (HRCT temporal bone) were documented and analyzed for each patient. The cases of EACC were staged according to the staging system of Naim et al..

Results
The presenting age range was 5-55 years, with a mean age of 25. Otorhoea (100%) was the predominant symptom in primary EACC and otalgia and hearing loss were the predominant symptoms in secondary EACC. The most common lesion site in primary EACC was the posterior wall (71.43%), followed by the inferior wall (28.57%). On the other hand, multiple wall involvement was noticed in all (100%) secondary EACC. All cases required surgical intervention. Among seven primary EACC cases, six cases were managed by canal wall down mastoidectomy and one case by canaloplasty and tympanoplasty. Surgical procedures applied in fifteen secondary EACC cases included canal wall down mastoidectomy in 4 cases, subtotal petrosectomy (STP) in 3 cases, canalplasty in 5 cases, removal of foreign body and conservative treatment in 2 cases, and excision of mass and canaloplasty in one case.

Conclusions
With a wide age range of presentation, old age may not be a predisposing factor in primary EACC. Instead of the inferior wall, posterior wall involvement in primary EACC explains the extension of the lesion into the mastoid in stage IV disease. An early stage of primary EACC (stages I and II) can be managed with the conservative approach. The advanced stages of primary and most cases of secondary EACC require various surgical methods, depending on the stage.

PP2.10 Otopathology of Incomplete Partition Type III: Implications for Cochlear Implantation

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Objectives
To describe the histopathology of Incomplete Partition Type III (IP-III) and consider it in the context of cochlear implant surgery.

Methods
The right temporal bone of an infant with otopalatodigital syndrome was fixed, decalcified, embedded, and sectioned at 20µm intervals. Every 10th section was stained with hematoxylin and eosin, and digitised. The otic capsule, scalae, and Rosenthal's canal were reconstructed in 3D in Amira. Spiral ganglion neurons (SGN) were counted.

Results
2D inspection and 3D reconstruction revealed incomplete separation of the basal turn of the cochlea from the internal auditory canal (IAC), with the enlarged scala vestibuli (SV) in continuum with the IAC and subarachnoid space. The height of the basal turn scala tympani (ST) was less than SV (round window: 0.64mm vs 1.54mm; 180 o 0.41mm vs 1.23mm; 360o 0.53mm vs 0.97mm). The lamina cribrosa was absent between the basal turn of the cochlea and IAC fundus. The interscalar septum between the 1st and 2nd turns was thick medially but missing laterally. There was no cochlear aqueduct. Quantification of SGNs on histologic sections revealed a reduced population (17% of normal for age). Rosenthal's canal was hypoplastic in the basal turn but normal beyond 360 degrees.

Conclusions
To our knowledge, this is the first identified histopathological sample of IP-III, and illustrates the morphological basis for intraoperative gusher. This analysis is relevant for cochlear implant candidacy. The anatomical findings of an unpredictable location of SGN in the basal turn and the reduced ST height, means middle turn cochleostomy to reach the viable SGN population or SV insertion could be considered.

PP2.11 A novel classification system and surgical strategies of first branchial cleft anomalies

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Objective
To define a novel classification of FBCAs based on the relationship between lesions and the facial nerve in term of radiographic imaging findings and to introduce the corresponding surgical managements.

Methods
The clinical data were retrospectively reviewed. Novel classification was proposed according to the head neck MRI findings and surgical records. FBCAs limited in the cartilaginous segment of external auditory canal (EAC) or superficial parotid gland capsule were classified as type A. Lesions close to the FN and(or) involved into the parotid gland with no scar formation and no previous parotidectomy were classified as type B. FBCAs adhered to the FN and(or) invaded the parotid gland with scar formation due to previous surgery were classified as type C. Appropriate surgery approaches was also described which was correlated with classification.

Results
Fifty-one patients were included, and one patient suffered from bilateral lesions. Thirty-one, twelve and nine lesions were classified as type A, type B and type C FBCAs respectively. One type A patient (1.92%) suffered from recurrence during follow-up. Temporary facial palsy (House-Brackmann Ⅱ) was identified in 2 type C patients (3.85%) after surgery and recovered to normal within 2 months. One type B patient (1.92%) suffered from facial paralysis due to the FN injury and underwent facial nerve graft simultaneously. No patients with type C complained of hearing loss postoperatively.

Conclusion
This novel classification clearly illustrates definitely relationship between lesion and the facial nerve and appropriate surgical strategies were proposed based on the novel classification.

PP3.01 Success in Valsalva maneuver in each ear may vary in a patient due to differences in peri-luminal tissue pressures between the Eustachian tubes.

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Objectives
The Valsalva maneuver (VM) increases nasopharyngeal pressures (NPP) to open the Eustachian tube (ET). The inability to perform VM has been considered a marker for ET function (ETF). Success in VM is determined by the achieved NPP and the physical properties of the ET. A study is conducted to assess subjects during VM, detect successful ET openings, and the passive functional properties of each ET.

Methods
A total of 23 subjects with history of ET dysfunction (ETD), 8 female 15 male, between ages 8-60 (average: 17.1+11.3), with bilateral non-intact tympanic membranes were evaluated in an ETD center, had recordings of the maximal NPP (maxNPP) during VM on each side and ability to open the ET on each side was recorded. Each ear of the subjects then underwent forced response test, to assess the passive functional properties of the ET by the measuring the opening pressure (OP), closing pressure (CP), and pressure during steady state air flow (PSS). Results between ears of the same subject and ears with and without successful VM were compared.

Results
Average differences between ears with lower measurement compared to the higher, in each subject for OP, CP, and PSS were 140.7+125 daPa (33.1+20.4% less), 48.5+42.3 daPa (48.6+27.4% less) and 96.5+80.3 daPa (38.9+22.6% less) respectively. A total of 18 ears (39.1%) of 12 subjects (6 bilateral, 6 unilateral) successfully opened their ET during VM (ear group VM-S) compared to 28 that failed (ear group VM-F). The average maxNPP for the VM-S and VM-F ears were 652.3+197.8 daPa and 390.1+129.5 daPa respectively. For the VM-S and VM-F ears, the average OP was 307.8+133 daPa and 353.8+176.2 daPa, and the CP was 67.6+55.8 daPa and 88.4+76.6 daPa respectively. For the VM-S and VM-F ears, average PSS was 166.3+99.6 daPa and 215.8+125.8 daPa respectively.

Conclusions
Successful VM is associated with the maxNPP. Although a patient achieves similar maxNPP when performing VM, success may be different on each side, determined by the passive functional properties of ETs, resistance from the peri-luminal tissue pressures. This variability requires attention to ear specific assessments and indication for balloon dilation treatment.

PP3.03 A Multicenter, Single-arm, Objective Performance Criteria-controlled Clinical Study of the Safety and Efficacy of the Double-lumen Eustachian Tube Balloon Catheter

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Objectives
To prospectively evaluate the technical efficacy and safety of the double-lumen Eustachian tube (ET) balloon catheter in patients with ET dysfunction.

Methods
Patients who were diagnosed with ET dysfunction and needed balloon eustachian tuboplasty (BET) were prospectively enrolled. A double-lumen ET balloon catheter was used to dilate the ET and inject medicine. Efficacy results were assessed by the injection channel patency (ICP) rate, the injection reached the expected site (IRES) rate, and the improvement in Eustachian Tube function was evaluated by the 7-item Eustachian Tube Dysfunction Questionnaire (ETDQ-7) score. Safety results were assessed in terms of adverse events and device defects.

Results
BET was successfully attempted in 87 patients from April 2022 to August 2022 at two academic medical centers in China (01, 02). The ICP rate was 100%, and the IRES rate was 88.51%. The overall ETDQ-7 score was significantly reduced ($P<0.001$) postsurgically at both centers. There were no major complications or device defects.

Conclusion
The double-lumen ET balloon catheter is technically effective and safe for the treatment of ET dysfunction.

PP3.04 Targeted temporal bone CT guidance for intratympanic steroid therapy

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Objectives
To evaluate the radiological anatomy at the round window region and to develop and validate a predictive nomogram for hearing recovery in sudden sensorineural hearing loss (SSNHL).

Methods
Thirty-nine patients diagnosed with severe or profound SSNHL and firstly hospitalized between January 2020 and December 2023 were enrolled in this retrospective study. All participants received corticosteroid impulse and intratympanic injection. The anatomical characteristics at RW region were summarized by temporal HRCT imaging. The pre- and post-treatment hearing thresholds were compared to evaluated the therapeutic effect. Additionally, the implication of radiological anatomy in the hearing outcome was investigated by univariate logistic regression analysis.
A total of 130 patients with SSNHL who firstly underwent intratympanic corticosteroids were enrolled into this research and randomly divided into
the development and validation group. The clinical and audiological data of patients were were summarized, and the anatomical characteristics at RW region were evaluated by temporal HRCT imaging. A nomogram was constructed based on radiological signature and clinical risk factors to predict the probability of hearing recovery, then internally and crossly validated by the development and validation cohort. The discriminatory ability of the nomogram was estimated by AUC (Area Under the receiver operating characteristic Curve), calibration curve and decision curve analysis.

Results
In total of 91 patients in the training cohort and 39 patients in the validation cohort were enrolled. Eight variables (age, course, PTA, RWNV, entrance, depth, morghology, and pneumatization) were identified in the hearing recovery prediction model, in which, the presence of RWNV, the narrow RWN, and the deep RWN were independent poor prognostic factors for hearing recovery after local administration. The internal and cross validation of Receiver Operating Characteristic (ROC) curve was statistically significant (AUC = 0.723 and 0.786, respectively). The calibration curve showed good agreement between the prediction and actual observation.

Conclusion
A nomogram based on radiological signature and clinical risk factors could intuitively and accurately predict the hearing outcome in patients with SSNHL undergoing local administration.

PP3.05 MRI-related artifacts after implantation of passive titanium implants and their influence on the detectability of cholesteatoma

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Objectives

Surgical removal is the treatment of choice for a cholesteatoma. Depending on the cholesteatoma an affection of the ossicular chain or the skull base can occur. Titanium implants (prostheses, meshes) can be used to restore sound transmission and to cover larger defects of the skull base. After the surgery, recurrence and residual control are necessary. This can be done using second-look surgery or an MRI examination with a non-EPI DWI sequence. Like other metal implants, artifacts may occur in the image due to the titanium used. Assessing the limitation of cholesteatoma detection utilizing non-EPI DWI sequence-generated MRI artifacts due to the titanium foreign material (prosthesis, mesh) is of central importance. This study aimed to estimate titan implant-related MRI artifacts after cholesteatoma surgery.

Material and methods

MRI examinations after cholesteatoma surgery and one-stage implantation of a PORP, TORP, or titanium mesh were investigated by different sequences. Other reconstructions were excluded. The size of the artifacts was measured, and the mean artifact sizes of the respective prosthesis types were compared.

Results

28 MRI examinations could be included. Artifacts occurred in all titanium implants. We observed a correlation between prosthesis/ mesh and artifact size. All subsequent second-look surgeries confirmed the MRI examinations according to a positive control for the presence of a cholesteatoma.

Discussion and conclusion

The cholesteatoma size influences the detectability of a recurrence in the presence of titanium material. The prosthesis size influences the size of the artifact in the image.

PP3.06 First clinical experience with a new device for the removal of cochlear schwannoma

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Background
In most cases, intra-labyrinthine schwannoma (ILS) occurs in patients with unilateral hearing deterioration or neurofibromatosis type II (NF II). The pattern of localization of these tumors is various but affects mostly the cochlea. Extirpation of the ILS, if hidden by the cochlea modiolus, is difficult under the aspect of complete removal. Therefore, a tissue removal device (TRD) was designed and tested in temporal bones. The principle of handling the new device is a pushing and pipe cleaner handling inside the cochlea. This present study aimed to describe the first in vivo experience with the newly developed TRD for removing cochlear intra-labyrinthine schwannoma.

Methods
In three patients, the TRD was used for the tumor removal of ILS. In two patients with a cochlear schwannoma in combination with a cochlea implantation and one patient suffering from NF II, a cochlear schwannoma was removed with the TRD. The access was performed with a posterior tympanotomy, an enlarged round window approach, and an additional second-turn access. The device was inserted and extracted gradually from the second turn access until the rings were visible in the second turn access. By pushing and pipe cleaner handling, the tumors were removed. An MRI control was performed on the day postoperatively with a T1 GAD sequence.

Results
Tumor removal with the TRD was performed in a 15-minute procedure. MRI control confirmed a complete removal on the postoperative day in all cases.

Conclusion
In vivo handling of the device confirmed a straightforward handling for tumor removal. MRI scanning showed a complete removal of the tumor by the TRD.

PP3.09 Treatment response evaluation in necrotizing otitis externa using FDG-PET imaging

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Objectives
Necrotizing otitis externa (NOE) poses significant clinical challenges due to its rarity and potential life-threatening complications. Treatment includes multiple weeks of systemic antibiotics and management of comorbidities. However, evaluating treatment response presents challenges, sometimes due to the difficult differentiation between sterile inflammation and active infection on FDG-PET. This study aims to identify FDG-PET imaging features aiding in the accurate determination of treatment response in NOE, aiming to enhance patient outcomes and refine clinical management strategies.

Methods
In a single-center retrospective cohort study approved by the Institutional Review Board of the VU University Medical Center, patients diagnosed with Necrotizing Otitis Externa (NOE) between 2011 and 2022 were analyzed. NOE criteria included otalgia, otorrhea, granulation, and radiological features consistent with osteomyelitis. Data collection involved patient demographics, comorbidities, microbiological results, and treatment outcomes. FDG-PET parameters were derived from manually delineated regions of interests, and were evaluated on both pre- and post-treatment scans. Statistical analyses were conducted, including Mann-Whitney U tests and determination of optimal cutoff values for predicting recurrences.

Results
This study comprised 20 NOE patients, with 5 experiencing recurrent disease. Post-treatment FDG-PET parameters, particularly maximal standardized uptake value (SUV Max) and peak standardized uptake value (SUV Peak), were significantly higher in recurrent cases. Both parameters demonstrated 'very good' discrimination ability in predicting recurrence, with optimal cutoffs yielding 100% sensitivity and 67% specificity. Other parameters including SUV mean, total lesion glyclosis, did not yield significant results, neither did the calculated difference in uptake between post-treatment and pre-treatment scan.

Conclusions
SUV-Peak on FDG-PET may be an adequate parameter for response evaluation of necrotizing otitis externa distinguishing patients at risk for recurrent disease which may necessitate prolonged treatment from patients without risk for recurrent disease permitting safe treatment cessation.

PP3.10 Treatment of sinus thrombosis secondary to mastoiditis.

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Objective
To evaluate the need for surgical intervention versus conservative treatment in sinus thrombosis (ST) secondary to mastoiditis.

Methods
A retrospective case series was analyzed. Patients with mastoiditis and sinus thrombosis that received a mastoidectomy were included. We compared treatment for ST, specifically whether anticoagulants were given and/or if surgery was amended with an intervention aimed at the sinus. Primary outcomes include length of hospital admission, length of antibiotic treatment, otologic or neurologic complications and recanalization of the sinus.

Results/Conclusion
At EAONO we would like to present our findings.

Discussion
We would like to discuss the different treatment modalities for sinus thrombosis. At the moment cases like this evoke much discussion in the clinical setting with regard to optimal treatment of the ST. The goal is to reach a more harmonized approach in treatment of ST patients and provide better insights based on literature and our case series.

PP3.13 Vestibular Function and Complaints in Patients with Untreated Unilateral Vestibular Schwannoma

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Objectives

The primary aim of this study is to assess the vestibular function of patients with unilateral vestibular schwannoma and correlate their outcome to vestibular complaints and quality of life. Secondly, we evaluated patient and tumor characteristics that may affect these outcomes.

Methods

In this cross-sectional study, patients with unilateral vestibular schwannoma aged ≥18 years were included. The participants were evaluated with caloric test, vHIT, cVEMP, DHI, PANQOL and SF-36. Tumor and patient characteristics were retrieved from the patient file. Linear regression analyses were performed to identify predicators for vestibular function.

Results

The majority (89%) of vestibular schwannoma patients showed one or more objective vestibular abnormalities. The horizontal and anterior vHIT correlated with the caloric test results, and vHIT outcomes were correlated with hearing loss (lower gain is associated with worse hearing [$p<0.05$]) and tumor size (lower gain is associated with bigger tumors [$p= 0.005$]). However, there was no significant correlation between the objective vestibular test results and vestibular complaints or quality of life. Likewise, tumor characteristics did not correlate with subjective outcomes. Even so, DHI scores showed a strong inverse correlation with PANQOL scores ($p<0.001$).

Conclusions

Vestibular complaints have a significant impact on the quality of life in vestibular schwannoma patients. Whereas v-HIT does correlate with tumor size and hearing loss, objective vestibular function tests nor tumor characteristics correlate well with vestibular complaints or quality of life in this patient group.