Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-001
How imaging can help surgeons prepare for second-look cholesteatoma surgery in the child

R. Baudouin [1,*], F. Simon [2], R. Levy [3], N. Leboulanger [2], V. Couloigner [2], E.-N. Garabedian [2], F. Denoyelle [2]
[1]Université de Paris, [2]Pediatric otolaryngology, [3]Pediatric radiology, Necker Hospital, Paris, France

Introduction: In children, imaging before a systematic second stage surgery for cholesteatoma is not performed routinely but may be desired by the surgeon due to a challenging first procedure. CT-scan or non-EPI Diffusion-Weighted MRI (non-EPI MRI), usually preferred for long-term follow-up, may be used.

Objectives: We assessed both techniques to correctly diagnose and locate residual disease to best prepare the second stage procedure.

Methods: All consecutive patients between 2010 and 2020 who had a planned 2-stage procedure for cholesteatoma (12 months delay), and had imaging (CT-scan, non-EPI DW MRI, or both) before the second procedure were included and analyzed.

Results: 290 ears (285 patients) including 131 CT-scans and 140 non-EPI MRIs were analyzed. The residual cholesteatoma rate at the second procedure (12.8 ±3.5months after first surgery) was 54.1%, mostly millimeters large. Diagnostic sensitivity (SE) and specificity (SP) were SE=0.67 and SP=0.77, for CT-scan and SE=0.57 and SP=0.83 for non-EPI MRI, respectively. In the atticomastoid region, SE=0.58 and SP=0.64 for CT-scan and SE=0.46 and SP=0.65 for the non-EPI MRI. In the retrotympanic region, SE=0.24 and SP=0.49 for CT-scan and SE=0.23 and SP=0.53 for the non-EPI MRI

Conclusions: To prepare a systematic second stage procedure, 12 months after the first, CT-scan seems more efficient than non-EPI MRI to correctly locate residual disease, especially when located in the atticomastoid region. Both imagery techniques poorly diagnose cholesteatoma in the tympanic region

Disclosure of Interest: None Declared

Keywords: Cholesteatoma, recurrence, CT-scan, MRI, second-look, pediatric

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-002
MRI performance before revision surgery for cholesteatoma in the child.

R. Baudouin [1,*], F. Simon [2], R. Levy [3], N. Leboulanger [2], V. Couloigner [2], E.-N. Garabedian [2], F. Denoyelle [2]
[1]Otolaryngology, Université de Paris, [2]Pediatric otolaryngology, [3]Pediatric radiology, Necker hospital, Paris, France

Introduction: Non-Echo Planar (EPI) Diffusion-Weighted (DW) MRI (non-EPI MRI) is the appropriate sequence to detect residual cholesteatoma but is limited by small size (< 3mm), otitis media with effusion (OME) and orthodontic artefacts in children.

Objectives: The aim of this paper was to retrospectively assess MRI in a postoperative context of child cholesteatoma.

Methods: All the patients in the department who had a 2-staged procedure for cholesteatoma, between 2010 and 2020 with an MRI before the second stage were included and analyzed. A pediatric neuroradiologist reviewed all false negative (FN) and false positive (FP) images.

Results: N=141 cholesteatoma events (140 children) were included with a mean age at MRI of 10.3 (±3.7) years old. Non-EPI MRI were performed 10.7 (±3.8)months after 1st-stage surgery and 2.2 (±2.6) months before 2nd-stage procedure. Non-EPI MRI had a 0.57 sensitivity (SE) and 0.83 specificity (SP). MRI was reviewed in 38 cases (8 FP and 30 FN). Status was corrected in 14 cases (7 FN and 7 FP). SE=0.65 and SP=0.98 after re-reading.

Conclusions: MRI does not reach its highest diagnostic performance before a 12-month second-look procedure. If required to prepare the second-stage procedure, non-EPI MRI should be performed in centers where difficult cases may be reviewed by a team of neuroradiologists, especially in cases of bilateral OME.

Disclosure of Interest: None Declared

Keywords: Cholesteatoma, recurrence, Pediatric, MRI, second-look

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-003
post-operative fever in children undergoing mastoidectomy due to complicated acute mastoiditis

O. Ziv [1], A. Sapir[*], E. Leibovitz, S. Kordeluk, D. M. Kaplan [1], S. El-Saied [1]
[1]Department of Otolaryngology-Head and Neck Surgery, Soroka University Medical Center, Beer-Sheva, Israel

Introduction: The most common complications seen in children with acute mastoiditis include sub-periosteal abscess, sigmoid sinus thrombosis, peri-sinus fluid/abscess, epidural, subdural abscess, and acute meningitis [(1-2)]. These complications are diagnosed both, clinically and radiologically [(3)]. Cortical mastoidectomy with ventilation tube insertion has a vital role in treating complicated mastoiditis, along with antibiotics [(4)], antipyretics, and anticoagulation. The management of a febrile child with complicated acute mastoiditis regardless of clinical improvement becomes challenging. In such cases, repeated imaging and revision surgery should be considered. However, imaging in such circumstances possesses several limitations; Post-contrast head CT in children usually requires general anesthesia and is associated with substantial ionizing radiation. Head MRI is superior over CT for evaluating soft tissue details such as of peri-sinus abscess and presence of sigmoid sinus throm but is less available, costly, and requires an extended general anesthesia period.

Objectives: To characterize the incidence and course of post-operative fever in children with complicated acute mastoiditis following surgery.

Methods: A retrospective chart review of children diagnosed with complicated acute mastoiditis who underwent mastoid surgery during 2012-2019. 33 patients divided into two groups: Single complication group included all children diagnosed with acute mastoiditis and isolated sub-periosteal abscess. Multi complications group included patients with additional intratemporal or intracranial complication (peri-sinus fluid/abscess, epidural abscess, sigmoid sinus thrombosis). Post-operative body temperature was assessed every eight hours via rectal or axillary route and fever was defined as any body temperature of ≥38.0°C.

Image:

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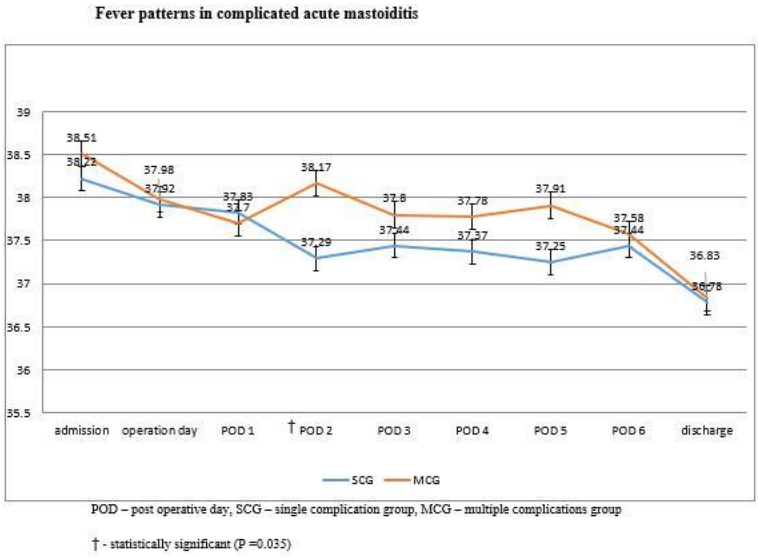

POD – post operative day, SCG – single complication group, MCG – multiple complications group

† - statistically significant (P =0.035)

Results: Thirty-three patients who underwent a cortical mastoidectomy and ipsilateral ventilation tube insertion were identified. 17 patients with subperiosteal abscess alone and 16 patients with subperiosteal abscess and additional intracranial or intratemporal complications. 6/17(35.3%) single complication group patients experienced post-operative fever *vs*. 12/16(75%) in the multiple complication group (P=0.012). At post-operative day 2 (POD2), 10/13(77%) febrile patients belonged to multiple complication group and 3/13(23%) to single complication group (P=0.013). post-operative fever was recorded until POD6 in both groups.

Conclusions: Following a cortical mastoidectomy for complicated acute mastoiditis, post-operative fever is not unusual in the first 6 days and seem to be benign condition. However, post-operative fever is more common, higher, and persistent for a longer duration in patients with multiple complications. At POD 6, fever is expected to normalize. Hence if fever persists further evaluation should be considered.

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Disclosure of Interest: None Declared

Keywords: complications, mastoiditis, microbiology, post-operative fever

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-006

Radiological follow-up after the bony obliteration tympanoplasty in detecting residual cholesteatoma: towards an optimal postoperative MR imaging protocol

H. van der Toom [1,*], J. van Dinther [1], A. Zarowski [1], H. Baazil [1], B. de Foer [2], A. Bernaerts [2], J. Casselman [2 3], E. Offeciers [1]
[1]European Institute for ORL-HNS, Department of ENT-HNS, Sint-Augustinus, GZA Hospital, Antwerp, Belgium, [2]Department of Radiology, Sint-Augustinus, GZA Hospital, Antwerp, Belgium, Antwerp, [3]Department of Radiology, AZ Sint-Jan Brugge-Oostende av, Campus Brugge, Bruges, Belgium, Bruges, Belgium

Introduction: Since it was shown by our institute in 2007 that non-EP DW MRI is able to detect small residual middle ear cholesteatoma, this technique was widely adopted in the postoperative management of cholesteatoma worldwide. However, there is no consensus in literature on the most optimal follow-up imaging protocol after the canal wall-up bony obliteration tympanoplasty (CWU-BOT). On the one hand, no residual cholesteatoma should be missed but on the other unnecessary MR images should be avoided.

Objectives: The aim of this study is to evaluate the postoperative results of non-EP DW MRI after CWU-BOT surgery at our institution and to propose an optimal postoperative MR imaging scheme based on our data.

Methods: Retrospective cohort study; all 271 patients who underwent the bony obliteration tympanoplasty between January 2010 and January 2016 with follow-up at our institution were included. Variables of interest were retrieved from electronic patient records.

Results: The median follow-up time was 60 months (inter-quartile range 56-62 months). Two hundred seventy-one patients (100%) received a 1-year MRI, 107 (39%) a 3-year MRI and 216 (79.7%%) a 5-year MRI. Residual cholesteatoma was found in 9 cases (3.3%), corresponding with an estimated residual rate at 5 years follow-up of 3.7% when using Kaplan-Meier analysis. Of these 9 cases, 6 cases of residual cholesteatoma (66.7%) were detected at the 1-year MRI (12-14 months post-surgery), 2 cases (22.2%) at the 3-year MRI (35-39 months post-surgery) and 1 case (11.1%) at the 5-year MRI (51 months post-surgery, in this patient no 3-year MRI was performed). An uncertain MRI result was found in 14 cases, presenting as relatively hyperintens lesions. However, subsequent follow-up scans did not show persistent evidence for residual disease in these cases.

Conclusions: A postoperative MRI scan after 1 and 5 years is essential to detect early and late residual cholesteatoma. In our cohort, 22.2% of residual cases were detected at the 3-year MRI. However, this percentage could potentially have been higher when all patients would have received a 3-year MRI. Therefore, in order to detect residual disease as soon as possible, we propose to perform an MRI scan at 1, 3 and 5 years after the bony obliteration tympanoplasty. In cases of an unclear MR result, we suggest a repeat MRI after 12 months.

Disclosure of Interest: None Declared
Keywords: Cholesteatoma, recurrence, CT-scan, MRI, second-look, pediatric

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Abstract Presentations

Neuro Otology
Neuro Otology - Clinical Science

EAONO21-PO-007
Evaluation of the effects of vibration caused by drilling on cranium

R. Kilic [1,*], E. Ocak [1], S. Mulazimoglu [1], O. B. Ozgursoy [1]
[1]Otolaryngology, Ankara University, Ankara, Turkey

Introduction: Drilling devices have been used to cut or dissect the skull bones in otorhinolaryngology and neurosurgical procedures. High frequency energy is applied to the cranium during the use of these devices which may damage inner ear and cranial nerves. However, there are no adequate and competent studies in the literature that examine the effects on the inner ear, brain, cerebellum and cranial nerves that occur during the use of drilling devices.

Objectives: The objective of this study was to measure the vibration values, examine and classify the changes that will occur during the use of different types of drills. We also aimed to prepare a basis for new studies that will objectively examine the effects that may occur due to this vibration energy.

Methods: The study was conducted on fresh frozen temporal bones. The cadaver dissection was conducted in the Department of Anatomy of Ankara University Faculty of Medicine. During temporal bone dissection, measurements were made with the "PCE-VT 2800 Vibration Meter" and the mean and standard deviations of the measured values from different anatomical regions were calculated. It was also investigated whether there is a difference between diamond, coarse diamond and cutting burrs.

Table:

<table>
<tr><td></td><td>Peak to peak</td><td rowspan="2">Test Statistics</td><td rowspan="2">p*</td></tr>
<tr><td>Diameter</td><td>Mean±SS
Median (Min-Max)</td></tr>
<tr><td>2.3 mm</td><td>0.080±0.011
0.082 (0.065-0.095)</td><td rowspan="3">χ^2 =10.000</td><td rowspan="3">0.007</td></tr>
<tr><td>4 mm</td><td>0.225±0.085
0.180 (0.143-0.325)</td></tr>
<tr><td>6 mm</td><td>0.681±0.085
0.680 (0.562-0.779)</td></tr>
</table>

Image:

Abstract Presentations

Results: We observed that the vibratory energy measured during the dissection of cranial bones increased while approaching closer the dissected area. When the vibration values were evaluated, it turned out that the length and diameter of the drills and the amount of displacement (peak-to-peak (mm)) increased as the number of revolutions per minute (rpm) increased. In addition, when the burr types were compared, it was determined that the Tungsten burr (cutting) vibrated the most, Coarse Diamond burr was less, and Diamond burr caused the least vibration energy. It was also observed that as the length of the drill increased, the surgeon had difficulty in dissecting the desired area.

Conclusions: We recommend the use of ideal burr type which will generate less vibration in the inner ear as well as providing an adequate drilling performance. Drilling devices can be used more reliably under the light of the data obtained in this study. Moreover the results of this research will lay the groundwork for new studies that can examine the effects of vibration.

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Abstract Presentations

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Disclosure of Interest: None Declared

Keywords: Cranium, Drill piecemen, Mastoidectomy, Temporal bone, Vibration

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-008

SerenoCemTM granules and bone reabsorption: a retrospective analysis of 43 patients and identification of a subset with progressive erosion.

F. Bandino*

Introduction: Mastoid obliteration is a well-established and effective procedure for troublesome mastoid cavities. Several materials have been described in the literature with different results; SerenoCem™ granules, although presented as an ideal material for this purpose, showed bony reabsorption as a complication.

Objectives: Evaluation of bone resorption after mastoid obliteration with SerenoCem™ granules.

Methods: This was a retrospective analysis on 43 patients who underwent mastoid obliteration with SerenoCem™granules; the impact of different clinical parameters was calculated using univariate and multivariate analyses.

Results: 43 patients were included in this study (1 patient was obliterated bilaterally); mean follow up was 64.14 months. Re-epithelisation time was 2.81 months with a dry rate of 93.18%. Bony erosion likely due to SerenoCem™ granules was observed in 70.73% of the patients, while 93.10% of them are currently asymptomatic; 6 patients had revision surgery and removal of the granules. BC PTA was stable in 93.18% of the patients at the last appointment. 3 of the 15 patients (20%) who had interval post-operative CT scans showed ongoing, progressive erosion up to 4 years after surgery.

Conclusions: SerenoCem™ granules showed a risk of 70.73% of bony erosion when used for mastoid obliteration; most of the patients are asymptomatic, therefore clinical symptoms cannot be used as a predictive factor. We did not identify any statistically significant correlation with the clinical parameters analysed. Despite the bony erosion, granules did not seem to show any ototoxicity in this study. Bony erosion tends to stabilize with time in the majority of the patients, but can progress in some, and prediction of this subset is difficult. There are multiple dilemmas that need to be addressed considering several parameters (age, patient's requests, site of erosion, etc.). We observed that removal of the granules is technically difficult but possible, with minimal morbidity and should be considered in some patients without waiting for the appearance or progression of the bony erosion.

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Disclosure of Interest: None Declared

Keywords: Mastoid obliteration

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-009

Management of sudden sensorineural hearing loss: Audit of current pathway in a UK specialist unit and recommendation

K. Lau [1,*], P. Arullendran [1]
[1]Department of Otolaryngology, Sunderland Royal Hospital, Sunderland, United Kingdom

Introduction: Sudden sensorineural hearing loss (SSNHL) is a common presentation amongst ENT units. SSNHL is a complex condition with vast differentials which requires detailed assessment.

Objectives: In this study, we review the current pathway of SSNHL management in our specialist unit and propose a new streamlined protocol to enhance patient care.

Methods: Clinical documentations of patients presenting with SSNHL to clinic from April 2020 to March 2021 in a specialist-held MDT database are reviewed. Data extracted includes patient demographics, initial diagnosis from pure tone audiometry (PTA) and treatments offered.

Results: 26 patients with a mean age of 53.7 with SSNHL were seen within a 12-month period. 15 patients (57.7%) were seen within 7 days of symptom onset, 4 (15.4%) were seen within 8 to 14 days, and 7 (26.9%) were seen at least one month after hearing loss. 10 patients (38.5%) proved to be true SSNHL with PTA, 6 of whom were offered oral steroids. 1 was offered intratympanic steroids. Follow up was offered to 6 true SSNHL patients and 7 patients with other diagnoses. Magnetic resonance imaging was performed in 7 patients (26.9%); none showed any significant findings

Conclusions: There currently exists a discrepancy in the management of SSNHL primarily driven by clinician preference, which reflects a need for an evidence-based pathway. Current studies suggest intratympanic steroid injection has a role in secondary therapy when patients failed to respond to oral systemic steroids. We propose a standardised protocol that offers intratympanic steroid injection as a pilot program in our unit.

Disclosure of Interest: None Declared

Keywords: hearing loss

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-010
External Auditory Canal Cholesteatoma: Clinical Presentation and Management of 10 Cases

K. Saha [1 1,*], M. Joarder [1], S. Rao [2]
[1]Department of Otolaryngology-Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, [2]Ear ,Nose,Throat and Skull Base Surgery, Manipal Hospital, Bengaluru, India

Introduction: External auditory canal cholesteatoma (EACC) is an uncommon benign lesion lined with stratified squamous epithelium containing proliferative keratin with bony erosion with an unclear etiology and pathogenesis. In 1980 Piepergerdes et al first demonstrated the definite clinical and pathological findings and described differentiation and management of Keratosis Obturans (KO) and external auditory canal cholesteatoma. The most useful findings confirming an external auditory canal cholesteatoma are focal osteonecrosis with or without sequestration and lack of epithelial covering of the bony surface. Treatment modalities are planned according to the staging of the lesion. Due to rare or incidental presentation, isolated case series of EACC has been reported in most works of literature.

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

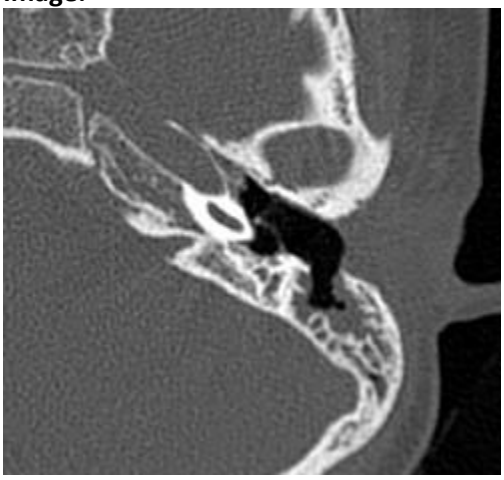
Methods: Ten consecutive cases of external auditory canal cholesteatoma (five primary EACC and five secondary EACC) were retrospectively reviewed from January 2012 to January 2020.Pre-operative, per-operative, and post-operative Otoendoscopic or Microscopic findings were documented with photographs and video recording system and stored in the portable storage device. In each case, the clinical data were reviewed concerning age, sex, presenting symptoms, previous history, side of the lesion, localization of the EACC, staging, and surgical treatment, outcome, and recurrence. Pre-operative and post-operative audiological and radiological data (HRCT temporal bone) were documented and analysed for each patient.

Table: Distribution of site of lesion and staging in patients with EACC

EACC Site and Staging	Idiopathic	Secondary
Total no of affected ears(n)	5	5
Site (n, %)		
Posterior wall	4(80%)	4
Inferior wall	1(20%)	3
Superior wall		4
Anterior		3
Stage (n, %)		
I		
II		3
III	1	
IV	4	2

Abstract Presentations

Image:



Results: The presenting age range was 5-50 years with a mean age of 20 years. Otorhoea (100%) was the predominant symptom in primary EACC, and otalgia and hearing loss were the predominant symptoms in secondary EACC. The most common site of lesion in primary EACC was posterior wall (80%) followed by the inferior wall 20%. On the other hand, multiple walls involvement was common (80%) in secondary EACC. According to Naim et al staging system, four cases of primary and two cases of secondary EACC were categorized as stage-IV. These six cases and one stage-II case of primary EACC were managed with canal wall down mastoidectomy. All cases of this series required surgical intervention.

Conclusions: Otorrhea and otalgia in case of primary EACC, and hearing loss and otalgia in case of secondary EACC are the presenting complaints. With a wide age range of presentation, old age may not be a predisposing factor in the case of primary EACC. Instead of the inferior wall, posterior wall involvement in primary EACC explains the extension of the lesion into mastoid in stage IV disease. An early stage of primary EACC (stages I and II) can be managed with the conservative approach. Advanced stages of primary and most cases of secondary EACC require various surgical approaches depending on the stages. Due to the rarity of the disease, a high index of clinical suspicion can help differentiate EACC from Keratosis obturans and other external auditory canal lesions.

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Disclosure of Interest: K. Saha Conflict with: None, M. Joarder: None Declared, S. Rao: None Declared

Keywords: External auditory canal cholesteatoma,primary,secondary, keratosis obturans, modified bondy mastoidectomy

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-011

Analysis of tinnitus severity and associated risk factors in patients with chronic otitis media: data from the multinational collaborative COMQ-12 study

B. Tailor [1,*], J. Phillips [1], I. Nunney [2], M. Yung [3] and Multinational Collaborative COMQ-12 Study Group [John Phillips, Matthew Yung, Can Doruk, Hakan Kara, Taehoon Kong, Nicola Quaranta, Augusto Peñaranda, Daniele Bernardeschi, Chunfu Dai, Romain Kania, Françoise Denoyelle, Tetsuya Tono]
[1]Department of Otolaryngology, Norfolk and Norwich University Hospital, [2]Norwich Clinical Trials Unit, Norwich Medical School, University of East Anglia, Norwich, [3]Department of Otolaryngology, Ipswich Hospital, East Suffolk and North Essex Foundation Trust, Ipswich, United Kingdom

Introduction: Subjective tinnitus is a common symptom, and there is often an underlying otological cause. The epidemiology of tinnitus in patients with chronic otitis media (COM), including the prevalence of severe tinnitus and associated risk factors, remains unclear.

Objectives: The aim of this study was to investigate the degree of tinnitus-related annoyance in patients with COM as well as analyze whether associations with tinnitus severity exist.

Methods: A cross-sectional analysis was conducted using data from the multinational collaborative Chronic Otitis Media Questionnaire-12 (COMQ-12) study. Adult patients suffering from COM (n=478) across nine otology referral centers in eight countries were included. We investigated tinnitus severity using participant responses to item 7 of a native version of the COMQ-12 and recorded routine clinical data, including otoscopic assessment and audiometry.

Results: With respect to tinnitus severity, 23.8%, 17.4%, 15.5%, and 43.4% of participants reported no inconvenience, minor inconvenience, moderate inconvenience, and major inconvenience or greater, respectively. The absence of ear discharge (adjusted odds ratio [AOR], 1.78; 95% confidence interval [95% CI], 1.10-2.86; p=0.0182), absence of cholesteatoma (AOR, 1.77; 95% CI, 1.12-2.82; p=0.0155), and poorer disease-specific health-related quality-of-life (AOR, 1.09; 95% CI, 1.07-1.11; p<0.0001) were associated with increased tinnitus severity in patients with COM, whereas age, hearing disability and geographical region showed no association.

Conclusions: This analysis provides novel insight into potential risk factors for tinnitus in patients with COM. The presence of ear discharge, cholesteatoma, or both is related to a lower degree of perceived tinnitus severity. Further studies are necessary to validate these associations and better understand the psychopathology of tinnitus.

Disclosure of Interest: None Declared

Keywords: Otitis Media

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-012

Presentation of dizziness in individuals with chronic otitis media: data from the multinational collaborative COMQ-12 study

B. Tailor [1,*], J. Phillips [1], I. Nunney [2], M. Yung [3] and Multinational Collaborative COMQ-12 Study Group [John Phillips, Matthew Yung, Can Doruk, Hakan Kara, Taehoon Kong, Nicola Quaranta, Augusto Peñaranda, Daniele Bernardeschi, Chunfu Dai, Romain Kania, Françoise Denoyelle, Tetsuya Tono]
[1]Department of Otolaryngology, Norfolk and Norwich University Hospital, [2]Norwich Clinical Trials Unit, Norwich Medical School, University of East Anglia, Norwich, [3]Department of Otolaryngology, Ipswich Hospital, East Suffolk and North Essex Foundation Trust, Ipswich, United Kingdom

Introduction: In chronic otitis media (COM), disease chronicity and severity of middle ear inflammation may influence the development of inner ear deficits, increasing the risk of vestibular impairment.

Objectives: This secondary analysis of the multinational collaborative Chronic Otitis Media Questionnaire-12 (COMQ-12) dataset sought to determine the prevalence of vestibular symptoms in patients with COM and identify associated disease-related characteristics.

Methods: Adult patients with a diagnosis of COM in outpatient settings at nine otology referral centers across eight countries were included. We investigated the presence of vestibular symptoms (dizziness and/or disequilibrium) using participant responses to item 6 of a native version of the COMQ-12. Audiometric data and otoscopic assessment were also recorded.

Results: This analysis included 477 participants suffering from COM, with 56.2% (n=268) reporting at least mild inconvenience related to dizziness or disequilibrium. There was a significant association between air conduction thresholds in the worse hearing ear and presence of dizziness (adjusted odds ratio [AOR], 1.01; 95% CI, 1.00-1.02; *p*=0.0177). Study participants in European countries (AOR, 1.53; 95% CI, 1.03-2.28; *p*=0.0344) and Colombia (AOR, 2.48; 95% CI, 1.25-4.92; *p*=0.0096) were more likely to report dizziness than participants in Asian countries. However, ear discharge and cholesteatoma showed no association with dizziness in the adjusted analyses.

Conclusions: Vestibular symptoms contribute to burden of disease in patients with COM and associates with hearing disability in the worse hearing ear. Geographical variation in presentation of dizziness may reflect financial barriers to treatment or cultural differences in how patients reflect on their health state.

Disclosure of Interest: None Declared

Keywords: Otitis Media

Abstract Presentations

Neuro Otology
Neuro Otology – Clinical

EAONO21-PO-013
A pilot study of virtual assessment and management of vertigo: our experience in a District General Hospital.

B. Bayley-Skinner [1,*], C. Perkins [2], D. Whinney [2]
[1]University of Exeter Medical School, Exeter, [2]ENT, Royal Cornwall Hospital, Truro, United Kingdom

Introduction: Vertigo can be a distressing and sometimes disabling symptom for patients, and one that can lead to much anxiety if appropriate advice is not received in a timely manner. During the COVID pandemic, patients referred with vertigo to our department have faced long delays to be seen and a backlog of referrals has developed; even telephone appointment capacity has been limited. We aimed to improve this by developing a symptom questionnaire and asking patients to carry out some simple vestibular tests themselves at home. Once these were returned we were able to carry out virtual assessments, subsequently offering management advice.

Objectives: To provide a more efficient service of triage and advice to patients with vertigo that can be delivered remotely, therefore reducing the waiting time for assessment and treatment as well as minimising the risk of COVID transmission through unnecessary hospital exposure.

Methods: Between September 2020 and October 2020, during the COVID pandemic, all patients referred from primary care to the ENT department with a complaint of vertigo, vetted by the senior author, were included. They were sent a proforma focused questionnaire about their symptoms also asking them to carry out simple vestibular tests themselves at home and record the findings. Once each questionnaire was returned, the patients were contacted by the senior author and provided with individual advice and standard, disease specific, advice resources. All patients received follow-up either by phone or in a face-to-face clinic.

Results: Thirty four patients received the questionnaire and nineteen were returned (56% response rate). Ten provided significantly more useful information than the referral letter, which was sufficient to give management advice remotely or to redirect the referral to more appropriate services such as Eldercare. Provisional diagnoses were: BPPV = 6, Redirect to Eldercare = 4, BPPV with additional episodic vertigo = 2, Migraine = 1, Episodic vertigo (Meniere's, vestibular neuronitis or vestibular migraine) = 4, others = 2.
Ten patients (29%) could be managed remotely and discharged. Three were managed remotely and have telephone follow-up. Two required face to face appointments.

Conclusions: We conclude that a focused "virtual assessment" of this kind provides effective remote treatment for many and triage for others, so reducing the number of face to face appointments required. We believe that this method of triage and early advice offers a more efficient pathway than the traditional model and prevents the long wait for advice that can cause significant anxiety to patients. We have now adopted this approach as routine and will re-audit the outcome of a larger cohort in 2022.
Disclosure of Interest: None Declared
Keywords: Vertigo

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-014
Development of a protocol for pre-operative imaging for paediatric cochlear implantation
C. Moen*, P. Sooby, N. Grimmond, P. Wardrop, G. Thachil, L. Fraser

Introduction: There is no consensus on pre-operative imaging modality for paediatric cochlear implantation (CI) in the UK.

Objectives: Audit choice of scan modality and evaluate usefulness in determining candidacy and predicting surgical difficulty.

Methods: Data was collected from 2016-19 on scan modality used, imaging findings, whether scan influenced decision to offer CI and intraoperative difficulties.

Results: 79 children were implanted and 54% had both MRI/ CT, 39% had MRI and 6% had CT. Of those having MRI alone, 2 had intraoperative difficulties that would not have been anticipated from additional CT. Additional CT was only helpful in 1 syndromic child with anticipated complex middle ear anatomy. Of 67 children not implanted, combined MRI/CT was essential to this decision in 2 cases (CHARGE syndrome).

Conclusions: Most prelingually deafened children require MRI only. Our new protocol could save 16 CT slots per year, reduce anaesthetic time and reduce radiation dose.

Disclosure of Interest: None Declared

Keywords: cochlear implantation

Abstract Presentations

Neuro Otology
Neuro Otology - Clinical Science

EAONO21-PO-015

Cerebellopontine Angle Tumor Resection via Translabyrinthe Approach: A Case Series and Review of Related Literature

C. A. M. Mendez [1,*], F. L. Abes [1]
[1]Otorhinolaryngology- Head and Neck Surgery, Makati Medical Center, Makati City, Philippines

Introduction: Cerebellopontine Angle Tumors (CPA) consists of 5-10% among the causes of the intracranial masses. Of which, the most common etiologies are vestibular scwahnnoma, meningoma and epidermoids. There is a wide selection of lateral skull base surgical approaches for CPA lesions largely depending on tumor size and hearing serviceability.

Objectives: The study intends to report the demographic profile, clinical and radiographic findings of 3 CPA tumor cases which underwent lateral skull base surgery. The surgical team's experience and outcomes will also be illustrated.

Methods: All of the cases were male with a mean age of 34.3 (range 31-38) noted with non-serviceable hearing at diagnosis predominantly on the right by laterality, who prompted clinical consult with individually different complaints: facial asymmetry, unilateral hearing loss and gait imbalance. Cranial Magnetic Resonance Imaging was done in all of the cases with a radiographic CPA mass mean size of 3.96 cm in its widest anteroposterior dimension. All patients underwent tumor resection via translabyrinthe approach (TA) lateral skull base surgery with mastoid obliteration using fat graft and closure of the ear canal via blind sac from March to April 2021 in our institution.

Results: Among the 3 cases done, two of which histopathologically turned out to be vestibular schwannoma and one non-acoustic tumor which was read as cholesteatoma. Correlation of the tumor size, onset of facial paresis and post-operative facial function were evaluated. Vestibular, gait and balance testing were also tested pre and post-procedure. Post-operative surgical outcomes, morbidity and complications such as wound dehiscence, inadvertent cerebrospinal fluid leaks, and graft site hematoma were reported.

Conclusions: CPA lesions commonly has a spectrum of symptoms with hearing loss, facial paresis and gait unsteadiness hampering the quality of life of an affected individual thus a prompt diagnosis and a timely intervention is paramount of importance. Multidisciplinary approach composed of neuro-otologist, neurosurgeon, radiologist, pathologist and physiatrist is a significant catalyst in the management and formulation of strategies in the care of CPA tumors.

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Disclosure of Interest: None Declared
Keywords: Cerebellopontine Angle Tumor, Cholesteatoma, Internal Acoustic Canal Tumor, Lateral Skull Base Surgery

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-016

VITOM 3D exoscope system for otological surgery; a feasibility study using an animal model and its relevance to COVID-19

N. Vakharia [1,*], W. Yeung [1], C. Johnatty [1], P. Achar [1], A. V. Kasbekar [1 2]
[1]Department of Otolaryngology, Nottingham University Hospitals NHS Trust, [2]NIHR Nottingham Biomedical Research Centre, Nottingham, United Kingdom

Introduction: Delivery of safe surgery has been a priority during the COVID-19 pandemic, especially with use of personal protective equipment (PPE) during aerosol generating procedures. Eye protection has made the use of the eye piece of an operating microscope challenging due to reduced field of view, along with other difficulties such as misting of goggles. Use of a 3D exoscope system was first described in ENT surgery almost a decade ago, but advances in image resolution has resulted in more widespread use. Given the advantages of a more ergonomic operating position and image display on a monitor, we sought to assess the feasibility of a 4K 3D exoscope system in otological surgery.

Objectives: Using an animal model, we sought to evaluate the efficacy, functionality and the surgeon's experience of the VITOM 3D system (KARL STORZ, Germany). Our aim was to assess the potential of using 3D exoscope systems as an alternative to an operating microscope, to facilitate safe otological surgery during the COVID-19 era and beyond.

Methods: Ethical approval was granted by the Nottingham Health Science Centre Research Prioritisation Committee. Using a simulated operating theatre and standard operating equipment in our institution's wet laboratory, we invited 18 participants from our faculty to perform mastoid surgery (including temporal bone drilling) on an animal model. A sheep's head was chosen due to similarities with human temporal bones. The VITOM 3D system was used in place of a microscope, with participants performing the procedure in full PPE. On completion of the assigned tasks, participants were asked to complete a feedback questionnaire on their experience of the system, including comparison to an operating microscope.

Results: 74% of participants reported that the VITOM 3D was ergonomic and 94% found it comfortable to use. Whilst colour fidelity and image quality were very good, 50% reported image distortion and pixilation at the highest magnification. Feedback on image focus, level of magnification and brightness were positive in the majority of responses. 67% felt confident using the VITOM 3D and 75% found the setup comfortable whilst donned in full PPE. All participants agreed that there was an increased educational value to exoscope technology. Half of the participants preferred the microscope over the VITOM 3D for fine otological work.

Conclusions: The VITOM 3D exoscope is a promising and viable alternative for performing otological surgery when using full PPE in the COVID-19 era. The intuitive control and ergonomic setup allow a wide and unrestricted operative field for ENT surgeons in full PPE. Drawbacks include image pixilation at the highest magnification and illumination of structures down narrow surgical corridors. These findings will need to be corroborated with larger scale studies, but the educational value of this system in surgical training matches findings in previously published work.

Funding: Funding for consumable materials was provided by the Nottingham Ears Charity.
Conflict of Interest: The VITOM 3D system was loaned to the department by Karl Storz (Germany) for the purposes of this study but did not take part in planning, data collection or analysis of results.

Disclosure of Interest: None Declared

Keywords: COVID-19, exoscope, operating microscope, PPE

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Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-017

Our Experience of the Minimally Invasive Ponto Surgery Technique for Percutaneous Bone Conduction Implants: A Retrospective Case Series

C. Xie [1,*], R. Obholzer [1], D. Jiang [1], H. Powell [1]
[1]The Hearing Implant Centre, Guy's and St Thomas's Hospital, London, United Kingdom

Introduction: Percutaneous bone conduction implants (PBCI) are now a widely used and highly effective method of improving hearing for patients. Throughout the years, concerns regarding soft tissue complications, cosmesis and failure of osseointegration has led the surgical technique to evolve from an initial approach with soft tissue reduction and pedicled skingrafts to modern techniques which do not utilise soft tissue reduction at the implant site[1-4]. The more recent introduction of longer abutments has also precluded the need for soft tissue reduction. With improvements in success rates and reductions in complications with the less invasive techniques came the drive to simplify surgery even further by obviating skin and soft tissue reduction and just creating a circular incision using a skin biopsy punch overlying the intended implant site. This was initially termed the "punch" technique[5]. In 2013, Oticon Medical AB (Askim, Sweden) introduced the "Minimally Invasive Ponto Surgery (MIPS)" technique with an aim to standardise the "punch" technique[6,7]. The aim of our study is to present our experience and compare outcomes between the linear and MIPS techniques for PBCI.

Objectives: The objective was to compare the surgical outcomes of the MIPS technique with linear incision technique with soft tissue preservation for PBCI surgery.

Methods: A retrospective case series on adult patients who received single-stage PBCI surgery was conducted between the 1st October 2015 to 31st December 2019. MIPS surgery for the Oticon Ponto implant was carried out according to the manufacturer's instruction. For the linear (L) incision technique, a post-auricular straight or C-shaped incision is made down to the periosteal layer. This can be overlying (L-IN) or separate to (L-OUT) the intended implant site. The periosteum over the intended implant site is removed. Stepwise drilling is performed initially with a 3mm guide drill, followed by a 4mm guide drill by removing the spacer if there is sufficient bone at the base. A countersink drill is used to wide the hole. The implant with mounted abutment is inserted with a torque setting of 40 - 50 Ncm. A 4 or 5mm punch is used to make a hole in the soft tissues and skin for the abutment to protrude through the skin. The incision line is closed with absorbable sutures and sometimes also with skin glue.

Results: Out of 132 surgeries included in the study, the linear group comprised 72 and the MIPS group comprised 60. The total rate of complications in our series was 29.5%. This includes adverse skin reactions, chronic pain and implant loss or removal. Nineteen (14.4%) devices were lost or removed electively. The proportion of patients having an adverse skin reaction was 19.8%. There was no significant difference in complication rates between the two groups.

Conclusions: The MIPS technique is comparable to the linear technique. The benefits of a shorter surgical time, a smaller skin incision, better cosmesis and skin sensibility found in similar studies favour the increasing use of the MIPS technique.

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Disclosure of Interest: None Declared

Keywords: bone conduction implants

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-019
Novel use of suction-irrigation enabled endonasal curved sinus burr in transcanal endoscopic ear surgery

C. Meco [1 2,*], S. Mulazimoglu [2]
[1]Department of Otorhinolaryngology, Salzburg Paracelsus Medical University, Salzburg, Austria, [2]Department of Otorhinolaryngology, Ankara University, Ankara, Turkey

Introduction: During transcanal endoscopic ear surgery (TEES) high speed drilling may be needed for atticotomy, mastodiectomy and canalplasty. The handle of conventional otologic drills can take up valuable space at the already narrow surgical corridor along the external ear canal. Furthermore, their unprotected rotating shaft could potentially damage the meatal skin and crossover with additionally required irrigation and suction instruments controlled by the assistant, which could predispose unintentional trauma to the delicate middle ear structures. Moreover, bone dust and blood retained in the field can also obscure the view, avoiding continuous drilling and possibly threaten safety. On the other hand, with their covered shaft and integrated suction irrigation, the curved sinus burrs of endonasal drill systems might overcome some of these problems, if they can be applied in this area.

Objectives: To introduce a novel method for drilling during TEES and assess its applicability.

Methods: A 5mm diamond sinus burr with a 15-degree curved, 4mm protected suction-irrigation shaft attached to the DrillCut-X II N handpiece (Karl Storz, Germany) were first used for drilling with 12.000 rotations per minute in two temporal bones for initial applicability test. Then, using the same setup, in three patients a transcanal endoscopic atticotomy, in one cholesteatoma case a retrograde mastoidectomy and in one cochlear schwannoma case during transcanal transpromontorial approach a circumferential canalplasty were performed. Efficacy of this endonasal system for TEES was evaluated.

Results: It was possible to apply otologic drilling principles with the sinus burr system and drilling was carried out safely without compromising the view of the operation field in all temporal bones and patients. No complications occurred during drilling. The integrated suction irrigation successfully managed to clear out bone dust and blood from the surgical field and prevented smoke formation in all instances. No additional irrigation or suction were needed to be introduced into the field by the assistant, thus no crossover of instruments held by a third/fourth hand occurred. Protected shaft safeguarded the lateral meatal skin in all cases. The 15-degree curved tip of the shaft enabled a broader reach of effective drilling area, while reducing unnecessary drilling of the lateral external ear canal and thereafter reconstruction requirement, compared to straight conventional otologic drills.

Conclusions: Endonasal suction-irrigation enabled curved sinus burr system with its protected shaft was safely and effectively used during TEES procedures providing a clear surgical field during drilling. Main advatages of its utility were found to be eliminating need for depleting extra instrumentation, reaching a wider effective drilling area with curved shaft and in return reducing unnecessary removal of bone along the external ear canal that requires reconstruction.

Disclosure of Interest: None Declared

Keywords: atticotomy, canalplasty, endoscopic ear surgery, mastodiectomy

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Abstract Presentations

Otology
Otology - Clinical Science

EAONO21-PO-020
An Aggressive Cholesteatoma with an Extramastoidal Extension and Malignant Transformation: A Case Report

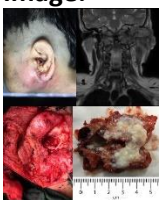
D. J. De Castro [1,*], C. R. Laganao [1]
[1]Ear, Nose, Throat - Head and Neck Surgery, Southern Philippines Medical Center, Davao, Philippines

Introduction: Malignancies of the temporal bone accounts for an estimated 0.2% of all head and neck cancers[1] and 60-80% of which are histologically squamous cell carcinoma.[2] They are usually diagnosed in their late stages[3,4] and is associated by poor outcome.[5] These tumors are often only heralded by non-specific symptoms related to the hearing and balance functions contributing to the delay in the diagnosis of the disease.[4,6-8] Its association with chronic inflammatory states such as chronic otitis media and cholesteatoma formation have been proposed to be a likely mechanism to cancer development.

Objectives: The aim of this study is to report a case of a 51-year-old female who presents with a chronic left middle ear infection, cholesteatoma of the parotid area and squamous cell carcinoma of the middle and external ear on surgical pathology.

Methods: We present a case of a 51-year-old female with chronically bilateral discharging ear, a left external ear mass, parotid area swelling, and facial paresis (HB III). An FNAB of the parotid mass was exhibited a cholesteatoma. Imaging of the temporal bone showed findings consistent with a middle ear cholesteatoma and the parotid area mass was a probable abscess formation. The patient underwent a subtotal petrosectomy with blind sac closure of the left external auditory canal and mastoid obliteration using an inferiorly based musculoperiosteal flap and temporalis muscle flap. The left parotid mass was consequently excised.

Image:



Results: Histopathology of the left parotid mass revealed a benign cholesteatoma, whereas, that of the middle and external ear cavity showed anastomosing sheets of squamous cells diffusely infiltrating the surrounding fibrous tissue - a well differentiated squamous cell carcinoma. The patient was staged as IV ($T_4N_0M_0$) according to Pittsburg system. Although benign, cholesteatoma destroys adjacent structures including bony architecture in the middle ear cavity by virtue of its innate osteolytic mediators.[10] The retrieval of a cholesteatoma in the left infra-auricular area in the setting of a chronically discharging ear shows how destructive these mediators can be. While the incidence of an extramastoidal

cholesteatoma is remote, it remains anatomically possible thru the fissures of Santorini present in the osteo-cartilaginous junction of the external auditory canal.[11]

It is unclear whether cholesteatoma coexists or can transform to a high-grade malignancy such as squamous cell carcinoma given that some risk factors are common to both. However, some studies have identified several mediators involved in the osteolytic activity in cholesteatoma to have a role in neoplastic process including the activation of c-myc, angiogenesis, tumor necrosis factor alpha, and an increase in p63, p53 tumor suppressor gene or telomerase activity all of which have been attributed to hyperproliferation and/or the survival of the neoplastic cell.[4, 8-10]

Conclusions: The aggressive nature of a cholesteatoma is exemplified by the extra-mastoidal migration by virtue of its inherent osteolytic chemicals. In addition, the finding of a squamous cell carcinoma in the background of chronic inflammation may support the possibility that the inflammatory mediators present may also be involved in malignant transformation.

The similiarity in clinical presentation has hampered its early diagnosis and sbsequent treatment, therefore, a high index of suspicion is necessary to mitigate its poor disease prognosis.

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Disclosure of Interest: None Declared

Keywords: chronic suppurative otitis media, extra mastoidal cholesteatoma, middle ear squamous cell carcinoma

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-021
Evaluating the Clinical Usability of the Automated Audiometer, SHOEBOX

R. Sekhon[*], V. Reddy[1], D. Whinney[1], A. Lambert[1]
[1]ENT, Royal Cornwall Hospital, Cornwall, United Kingdom

Introduction: Access to hearing screening poses a significant challenge considering the limited number of audiology service providers available to meet the overwhelming demand for testing. Provision for easily accessible and reliable audiometry has therefore warranted particular attention. Automated audiometry offers a viable solution. SHOEBOX, commercially released in 2014, is an automated audiometer which has been validated in both paediatric and adult populations.

Objectives: To improve audiology capacity to investigate hearing loss referred from primary care, we hypothesise SHOEBOX may be used as an initial screening tool to highlight patients that require subsequent formal testing. We performed a prospective service evaluation to elucidate indications warranting conventional audiometry following screening with SHOEBOX and to identify patient and healthcare professional satisfaction.

Methods: A prospective service evaluation was performed in a secondary care ENT audiology clinic at Royal Cornwall Hospital in January and March 2020. Patients, above 18 years of age, completed iPAD-based SHOEBOX audiometry, independently in the presence of an observer, in a sound-insulated room. As there were no pre-determined protocols dictating which patients would require a conventional audiogram, the clinical history, examination and SHOEBOX audiogram of each patient was reviewed by a Consultant ENT Surgeon to select those that would benefit from formal testing, performed on the same day in an identical setting. To evaluate satisfaction a bespoke questionnaire was completed by patients and healthcare professionals, the latter of which included three Healthcare Assistants, one Nurse, one Audiologist and two Consultant ENT Surgeons.

Results: 37 adult patients participated in the service evaluation with 28 (75.7%) requiring SHOEBOX alone and 9 patients (24.3%) requiring conventional audiometry, seven of whom were tested to evaluate asymmetry, and the remaining two to evaluate hyperacusis and profound deafness, respectively. 34 patients completed the bespoke questionnaire, eight of whom underwent dual testing. All patients found SHOEBOX easy to use and of the eight dual tested patients, five had no preference in choice of audiological testing with three preferring SHOEBOX. While 65% favoured a primary care setting, if this were an option, all patients were willing to undergo further testing if hearing loss was identified. Potential limiting factors when using SHOEBOX, as reported by the clinical team, include significant hearing loss, issues with focus, coordination and dexterity as well as lack of confidence with modern technology particularly among the elderly. Overall, however, the clinical team believed SHOEBOX to be a worthwhile tool with scope to be used in primary care to select patients that may require secondary-care ENT input and to supplement referral information.

Conclusions: This service evaluation demonstrates that automated audiometry lessens burden of demand for conventional pure tone audiometry and both patients and healthcare professionals are willing to utilise SHOEBOX as an

initial triage tool to select patients that require further testing, namely for asymmetrical hearing, hyperacusis and profound hearing loss. SHOEBOX provides an easily accessible and less resource intensive audiology service enabling timely detection of hearing loss.

Disclosure of Interest: None Declared

Keywords: automated audiometry, hearing loss

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-022
Solitary fibrous tumour / haemangiopericytoma of the external auditory canal

K. Saha [1,*]
[1]Department of Otolaryngology-Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

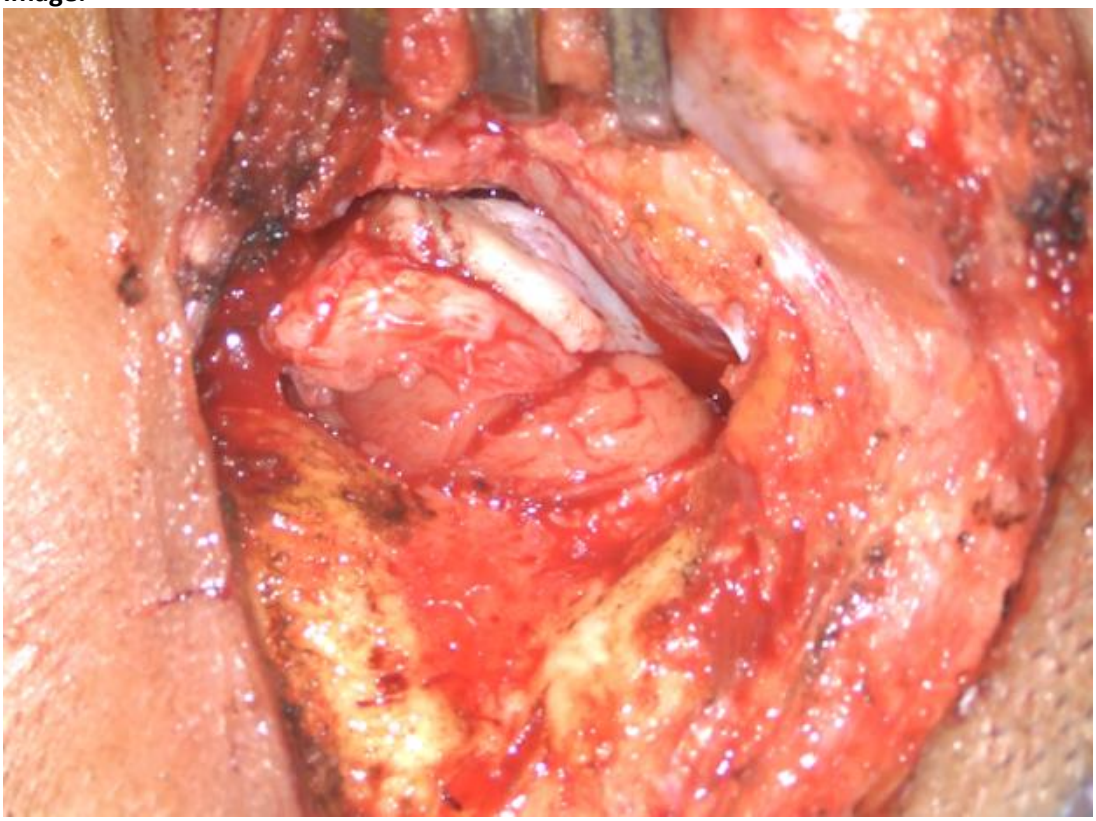
Introduction: Solitary fibrous tumour (SFT)/haemangiopericytoma (HPC) accounts for approximately 1% of all vascular tumours, and 13-25% of them are present in the head and neck region. Only five cases have been reported from the external auditory canal as a primary site of origin. SFT/HPC in the head and neck is more likely to be benign than SFT elsewhere and has a good prognosis.

Objectives: To characterize the clinical presentation and management of a solitary fibrous tumour (SFT)/haemangiopericytoma (HPC) from the external auditory canal as a primary site of origin.

Methods: A 32-year-old man presented with complaints of progressive painless swelling in the left ear canal, blockage sensation, and decreased sensation of hearing for 7 months. He did not notice any discharge from the ear. A physical examination revealed a smooth surfaced, firm swelling that seemed to attach with the inferior and post wall of the external auditory canal (EAC). It completely occluded the canal and the tympanic membrane could not be visualized. Prominent vascular marking was noticed over the swelling under the skin. Tuning Fork test showed Rinne negative in the left ear and Weber lateralized to the same side correlated with conductive hearing loss. Pure tone audiogram revealed 30.75dB ABG (air-bone gap) in 500,1000,2000 and 4000 Hz. Computed tomography showed a round, homogenous soft tissue mass involved the posterior and inferior wall of EAC, and the lesion was enhanced with contrast. The lesion seemed to erode the posterior and inferior bony EAC but there was no invasion of middle and mastoid or adjacent structures. The tumour was excised completely on 1st February 2018 with a standard postauricular approach under general anaesthesia. The tumour was removed with preserving the skin of EAC. The anterior and superior walls of the EAC, and tympanic membrane were intact and healthy. After removal of the tumour, an erosion was found in the tympanic part at the floor of EAC which was reconstructed with cortical bone chips and conchal cartilage. Macroscopically the tumour was grey-white in colour. Microscopically the tumour was composed of sheets of cells with uniform, monomorphous spindle cell with a round to oval nuclei. These cells showed moderate pleomorphism with a moderate amount of eosinophilic cytoplasm and indistinct cytoplasmic borders. Intratumoral staghorn type well developed, branching, thick-walled blood vessels were present. The focal area showed storiform pattern. Mitoses were infrequent. Based on these findings the tumour was diagnosed as (solitary fibrous tumor/haemangiopericytoma)-grade II.

Abstract Presentations

Image:



Results: The patient passed an uneventful postoperative course. The complete healing of the external auditory canal was achieved within 2- 3 months. He got complete relief of symptoms with the improvement of hearing. The patient was in regular follow-up in every 5-6 months interval. The last follow-up findings were recorded on 25th July 2021 when a pure tone audiogram showed 6 dB ABG (air-bone gap) in 500,1000,2000 and 4000 Hz. And otoendoscopy revealed no recurrence after 41 months of follow-up.

Conclusions: Though rare in presentation, external auditory canal SFT/HPC may be considered as a differential diagnosis of any smooth-surfaced slowly growing lesion that seems to arise from EAC. Even with modern imaging techniques, differentiation of SFT/HPC from other benign soft tissue neoplasms such as angioma, meningioma, fibroma, chordoma, etc. is quite difficult. In addition to CD34, vimentin, and Bcl-2, STAT6 nuclear immunoreactivity is the most diagnostic marker for SFT. Because of unpredictable behaviour, even after complete resection and histopathology report reveal benign, SFT/HPC should be followed up for at least 10 years to notify late recurrence.

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Abstract Presentations

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Disclosure of Interest: K. Saha Conflict with: None

Keywords: Solitary fibrous tumour, haemangiopericytoma, external auditory canal

Abstract Presentations

Otology
Otology - Basic Science

EAONO21-PO-024
Changes in the auditory system accompanying unilateral hearing loss – first results

V. Svobodová [1 2,*], O. Profant [1 3], Z. Bures [1], D. Tothova [1 2], J. Plzak [2], J. Syka [1]
[1]Department of Auditory Neuroscience, Institute of Experimental Medicine CAS, [2]Department of Otorhinolaryngology and Head and Neck Surgery, 1st Faculty of Medicine, Charles University, University Hospital Motol, [3]Department of Otorhinolaryngology, 3rd Faculty of Medicine, Charles University, University Hospital Královské Vinohrady, Prague, Czech Republic

Introduction: Unilateral hearing loss (UHL) is often considered to be an inferior topic compared to bilateral deafness. Nevertheless, the condition of UHL influences the processing of auditory input by several mechanisms. UHL causes the deterioration of orientation in space and increases the difficulty of speech understanding, especially in a noisy environment. Numerous potential etiology for UHL include: Ménière's disease, vestibular schwannoma, congenital hearing loss, and sudden sensorineural hearing loss.

Objectives: In the current experiment, an extended auditory examination was conducted to characterize the hearing ability of patients with UHL more precisely.

Methods: Twenty-eight patients with sensorineural UHL and thirty-seven controls with normacusis underwent an auditory examination. Normal hearing was confirmed in the unaffected ear, and the interaural difference was at least 20 dB. The battery of auditory tests comprised routine tests (pure tone audiometry, speech audiometry, tympanometry), and experimental methods focused on both peripheral and central processing (speech audiometry in babble noise, periodically gated speech, binaural time-intensity interchange ratio, detection threshold of gap in noise and others). The unpaired t-test was used for statistical comparison of means of two data samples.

Results: We have until now focused on the influence of UHL on speech perception in noise, gap detection threshold and spatial hearing. The results in bilateral speech audiometry, speech audiometry in babble noise, periodically gated speech and gap detection threshold were not significantly different in the UHL group, compared to the controls. Therefore, we performed unilateral variants of the tests and variants with compensating components. The results in more sophisticated experimental tests were significantly worse in the UHL group. The spatial hearing was deteriorated in 71 % and lost in 29 % of patients depending on the level of hearing loss.

Conclusions: The current results indicate that unilateral hearing loss is not merely a loss of sensitivity in one ear, but it may significantly influence central auditory processing and complex hearing abilities, including speech comprehension and temporal resolution. More attention should thus be paid to understanding the mechanisms of the UHL-induced plastic changes of the auditory system and their consequences for compensation and treatment.

References: *This project was supported by grant 392119 funding from GA UK (Grant Agency of Charles University) and grant 19-08241S funding from GA ČR (Czech Science Foundation).*

Disclosure of Interest: None Declared

Keywords: audiology, experimental methods, unilateral hearing loss, vestibular schwannoma

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6-10 SEPTEMBER 2021

Abstract Presentations

Auditory Implants
Auditory Implants - Clinical Science

EAONO21-PO-025
BAHS placement using a newly designed single drill technique - experimental data and first clinical feedback

M. L. Johansson [1 2,*]
[1]Department of Biomaterials, Institute of Clinical Sciences, University of Gothenburg, Gothenburg, [2]Research and Technology, Oticon Medical AB, Askim, Sweden

Introduction: The standard surgical approaches for installing the bone-anchored hearing system (BAHS) are currently the linear incision with tissue preservation and the minimally invasive Ponto surgery (MIPS). To mitigate the risk of overheating the bone during the osteotomy creation, a stepwise drilling protocol, involving three drill steps sequences using two different drill bits, is employed for both these approaches. With the intention to simplify the system and to promote BAHS treatment under local anaesthesia in an outpatient setting, a minimally invasive, single-step, guided drill system (MONO) has been developed. With the MONO system, the osteotomy for a 4 mm BAHS implant is created in one drill sequence using a novel parabolic twist drill.

Objectives: The aim of this study was to evaluate the MONO systems with respect to the cutting properties and the degree of heat generation, and to investigate the influence of irrigation and drilling procedure. Comparison was made with the MIPS drills. Furthermore, the aim was also to collect clinical feedback from a controlled release of the system.

Methods: The cutting characteristics of the drill systems were evaluated and compared using cow tibia bone. Drilling was performed at different feed rates (0.5, 1.0, and 2.0 mm/s) at 2,000 rpm while measuring the thrust force and the torque. The temperature changes were measured by thermocouples when drilling in artificial compact bone. Five drilling procedures were chosen to imitate different clinical situations in order of assumed increased heat generation due to deviation from the recommended standard procedure in terms of irrigation and length of drilling procedure. Ten drilling procedures were performed in each group.

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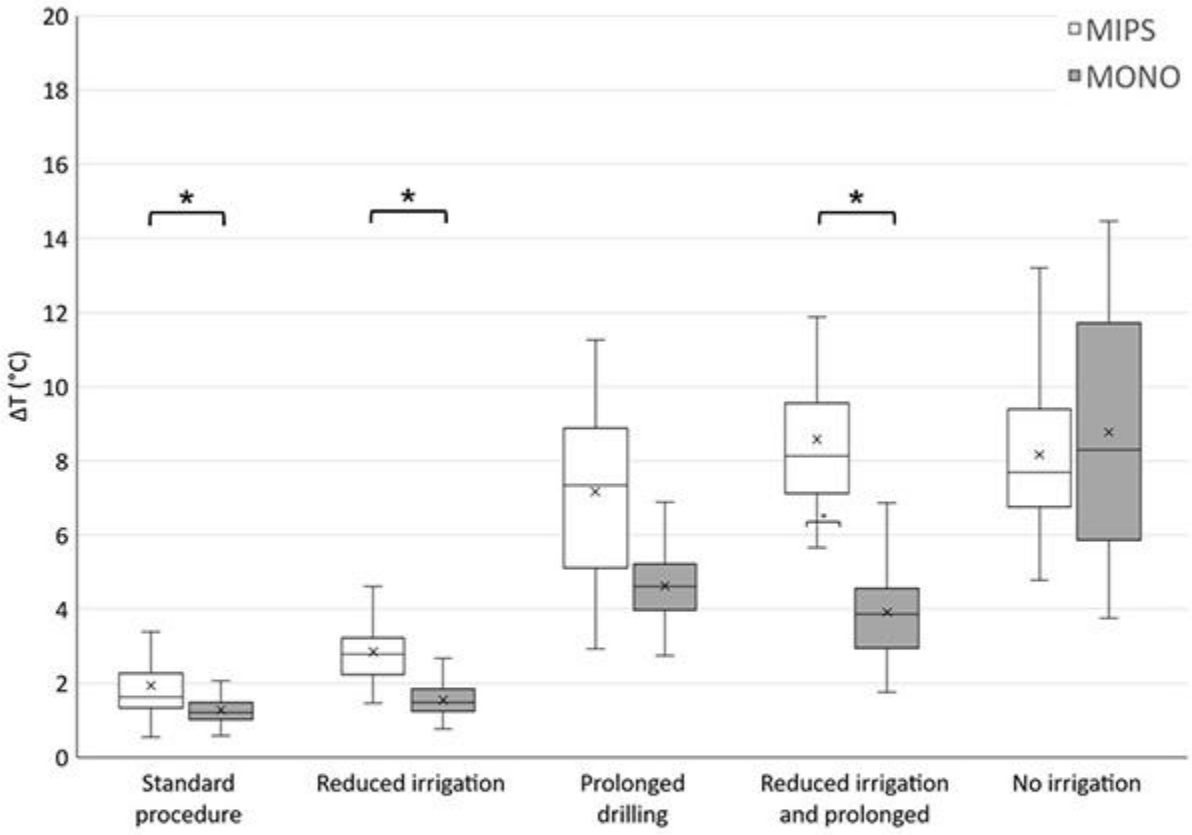
Abstract Presentations



Box plot showing the mean maximum temperature increase for each combination of drill system (MONO vs MIPS) and drilling procedure. Asterix indicate statistically significant difference between drill systems (Independent-Samples Kruskal-Wallis test , $p < 0.05$).

Results: The mechanical evaluation revealed a significant increase in both the force and the torque with increased feed rate for both drill systems. The mean force was lowest for MIPS widening drill and highest for the MONO drill except at the highest feed rate where there was no significant different between the drill bits. In contrast, the mean torque was highest for the MIPS widening drill and lowest for MIPS guide drill. The total drill energy needed to create the osteotomies reduced with increasing feed rate with the MONO system requiring significantly less energy than MIPS at 0.5 and 1.0 mm/s. The mean maximum temperature increase using MONO was below 5 °C also when deviating from the standard recommended procedure, which is below the threshold for thermally induced tissue damage. Compared with MIPS, the MONO system generated significantly less amount of heat in all situations except in the prolonged drilling

sequence case where the difference was not statistically different. Clinical experience and feedback from the controlled launch will be available at the time of the presentation.

Conclusions: A new guided drill system with a parabolic twist drill has been developed to facilitate osteotomy preparation for a 4 mm BAHS implant in one drill step, contrasting the conventional systems that employ a three-step drill sequence. The present *in vitro* study show that a parabolic twist drill design is more efficient in terms of cutting performance compared conventional twist drills. Although the bone volume is removed in one sequence, the data reveal that MONO generates less amount of heat compared with MIPS. In summary, results suggest that MONO system, conveys a promising design for an efficient one-stage osteotomy site preparation for BAHS installation.

Disclosure of Interest: M. L. Johansson Conflict with: Oticon Medical AB supported this research

Keywords: Bone anchored hearing system, bone conduction implants, experimental methods, surgical technique

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-026
MIDDLE EAR BAROTRAUMA IN FLIGHT AND DIVING: A NATIONWIDE SURVEY STUDY

O. Lindfors [1,*], K. Ketola [2], A. Räisänen-Sokolowski [3 4], T. Klockars [1], J. Suvilehto [5], T. Leino [4 6], S. Sinkkonen [1]
[1]Otorhinolaryngology - Head and Neck Surgery, Helsinki University Hospital, Helsinki, [2]Finnair Aeromedical Centre, Finnair Health Services, Vantaa, [3]Pathology, Helsinki University Hospital, [4]Centre for Military Medicine, Finnish Defence Forces, [5]Mehiläinen Oy, [6]Leadership and Military Pedagogy, National Defence University, Helsinki, Finland

Introduction: Middle ear barotrauma (MEBT) are the most common condition in flight and diving, potentially posing serious safety risks in both environments.

Objectives: A comprehensive overview of MEBT.

Methods: Anonymous questionnaires were sent to commercial aircrew of the three commercial airlines operating in Finland (n= 3799) as well as professional divers of the Finnish Border Guard, the Finnish Rescue Services, the Finnish Heritage agency, and recreational divers of the Finnish Divers' Association (n=7060). Primary outcomes were frequency, clinical characteristics, and short-term health effects of MEBT while flying and diving. Secondary outcomes were adjusted odds ratios (OR) with respect to possible risk factors.

Results: The response rate was 47% (n=1789) in aircrew. A total of 85% had experienced MEBT while flying and of those affected, 60% had used medications, 5% had undergone surgical procedures, and 48% had been on sick leave due to MEBT (40% during the last year). Factors associated with MEBT were a high number of upper respiratory tract infections (≥ 3 URTIs per year vs. 0 URTIs per year: OR, 9.02; 95% confidence interval [CI] 3.99 – 20.39) and poor subjective performance in Valsalva ("occasionally" vs. "always" successful: OR, 7.84; 95% CI 3.97 – 15.51) and Toynbee ("occasionally" vs. "always" successful: OR, 9.06; 95% CI 2.67 – 30.78) maneuvers.

The response rate was 27% (n=1881) in divers. A total of 81% had experienced MEBT while diving and of those affected, 38% had used medications and 1% had undergone surgical procedures due to MEBT. Factors associated with MEBT were poor subjective performance in Valsalva ("occasionally" vs. "always"46 successful: OR, 11.56; 95% CI 7.24-18.47) and Toynbee ("occasionally" vs. "always" successful: OR, 3.51;47 95% CI 1.95-6.30) maneuvers.

Conclusions: MEBT are frequent while flying and diving. They lead to an increased need for medications, surgical procedures, and sickness absence from work duty. The most important risk factors are a high number of URTIs and poor performance in pressure equalization maneuvers.

Disclosure of Interest: None Declared

Keywords: ENT, Epidemiology, Eustachian tube, Eustachian tube dysfunction

Abstract Presentations

Otology
Otology - Basic Science

EAONO21-PO-027
Microbiome of the Healthy External Auditory Canal

A. Sjövall [1,*], V. Aho [2], T. Hyyrynen [1], T. Kinnari [1], P. Auvinen [2], J. Silvola [3], A. Aarnisalo [1], A. Laulajainen-Hongisto [1]
[1]Department of Otorhinolaryngology-Head and Neck Surgery, University of Helsinki and Helsinki University Hospital, [2]Institute of Biotechnology, University of Helsinki, Helsinki, Finland, [3]Department of Otorhinolaryngology, Akershus University Hospital and University of Oslo, Akershus and Oslo, Norway

Introduction: A growing number of next-generation sequencing-based microbiome studies have deepened the understanding of health and disease of many human organs. However, the microbiome of the external auditory canal (EAC) remains scarcely examined.

Objectives: The objective of this study is to investigate the microbiota of the healthy EAC culture-independently and to evaluate the usefulness of the swabbing method in collecting EAC microbiota samples.

Methods: Fifty healthy working-age volunteers. Samples were harvested with DNA-free swabs from the volunteers' EACs.
DNA extraction, PCR amplification, and sequencing (Illumina MiSeq platform) of the 16S rRNA gene were performed in the DNA Sequencing and Genomics Laboratory of the Institute of Biotechnology, University of Helsinki. Statistical analyses were performed in R.

Results: The swabbing method is feasible for EAC microbiota sample collection. The four most frequent amplicon sequence variants in the microbiota data were *Staphylococcus auricularis*, *Propionibacterium acnes*, *Alloiococcus otitis*, and *Turicella otitidis*.
Typically, the dominant amplicon sequence variant in a sample was one of the most frequent bacteria, but there were also subjects where the dominant species was not among the most frequent ones. The genus *Alloiococcus* was least common in females who reported cleaning their ears.
Subjects with a high relative abundance of *Alloiococcus* typically had a low abundance of *Staphylococcus,* which may be a sign of the two being competing members of the microbial community.

Conclusions: The most common bacteria in the microbiome of the healthy EAC were *Staphylococcus auricularis*, *Propionibacterium acnes*, *Alloiococcus otitis*, and *Turicella otitidis*. The EAC microbiota seems more diverse and individualized than previously thought. Also, ear cleaning habits seem to alter the EAC microbiome.

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Disclosure of Interest: None Declared
Keywords: 16S rRNA gene sequencing, Bacteria, External auditory canal, Microbiome

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-028

Cochlear implant eligibility in an adult hearing aid population: A multi-perspective service evaluation of a patient referral pathway at Southend University Hospital.

L. Thompson [1,*], H. Bazeer [2], B. Young [1], G. Smith [3], J. Blackaby [3], J. Wasson [4], A. Trinidade [2]
[1]Anglia Ruskin University School of Medicine, Chelmsford, [2]Department of Otolaryngology, [3]Department of Audiology, Southend University Hospital NHS Foundation Trust, Southend-On-Sea, [4]Department of Otolaryngology, East Kent University Hospitals NHS Foundation Trust, Canterbury, United Kingdom

Introduction: In March 2019 the National Institute for Clinical Excellence (NICE) re-evaluated and subsequently changed the criteria threshold for patients with profound hearing loss who qualify for cochlear implantation (CI) (NICE – TA566). It is therefore recommended that patients who meet their re-evaluated criteria, with a proven majority sensorineural hearing loss, be considered for cochlear implants.

Objectives: Our main objectives were to quantify the number of patients eligible for CI following implementation of the National Institute for Clinical Excellence (NICE) 2019 (TA566) guidelines within the last 5 years at a British District General Hospital (DGH) and identify factors that influence patients' decisions surrounding cochlear implant referral.

Methods: A retrospective analysis of audiological data for a 5-year period from 1st April 2014 to 1st April 2019 was performed. The database was searched to identify patients who would have met audiological criteria for CI under NICE 2009 (TA166) guidance and then using NICE 2019 (TA566) guidance. The data was then cross-referenced to give a cumulative total of patients who fulfilled criteria for each year in any of the hearing frequency categories. Patients were excluded if they had been previously included in another frequency range. To compare the number of patients who were eligible for CI based on TA166 and TA566 guidelines over the 5-year study period, a paired t-test was performed. To identify factors that influence patients' decisions surrounding cochlear implants, a retrospective search of electronic patient files was conducted, and files from March 2019 to March 2020 were manually reviewed to identify patients who had 'declined' further referral and the reason for this, if noted. Patients for whom a reason for decline was not noted were offered the opportunity to answer an identical question set via an online questionnaire platform or a video conference interview. Thematic inductive analysis was performed on the combined data set.

Results: NICE 2019 (TA566) criteria applied to our patient population and measured against NICE 2009 (TA166) criteria between 2014 and 2019 an average of a 259% increase in eligibility for CI. The majority of patients were found to have thresholds of ³80dBHL at 3 and 4 kHz. Qualitative analysis revealed several barriers to CI from the patients' perspective and included patient-centered barriers, such as health-related anxieties and misperceptions about the implantation process, and external barriers such as inability to get to regional implant centres easily. Motivating factors for CI included improvement in quality of life and access to local CI services.

Conclusions: With the introduction of the NICE 2019 (TA566) criteria, the number of eligible candidates for CI has greatly increased in the UK, putting pressure on CI centres and the DGHs referring to them. The current referral systems contain

within them both external and patient-centered barriers to implantation, with logistical issues being prominent and patient preference for local services. The way that the CI service in the UK is delivered may need to be rethought to meet increasing populational demands improve accessibility to those most vulnerable to these barriers.

Disclosure of Interest: None Declared

Keywords: cochlear implantation

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Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-029
Cochlear implantation for children under the age of 12-months

M. Ghrayeb-Haddad [1,*], H. Powell [1], K. Morrish [1], J. Horton [1], C. Bartop [1], J. Garvey [1], K. Webb [1], D. Jiang [1], K. Wilson [1]
[1]The Hearing Implant Centre , Guy's and St Thomas',NHS Foundation Trust, London, United Kingdom

Introduction: Cochlear implants (CI) have proven communication benefits for patients with pre- and post-lingual deafness. It has become common to offer CI under the age of one year, once reliable testing is obtained, in order to enable patients to develop their auditory performance and language skills at the earliest possible opportunity[1].
Our aim is to assess safety and efficacy of cochlear implant surgery in infants under the age of 12 months by reporting surgical[2], anaesthetic[3] and audiologic outcomes and to compare them to children implanted between the ages of 12-24 months.
Additionally, amongst the children in both groups we identified inner ear malformations and other medical conditions or disabilities that influenced complications and outcomes including auditory performance.

Objectives: A review of our the real-life data for children receiving CI at Evelina London / Guy's and St. Thomas' Hospitals. I assessed the safety and auditory performance of implantation of those implanted prior to 12 months to those implanted between 12 to 24months.
Among these 2 groups, we reviewed the records including head imaging studies, communication mode, speech and auditory tests. Besides, identifying other hearing impairing syndromes or inner ear abnormalities and investigate their effect on the safety profile and hearing outcome.

Methods: A retrospective chart review of children who underwent cochlear implantation at Evelina London Children's Hospital / Guy's and St. Thomas' NHS Foundation Trust, London, United Kingdom between the years 2000-2020.
All patients undergoing CI surgery at ages 0-12 months (group 1) and 12-24 months (group 2) were identified. 47 out of 52 patients in the first group were included, and 67 out of 95 of the second group were included. Patients were excluded due to loss to follow-up, failure to use the device and sequential implantation.
Audiometric and speech perception evaluation including: Auditory Brainstem Response (ABR) testing, Category of Auditory Performance (CAP), Speech Intelligibility Rating test and the Nottingham Auditory Milestones (NAMES) were performed.
A sub-analysis included data about children from with inner ear malformations to report the complication rates and the final language and hearing ability.

Table:

	under 1's	under 2's
speech	71.10%	54.55%
mixed	26.60%	38.18%
sign	2.30%	7.27%

Abstract Presentations

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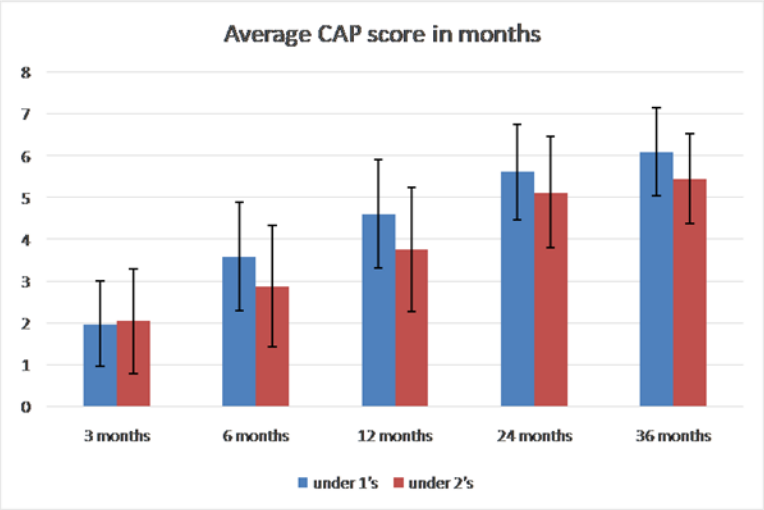

Results: The average age at switch-on was 11.00±2.06 months and 18±3.76 months for group-1 and group-2, respectively.
The communication mode one year post switch-on was speech only in 71% in group-1 and 55% in group-2, sign language only in 2% of group-1 and 7% of group-2 and mixed in 27% of group-1 and 38% in group-2.
CAP score was better for group-1 starting from 6 months post switch-on until 36 months post implantation. The difference is statisticaly significant for 6 and 12 months post switch-on.
Names was better starting from 3 months post switch-on till 36 months and the difference was statistically significant 6 and 12 months post switch-on.
No major surgical complications were encountered in both groups.
The complication rate was similar for both groups without significant difference.

Conclusions: Early cochlear implantation gives children better chance to get speech and audiology levels that are similar to their normal hearing peers. Early implanted children reach better hearing outcomes comparing to those implanted later on.
These results corallites with previously published data.Further prospective studies are required to corroborate our findings.

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Abstract Presentations

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Disclosure of Interest: None Declared

Keywords: cochlear implantation, Infants

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-030
Validation of the novel Deep Reality Viewer (DRV) 3D digital stereo viewer in otology surgery

T. Milner [1], O. Denton [1,*], C. Moen [2], A. Iyer [1]
[1]ENT, University Hospital Monklands / NHS Lanarkshire, Airdrie, [2]ENT, University Hospital Crosshouse / NHS Ayrshire & Arran, Kilmarnock, United Kingdom

Introduction: Three-dimensional (3D) visualisation of the surgical field is supported by evidence of superior operator performance in comparison to two-dimensional (2D) technologies. Traditionally, this has been achieved through microscopy as the gold standard in otology surgery.

Objectives: This study aims to evaluate a novel 3D digital stereo viewer, the Deep Reality Viewer (DRV), in otology surgery, in comparison to both a 2D monitor and microscopy.

Methods: The DRV is a stereomicroscope combined with a viewer that provides a 3D visual display without the need for 3D glasses. This was assessed in a prospective clinical research study comparing the visual and practical applications of the DRV in comparison to microscopy and a 2D monitor display. Eleven ENT consultants and trainees viewed pre-recorded in vivo mastoid exploration displayed on a 2D monitor and the DRV screen. Nine ENT consultants and trainees underwent a practical assessment, performing tympanoplasty graft placement, ossiculoplasty placement and mastoid drilling on a human cadaveric head using both the microscope and DRV. Face, task-specific and global content outcome assessments using 5-point Likert scale questionnaires were the primary outcome measure in both arms. The time taken to perform tympanoplasty and ossiculoplasty placement was recorded allowing comparison of operative speed between the DRV and the microscope. Construct validity assessments were performed through separate analyses controlling for surgical experience. Analyses were conducted using descriptive statistics, Wilcoxon signed rank tests, and paired t-tests.

Results: The DRV achieved the pre-determined validation threshold of 4 for all face, task-specific and global content validity parameters in both visual and practical assessment. In direct comparison to the 2D monitor, DRV significantly outperformed it in 4 of 5 face validity parameters (image quality, colour contrast, depth perception and overall), 5 of 6 task-specific content validity parameters (chorda tympani identification, identifying ossicles and disarticulating incus, mastoid drilling, facial nerve identification and overall), and all global content validity parameters (definition of anatomy, economy of movement, operative progression, surgical planning and overall). For the practical comparison to the microscope there was no significant difference in all 5 face validity parameters. The DRV significantly outperformed microscopy in 2 of 6 task-specific parameters (identifying middle ear anatomy and overall), and 1 of 5 global content validity parameters (definition of anatomy). There was no difference in operating time for tympanoplasty and ossiculoplasty placement between the DRV and the microscope. Construct validity was not demonstrated, with no difference between trainees and consultants in their assessments of the DRV.

Conclusions: The DRV achieved the validation threshold for all parameters assessed both in comparison to a 2D monitor and during practical comparison to a microscope. It also outperformed both in several of these validation parameters.

Abstract Presentations

This validates the DRV for performing otological procedures, and suggests that it would be a useful alternative to the gold standard of microscopy in otology surgery.

Disclosure of Interest: None Declared

Keywords: 3D, Deep Reality Viewer, Otology, Validation

Abstract Presentations

Otology
Otology - Basic Science

EAONO21-PO-031
AAV2/7 is a Promising Vector to Transduce Spiral Ligament Fibrocytes in a Save and Efficient Way

D. Verdoodt [1 2,*], K. Szewczyk [2], G. Van Camp [3], P. Ponsaerts [1], V. Van Rompaey [2 4]
[1]Laboratory of Experimental Hematology, [2]Translational Neurosciences, [3]Centre of Medical Genetics, Universiteit Antwerpen, Antwerpen, [4]Department of Otorhinolaryngology and Head & Neck surgery, Universitair Ziekenhuis Antwerpen, Edegem, Belgium

Introduction: Inner ear gene therapy is a promising approach to restore sensorineural hearing loss, for which several gene therapy applications have been studied and reported in preclinical animal studies. Although gene delivery by using adeno-associated viral vectors (AAV) is considered as the best option, most animal studies to date have only injected viral vectors into neonatal ears to effectively transduce inner and outer hair cells.

Objectives: In this study, our aim is to inject AAV2/7 through the posterior semicircular canal in adult mice in order to assess safety, immunogenicity and transduction efficiency in the fibrocytes of the spiral ligament.

Methods: Five six-months old C57BL/6NTac-Cdh23/H mice received an injection with a CMV-eGFP-T2A-FfLuc AAV2/7 vector through the posterior semi-circular canal (PSC) approach in the left ear. Hearing assessment involved distortion product otoacoustic emission (DPOAE) and auditory brainstem response (ABR) measurements at baseline and one week after injection. In addition, in vivo bioluminescence imaging (BLI) was performed to follow up transduction efficiency. One week after injection, mice were euthanized and immunohistochemical staining was performed to visualize macrophages and eGFP-protein in the spiral ligament.

Results: DPOAE and ABR-measurements revealed that injection of AAV2/7 in the inner ear of adult mice has no negative influence on cochlear functioning as hearing function was completely preserved in all injected animals after one week. Furthermore, in all mice, BLI signal was observed in the region of the left ear indicating efficient transduction of inner ear cells. Immunohistochemistry showed no increase in macrophages or activated macrophages when compared to control mice demonstrating that PSC injection does not result in inner ear inflammation. The next step is to assess eGFP expression using an anti-eGFP antibody.

Conclusions: As these preliminary results are highly promising, we will inject more mice with AAV2/7 and assess hearing function, inner ear inflammation and transduction efficiency at different time points, up to three months.

Disclosure of Interest: None Declared

Keywords: Gene therapy, spiral ligament, Viral vector

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-032

TREATMENT EFFICACY OF ACUTE ACOUSTIC TRAUMA CAUSED BY EXPLOSIVES AND VARIOUS FIREARMS AT WAR SITE

C. Karacayli [1,*], B. Satar [2], K. Simsek [3], N. D. Ozaydin [2]
[1]Audiology, [2]Otorhinolaryngology, [3]Underwater And Hyperbaric Medicine, University of Health Sciences Turkey, Ankara, Turkey

Introduction: Hearing loss caused by acute acoustic trauma is a worrisome disability for military personnel and involved civilians. There are different treatment protocols including systemic dexamethasone, antioxidant agents (N-acetylcysteine), intratympanic dexamethasone, and hyperbaric oxygen therapy.

Objectives: In this study, we aimed to determine the effect of our treatment protocol on hearing loss caused by explosives and various firearms.

Methods: In this retrospective study, we enrolled 197 patients who were admitted to our hospital for acoustic trauma and other types of injury. Age, gender, type of explosion, explosion site, otologic examination, treatment protocol, and pure tone thresholds were recorded. The type of explosion was categorized as low energy, medium energy, and high energy. In low energy group, we included explosions with light weapons such as gunshots. In medium energy group, we mainly included hand-made explosives. In high energy group, we included explosions such as artillery attack missiles. Pure tone average was calculated using 500, 1,000, 2,000, and 4,000 Hz thresholds. 68 patients had pure tone audiometry after treatment or follow-up period. 11 of these patients got both medical treatment and hyperbaric oxygen therapy. Medical treatment protocol included systemic steroids (dexamethasone), antioxidant agents (N-acetylcysteine), intratympanic steroids (dexamethasone).

Table: *Table 1: Descriptives of energy groups. PTA: pure tone threshold, Hz: Hertz*

	Right Ear			Left Ear		
	PTA	4,000 Hz	6,000 Hz	PTA	4,000 Hz	6,000 Hz
Low Energy (n=38)	29.77±19.89	41.84±27.81	52.24±32.5	29.97±27.54	45.26±31.19	50.92±32.67
Medium Energy (n=104)	27.33±22.4	38.61±28.74	49.33±30.91	28.51±20.31	40.19±27.8	49.9±29.59
High Energy (n=55)	27.61±20	43.18±31.11	50.82±33.94	28.93±15.77	45.73±24.63	54.82±27.4

Results: Mean age of the patients was 33.7±6.85 years. 2 of the patients were female. 38 patients were suffered from low energy, 104 from medium energy and 55 from high energy explosions. The explosion groups were compared in terms of air and bone conducted thresholds. There was no significant difference in hearing loss between any of the groups. There was no significant difference in pure tone thresholds at 4,000 Hz and 6,000 Hz for both left and right ears. Pure tone average, 4,000 Hz and 6,000 Hz thresholds were described in Table 1. There were 42 patients who had post-treatment pure tone audiometric evaluation. When the pre- and post-treatment pure tone thresholds were compared for right ears there was significant difference at PTA, 500, 1,000, 2,000 and 4,000 Hz. For left ears, there were significant differences at PTA, 250, 500, 1,000, 2,000, 4,000 and 6,000 Hz. Post treatment pure tone averages were significantly

lower than those pre-treatment for right and left ears ($p=0.025$ and $p<0.001$, respectively). For right ears pre- and post-treatment PTA were found 33±26.60 and 30±25.72 respectively. For left ears pre- and post-treatment PTA were found 35±25.48 and 28±23.08 respectively. Out of 197, 26 patients did not take any medication for acoustic trauma because of late admission. However, they had follow-up audiometry. The follow up period was 242±248 days. There was no significant spontaneous improvement in hearing of these patients.

Conclusions: There are several studies claiming benefit of different treatment protocols. In our study, we used systemic dexamethasone, antioxidant agents (N-acetylcysteine), intratympanic dexamethasone and hyperbaric oxygen therapy. This protocol appears effective in acute acoustic trauma caused by explosives and various firearms.

Disclosure of Interest: None Declared

Keywords: acoustic trauma, blast trauma, hearing loss

EAONO WEEK 2021 HOSTED BY THE UK
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Abstract Presentations

Skull Base
Skull Base – Clinical

EAONO21-PO-033
THE RESULT OF SURGICAL TREATMENT OF TEMPORAL BONE PARAGANGLIOMAS

K. Diab*, D. Nikolay [1], U. Parviz, P. Olga, Z. Darya, P. Olga
[1]Natinal Medical Research Center of Otorhinolarhingology, Moscow, Russian Federation

Introduction: Paraganglioma is a fairly rare tumor that arises from the cells of nonchromaffin paraganglia, also called glomus bodies, and therefore has many synonyms: glomus tumor, glomus tympanicum and glomus jugulare tumor, chemodectoma, receptoma, nonchromaffin paraganglioma. The incidence of temporal bone paraganglioma is 1:1300000. This is a benign tumor, but according to the literature, it can sometimes metastasize, even several years after a successful surgery. All these qualities make glomus tumors one of the most difficult pathologies in otosurgery and emphasize the importance of early detection and timely full surgical removal of these formations with the ability to preserve the function of vital anatomical structures.

Objectives: to evaluate the effectiveness of surgical treatment of patients with paraganglioma.

Methods: the article presents our five-year experience of surgical treatment of temporal bone paraganglioma. During the period from February 2015 to April 2021, 130 patients with temporal bone paragangliomas underwent surgical treatment on the base of the National Medical Research Center of Otorhinolaryngology Federal State Budget-Funded Institution. The average age was 35,8 year, 34 men and 96 women. All patients were divided into 3 groups (A,B,C) taking into account the classification of U. Fisch and D. Mattox modified by M. Sanna in 2013. Among them: 22(%) patients with type A tumor (12 cases of A1, 10 cases of A2 tumor); 73 patients with type B tumor (25 cases of B1, 16 patients of B2, 32 patients of B3 tumor); 35 patients with type C (10 cases of C1, 12 cases of C2 - patients, 7 cases of C3, 5 cases of C4 tumor).

Results: all the patients after detailed examination (CT scan, MRI with gadolinium enhancement) underwent surgery with total removal of paraganglioma.
Type A paraganglioma was removed through the retroauricular transmeatal approach; in type B1 and B3 paraganglioma was performed extended canaloplasty; B2 paraganglioma was removed through the canal-wall-up approach; type C through – retrofacial anf infratemporal approaches. Intraoperatively adequate visualization of important anatomical structures was obtained. In all cases of paraganglioma type A and B FN and lower cranial nerves function was preserved. In type C tumors the recovery of FN function up to grade 3 on the House-Brackman scale was noted. The hearing improvement was achieved in the majority of patients with type A and B tumors. There was no tumor recurrence according to CT, MRI scans and otoscopic examination 1, 2, 5 years after surgery (maximum observation time was 62 months).

Conclusions: The use of the various approaches with endoscopic technique adequate visualization of the middle ear atomic structures for removal of temporal bone paraganglioma allows to remove the tumor completely and to prevent the intracranial spread of the tumor.

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-034
MIDDLE CRANIAL FOSSA APPROACHES TO THE INTERNAL AUDITORY CANAL AND PETROUS APEX LESION

K. Diab*, P. Olga, P. Olga

Introduction: The middle fossa approach is a useful option for lesions of the petrous apex and small internal auditory canal tumors when hearing might be preserved. The approach is versatile because it can be extended anteriorly by drilling the petrous apex (Kawase's triangle) and gaining access to the posterior fossa and petroclival area.

Objectives: to describe the microsurgical anatomy of the middle cranial fossa; to consider approaches to the internal auditory canal (IAC) and the petrous apex in cases of various pathology of the temporal bone; analyze the available clinical material; compare the results of surgical treatment.

Methods: The study included 15 patients, who underwent surgical treatment on the base of National Medical Research Center of Otorhinolaryngology: 5 patients with vestibular schwannomas of IAC; 10 patients with various pathologies of the apex of the temporal bone pyramid (cholesterol granuloma, cholesteatoma).The average age of patients was 23.7 years. CT, MRI with gadolinium enhancement, pure tonal audiogram were performed for all patients in preoperative stage. Facial nerve function was evaluated by House-Brackmann scale. We used 3 types of MCF approaches depending on the anatomical localization of the pathological process: 1) approach to IAC for intracanal tumors; 2) approach to IACwith posterior extension for vestibular schwannomas 1-2 Koos and Samii grade; 3) anterior petrosal approach for petrous apex lesions. FN monitoring and endoscope assictance were performed intraoperatively in all cases.

Results: In 4 cases of vestibular schwannomas the total tumor removal was achieved by MCF approach, in 1 case on MRI with contrast enhancement 1 year after the surgery was revealed a limited accumulation of contrast agent along the course of the FN. The normal function of the FN in the postoperative period was observed in all cases. All patients with pathology of the petrous apex were operated on with an extended anterior petrosal approach. In all cases, a complete sanation of the petrous apex was achieved with preservation of hearing and facial nerve function at the preoperative level.

Conclusions: Group of MCF approaches are hearing-preserving approaches that provides a good view of the IAC along its entire length and control of the position of the FN. A detailed knowledge of topographic anatomy of MCF and adjacent areas, surgical technique, experience in cadaver dissection and intraoperative endoscopy,FN monitoring are necessary for the implementation of this approach in real practice and avoiding of complications.

Disclosure of Interest: None Declared

Keywords: None

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-035
'The Moran Method' – Our low-cost contribution to mastoid surgery theatre safety during the COVID-19 pandemic

A. Sheldon [1,*], P. Moran [1], A. Lambert [1], D. Whinney [1]
[1]Department of Ear, Nose & Throat Surgery, Royal Cornwall Hospital, Truro, United Kingdom

Introduction: High-speed drilling of the mastoid produces significant aerosolisation of bone and other tissue[i], thus inferring the risk of viral transmission to operating theatre personnel. Recent studies have demonstrated the use of multiple different barrier drapes ('Ototent' & 'Southampton Tent') [i] [ii] to contain these aerosolised particles within the operating field and prevent potential spread of COVID-19.

Objectives: To identify if the use of an eye drape with an adhesive aperture (product code: 9030; cost: £2.85/pc) could be used as a suitable barrier during mastoid surgery.

Methods: The adhesive aperture was placed on the microscope objective surround and draped over the wound. Any excess material was trimmed and discarded. An iterative process of quality improvement was then employed, with input from the theatre and surgical team, to make small modifications to the drape. For example in the application and trimming of material; optimising of scrub nurse position and modifying the technique for passing instruments under the drape. Such changes were discussed at local clinical governance and the regional otology group meetings, with accepted changes adopted in future cases.

Results: 'The Moran Method' created the required protective barrier between operating field and operating surgeon. The absorbent underside of the drape prevented pooling of fluid beneath it and allowed it to be discarded safely after use. Each drape could be custom shaped around the wound and fitted to the microscope with ease. This was at a significantly lower cost price compared to available alternatives.

Conclusions: 'The Moran Method' is a low-cost, practical and convenient barrier drape to be used during mastoid surgery.

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Disclosure of Interest: None Declared

Keywords: aerosol generating, COVID-19, drape, mastoidectomy

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-036
Endoscopic diving technique for hearing preservation in managing labyrinth invading cholesteatomas

S. Mulazimoglu [1,*], C. Meco [1 2]
[1]Department of Otorhinolaryngology, Ankara University Faculty of Medicine, Ankara, Turkey, [2]Department of Otorhinolaryngology, Salzburg Paracelsus Medical University, Salzburg, Austria

Introduction: Endoscopic diving technique (EDT) is being used in endoscopic pituitary tumor surgery for a long time. Recently, underwater dissection has been also proposed in otologic surgery while repairing superior canal dehiscence and labyrinthine fistulas. Deterioration in the postoperative bone conduction hearing is the main concern in labyrinthine destructive cholesteatoma**.** As a new concept, use of EDT during cholesteatoma dissection may help us at preserving hearing in advanced cholesteatoma cases.

Objectives: To present utilization of transcanal EDT and transmastoid EDT to preserve membranous labyrinth integrity in advanced cholesteatoma cases.

Methods: On a fresh frozen cadaver temporal bone, membranous semicircular canal anatomy was studied using EDT. All membranous semicircular canals were revealed using highspeed drill. Transcanal endoscopic ear surgery was performed on a 33-years-old female with extensive middle ear cholesteatoma. Lateral semicircular canal (LSC) was unidentifiable on the preoperative CT scan due to erosion with a contracted sclerotic mastoid. EDT was used for the dissection of cholesteatoma over the membranous LSC. Transmastoid microscopic surgery was performed on a 57-years-old male with LSC and superior semicircular canal (SSC) erosive cholesteatoma. EDT was used for the dissection of cholesteatoma over the fistulas of LSC and SSC.

Results: Membranous anatomy was preserved on the cadaver temporal bone during underwater dissection. Continuous irrigation is needed to be adjusted in order to work underwater. On the first case managed with transcanal EDT, LSC was eroded more than half of its length. Fallopian canal was eroded circumferentially at the second genu and part of the mastoid segment. Cholesteatoma matrix was completely removed preserving the membranous LSC. On the second case we were able to remove cholesteatoma matrix over the LSC and SCC fistula this time utilizing transmastoid EDT. During semicircular canal dissection, not only systemic steroids were administered, but steroids were also added to the saline irrigation solution. Free muscle graft and fascia was used for obliteration of the membranous canal on the first case and fistulas on the second case. Postoperative bone conduction thresholds of the operated ears were intact after the follow-up periods of 6 and 8 months with masked pure tone audiometry.

Conclusions: EDT can be safely utilized during cholesteatoma removal over the eroded labyrinth with the preservation of the membranous labyrinth and thus may help preserve the cochlear function, despite destructive nature of the disease.

Disclosure of Interest: None Declared
Keywords: Cholesteatoma, Endoscopic diving technique, Endoscopic ear surgery, Hearing preservation

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Abstract Presentations

Otology
Otology - Clinical Science

EAONO21-PO-038
Teaching Junior Doctor Clinical Skills: An Innovative Pinna Haematoma Simulation Model

S. Chiu*, J. Chan

Introduction: Inexperienced junior doctors often rotate through an ear, nose and throat (ENT) department during their training in England.[1,2] This can prove to be challenging, as it requires knowledge of common ENT conditions coupled with basic surgical skills to manage certain conditions, one of which is, pinna haematomas. In order to ensure that junior doctors are well equipped with essential ENT skills, many skills courses have been designed to aim to achieve this with various simulation models.[3] Although recognised as an ENT emergency[4], there is no established simulation model for aspiration of pinna haematomas.

Objectives: To create a simulation model for aspiration of pinna haematomas.

Methods: We developed an easy to create, inexpensive, and adjustable pinna haematoma simulation model using readily accessible materials (i.e. garden wire, latex gloves, liquid latex). (*fig. 1*) The models were used during a junior doctors' ENT skills course to teach management of pinna haematoma. Delegates at the course were taught aspiration using the models. The faculty from the course were also invited to aspirate the model and faculty feedback via survey was collected.

Image:

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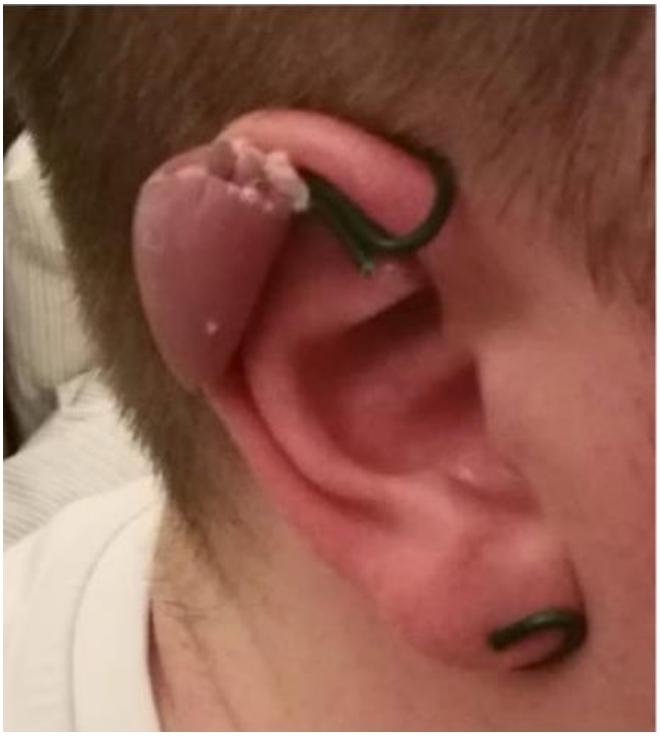

Results: 78% of faculty members provided feedback. All participants agreed the model mimicked pinna haematoma anatomy, was user friendly, was a useful training exercise for junior doctors, was a useful addition to the ENT Junior Doctor's Skills Course, and correlated with essential skills for aspiration of pinna haematoma.

Conclusions: This model is easy to reproduce and provides safe and effective training for aspiration of pinna haematoma.

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Disclosure of Interest: None Declared

Keywords: Educational model, Pinna Haematoma, Simulation

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-039
Development and Validation of Otology Specific Outcome Measure: Ear Outcome Survey-16 (EOS-16)

J. Laakso [1,*], J. Silvola [2], I. Kivekas [3], J. Laitakari [4], J. Jero, A. Dietz [5], L. Haavisto [6], M. Hytönen [1], S. Sinkkonen [1]
[1]Otorhinolaryngology - Head and Neck Surgery, Helsinki University Hospital, Helsinki, Finland, [2]Ear, Nose, and Throat – Division of Surgery, Akershus University Hospital, Lørenskog, Norway, [3]Otorhinolaryngology - Head and Neck Surgery, Tampere University Hospital, Tampere, [4]Otorhinolaryngology - Head and Neck Surgery, Oulu University Hospital, Oulu, [5]Otorhinolaryngology - Head and Neck Surgery, Kuopio University Hospital, Kuopio, [6]Otorhinolaryngology - Head and Neck Surgery, Turku University Hospital, Turku, Finland

Introduction: An important outcome measure of patient care is the impact on the patient's health-related quality of life (HRQoL). Existing ear-specific HRQoL instruments are designed for a certain diagnosis and have different emphases on subdivisions such as symptoms, hearing problems, psychosocial impact and the need for care. The optimal length of the recall period has not been studied. For these reasons, a new survey that would cover most chronic ear diseases was developed.

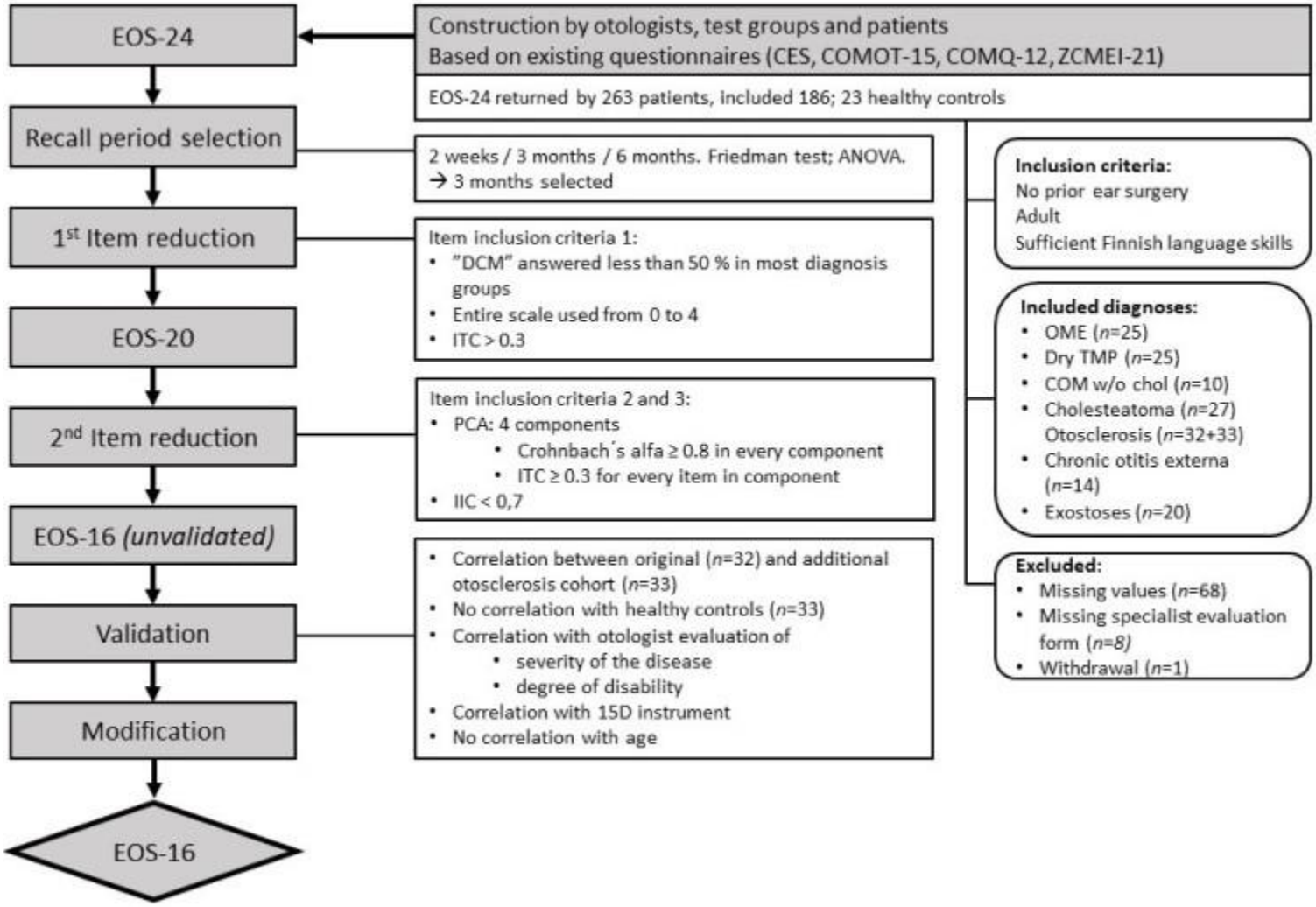
Objectives: Untreated adult patients (included n=186) with one of seven different chronic otologic conditions (secretory otitis media (SOM), tympanic membrane perforation with dry middle ear, chronic otitis media without cholesteatoma (COM), cholesteatoma, otosclerosis, exostosis, or chronic otitis externa) from all five university hospitals in Finland were recruited.

Methods: A preliminary 24-item survey (EOS-24) was created. Included patients responded to EOS-24 and 15D general HRQoL instruments. The recruiting otologists evaluated the severity of the disease and the disability caused by the disease. A control group was recruited. Based on the patients' responses in different diagnosis groups, the items were reduced according to pre-defined criteria. The resulting survey was validated by a thorough statistical analysis. Further testing has been done with retrospective and prospective patient cohorts.

Table: Study design. OME, Middle ear with effusion; Dry TM perforation, dry tympanic membrane perforation; COM w/o chol., chronic otitis media without cholesteatoma.

Image:

Abstract Presentations



Results: The relevance and necessity of the original 24 items were thoroughly investigated, leading to exclusion of eight items and modification of one. The remaining 16 items were well-balanced between subdivisions and useful in all seven diagnosis groups, and thus constitute the final instrument EOS-16. The most suitable recall period was three months.

Conclusions: EOS-16 has been created according to the HRQoL survey guidelines with a versatile nationwide patient population. The survey has been validated and can be used for a wide range of chronic ear diseases as a HRQoL instrument. The EOS-16 is introduced to clinical use, and has proven very helpful in routine otological practice.

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Abstract Presentations

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Disclosure of Interest: None Declared

Keywords: Chronic ear diseases; , Health-related quality of life, HRQoL

Abstract Presentations

Neuro Otology
Neuro Otology - Basic Science

EAONO21-PO-040
Herpes-, polyoma- and parvoviruses in vestibular schwannoma

M. Jauhiainen [1 2,*], U. Mohanraj [1], M. Lehecka [3], M. Niemelä [3], T. Hirvonen [2], A. Mäkitie [2], M. Söderlund-Venermo [1], S. Sinkkonen [2]
[1]Virology, University of Helsinki, [2]Otorhinolaryngology – Head and Neck Surgery, [3]Neurosurgery, Helsinki University Hospital, Helsinki, Finland

Introduction: Vestibular schwannoma (VS) arises from the Schwann cells surrounding the eighth cranial nerve. Although benign, its growth and compression may cause serious morbidity and mortality. VS may occur sporadically or as a result of the Neurofibromatosis 2 syndrome. In both, inactivation of the tumor suppression gene *MERLIN* is detected. The cause of the mutation in the sporadic disease remains unknown. There are some occupational risk factors, and high-dose ionizing radiation has been shown to be associated with an increased risk of VS.

Objectives: Only a few reports regarding a potential viral etiology of VS exist but with no notable findings. This study focuses on the potential presence of herpes-, polyoma- and parvoviruses in VS.

Methods: The presence of various herpes- (HSV-1, HSV-2, VZV, HHV-6A, HHV-6B, HHV-7, EBV, CMV, and KSHV), polyoma- (BKPyV, JCPyV, MCPyV), and parvo- (B19, BuV, TuV and CuV, HBoV1-4) virus DNAs was analyzed by PCRs in formalin-fixed paraffin-embedded (FFPE) tissue samples of 46 VSs.

Results: The presence of 20 viruses was analyzed in a total of 46 VS tumor samples. Viral DNA was detected in altogether 5/46 (11%) samples. Merkel cell polyomavirus (MCPyV) was detected in 3/46 (7%) tumors. One tumor was positive for Epstein-Barr virus (EBV) DNA and one tumor for human herpesviruses 7 (HHV-7).

Conclusions: Our findings do not support a major role for these herpes-, polyoma- and parvoviruses in the etiology of VS.

Disclosure of Interest: None Declared

Keywords: etiology, vestibular schwannoma, virus

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-041

Balloon Eustachian tuboplasty for baro-challenge-induced Eustachian tube dysfunction; a systematic review and a retrospective cohort study of 39 patients

H. Oehlandt [1 2,*], O. Lindfors [2], J. Laakso [2], J. Toivonen [1], D. Poe [3], S. Sinkkonen [2]
[1]Otorhinolaryngology, Turku University Hospital, Turku, [2]Otorhinolaryngology – Head and Neck Surgery, Helsinki University Hospital, Helsinki, Finland, [3]Otolaryngology and Communications Enhancement, Harvard Medical School, Boston, United States

Introduction: Baro-challenge-induced Eustachian tube dysfunction (ETD) manifests due to inadequate Eustachian tube (ET) function during rapid ambient pressure changes, although ET function may be normal in normobaric situations. Although balloon Eustachian tuboplasty (BET) has been shown effective in some other forms of dilatory ETD, information about its effects on baro-challenge-induced ETD is scarce due to rarity of the entitity.

Objectives: This systematic review and retrospective cohort study aimed to evaluate the effectiveness of BET for the treatment of baro-challenge-induced ETD.

Methods: A systematic literature search (PubMed, the Cochrane Library and Scopus) was conducted in November 2020 and resulted 174 articles. Eight articles fulfilled the inclusion criteria (data available from 74 adult baro-challenge-induced ETD patients). In addition, we retrospectively evaluated 39 BET operations at Helsinki University Hospital from 2011 to 2020. Data from these patients were collected from medical charts, and a questionnaire was sent to patients. Meta-analysis was used to evaluate subjective improvement in symptoms, changes in ETDQ-7 scores and Valsalva maneuver performance.

Results: Outcome parameters varied between studies. Reduction in subjective symptoms was noted in 80 % of the patients. Mean ETDQ-7 score improvement ranged from 10 to 18 points. Four studies showed improvement in Valsalva maneuver performance.

Conclusions: BET seems to be effective in most cases of baro-challenge-induced ETD.

Disclosure of Interest: None Declared

Keywords: Baro-challenge-induced , Balloon dilation, Balloon Eustachian tuboplasty, Eustachian tube dysfunction

Abstract Presentations

Auditory Implants
Auditory Implants - Clinical Science

EAONO21-PO-042
Sound localization with bilateral bone conduction devices

E. Teunissen [1], C. Caspers [1], A. Janssen [1], M. Agterberg [2], C. Cremers [1], M. Hol [3 4 5,*], A. Bosman [1]
[1]Otorhinolaryngology/Head and Neck Surgery, Radboudumc, [2]Biophysics, Donders Institute for Brain, Cognition and Behavior, [3]Otorhinolaryngology/Head and Neck Surgery, Radboud University, Nijmegen, [4]Research School of Behavioral and Cognitive Neurosciences, Graduate School of Medical Sciences, [5]Otorhinolaryngology/Head and Neck Surgery, UMCG, Groningen, Netherlands

Introduction: The percutaneous bone conduction device (BCD) is an established hearing rehabilitation method for patients with conductive or mixed hearing loss, if hearing cannot be optimized by surgery or conventional hearing aids. The effectiveness of bilateral BCDs has been questioned, as due to the small intracranial attenuation one BCD will stimulate both cochleas almost equally. However, already in 1991, Hamann et al. demonstrated the audiological benefit of a second BCD in patients with bilateral conductive hearing loss (BCHL). Subsequently, in 1995, bilateral application of BCDs was gradually introduced. Since then, several studies have shown that bilateral usage of BCDs is effective in improving speech understanding in noise, hearing-related quality of life and sound localization in patients with BCHL. With sound localization being an important feature in everyday life, it would be of interest to explore whether we can incorporate sound localization improving methods into our clinical practice. Improved localization might be achieved by changes in device settings and by providing localization training. However, with conventional hearing aids, it has been demonstrated that features such as compression and microphone directionality have an effect on localization performance. It is still unclear whether this also holds for BCDs. Furthermore, a recent study with normal hearing patients showed that localization training with visual feedback improved horizontal localization accuracy. A similar training in acute monaurally deprived patients also resulted in enhanced horizontal localization.

Objectives: To investigate sound localization in patients bilaterally fitted with bone conduction devices (BCDs). Additionally, clinically applicable methods to improve localization accuracy were explored.

Methods: Fifteen adults with bilaterally fitted percutaneous BCDs were included. At baseline, sound localization, (un)aided pure-tone thresholds, device use, speech, spatial and qualities of hearing scale (SSQ) and York hearing-related quality of life (YHRQL) questionnaire were measured. Settings to optimize sound localizing were added to the BCDs. At 1 month, sound localization was assessed again and localization was practiced with a series of sounds with visual feedback. At 3 months¸ localization performance, device use and questionnaire scores were determined again.

Results: Fifteen adults with bilaterally fitted percutaneous BCDs were included. At baseline, sound localization, (un)aided pure-tone thresholds, device use, speech, spatial and qualities of hearing scale (SSQ) and York hearing-related quality of life (YHRQL) questionnaire were measured. Settings to optimize sound localizing were added to the BCDs. At 1 month, sound localization was assessed again and localization was practiced with a series of sounds with visual feedback. At 3 months¸ localization performance, device use and questionnaire scores were determined again.

Conclusions: In this study, the majority of experienced bilateral BCD users could lateralize sounds and one third was able to localize sounds (quite) accurately. The localization performance was robust and stable over time. Although SSQ scores were increased at the last visit, optimizing device settings and a short practice session did not improve sound localization.

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Disclosure of Interest: E. Teunissen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, C. Caspers Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, A. Janssen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, M. Agterberg Conflict with: Cochlear Bone Anchored Solutions, C. Cremers Conflict with: OticonMedical, M. Hol Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, A. Bosman Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical

Keywords: bone conduction implants

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-043

INNER EAR BAROTRAUMA AND INNER EAR DECOMPRESSION ILLNESS: A SYSTEMATIC REVIEW ON DIFFERENTIAL DIAGNOSTICS

O. Lindfors [1,*], A. Räisänen-Sokolowski [2 3], T. Hirvonen [1], S. Sinkkonen [1]
[1]Otorhinolaryngology - Head and Neck Surgery, [2]Pathology, Helsinki University Hospital, [3]Centre for Military Medicine, Finnish Defence Forces, Helsinki, Finland

Introduction:
Inner ear barotrauma (IEBT) and inner ear decompression illness (IEDCI) are the two dysbaric inner ear injuries associated with diving. Both conditions manifest as cochleovestibular symptoms, causing difficulties in differential diagnostics and possibly delaying (or leading to inappropriate) treatment.

Objectives:
A comprehensive overview of IEBT and IEDCI.

Methods:
This was a systematic review. The search strategy consisted of a preliminary search, followed by a systematic search covering three databases (PubMed, Medline, Scopus) and limiting the search to studies published in English. The studies were included when sufficiently reporting of one or more IEBT or IEDCI patients in connection to diving. In addition to data extraction, concerns regarding missing and duplicate data were minimized by contacting the original authors when necessary.

Results:
In total, 25 studies with IEBT patients (*n*=183) and 18 studies with IEDCI patients (*n*=397) were included in the literature review. The variables most useful in differentiating between IEBT and IEDCI were dive type (free diving vs. scuba diving), dive gas (compressed air vs. mixed breathing gases), dive profile (mean depth 13 msw vs. 43 msw), symptom onset (when descending vs. when ascending or surfacing), and distribution of cochleovestibular symptoms (vestibular vs. cochlear, isolated vs. non-isolated). The variables related to middle ear equalization (middle ear equalization difficulties or middle ear barotrauma) were *not* reliable in the differential diagnostics between IEBT and IEDCI.

Conclusions:
This systematic review elaborates the differential diagnostics of inner ear injuries in connection to diving. The data suggest that contrary to current guidelines, symptoms of poor middle ear equalization or findings consistent with middle ear barotrauma should *not* be utilized in the differential diagnostics between IEBT and IEDCI. Future research should focus on examining poor middle ear equalization in both IEBT and IEDCI patients before such a guideline can be formulated.

Disclosure of Interest: None Declared
Keywords: Decompression, Diving, ENT, Epidemiology

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-044
Pre-school and early school hearing and dental status screening in hard-to-reach areas of Bulgaria

M. Milkov [1,*], M. Stoykov [1], M. Bliznakova [1]
[1]Medical University Varna, Varna, Bulgaria

Introduction: The ability to hear is one of the most important human sensations. Any disorders in it should be proven and coped with in a timely manner.

Objectives: The aim of the work was to assess the hearing and dental status of children in the pre-school and early school age in area of the country that are hard to reach.

Methods: 250 pre-school and early school children from 2 municipalities of the district Varna, Bulgaria in the period between 2016 and 2019 had their hearing ability examined. They were aged between 4 and 12. The children were offered primary ENT- and dental examination. The action was charitable and was executed by a medical ENT-doctor and students of Medical University - Varna. Audiometry and OAE-tests for hearing assessment and a dental check-up for teeth condition evaluation were performed. A portative audiometer and OAE-measuring device were used along with dental probes and mirrors.

Results: It is of great importance to keep track of the hearing ability of children in pre-school and early school periods nationwide especially when hearing screening campaigns of the kind are not established and organized.

Conclusions: The significance of the universities when establishing and executing screening programs which are often the first of their kind must be stressed out.

Disclosure of Interest: None Declared

Keywords: hard-to-reach ares, universities, hearing screening, OAE, audiometry

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-045
Ceruminous Adenocarcinoma of the Temporal Bone : A Case Report

M. A. K. Chan [1,*], F. L. Abes [1]
[1]Otorhinolaryngology, Manila Doctors Hospital, Manila, Philippines

Introduction: Tumors that originate from ceruminous glands are very rare and malignancies of the temporal bone make up only 0.2% of all head and neck cancers[5]; thus, the classification, clinical behavior, and management of these tumors remain debatable[1]. Late stage temporal bone carcinomas have poor survival rates even after surgery. Herein we report our case of ceruminous adenocarcinoma presenting as a polypoid mass over the external auditory canal. Patient underwent subtotal temporal bone resection followed by radiotherapy, is generally well and survives up to this day.

Objectives: To present a rare case of a temporal bone ceruminous adenocarcinoma

Methods: Case Report

Image:

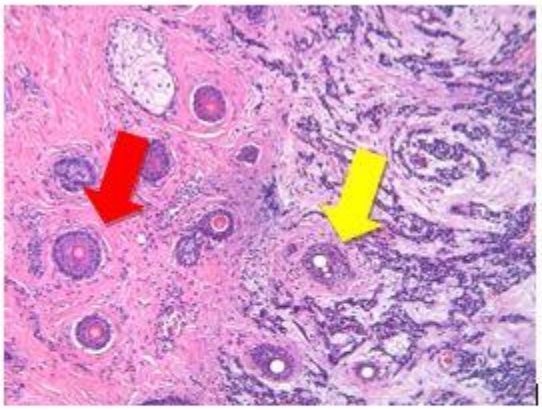

Fig. 1. Adjacent to the infiltrative neoplasm are ceruminous glands which is probably the site of origin for this poorly differentiated neoplasm. As seen in this figure, there is a transition of stages of tumor development arising from the ceruminous glands. From your left, these are the normal structure of sweat glands and hair follicles *(red arrow)*. Wherein the tumor cells gradually involves the glands and from the right most portion, these glands are completely involved by the tumor cells *(yellow arrow)*.

Results: Carcinomas of ceruminous origin frequently recur locally, and may give rise to regional lymph node and systemic metastasis. Ceruminous carcinomas usually have an average mean survival of 1.5 –4.7 years and the disease specific mortality is 35.0% for ceruminous adenocarcinomas. Despite adequate treatment, overall 5-year survival rates

do not exceed 50% for this group of late-stage tumors[6]. In some series, the estimated 5-year survival rates for primary carcinomas of the external auditory canal range from as low as 10–15% for advanced cases to 80–85% for early disease[8]. Our patient, however, was able to undergo radiotherapy and survives up to this day, 2 years post-surgery.

Conclusions: Primary carcinomas of the external auditory canal or temporal bone are very rare. Patients presenting with a late stage tumor have generally poor prognosis and outcome. Further epidemiological studies are suggested to have a better understanding of this rare disease.

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Disclosure of Interest: None Declared

Keywords: ceruminous adenocarcinoma, ear canal mass, external auditory canal carcinoma, temporal bone cancer

Abstract Presentations

Neuro Otology
Neuro Otology – Clinical

EAONO21-PO-046

Introduction of modern audio-vestibular diagnostic methods in the Faculty of Dental Medicine, Medical University – Varna

M. Milkov [1,*], M. Stoykov [1], S. Peev [1]
[1]Medical University Varna, Varna, Bulgaria

Introduction: Audio-vestibular diagnostics is an important and modern field of the ENT-specialty. Due to the stressful everyday life it could be said that there is an epidemic of patients with audio-vestibular problems – reduced hearing ability, tinnitus, dizziness, vertigo. It should be stressed out that there is a connection with the pathology in the maxillo-facial region such as temporomandibular disorders, pain in the neck and other dysfunctions.

Objectives: To present our experience in the field of providing patients with full diagnostics and treating features in the field of the audio-vestibular disorders in the University Medical and Dental Centre in Medical University – Varna, Bulgaria and the newly established Audio-vestibular laboratory.

Methods: For the time period September 2020 – May 2021, 120 patients (including hearing screening of 30 children up to the age of 10), aged between 2 and 80 years, had audio-vestibular examinations in the Audio-vestibular laboratory in the University Medical and Dental Centre of Medical University – Varna, Bulgaria. Tests implemented according to the different clinical cases were audiometry, tympanometry, OAE, SERA, ASSR, caloric tests, vHIT, videonystagmography, virtual reality. All patients received a thorough ENT-examination and consultation. Those of them with dysfunctions in the maxillo-facial region were inspected by a dentist. Charity campaigns were introduced with free check-ups as well.

Results: Based on the results from the patients' interviews and examinations performed it can be deducted that dysfunctions of the audio-vestibular system are not rare. Some of the patients presented as multi-pathology cases. 75% of the patients had tinnitus, nearly 30% - a dysfunction in the maxillo-facial area. Dizzy patient were 22% of all examined.

Conclusions: Clinicians should work tirelessly so as to present their patients with clear examination and treating protocols. More measures should be implemented to make the examinations more affordable to the wide range of patients.

Disclosure of Interest: None Declared

Keywords: OAE, audiometry, tympanometry, SERA, VNG, vHIT

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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-047
Unusual presentation of a fibroepithelial polyp in the external auditory canal

K. Saha [1,*]
[1]Department of Otolaryngology-Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

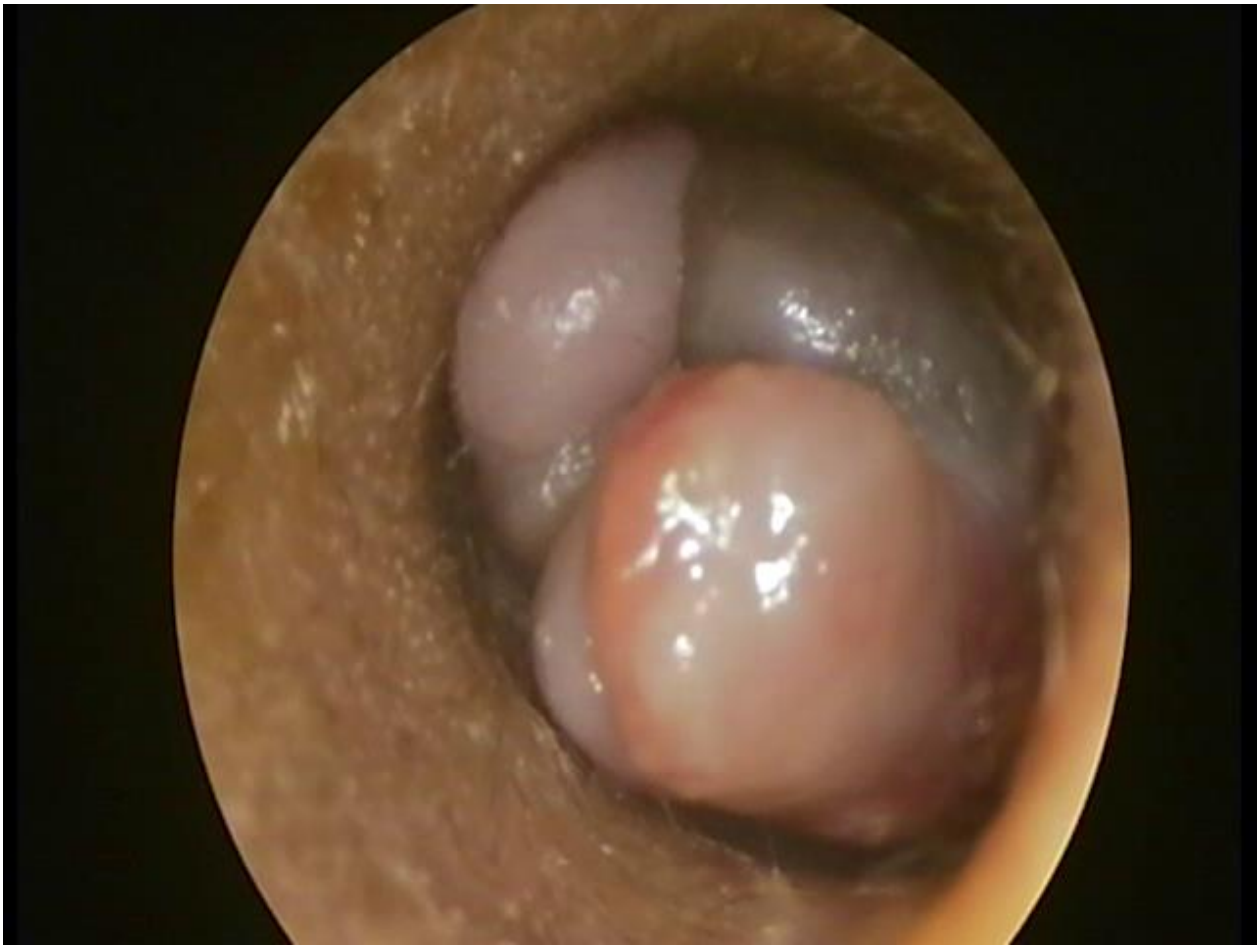
Introduction: In Otolaryngology, fibroepithelial polyp (FEP) is commonly found in the skin of the neck, trunk, and face. Independent cases of mucosal origin in the head and neck region were reported from the tongue, oropharynx, inferior nasal turbinate, tonsil. Fibroepithelial polyp originating from the external auditory canal (EAC) is extremely rare. The independent origin of FEP in the external auditory canal was first reported by Tanaka et al in 2013. Only three cases of independent origin of EAC have been reported to date.

Objectives: To characterize the clinical presentation and management of a rare case of independent origin of fibroepithelial polyp of the external auditory canal.

Methods: A 12-year-old male child presented with complaints of swelling and blockage sensation in the left ear for 5 years, hearing impairment for 1 year, and otorhoea associated with pain for 10 days. Initially, it was an asymptomatic small lesion. Otoendoscopy revealed the grape-like multiple swellings with the surface ulceration in some areas. It occluded the whole EAC, and its attachment could not be delineated. The rest of the ENT examination found no abnormality. Pure tone audiogram revealed 38.75dB ABG (air-bone gap) in 500,1000,2000 and 4000 Hz in the left ear. A computed tomography scan demonstrated a well-circumscribed calcified lesion having an eccentric small soft tissue component in the left external auditory canal. The soft tissue density between the lesion and the tympanic membrane may be granulation tissue or desquamated debris. The lesion was excised completely with a standard post-auricular approach under general anesthesia on 19-08-2018. The per-operative finding showed that the mass was attached at the junction of the inferior and posterior wall, single in number with multiple surface projections. Some surface areas had superficial ulceration. After removal of the mass, desquamated keratinous debris was found in the external auditory canal which was sucked out. The tympanic membrane and remaining EAC were revealed normal. A bony erosion and uneven bony projection were noticed near the attachment of the lesion. Canaloplasty was done, and the bony gap was filled with pieces of conchal cartilage. The postoperative course was uneventful. Macroscopically the tumour was solid, hard, and grey-white, partly covered with mucosa. It measured 2.0X1.4X1.0 cm. The microscopic examination showed polypoidal tissue covered with stratified squamous epithelium and the underlying core of fibrous tissue. Some areas showed small chips of woven bone with fibrous tissue and ulcerated surface lined by granulation tissue. These findings suggested a diagnosis of the fibroepithelial polyp.

Image:

Abstract Presentations



Results: The resected area of the external healed completely within one month. The child had got relief of pain, otorhoea, and blockage sensation of the ear with the improvement of hearing. The follow-up pure tone audiogram after 33 months showed 16.25dB ABG (air-bone gap) in 500,1000,2000 and 4000 Hz with 22.5 dB gain. The recurrence was noticed in the resected area after 33 months. There were smooth surfaced, multiple swelling in the previous site without any symptom.

Conclusions: Fibroepithelial polyp arising independently in the external auditory canal (EAC) is extremely rare. As the differentiation of FEP from others, tumour-like lesions in the EAC is clinically quite difficult, it should be considered as a rare differential diagnosis along with them. Surgical excision and histopathological confirmation are the management of choice even it is asymptomatic. So, though benign, long-term follow-up is recommended to detect late recurrence.

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Disclosure of Interest: K. Saha Conflict with: None

Keywords: Fibroepithelial polyp, aural polyp, external auditory canal, surgery, recurrence

EAONO WEEK 2021 HOSTED BY THE UK
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Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-048

Mastoid obliteration with hydroxyapatite or bone pâté in tympanomastoidectomy surgery performed on patients with cholesteatoma and chronic suppurative otitis media: a retrospective analysis.

C. Lindeboom[*], P. van Kempen [1], J. Buwalda [1], S. Bom [1], B. Westerlaken [2], D. van Zuijlen [2], F. van der Beek
[1]Ear, Nose and Throat Surgery, Deventer Ziekenhuis, Deventer, [2]Ear, Nose and Throat Surgery, Medisch Spectrum Twente, Enschede, Netherlands

Introduction:
Objectives: To compare the efficacy and safety of, synthetic hydroxyapatite (HA) versus autologous bone pâté as filler material in obliteration surgery performed on chronic suppurative otitis media and acquired cholesteatoma.

Methods: A retrospective follow-up study between 2017 and 2020 in two large teaching hospitals in the Netherlands. Eighty-one patients (83 ears) with chronic suppurative otitis media or acquired cholesteatoma underwent tympanomastoidectomy surgery and mastoid obliteration by use of HA (n=45) or bone pâté (n=38). All patients underwent preoperative CT scanning and were followed-up with micro-otoscopy, audiometry and MRI with diffusion-weighted imaging if indicated. The following outcome parameters were analyzed: procedure safety (wound infections and complications), cholesteatoma recidivism (residual and recurrent rates), control of infection (Merchant's scale) and audiometric performance (pure-tone averages at 500, 1000, 2000 and 4000 Hz).

Results: During the follow-up period of 25 months (±8.6, 12–43) for HA and 24 months (±6.2, 11–43) for bone pâté wound infection was only detected in patients obliterated with bone pâté (4.8%) and were successfully treated with antibiotics. No other major surgical complications were observed. Cholesteatoma recidivism was observed in 10.5% (recurrence 5.3%; residual 5.3%) of the patients using bone pâté and 6.7% (recurrence 0%; residual 6.7%) of patients using HA. Complete control of infection (Merchant grade 0) was achieved in 76.2% using bone pâté and in 86.8% of all cases obliterated with HA one year postoperatively. The remaining cases scored a Merchant grade 1 or 2, none showed complete failure to manage infection (Merchant grade 3). Pre- and postoperative audiometry showed significant improvement of the air conduction threshold, mean air bone gap, low and high Fletcher Index in both groups. Audiometric performance did not differ significantly between groups.

Conclusions: Mastoid obliteration with HA and bone pâté are both safe and effective materials in tympanomastoidectomy surgery. Remarkably, in the bone pâté group wound infections were observed where in the HA group none were established in any of the follow-ups.

Disclosure of Interest: None Declared

Keywords: Bone pâté, Cholesteatoma, Chronic suppurative otitis media, Mastoid obliteration

Abstract Presentations

Auditory Implants
Auditory Implants - Clinical Science

EAONO21-PO-049

A clinical evaluation of minimally invasive Ponto surgery with updated procedure package for inserting bone-anchored hearing implants

E. Teunissen [1,*], C. Caspers [1], I. Kruyt [1], E. Mylanus [1], M. Hol [1 2 3]
[1]Otorhinolaryngology/Head and Neck Surgery, Radboudumc, Nijmegen, [2]Research School of Behavioral and Cognitive Neurosciences, Graduate School of Medical Sciences, [3]Otorhinolaryngology/Head and Neck Surgery, UMCG, Groningen, Netherlands

Introduction: Because of its favorable outcomes, the linear incision technique with soft tissue preservation (LIT-TP) is currently considered the gold standard procedure to insert bone-anchored hearing implants (BAHIs). To further reduce postoperative complications, a standardized punch-only procedure called minimally invasive Ponto surgery (MIPS) was developed. Several institutions have already adopted this procedure notwithstanding the high variability in implant loss rates reported. The high implant loss rates in some studies raised concerns, especially since a non-significantly higher implant loss rate was found for MIPS when compared with the LIT-TP and bus-stop technique. In line with this, a comparative study of MIPS and LIT-TP conducted at our institution, resulted in a statistically non-significant though higher implant loss rate of 12% for MIPS. Several factors contributing to the high implant loss rates after MIPS have been proposed. The MIPS drills used in this study are included in an updated MIPS procedure pack which is currently utilized in several institutions. The design and shape of the drill bits were modified to further improve drill efficiency and osteotomy preparation. Clinical outcomes of the modified MIPS drills (m-MIPS) have not yet been published. Since the modified drills are already in clinical use, we believe it is of importance to investigate the outcomes of m-MIPS, before determining whether this procedure should be considered an equivalent alternative to LIT-TP.

Objectives: To compare 6-months outcomes of the modified minimally invasive Ponto surgery (m-MIPS) to both the linear incision technique with soft tissue preservation (LIT-TP), and original MIPS (o-MIPS) for inserting bone-anchored hearing implants (BAHIs).

Methods: This i tudy includes an exploratory pilot with one test group and two historical control groups performed in a tertiary referral center. In the test group, 24 patients (25 implants) were prospectively included. Each control group comprised 25 patients (25 implants) who participated in previously conducted clinical trials. The test group received a BAHI using m-MIPS. The two control groups underwent surgery using the LIT-TP and o-MIPS, respectively. Implant survival, implant stability and surgery-related variables were compared between the test and control groups. Soft tissue status, skin sensibility and subjective numbness were compared between m-MIPS and LIT-TP only.

Results: Implant survival was comparable between m-MIPS and LIT-TP**,** whereas implant stability measurements were slightly lower for m-MIPS. M-MIPS resulted in comparable adverse skin reactions and skin sensibility, significantly reduced surgical time and slightly improved subjective numbness, compared with LIT-TP. Between m-MIPS and o-MIPS, no statistically significant differences in I implant survival, implant stability and surgical time were observed.

Abstract Presentations

Conclusions: A trend towards lower implant loss rates after m-MIPS was observed, when compared with o-MIPS. M-MIPS seems to be a good alternative to LIT-TP for inserting BAHIs, since most clinical outcomes were either comparable or slightly better for m-MIPS. Upon deciding on which technique to use, larger studies on implant survival should be performed. Furthermore, other aspects such as costs, training aspects and surgical experience should be evaluated.

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Abstract Presentations

Disclosure of Interest: E. Teunissen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, C. Caspers Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, I. Kruyt Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, E. Mylanus Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, M. Hol Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical

Keywords: bone conduction implants

EAONO WEEK 2021 HOSTED BY THE UK
6-10 SEPTEMBER 2021

Abstract Presentations

Neuro Otology
Neuro Otology – Clinical

EAONO21-PO-050

How efficient is a new type of Mechanical Rotational Chair in the treatment of posterior Benign Paroxysmal Positional Vertigo?

D. D. Hougaard [1,*]
[1]Department of Otolaryngology, Head & Neck Surgery and Audiology, Aalborg University Hospital, Aalborg, Denmark

Introduction: Benign Paroxysmal Positional Vertigo (BPPV) is a very common vestibular disease and in most cases this disease may be diagnosed and treated efficiently by manual reposional maneuvers performed on an examination bed. However, not all BPPV cases are diagnosed and treated suffiently by these standard methods. Therefore, several Mechanical Rotational Chairs have been developed with possible 360 degree positioning of patients in two orthogonal planes. There are several repositional maneuvers available with these chairs, but so far limited research regarding the efficiency of these fairly new treatment modalities exist. This chair (Rotundum), among other things, has a special feature that allows exact positioning with one degree intervals in the yaw plane.

Objectives: Primary endpoint was to evaluate how efficient a new mechanical rotational chair was in the treatment of posterior canalolithiasis (p-CAN) overall. Secondary endpoints include treatment efficiency of three individual repositional maneuvers.

Methods: Randomized prospective clinical trial. Approximately 250 subjects diagnosed with p-CAN Benign Paroxysmal Positional Vertigo (BPPV) has been included. Both diagnostics and treatments were done with the Rotundum® Chair. When diagnosed with p-CAN BPPV patients were block randomized to one of three selected treatment options with the chair: 1) Epley Maneuver, 2) Semont Maneuver or 3) 360-degree vertical rotation maneuver. For diagnostics, patients were fitted with a VNG google with vision denied.

Image:

Abstract Presentations

Results: Preliminary data on the efficacy of the treatments offered with the Rotundum Rotational Chair will be presented, including overall data as well as data on the efficacy of all three separate treatment options. Successful treatment criteria include cessation of both positional nystagmus and symptoms. Treatment failure was set to a need of more than 10 treatments.

Conclusions: Following data extraction, preliminary conclusions will be made on how efficient this new rotational chair is in the treatment of p-CAN BPPV.

Disclosure of Interest: None Declared

Keywords: BPPV, Mechanical Rotational Chair (Rotundum)

Abstract Presentations

Auditory Implants
Auditory Implants - Clinical Science

EAONO21-PO-051
Hearing-related quality of life in 75 patients with a percutaneous bone conduction device

E. Teunissen [1], C. Caspers [1], R. Nelissen [2], H. Groenewoud [3], M. Hol [1 4 5,*]
[1]Otorhinolaryngology/Head and Neck Surgery, Radboudumc, Nijmegen, [2]Otorhinolaryngology, Status. Antonius Hospital, Nieuwegein, [3]Health Evidence, Radboudumc, Nijmegen, [4]Research School of Behavioral and Cognitive Neurosciences, Graduate School of Medical Sciences, [5]Otorhinolaryngology/Head and Neck Surgery, UMCG, Groningen, Netherlands

Introduction: Clinical and audiological outcomes of the percutaneous bone conduction device (BCD) are proven to be beneficial for patients with conductive/mixed hearing loss (CMHL) or single sided deafness (SSD) who can't be rehabilitated with conventional hearing aids or surgery. A BCD involves a surgical procedure as well as financial costs related to care and replacement of the devices. In order to justify the use of such an implant system, cost-effectiveness studies have become increasingly important. Unfortunately, cost-effectiveness evaluations are limited by the lack of usable data on quality of life (QoL) and device usage. Generic health-related QoL questionnaires do not seem specific enough to detect changes in QoL related to the BCD. Furthermore, studies on hearing-related QoL (HRQoL) either use retrospectively collected data, or focus on short-term HRQoL in patients with a specific indication. In these studies, HRQoL is mainly assessed by means of the Glasgow Benefit Inventory (GBI). The GBI is a single-shot questionnaire which is widely used to assess the benefit of different otolaryngology interventions, despite the fact that it is subject to recall bias. Status questionnaires, such as the Glasgow Health Status Inventory (GHSI), which are administered pre- and postintervention are therefore considered to be more bias-free. Unfortunately, the GHSI is not commonly used in BCD patients.

Objectives: To evaluate long-term hearing-related quality of life (HRQoL) and device use in bone conduction (BCD) users. Furthermore, to assess differences between indications and changes in HRQoL over time.

Methods: This study includes a prospective questionnaire survey of 75 patients with a percutaneous BCD performed in a tertiary referral center and measured. Main outcome measurs included the Glasgow Benefit Inventory (GBI) at 3 and 12 months postoperatively, Glasgow Health Status Inventory (GHSI) preoperatively and 6 and 36 months postoperatively, device use at 6, 12 and 36 months. Changes over time were assessed and outcomes were compared between indications.

Results: After implantation, 97% of all patients reported a positive benefit on the GBI total. The GHSI total had improved with median 15 points (Interquartile range (IQR) 12). At 36 months, median device use was 15 hours/day (IQR 10) and one non-user was reported. Patients with bilateral hearing loss (BHL) showed greater improvement on the GHSI total (median 18 versus 14, $p<0.0001$) and used their devices more frequently (median 16 versus 8 hours/day, $p<0.0001$) than patients with unilateral HL (UHL). Postoperative GHSI and GBI scores were consistent over time, in the entire patient population and for every indication. Between 6 and 36 months, device use was stable over time, except for patients with single-sided deafness (SSD; median -6.4 hours/day, $p=0.009$).

Conclusions: The BCD improves HRQoL in patients with BHL, in patients with unilateral conductive/mixed hearing loss and in patients with SSD. Patients with BHL experienced a greater improvement in hearing status compared to patients with UHL. Although use decreased over time in SSD patients, device use was high for every indication.

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Abstract Presentations

Disclosure of Interest: E. Teunissen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, C. Caspers Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, R. Nelissen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, H. Groenewoud: None Declared, M. Hol Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical

Keywords: bone conduction implants

Abstract Presentations

Neuro Otology
Neuro Otology – Clinical

EAONO21-PO-053
Telephone Dizziness Clinic- Retrospective analysis

R. Vetrivel Vedachalam [1,*], P. Achar [2], N. Fergie
[1]Nottingham University Hospital, Nottingham, United Kingdom, [2]ENT, Nottingham University Hospital, Nottingham, United Kingdom

Introduction: Covid -19 pandemic had a profound impact on the way how the National Health Services delivered its care during these crucial times. 'E-health' (Ueda et al.,2020) or 'Digital health' emerged as a crucial and vital modality by which health care in provided to the needy during the times of lockdown and social distancing . In our institution, we have provided teleconsultations to the patients referred for dizziness management during this pandemic and aim of this study is to assess the effectiveness of these telephone clinics and identify areas for improvement.

Objectives:
1.To analyse role of telephone dizzy clinics in reducing patient footfall within hospital during COVID pandemic.
2.To identify challenges of telephone clinics in management of dizziness.

Methods: This is a retrospective analysis of patients participated in the Telephone vertigo clinic consultations in our hospital from October 2020 to December 2020 during the pandemic . Patients completed an online dizziness questionnaire sent through 'Drdoctor 'application before telephone consultation. Patients who had initial telephone consultation were included in the analysis and patients who had initial face to face consultation or only face to face consultation were excluded.

Results: Fifty Nine patient's case notes were screened. Six patients were excluded from the analysis based on exclusion criteria. Three patients were not accessible over phone and considered 'Did Not Attend'. They were given further telephone appointments and not excluded from the analysis. The sex ratio (Male:Female) in our study was 1:1.65. The mean age of the patients included in the study was 59 years (Range: 23-88 years). Seventy five percent of the patients were over 5th decade. Seventy percent of the patients were managed through only telephone consultation. Their results were either discussed with a follow up telephone appointment or informed through letter. Referral to balance clinic for vestibular assessment & physiotherapy and to audiology department for hearing assessment was required for 33% of our patients. The most common diagnosis in our study sample is Vestibular migraine (40%)followed by Benign Paroxysmal Positional Vertigo (21%) (Neuhaser,2016). Common reasons for discharge from telephone dizzy clinic in the first consultation were postural hypotension and resolved BPPV .Severe hard of hearing, Language barriers and Dementia were the hurdles in telephone consultation which required Face to face consultation. 33% of patients needed to come to hospital for further examination and audio-vestibular investigations. This can partially be addressed with video consultations and standardized application in smart devices for audiological assessment.

Conclusions: Vestibular migraine was found as a common diagnosis. Smart technologies and applications can be used in overcoming the hurdles in teleconsultations(Cohen and Nahed,2021). The screening questionnaire can be used by

general practitioners to triage the patient and educate them in managing migraine before the need for an ENT referral. Telephone consultation along with a screening questionnaire is an effective strategy in triaging and managing dizzy patients. A comparative analysis between telephone and face to face consultations is currently being studied to throw further light in this area.

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Disclosure of Interest: None Declared

Keywords: BPPV, Online dizziness questionnaire, Telephone vertigo clinic, vestibular migraine

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Abstract Presentations

Auditory Implants
Auditory Implants - Clinical Science

EAONO21-PO-054

Long-term clinical outcomes of percutaneous implants for bone conduction devices: Prospective five year evaluation of different implant designs and surgical techniques

E. Teunissen [1,*], M. Vijverberg [2], C. Caspers [1], E. Mylanus [1], M. Hol [1 3 4]
[1]Otorhinolaryngology/Head and Neck Surgery, Radboudumc, Nijmegen, [2]Otorhinolaryngology/Head and Neck Surgery, LUMC, Leiden, [3]Research School of Behavioral and Cognitive Neurosciences, Graduate School of Medical Sciences, [4]Otorhinolaryngology/Head and Neck Surgery, UMCG, Groningen, Netherlands

Introduction: Since its introduction in 1977, bone-anchored hearing systems have been used by more than 200.000 people worldwide to achieve adequate hearing rehabilitation. The most frequently observed complications of the percutaneous bone-anchored hearing implant (BAHI) in the adult population are implant loss (1.6–17.4%) and adverse soft tissue reactions (2.4–38.1%). Over the past decades, several changes in implant design and surgical technique have been made aiming to decrease the complications. In order to reduce postoperative complications of the bone-anchored hearing implant, several changes in implant design and surgical technique have been made aiming to decrease complications. In 2010, the so-called wide-diameter implant was introduced. This new 4.5-mm diameter implant has led to a larger bone-to-implant contact surface compared to the previous generation 3.75-mm diameter implants. Several clinical studies have shown superiority of this new implant design in terms of and higher implant stability quotient (ISQ) rates over the previous generation implants. Although implant survival of the 4.5-mm wide implant is high, a difference in survival compared with the 3.75-mm wide implant has not been found in previous investigations. Striving to decrease adverse skin reactions and improve skin sensibility the linear incision technique with soft tissue reduction (LIT-TR) was modified into a procedure without soft tissue reduction, so called 'soft tissue preservation'. This shorter surgical procedure showed more favorable results regarding skin sensibility and cosmetic outcomes. However, no difference in adverse skin reactions was observed. Consequently, the current standard of practice regarding BAHI surgery include the 4.5-mm-wide implant and the linear incision technique with soft tissue preservation (LIT-TP). Although short-term outcomes seem promising, limited data is available on long-term outcomes of the 4.5-mm-wide implant and concomitant surgical techniques.

Objectives: To evaluate 5-year clinical outcomes of bone-anchored hearing implants. Outcomes were compared between a 4.5-mm-wide and a 3.75-mm-wide implant, as well as between the linear incision technique with soft tissue preservation (LIT-TP) and soft tissue reduction (LIT-TR).

Methods: Single follow-up visit of two previously completed clinical studies. A total of 68 patients were included. These patients had either received a 4.5-mm-wide or a 3.75-mm-wide implant (both from Oticon Medical) and were operated using either the LIT-TP or LIT-TR technique.

Results: No significant differences between the 4.5-mm-wide and 3.75-mm-wide implant were observed in implant- (97.4% versus 95.0%) or abutment survival (94.8% vs 95%). For the LIT-TP versus LIT-TR, no significant differences between implant (96.0% vs 100%) or abutment survival (92.0% vs 92.0%) were seen. Implant stability quotient (ISQ)

from surgery increased significantly over time for both implants and both surgical techniques. During the 5-year follow-up of patients operated using LIT-TR, adverse Holgers scores (Holgers≥ 2) were observed in 15.2% of the 4.5-mm-wide implants and in 23.5% of the 3.75-mm-wide implants (*p*=.72). When comparing Holgers scores between LIT-TR and LIT-TP, adverse Holgers were reported in 10.5% versus 30.0% patients (p=0.27).

Conclusions: At 5-year follow-up, high implant and abutment survival rates were observed for both implant designs and both surgical techniques.

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Disclosure of Interest: E. Teunissen Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, M. Vijverberg Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, C. Caspers Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, E. Mylanus Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, M. Hol Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical, Conflict with: Cochlear Bone Anchored Solutions & Oticon Medical

Keywords: bone conduction implants

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-055

Analysis of Computed Tomography Scans of Temporal Bones: A study of observer agreement and critical reporting appraisal

C. Azevedo [1,*], D. Ribeiro [1], F. Mar [1], M. Neves [2], J. Rocha [2], M. Breda [1], S. Vilarinho [1], L. Dias [1]
[1]Otorhinolaryngology, [2]Neuroradiology, Hospital de Braga, Braga, Portugal

Introduction: Computed tomography (CT) scan of the temporal bone is universally recognized as being a very useful tool for assessing the structures of the ear, allowing the diagnosis of multiple associated pathologies, and supporting in surgical procedures, if necessary. However, given the complexity of its analysis with a steep learning curve, many otorhinolaryngologists rely on radiology reports for their diagnostic and therapeutic conduct, which are often incomplete or do not describe important structures which might influence the surgical approach.

Objectives: To explore inter-observer agreement in the analysis of anatomical and surgical structures of temporal bone CT scans and to evaluate radiology reports.

Methods: In 30 CT scans of the temporal bone from 30 different patients, 27 anatomical structures were analyzed blinded by three observers: a neuroradiologist, an Ear-Nose-Throat (ENT) surgeon, and an ENT third-year resident. We studied and compared the inter-observer agreement between de otorhinolaryngologists (surgeon and resident) and neuroradiologist and made a critical analysis of the respective radiology reports.

Results: We studied a total of 2430 responses given by our observers. In approximately 43% of the analysis made, there was a moderate inter-observer agreement of the structures by Cohen's kappa coefficient. Poor reliability was observed in the following structures, especially when analyzed by an ENT resident: external auditory canal, oval window, facial nerve, retrofacial cells, and sigmoid sinus. On average, only 39,5% of the structures analyzed were mentioned in the radiological reports, with the least mentioned structures being: sinus tympani, retrofacial cells, sigmoid sinus, carotid artery, vestibular aqueduct, and eustachian tube.

Conclusions: Although it is important for otorhinolaryngologists to know the structures of the ear and to recognize them in temporal bone CT scans, the truth is that radiological reports often end up being the guide in daily practice. With this study, we verified a considerable inter-observer variation in a few surgically important structures. So, the creation of a complete and mandatory checklist in the radiological reports of CT scans can improve its quality and clinical approach, and avoids possible failures in the diagnose of other concomitant pathologies.

Disclosure of Interest: None Declared

Keywords: Computed Tomography, Inter-Observer Agreement, Radiology, Temporal Bone

EAONO WEEK 2021 HOSTED BY THE UK
6-10 SEPTEMBER 2021

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-056
Endoscopic myringoplasty outcomes and follow up: self reflection on a training experience

M. Fiala [1 2,*], A. Ezzat [3]
[1]ENT, Alexandria University Hospital, Alexandria, Egypt, [2]ENT, Southampton University Hospital , Southampton , [3]ENT, United Lincolnshire Hospitals NHS, Lincoln, United Kingdom

Introduction: Over the last few decades, there has been a growing trend towards endoscopic ear surgery offering a less invasive technique and superior visualization with a wider angle view and improved, high-quality images of middle ear structures. This allows a more engaging operative experience for the training surgeons with a steep learning curve that can be ensured by a continous review of their own work.

Objectives: The aim of this work is:
1. Evaluate the training experience with endoscopic myringoplasty.
2. Self audit of postoperative outcomes and compare it with the national outcomes.
3. To audit follow up of operative cases.

Methods: Retrospective review of all patients who underwent endoscopic myringoplasty operation by a single training surgeon during the period from Augut 2019 to November 2020.
The collected data included age and sex of the patients, site and size of perforation, condition of the contralateral ear, graft material used, use of ear pack, length of hospital stay, follow up visits and whether follow up carried by the operating surgeon or not, symptoms relief, pre and post operative audiological results and complications.

Results: A total of 20 cases of endoscopic myringoplasty performed by a supervised single training surgeon were reviewed. The youngest case was 10 year old while the oldest case was 65 year old with a mean age for all cases of 36 years and a female to male ratio of 3:1. Eighteen cases were primary with only two revision cases. The contralateral ear was normal in 11 cases, while the rest showed pathology ranging from tympanic membrane perforation (2 cases), retraction (4 cases) and tympanosclerosis/scarred tympanic membrane (3 cases). The graft material used was cartilage and perichondriem (16 cases) and only perichondrium (4 cases). All cases were carried as a day surgery and were discharged on the same day. The closure rate of tympanic membrane perforations was 95% with 19 healed graft and one patient with residual perforation. The average hearing gain for all patients was 8.0 db. No major complications reported with minor complications ranging from mild balance symptoms (2 cases) and deep seated pain (1 case). All patients were offered a minimum of two follow up appointments with only 25% of patients who attended their first follow up appintment and 40% of those who attended their second follow up appointment were seen by the training operating surgeon.

Conclusions: Endoscopic ear surgery appears to provide superior visualization and teaching experience. Being a less invasive technique, it offers a smooth postoperative recovery and short hospital stay, still with satisfactory outcomes. As

any new technique, a learning curve is expected for training surgeons who should pursue self evaluation of operative outcomes and dedicated follow up of their own operative cases to ensure a better training experience.

Disclosure of Interest: None Declared

Keywords: endoscopic ear surgery, Hearing , Myringoplasty , outcome measures

Abstract Presentations

Skull Base
Skull Base – Clinical

EAONO21-PO-057
Spontaneous tegmen tympani dehiscence: causes and treatment of conductive hearing loss

R. Heywood [1 2 3 4,*], T. Goderie [5], M. Atlas [1 2]
[1]Ear Sciences Centre, Medical School, University of Western Australia, [2]Ear Science Institute Australia, Perth, Australia, [3]Duke-NUS Medical School, [4]Department of Otolaryngology, Sengkang General Hospital, Singapore, Singapore, [5]Department of Otolaryngology-Head and Neck surgery, Amsterdam UMC, Amsterdam, Netherlands

Introduction: Spontaneous dehiscence of the tegmen of the temporal bone with meningoencephalocele (SME) may present with otological symptoms, cerebrospinal fluid (CSF) rhinorrhea, neurological complications such as meningitis, or as an incidental finding during investigation of unrelated symptoms. Conductive hearing loss (CHL) is present in many patients at presentation. CHL commonly arises due to CSF effusion in the tympanomastoid space and prolapse of encephalocele on to the ossicular chain resulting in impaired movement. Synchronous superior semicircular canal dehiscence (SSCCD) may also cause CHL.

Objectives: To further investigate (i) the potential mechanisms for CHL in this setting; (ii) hearing outcomes following surgery to address SME, and (iii) the possible causes of persistent CHL following surgery.

Methods: The study was approved by the ethics review board. Retrospective case note review was performed of patients who underwent middle cranial fossa (MCF) repair of spontaneous tegmen defect with encephalocele and were found to have a tegmen tympani dehiscence, either in isolation or in combination with other temporal bone skull base defects. Seven patients (six female; nine ears) who underwent repair from October 2010 to September 2014 were included. Patients with spontaneous defects but without tegmen tympani involvement were excluded, as were those with a history of previous trauma, chronic suppurative otitis media or previous otologic surgery. Pre- and post-operative pure tone audiometry was performed. An air bone gap (ABG) pure tone average (PTA) (0.5, 1, 2 and 3kHz) of ≥15dB was considered to represent a significant conductive hearing loss.

Results: Eight out of nine ears (89%) had audiometric hearing loss at presentation. Seven ears (78%) had an air bone gap of ≥15dB; four of these had a middle ear effusion.
All nine ears were found to have an encephalocele involving the tegmen tympani defect. The defects were located in the tegmen tympani alone in two ears, and multiple sites in seven ears. Three ears had simultaneous SSCCD.
The CHL resolved postoperatively in 4/7 ears. Two of the three ears with persistent CHL had SSCCD. Attic ossicular fixation was identified in the other patient and the CHL resolved after ossiculoplasty.

Conclusions: This is the first study to our knowledge to appraise the mechanisms of CHL in detail by reporting hearing outcomes in a relatively homogenous group of patients with tegmen defects of purely spontaneous aetiology, all of whom have meningoencephalocele involving the tegmen tympani and closely related to the ossicular chain, and are reported pre and post MCF surgery, whereby repair could be achieved without manipulation of the ossicular chain. CHL associated with SME can be attributed pre-operatively to ossicular chain fixation and synchronous SSCCD as well as the

more commonly cited CSF effusion and prolapse of meningoencephalocele onto the ossicular chain. Persistent postoperative CHL can also occur due to SSCCD and ossicular fixation by adhesions. The findings from this study can be used to counsel patients on potential outcomes following surgical repair. Patients with spontaneous tegmen dehiscence with ME without SSCCD may expect their CHL to improve following MCF repair. A secondary exploratory tympanotomy and ossiculoplasty may occasionally be required to improve their hearing. Patients with SME and synchronous SSCCD have multiple factors contributing to their hearing outcomes and more research is needed to assess this group further.

Disclosure of Interest: None Declared

Keywords: Conductive hearing loss, Meningoencephalocele, Superior semicircular canal dehiscence, Tegmen defect

Abstract Presentations

Neuro Otology
Neuro Otology – Clinical

EAONO21-PO-058

The relationship between physical activity level and chronic dizziness after an acute unilateral vestibular deafferentiation.

L. Van Laer [1,*], N. Herssens [2], V. Van Rompaey [1], A. Hallemans [1], R. van den Berg [3], M. Karabulut [4], L. Vereeck [1]
[1]Faculty of Medicine and Health Sciences, University of Antwerp, Antwerpen, Belgium, [2]Directorate of Human Spaceflight and Operations, ESA - European Space Agency, Keulen, Germany, [3]Faculty of Health, Medicine and Life sciences, Maastricht University, Maastricht, Belgium, [4]Faculty of Health, Medicine and Life sciences, Maastricht University, Maastricht, Netherlands

Introduction: After experiencing an acute unilateral vestibular deafferentiation (UVD), a patient suffers from vertigo, instability and nausea. It is expected that these symptoms will resolve spontaneously due to the process of central vestibular compensation. To facilitate this, patients are advised to be physically active. For many patients this is challenging as in the acute phase (head)movements evoke symptoms. Furthermore 29-66 % of the patients develop chronic dizziness symptoms that remain present for over a year after the acute event.

Objectives: The aim of this review is to investigate if there is a relationship between physical activity (PA) level (I) and symptoms of chronic dizziness (O) after acute UVD (P).

Methods: This systematic review was performed according to the PRISMA guidelines and registered in the PROSPERO database (no. CRD42021229204). Databases MEDLINE (Pubmed), Web of Science (Web of Knowledge) and Scopus were systematically searched using a combination of Mesh terminology and free keywords based on the PICO question until the 16th of March 2021.

Results: Out of 1517 hits, nine articles were included that investigated PA level or the effect of a PA intervention in acute UVD patients. The results were summarized according to the type of PA: group sessions (GS), one on one physical therapy (PT), technology assisted rehabilitation (TA) and daily activities (DA). GS had significant positive effects on balance and perceived health status; PT showed positive results on perceived dizziness and balance that were similar to the effects of vestibular rehabilitation; TA showed inconsistent results and PA level during DA was significantly lower in patient groups compared to controls.

Conclusions: This review shows that interventions focussing on PA can improve dizziness related symptoms in patients after an acute UVD. Furthermore, lower PA levels are consistently reported in patients compared to healthy subjects suggesting that there might be a relation between PA and symptoms of (chronic) dizziness. More research is needed to confirm a causal relationship. Limitations of this review are a limited number of included articles and a broad variety in designs and outcome measures. More research is needed to draw a clear conclusion whether the level of physical activity is related to the development of chronic dizziness after acute UVD.

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Disclosure of Interest: None Declared

Keywords: Acute unilateral vestibular deafferentiation, Chronic dizziness, Physical activity, Unilateral vestibulopathy

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-059
First clinical experience with a new one-step drill system for bone anchored hearing procedures

H. R. F. Powell [1,*], D. Dupont Hougaard [2], R. Banga [3], J. R. Tysome [4], M. Eeg Olofsson [5], K. Feekings [2], D. Jiang [1], E. A. M. Mylanus [6], M. K. S. Hol [6 7 8]
[1]St Thomas' Hearing Implant Centre, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [2]Department of Otolaryngology, Head & Neck Surgery & Audiology, Aalborg University Hospital, Aalborg, Denmark, [3]ENT Department, Queen Elizabeth Hospital Birmingham, University Hospitals Birmingham NHS Foundation Trust, Birmingham, [4]ENT Department, Addenbrooke's Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge , United Kingdom, [5]ENT Department, Sahlgrenska University Hospital, Gothenburg, Sweden, [6]Department of Otorhinolaryngology, Hearing & Implants, Radboud University Medical Center, Nijmegen, [7]Department of Otorhinolaryngology/Head and Neck Surgery, University Medical Center Groningen, University of Groningen, [8]Research School of Behavioral and Cognitive Neurosciences, Graduate School of Medical Sciences, University of Groningen, Groningen, Netherlands

Introduction: Over time, a variety of modifications of the surgical techniques for bone anchored hearing systems procedures have been described and implemented in clinical practice, and the linear incision technique with tissue-preservation has for long been considered the gold standard. However, surgical developments have optimised the procedure further. One example is the Minimally Invasive Ponto Surgery (MIPS, Oticon Medical AB, Askim, Sweden) that was introduced in 2014. With MIPS the surgery is performed and the device implanted, through a punched hole without any need to further incise the skin. The use of MIPS has been shown to reduce the surgery time, improve cosmetic outcomes and decrease numbness in the area around the abutment to a minimum.
Recently, the MONO technique was developed to further streamline the procedure. In the MONO procedure, the osteotomy is created using a single drilling step. The MONO drill is of a novel parabolic design, enabling an effective creation of the osteotomy and less heat generation compared with other drill designs.

Objectives: The aim of this presentation is to describe the first clinical experience with the MONO procedure.

Methods: A prospective multicenter study was initiated to investigate the clinical outcomes using the MONO procedure. Fifty adult patients with an expected bone thickness of 5 mm will be included at six centers in the UK, the Netherlands, Denmark and Sweden. The primary objective of the study is to investigate the proportion of Ponto implant/abutment complexes providing a reliable anchorage for a sound processor three months after implantation using the MONO procedure. Secondary objectives include implant survival, implant stability, skin condition around the abutment, pain and numbness and patient-reported benefit after surgery. The patients will attend follow-ups 12 months post-operatively.
In addition, a controlled release program has been initiated and several surgeons in Europe and the United States have performed the MONO procedure. The aim of the controlled release is to collect additional clinical experience and receive feedback on how the surgeons perceive the MONO procedure.

Abstract Presentations

Results: So far, 30 procedures using the MONO drills have been performed within the clinical study and the controlled release program, with the first implantation taking place in November 2020. No serious intra-operative events have been reported. The surgeons report that the MONO drilling procedure is fast and easy to control. Similar to MIPS, the surgery time is short, and this non-invasive approach can readily be performed as an outpatient procedure. The tactility is reported to be slightly different compared to the MIPS procedure. Updated results will be available at the time of the presentation.

Conclusions: A single-step drill system for Ponto implants has been developed, utilising a novel parabolic design enabling effective bone work. Initial clinical experiences with the MONO procedure indicate good intra-operative and short-term objective clinical outcomes.

Disclosure of Interest: H. R. F. Powell Conflict with: Oticon Medical AB is the sponsor of the study, D. Dupont Hougaard Conflict with: Oticon Medical AB is the sponsor of the study, R. Banga Conflict with: Oticon Medical AB is the sponsor of the study, J. R. Tysome Conflict with: Oticon Medical AB is the sponsor of the study, M. Eeg Olofsson Conflict with: Oticon Medical AB is the sponsor of the study, K. Feekings Conflict with: Oticon Medical AB is the sponsor of the study, D. Jiang Conflict with: Oticon Medical AB is the sponsor of the study, E. A. M. Mylanus Conflict with: Oticon Medical AB is the sponsor of the study, M. K. S. Hol Conflict with: Oticon Medical AB is the sponsor of the study

Keywords: BAHS, Bone anchored hearing system, Ponto

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-061
Direct InjectTM calcium phosphate cement in mastoid obliteration – A prospective case series and literature review.

S. S. Hashmi*, S. Dewhurst, A. Qayyum and Samuel Dewhurst , Victoria Blackabey1, Salman Hashmi1, Asad Qayyum1, Ajmal Masood

Introduction: Canal wall down mastoidectomies are considered standard of care in extensive cholesteatomas since more than a century now. However, resultant large cavities gives rise to many problems namely need for regular debris cleaning, chronically draining cavities, repeated infections and granulation formation, caloric effects etc. Since the past few decades' clinicians have tried to overcome this problem by obliterating the resultant large cavities. Controversy prevails among otologist regarding the materials used for obliteration.
Hydroapetite is generally reported as the one of the commonest artificial material used for obliteration. Since its first successful use in mastoid obliteration reported by Young et al in 1996 4 . We intend to present a case series of patients in which a novel material is used for reconstruction of the posterior canal wall and mastoid filling 7 . The aim of the study is to establish the safety and effectiveness of a premixed isothermic calcium phosphate cement as a novel material for obliteration of mastoid cavities following revision surgery for cholesteatoma. To our knowledge it is the only HAP cement which is ready to use and doesn't need premixing and come premixed in a cannulated syringe.

Objectives:
To evaluate the results of mastoid obliteration and reconstruction of posterior meatal wall after canal wall down(CWD) mastoidectomy using Direct Inject hydroxyapatite bone cement.
To evaluate the results of mastoid obliteration and reconstruction of posterior meatal wall aftercanal wall down(CWD) mastoidectomy using Direct Inject hydroxyapatite bone cement.

Methods:
Study Design: retrospective case series
Setting: ENT department Peterborough City Hospital.
Intervention: canal wall down mastoidectomies and primary mastoid obliteration
Material for obliteration: **Direct inject** R (Stryker USA) HAP ready to use bone cement.
Outcome Measures: depicted in the table below
Min Follow up: 1 year

Table:

Abstract Presentations

Primary Outcome measures	Secondary Outome measures
Post operative complications	**Cholesteatoma recidivism**
Need for explantation	**Infection control**
	Hearing outcomes
	Tympanic membrane status

Results: A total of 18 patients were identified matching the inclusion criteria with 1 year post follow up post surgery. 1 patient was lost to follow up with less than 1 year follow up, hence excluded from the study.
Mean follow up was 25 months. Among all 17 patients only 1 needed complete explantation and in two partial explantation was done. However, at repeat operative intervention in 3 patients, no evidence of osteolysis or foreign body reaction was seen. No major complications were seen apart from post aural wound dehiscence (n= 3), EAC granulations(n=1), EC boil(n=1) and post op pain(n=1).

Complete dry ears were achieved among 12 of the 17 patients.
Conclusions: Direct Inject™ seems a viable, safe and easier alternative to other established techniques for mastoid obliteration, but further study is required. Its benefit compared to other available hydroxyapatite bone cements are that it is ready to use and can be delivered to every area of need in middle ear and mastoid surgery.
However, owing to the limited number of patients, further studies with statistically significant number of patients are required to confirm its efficacy.

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Disclosure of Interest: None Declared

Keywords: Cholesteatoma, chronic suppurative otitis media, Mastoid obliteration, mastoidectomy

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-062
Aspergillus external otitis resulting in tympanic membrane perforations and mastoiditis

M. Viljanen*, R. Saarinen, L. Hafrén, N. Friberg

Introduction: *Aspergillus* species, along with *Candidas*, are the most common fungi causing external otitis. Predisposing factors for fungal external otitis are the use of topical antibiotics, steroids and nonsterile oils, swimming and mechanical trauma from e.g. ear cleaning. Typical symptoms are itching, pain, ear discharge and decreased hearing. A rare but severe complication of otomycosis is fungal malign external otitis, which is typically associated with diabetes mellitus and other immunocompromising states. *Aspergillus* external otitis has also been associated with tympanic membrane perforations but literature addressing this topic is limited.

Objectives: To characterize patients with Aspergillus external otitis resulting in tympanic membrane perforations and invasive infection, and to find predisposing factors leading to these complications.

Methods: Retrospective data of 269 patients diagnosed with *Aspergillus* external otitis during 2010-2018 at Helsinki University Hospital, a tertiary care referral center, were studied and analyzed using IBM® SPSS® Statistics software.

Results: The most frequently isolated *Aspergillus* species were *A. niger* (55.4%), *A. flavus* (23.0%) and *A. fumigatus* 10.4%). Most infections (n=166, 61.7%) were restricted to the external ear canal, and most of these (n=146/166, 88.0%) healed with repetitive mechanical cleaning and topical antiseptic agents without specific antifungal drugs. Of the 269 infections in total, 96 (35.7%) and seven (2.6%) spread further, to the tympanum and mastoid, respectively. Forty-five (16.7%) novel tympanic membrane perforations were reported. *A. niger* was associated with middle ear infections more than other species ($p<0.05$), and *A. flavus* and *A. fumigatus* had higher prevalence in mastoiditis. Hyperbaric oxygen treatment was administered to one patient, long-term systemic voriconazole therapy to four patients, and seven patients needed operative treatment during the acute phase. Forty patients underwent myringoplasty, tympanoplasty or mastoidectomy after recovery. We found no significant correlation between infection severity and patients´ underlying medical conditions.

Conclusions: Mechanical cleaning and topical drug therapy were effective in most cases when the infection only involved the ear canal, indicating that careful local treatment is sufficient in eradicating *Aspergillus* but requires multiple visits and long treatment periods. *Aspergillus* external otitis resulted in a significant amount of tympanic membrane perforations, which necessitated subsequent operative treatment. No predisposing factors for tympanic perforations caused by *Aspergillus* external otitis were identified but a correlation between *Aspergillus* species and the invasiveness of infection was found.

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Abstract Presentations

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Disclosure of Interest: None Declared

Keywords: Aspergillus, External otitis, Mastoiditis, Tympanic membrane perforation

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-063
Our experience in management of idiopathic sudden sensorineural hearing loss

H. Mesropyan [1,*], N. Nahapetyan [1], A. Hambardzumyan [1] on behalf of Emilia Meloyan, Hermine Zargaryan, Gayane Antonyan, Lyusi Petrosyan and Emilia Meloyan, Hermine Zargaryan, Lyusi petrosyan, Gayane Antonyan
[1]otolaryngology, Astghik medical center, yerevan, Armenia

Introduction: Idiopathic Sudden sensorineural hearing loss (ISSNHL) is a development of sensorineural type of hearing loss of 30 dB or more in 3 consecutive frequencies in 72 hours without any abvious causative factors. The degree of hearing loss, period of time from the onset of hearing loss and starting of treatment, comorbidites (hypertension, diabetes), and presence of vestibular symptoms and tinnitus may influence the course of ISSNHL.Treatment protocols for ISSNHL aim to decrease the inflammation of the inner ear and to increase the blood supply and oxygenation.

Objectives: We aimed to compare the threatment efficacy of combination of dexamethasone and citicoline versus methylprednisolone in patients with idiopathic sudden sensorineural hearing loss.

Methods: This is a tertiary center, retrospective observational cohort study. We included 98 consecutive patients with idiopathic sudden hearing loss, received either dexametasone and citicoline combination (hereafter referred as an intervention group, n=65) or methylprednisolone (hereafter referred as a control group, n=33).
Patients with an identified causitive factors were excluded, and only idiopathic cases were investigated. The youngest patient was 12 years old, and the oldest was 73; the mean age were 46,88 (12,80) in control and 48,45 (14,08) in intervention group respectively.
Efficiency of two treatment schemes has been compared: dexamethasone followed by cyticoline and methylprednisolone as a monotherapy. All patints have been divided into two groups. The first group received dexametason 8mg/2ml/3days, then 4mg/1ml/ 3 days and 2mg/0,5ml/ 1day, respectively. After 7 days the patients of first group continue received citicoline 500mg/100ml 0.9% NaCl intravenously 10 days.The patients of second group received methylprednisolone 48mg/7days, then reduced to 4 mg daily until the end of the drug/10days. The duration of steroid has been reduced in the first group, preventing its side effects.
The PTA score at baseline (Day 0) before starting the treatment, then at Day 7 and Day 17 after the treatment according to recommended standard procedure has been checked.
As a secondary outcome, we assessed the proportion of patients who at the end of treatment experienced significant or complete recovery (changes in PTA score ≥ 9 unit between baseline and Day 17th) vs no recovery (changes in PTA score < 9 unit, between baseline and Day 17th) in hearing score.

Results: The primary analysis compared changes in patients' mean PTA scores over treatment period between the groups. At time of treatment initiation (Day 0) the mean PTA scores were comparable between control (53.4±18.7) and intervention (51.8±19.6)) groups. In both groups the PTA score improved over treatment period. The mean scores at day 7 and day 17 after the treatment initiation were 40.9±17.4 and 30.9±18.8 in control and 42.2±20.1 and 34.4±22.0 in

intervention group respectively. At the end of treatmnt (Day 17 -th) 84.8% (n=28) patientsn in control and 80.0% (n=52) patients in intervention group had experienced significant to complete recovery (p+0.757).

Conclusions: Conclusion: Comparison of treatment of ISSHL with combination of dexamethasone and citicoline with the treatment using methylprednisolone as a monotherpy has revealed that treatment with dexamethasone and citicoline also gives good results, but shortens duration of treatment and in such way significantly reduces the side effects of steroids.

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-065
Can COVID-19 cause sequential sudden onset sensorineural hearing loss – what is the mechanism?

J. Ng [1], N. Evans-Harding [1,*], B. Wilson [1], A. Bennett [1]
[1]Ear, Nose and Throat, NHS Lothian, Edinburgh, United Kingdom

Introduction: The aetiology of sudden onset sensorineural hearing loss (SSNHL) is often mysterious. Viral infections have been known to be associated with the condition. Bilateral SSNHL is very rare, with only up to 4.9% incidence of all SSNHL, and it is often related to inflammatory, systemic diseases, brain disorders or secondary to ototoxicity. To date, two cases of bilateral sensorineural hearing loss have been attributed to COVID-19.

Objectives: We report a case of sequential SSNHL in a patient who also developed symptoms of COVID-19 and posit micro-thrombotic events to be the mechanism based on literature evidence.

Methods: Literature search was performed on OVID Medline and EMBASE for related search terms “sensorineural”, “hearing loss”, “COVID-19”, and “coronavirus”. Exclusion criteria were non-English language papers and animal/cadaveric studies. Only case reports and observational studies were included.

Results: Only two bilateral SSNHL were reported in the literature. One patient developed the condition following a 30-day intensive care unit admission, meningeal inflammation and use of potentially ototoxic drugs. The other patient presented to the otology department and was subsequently tested positive to COVID-19 on serology testing for COVID-19 IgG but negative on SARS-CoV-2 nucleic acid amplification testing.
A 59-year-old academic flew back home to the United Kingdom via Paris just after Christmas during the second national lockdown. He developed fatigue, night sweats, persistent cough four days since arrival, whilst his wife who lives with him developed anosmia. Two days later, he developed right sided hearing loss. Within 30 days, he noticed hearing loss on the left and presented to accident and emergency, where he was commenced on oral prednisolone 60mg for ten days.
When seen in the otology clinic, he had profound hearing loss bilaterally. Blood tests including full blood count, renal and liver profiles, SARS-CoV-2 IgG, HIV Ag/Ab, anti-treponema IgG antibody, respiratory viruses PCR including COVID, vasculitis screen, complement proteins and clotting screen were normal. MRI showed no significant abnormality. Intratympanic steroid injection was commenced, and he was also admitted for a trial of intravenous acyclovir. Unfortunately, he developed acute kidney injury following intravenous acyclovir which was promptly discontinued. Repeated hearing tests found no improvement in his hearing and he was referred for cochlear implantation.

Conclusions: Although no laboratory evidence of positivity, we argue that this is most probably a COVID-19 phenomenon driven by micro-thrombosis, which is a pathophysiology mechanism well described in the literature whereby the interplay of cytokine release especially that of interleukin-6, oxidative stress, raised blood viscosity, endotheliitis and systemic impaired microcirculatory function results in SSNHL.
The lack of laboratory test evidence of COVID-19 positivity raises the question of false negative result, especially in patients like ours who had classic symptoms of the infection.

To our knowledge, this is the first case of sequential SSNHL best explained by the impaired microcirculatory function and thrombosis phenomenon in COVID-19. We argue that patients with SSNHL presenting with sensorineural hearing loss should be tested for COVID-19.

Disclosure of Interest: None Declared

Keywords: bilateral, COVID-19, sensorineural hearing loss, thrombosis

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-066
Canalplasty for exostoses, a personal series review of 83 ears, from drill to microchisel.

C. Perkins [1,*], B. Bayley-Skinner [2], D. Whinney [1]
[1]ENT, Royal Cornwall Hospital, Truro, [2]University of Exeter Medical School, Exeter, United Kingdom

Introduction: External auditory canal exostoses refers to benign bony overgrowths believed to develop as a result of repeated cold stimulation and affect surfers, open water swimmers, sailors and others whose ears are exposed to the cold. Those more severely affected will have recurrent episodes of pain and blockage, otitis externa, and eventually a persistent conductive hearing loss. It is widely believed that educating the at-risk group to wear ear plugs in the water can prevent the development of exostoses and reduce symptoms in those already affected. External auditory canal exostoses are relatively more common in Cornwall U.K., particularly affecting the surfing community. Symptomatic patients present to the local ENT department for advice and some require surgery. We will describe the evolution of personal surgical technique from a more traditional drill method to a less invasive technique using a 1mm Hetzler osteotome. We will also report results of surgery and long-term more detailed follow-up of 16 ears (10 patients), considering factors that may lead to recurrence of exostoses.

Objectives: To review the senior author's case series of Canalplasty surgery for external auditory canal exostoses.

Methods: All canalplasty procedures undertaken by the senior author between 2003 and 2021 were retrospectively captured using electronic theatre records, with subsequent notes review to determine surgical technique, outcome and recorded complications. Complete follow up data is available for 16 patients who were re-examined and evidence of recurrence recorded. The remaining patients will be contacted by telephone to enquire regarding surfing habits since surgery and symptoms of recurrence.

Results: Eighty three ear surgeries performed by the senior author in 57 patients have been identified from 2003 to 2020.
In 2003 the senior author used an endaural approach and, once meatal skin flaps raised, a high speed drill with a 2mm burr attempting to protect meatal skin as much as possible. With colleagues, he then started to use a 2mm chisel in addition to a drill, then a 2mm chisel alone and finally, more recently, adopted the technique advocated by Doug Hetzler using a 1mm osteotome. The technique will be described along with complication rates.
The 16 patients for whom complete follow-up data are available will be described in more detail, showing increasing rates of recurrence over time and possibly more so in those spending more time in the sea and wearing ear protection less reliably.

Conclusions: We report that a "micro-chisel" technique for canalplasty is safe and, possibly, preferable by causing less soft tissue trauma and so faster recovery. Long term results suggest that recurrence occurs in those who continue to surf and is probably correlated with duration of time in the water and whether ear protection is used consistently or not.
Keywords: Exostoses

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6-10 SEPTEMBER 2021

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-068
Can preimplantation assessment predict special intraoperative findings in cochlear implant surgery?

A. Anagiotos [1,*], M. Kazantzi [1], M. Callimachou [1], M. Ioannou [1], A. Aspris [1]
[1]Department of Otorhinolaryngology, Nicosia General Hospital, Nicosia, Cyprus

Introduction: Preimplantation diagnosis and evaluation of cochlear implant (CI) candidates is an essential part of any CI program, which aims among other to identify any features that may affect the surgical procedure.

Objectives: To examine whether preimplantation assessment can predict special intraoperative findings and surgical results in CI surgery.

Methods: The study analysed the data from the Cyprus national CI cohort database, for which detailed information has been collected since September 2017. It specifically evaluated CI recipients hearing loss aetiology, age of implantation, radiological findings of temporal bone anatomy, surgical features and early complications.

Results: Sixty three CI surgeries (age at implantation 12 months – 71 years, median 21 years old) were performed between September 2017 and May 2021. In seven cases, the procedure involved revision CI surgery. From 29 paediatric implantations (<18 years old at implantation), 16 were of genetic origin (e.g. connexin-26 mutation, various syndromes), one acquired (after chemotherapy), one still under clarification and 11 of unknown aetiology. Inner ear anatomy, as demonstrated at the preoperative CT and MRI scan, was mostly normal with only 4 cases of malformation (large vestibular aqueduct-LVA, incomplete partition and cochlea hypoplasia). The 34 adult implantations (≥18 years old at implantation) included 15 cases of progressive paediatric hearing loss (most of them of unknown origin), 8 of adult progressive hearing loss (cause unknown or otosclerosis), 7 with genetic syndromes (such as branchio-oto-renal) and 4 with autoimmune disease (Cogan syndrome). In the adult group, radiological findings included inner ear malformation in 5 cases (LVA, incomplete partition and cochlea hypoplasia) and one with partial cochlea ossification. Overall, during surgery, perilymph gusher was observed in all four LVA cases. The round window niche was completely covered by bone and needed removal for atraumatic round window insertion in 4 cases, 3 in syndromic patients (Noonan syndrome and 3-methylglutaric aciduria) and in one case with far advanced otosclerosis. Interestingly, in all 4 Cogan syndrome implantations, thickened mucosa and partly dense soft tissue were noted during posterior tympanotomy and round window niche exploration. There were no intraoperative and no early postoperative complications. In only one case (deafness after chemotherapy), postoperative local pain was noted several weeks after surgery and it was considered psychogenic after thorough work-up.

Conclusions: Several CI recipients' characteristics, like syndromes and anatomic inner ear anomalies, may be associated with special intraoperative features, which can complicate the surgical procedure. These results emphasize the importance of detailed consideration of the patients' preimplantation profile during the preoperative assessment.
Disclosure of Interest: None Declared
Keywords: cochleat implant, hearing loss, radiology, surgery

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-070
Outcomes with the second generation Osia System in a multi-centre study

R. Briggs [1,*], C. Birman [2], N. Baulderstone [2], I. Ng [3], A. Rousset [4], S. Tari [4], M. Tong [3], R. Cowan [1]
[1]Department of Otolaryngology, The University of Melbourne, Melbourne, [2]Next Sense , New South Wales, Australia, [3]Department of Otorhinolaryngology, Head and Neck Surgery, The Chinese University of Hong Kong, Shatin, Hong Kong, [4]The Royal Victorian Eye and Ear Hospital, Melbourne, Australia

Introduction: Active transcutaneous bone conduction implants are now available for rehabilitation of patients with conductive, mixed, or single-sided sensorineural hearing loss.

Objectives: In this study we investigated the clinical performance, safety, and patient-reported outcomes of the novel Cochlear™ Osia® 2 System, an active osseointegrated steady-state implant system that uses piezoelectric stimulation for bone conduction.

Methods: Twenty-nine adult subjects received the device as part of a multicentre clinical investigation conducted at three tertiary referral centres located in Melbourne, Sydney and Hong Kong. Twenty-four subjects had mixed or conductive hearing loss and 5 had single-sided sensorineural deafness. The six month follow up outcome measures included audiological threshold evaluation, speech recognition in quiet and in noise, and patient satisfaction and safety.

Results: At six-months post-implantation, a mean improvement in pure tone average of 25.6 dBHL and a mean improvement of 8.8 dB SNR in speech reception threshold in noise was achieved with the Cochlear Osia 2 System when compared to the unaided situation. Usability of the system was rated 71.4/100 mm for sound processor retention and 81.4/100 mm for overall comfort using a visual analogue scale.

Conclusions: This study confirms the clinical safety, performance, and benefit of the Cochlear Osia 2 System in subjects with conductive hearing loss, mixed hearing loss, or single-sided sensorineural deafness.

Disclosure of Interest: None Declared

Keywords: active transcutaneous bone conduction device, conductive hearing loss, mixed hearing loss, single-sided deafness

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-071
Cochlear reimplantation: evaluation of implant failure and postoperative speech perception

F. Cals [1,*], L. van de Rijt [1], W. Huinck [1], R. Pennings [1], J. Mulder, D. Kunst [1], L. Mens [2], E. Mylanus [1]
[1]Department of Otolaryngology, [2]Department of Audiology, Radboud University Medical Center Nijmegen, Nijmegen, Netherlands

Introduction: Cochlear implantation is a surgical treatment for patients with severe-to-profound sensorineural hearing loss. Since the first implantation of a cochlear implant in 1957, cochlear implant devices improved significantly. However, due to various reasons such as implant failure, medical problems or outdated systems, explantation and reimplantation is needed in some of our patients.

Objectives: The aim of this study was to review the reasons and the rate of explantation and reimplantation in more than 2000 consecutively implanted children and adults.

Methods: All patients implanted between 1987 and 2020 were reviewed and evaluated with respect to demographics, type of implant, reason for explantation, type of implant failure (soft versus hard failure), speech coding strategy before and after explantation and reimplantation and audiometric results (speech recognition measured with NVA phoneme scores).

Results: Reasons for reimplantation were hard failures, soft failures, medical issues and system upgrades. Reimplantation was feasible in all subjects. Speech recognition scores after reimplantation were comparable to the highest speech recognition scores measured with the previous cochlear implant. Even in cases the implant type and speech strategy did not improve, the overall mean phoneme scores improved after reimplantation (both short and long term results). When there was a reimplantation with a technically improved device, the mean phoneme score improvement even more.

Conclusions: In most cases, the reason for reimplantation of a cochlear implant is related to implant failure or infection. Cochlear reimplantation is surgically feasible on the short as well as on the long term after explantation of a previous device. Devices upgrade, technically and/or in speech coding strategy, showed a positive trend towards improved speech recognition scores.

Disclosure of Interest: None Declared

Keywords: cochlear implantation, reimplantation, implant failure, speech recognition score

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6-10 SEPTEMBER 2021

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-072
A 10-year results of cholesteatoma surgery with mastoid obliteration

E. Pchelenok*, S. Kosyakov, O. Tarasova

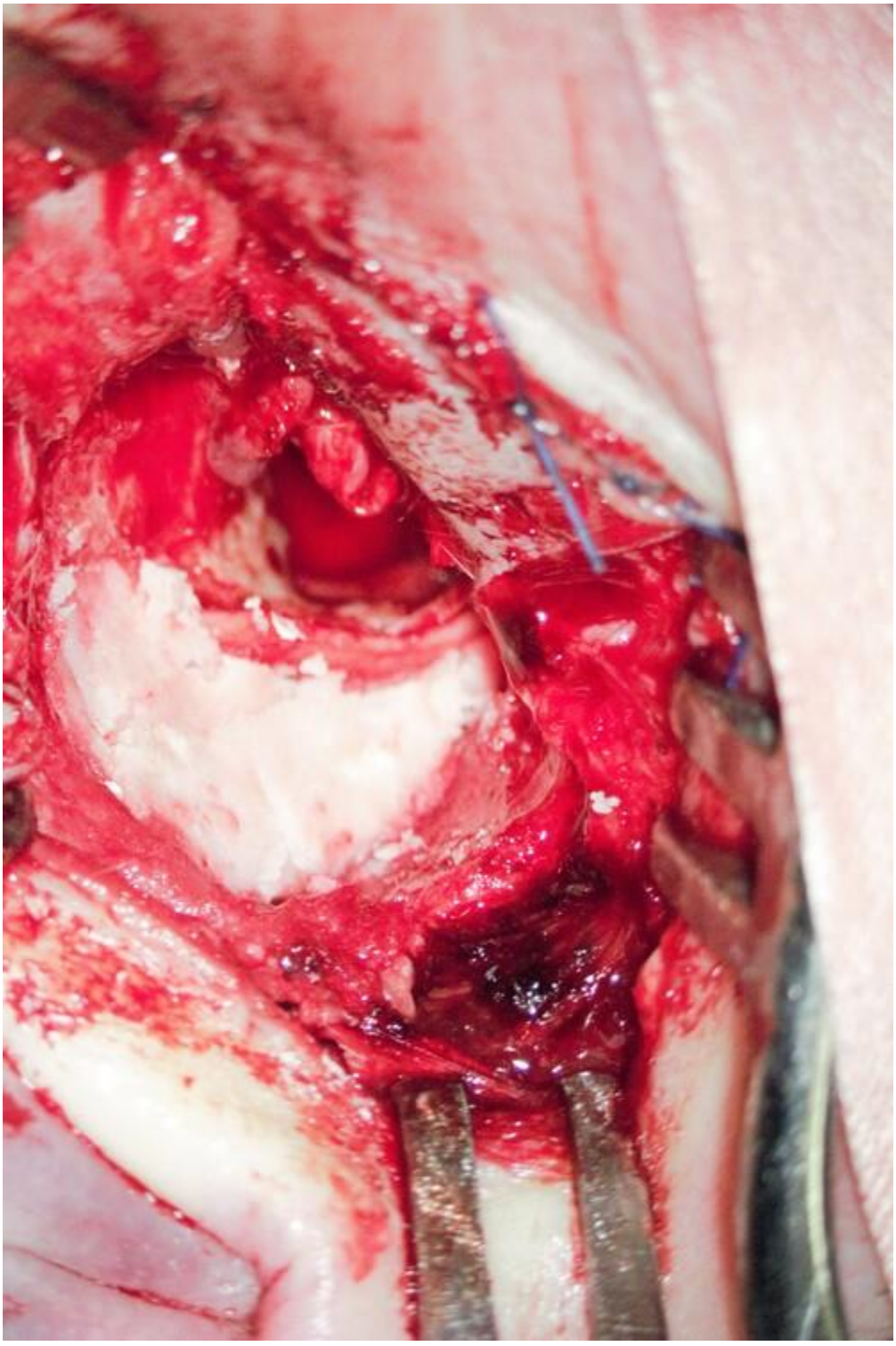
Introduction: Residual cholesteatoma and recurrent cholesteatoma are specific problems, that reduce the surgical treatment efficacy. Presently there are two main techniques for cholesteatoma surgery: the closed technique (wall up) and the open technique (wall down). The canal wall down mastoidectomy in cholesteatoma can secure a good operation field and easy removal of the lesion. However, there are some problems: these are the lifelong care of the cavity, dizziness due to the exposed semicircular canal, difficulty with the fitting of a hearing aid as well as poor cosmetics. The canal wall up technique has a better hygienic status and better functional outcome. This technique is associated with a higher rate of residual disease and a higher rate of recurrent disease. To prevent both residual and recurrent cholesteatoma, we performed canal wall down technique with the obliteration of paratympanic spaces for patients with acquired cholesteatoma.

Objectives: Evaluation of the effectiveness of paratympanic spaces obliteration during the middle ear cholesteatoma surgery.

Methods: We have been following up patients for some years and then analyzed the results about residual and recurrence of cholesteatoma. 253 ears were operated (249 patients: 102 females and 147males). In 176 cases an operation was performed for the first time and 77 cases were revision and re-operation after surgery by other surgeons. All patients underwent sanation surgery with the obliteration of paratympanic spaces followed by the restoration of the posterior wall of the external auditory meatus and simultaneous tympanoplasty. Close tympanic cavity with chondro-perichondrial flap with simultaneous ossicculoplasty. Obliterate paratympanic spaces with bone pate, or bioglass, or allocartilage and cover it with chondroperichodrial flap. The patients were examined 1, 2 and 3 years after the treatment with the use of the MRI technology using the non-EPI DWI regime to monitor the residual and recurrence cholesteatoma. The high intensive signal in regime T2 and non-EPI DWI and the low intensive signal in standard regime T1 show the presence of cholesteatoma. And control for recurrent disease was done by yearly microotoscopic evaluation.

Image:

Abstract Presentations



Abstract Presentations

Results: From 2010 to 2017, we operated 253 ears. The results were evaluated according to otomicroscopy, MRI sequences, such as the non-EPI DWI and recorded for survey. From 2010 to 2012 the residue of cholesteatoma was diagnosed in 10 cases (12%), from 2010 to 2013 – 13 cases (11,5%), from 2010 to 2014 – 14 cases (9.4%), from 2010 to 2015 – 15 cases (8,4%) and from 2010 to 2016 – 16 cases (7,4%), from 2010 to 2017 - 18 cases (7,1%). Most patients had good epithelization on the external auditory canal and could cease water restriction after surgery.

Conclusions: Long-term follow up indicated that the canal wall down technique with bony obliteration is a safe method with which to treat primary cases and to reconstruct unstable cavities. The MRI technology in the non-EPI DWI regime was successful in differentiating soft tissues and enabling the detection of residual or recurrent cholesteatoma after a canal wall down bony obliteration technique procedure.

Disclosure of Interest: None Declared

Keywords: Mastoid obliteration, MRI, non-EPI DWI, Residual cholesteatoma

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6-10 SEPTEMBER 2021

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-073
Functional and Patient-reported Outcomes of Bone Anchored Hearing Aids: A prospective case series study

C. Azevedo [1,*], M. Breda, D. Ribeiro [1], I. Costa, S. Vilarinho [1], L. Dias [1]
[1]Otorhinolaryngology, Hospital de Braga, Braga, Portugal

Introduction: The Bone Anchored Hearing Aid (BAHA) is an osteointegrated hearing implant that transmits the sound directly to the inner ear. These devices are mainly used in patients with unilateral conductive hearing loss, although they can also be used in those with mixed or unilateral profound sensorineural hearing loss, whenever the patient has no benefit or has contraindications for the use of conventional hearing aids or did not improve with surgical management. Multiple studies have already proven the advantages of using BAHA devices in these patients.

Objectives: To evaluate the functional (objective) and patient-reported (subjective) outcomes, and their correlation, after implantation with a BAHA device.

Methods: A prospective case series study was conducted between January 2018 and December 2020 in a tertiary care center. All adult patients (>18 years) who were implanted with a BAHA device during this evaluation period were included in the study. We assessed the complete auditory function with pure-tone average (PTA) and speech recognition threshold, and subjective and Health-related quality of life (HRQoL) measures in the preoperative period and 6 months after the implant activation. The measures of HRQoL included a generic form (Medical Outcome Study 36 Short Form Healthy Survey (SF-36)), and three disease-specific forms (Hearing Handicap Inventory (HHI), Satisfaction with Amplification in Daily Life Scale (SADLS), and Tinnitus Handicap Inventory (THI)).

Results: Twenty-two patients with an average age of 53 years were included in the study. Most patients (54.5%) had a BAHA due to severe conductive hearing loss and chronic otitis media who underwent mastoidectomy but had persistent or recurrent ear discharge with the impossibility to use conventional hearing aids. The greater the preoperative air-bone gap, the greater the functional gain obtained with BAHA ($r = 0.505$, $p < 0.05$), with no statistically significant differences according to the etiology of hearing loss. However, we verified that in patients who had a BAHA due to a profound, unilateral sensorineural hearing loss, the functional gain was lowest (mean 11.25dB vs. mean 29dB in general). In the subjective and self-assessment outcomes, we found a significant improvement in HHI scores ($p < 0.005$) and a significant increase in overall SADLS scores ($p < 0.05$) (in patients who previously used conventional hearing aids) with the use of BAHA devices. The placement of the implant did not influence the SF-36 scale scores.

Conclusions: It was found that BAHA can be an excellent and safe alternative hearing rehabilitation option in selected patients in whom it's impossible to use conventional hearing aids or whose functional gains are insufficient or non-satisfactory, as it proved to be effective, with an additional significant improvement in the self-assessment of hearing impairment parameters.

Keywords: Bone Anchored Hearing System, Health-related Quality of Life, Hearing Loss, Hearing Rehabilitation

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6-10 SEPTEMBER 2021

Abstract Presentations

Neuro Otology
Neuro Otology - Clinical Science

EAONO21-PO-074

Transmastoid plugging for superior canal dehiscence: long-term subjective and objective outcomes and evaluation of diagnostic indicators

K. E. Eberhard [1,*], N. C. West [1], P. Cayé-Thomasen [2]
[1]Copenhagen Hearing & Balance Centre, Department of Oto-Rhino-Laryngology, Head and Neck Surgery, and Audiology, Copenhagen University Hospital – Rigshospitalet, [2]Copenhagen Hearing & Balance Centre, Department of Oto-Rhino-Laryngology, Head and Neck Surgery, and Audiology, Copenhagen University Hospital – Rigshospitalet & Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

Introduction: Superior canal dehiscence (SCD) can produce debilitating symptoms that indicate surgical repair. Multiple diagnostic indicators have been suggested but few studies demonstrate postoperative normalization. Furthermore, data on surgical outcomes following transmastoid plugging are sparse, and few studies have long-term follow-up.

Objectives: We present subjective outcomes and a comprehensive pre- and postoperative auditory and vestibular evaluation of patients with SCD, who underwent transmastoid plugging. Patients were followed ≥1 year. Established indicators of SCD are furthermore evaluated for their diagnostic utility.

Methods: This prospective study included patients who underwent transmastoid plugging for SCD at Copenhagen University Hospital – Rigshospitalet from 2017–2021. Pre- and postoperative testing comprised audiometry, cervical vestibular evoked myogenic potentials (cVEMP), ocular VEMP (oVEMP), video head impulse test (vHIT) and caloric test. Subjective outcomes were evaluated using questionnaires: Autophony Index and Dizziness Handicap Inventory.

Results: The preliminary cohort includes eight patients (nine ears) with a median follow-up of 1.8 years. Stable symptom control up to 2.8 years postoperatively was achieved for the two most frequent complaints leading to surgery: autophony and sound- and/or pressure-induced vertigo.
Patient reported outcomes showed a reduction in the severity of autophony and dizziness: median Autophony Index score was reduced from 49 (range: 0-64) preoperatively to 2 (0-31) postoperatively, whereas the median Dizziness Handicap Inventory score was reduced from 39 (range: 0-66) to 10 (0-62).
Preoperatively, low-frequency supranormal bone conduction thresholds were present in 6/9 ears and low-frequency air-bone gap in 8/9 ears (median at 250Hz: 25dB). In 7/9 cases, cVEMP thresholds were lower in the symptomatic SCD ear than in the contralateral normal or asymptomatic SCD ear. In 5/8 cases 4kHz oVEMP showed responses only in the symptomatic SCD ear and not in the contralateral normal or asymptomatic SCD ear. Except for bone conduction thresholds, SCD indicators generally normalized postoperatively and remained stable long-term. That is, air-bone gaps were reduced, cVEMP and oVEMP responses normalized and amplitudes decreased.
No patients experienced sensorineural hearing loss. The VHIT demonstrated reduced function of the plugged superior semicircular canal in 7/9 cases and of the ipsilateral posterior canal in 5/9 cases. Caloric testing was abnormal in 1/9 ears postoperatively.

Abstract Presentations

Conclusions: Transmastoid plugging can be used to successfully manage debilitating symptoms of SCD with long-term symptom control. Risk of complications is low, primarily mild dizziness/reduced vestibular function. With varying sensitivity and specificity, multiple objective metrics can support the diagnosis and by postoperative normalization indicate stability of repair over time.

Disclosure of Interest: None Declared

Keywords: superior canal dehiscence, surgical outcome, transmastoid plugging, vestibular function

Abstract Presentations

Otology
Otology - Basic Science

EAONO21-PO-075

The Healthy Hearing Ears Initiative - Changing the treatment paradigm for patients with chronic otitis media related hearing loss

D. Backous [1,*] on behalf of The Healthy Hearing Ears Advisory Board
[1]Swedish Medical Center, Seattle, United States

Introduction: Chronic otitis media is a leading cause of acquired hearing loss and hearing rehabilitation strategies must accompany infection control in surgical planning. However, limited quality evidence hinders development of accepted best practice guidelines in this cohort of patients.

Objectives: To facilitate evidence- based decision-making, targeted research, and systematic data collection.

Methods: An international advisory board of eight ENT surgeons was assembled under the Healthy Hearing Ears Initiative and as a first step in developing best clinical practice we conducted a systematic literature review that assessed the success rates of tympanoplasty in closing the air-bone gap in patients with chronic otitis media.

Results: Our systematic review of literature published between 2008 and 2018 identified that tympanoplasty was successful in closing the air-bone gap to within 20 dBHL in 70% of patients, with a complication rate of 14%. Further review uncovered no standardized pathway for planning hearing restoration after surgery for chronic otitis media with or without cholesteatoma, and that AAO-HNS reporting guidelines are not routinely followed.

Conclusions: We propose an evidence-based paradigm for aural rehabilitation which includes hearing outcome and cost utility measures, to establish a baseline for future development of evidence-based clinical best practices in patients with chronic otitis media with or without cholesteatoma.

Disclosure of Interest: None Declared

Keywords: chronic otitis media, hearing rehabilitation, standard of care

Abstract Presentations

Otology
Otology - Basic Science

EAONO21-PO-076

The Healthy Hearing Ears Initiative - Hearing rehabilitation of patients with chronic otitis media; current status and research priorities

T. Lenarz [1,*] on behalf of The Healthy Hearing Ears Advisory Board
[1]Hannover Medical School, Hannover, Germany

Introduction: Although chronic otitis media is a major cause of conductive and mixed hearing loss, auditory rehabilitation is not optimal in this patient group and planning for hearing rehabilitation must accompany strategies for infection control when managing these patients.

Objectives: To identify barriers preventing adequate hearing restoration in patients with chronic otitis media.

Methods: A scoping review was conducted to synthesize the available research evidence surrounding hearing rehabilitation in patients with chronic otitis media and to identify knowledge gaps.

Results: Several barriers preventing adequate hearing restoration in patients with chronic otitis media were identified. Lack of standardized reporting of surgical interventions, hearing outcomes, and quality of life measures were highlighted as key issues preventing meta-analyses of existing data. The need for validated prognostic indicators, and generation of health economic data through well-designed health economic evaluations, was also recognised.

Conclusions: Strategies to improve reporting standards and methods have the potential to classify patients with chronic otitis media preoperatively, which could better guide decision making surrounding hearing rehabilitation. Appropriately selected clinical guidelines would not only foster directed research but could enhance patient-centred care.

Disclosure of Interest: None Declared

Keywords: chronic otitis media, hearing rehabilitation, standard of care

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6-10 SEPTEMBER 2021

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-078
5-year experience with the slim modiolar electrode: A single center study.

M. P. Iso-Mustajärvi [1,*], P. Linder [1], A. Dietz [1]
[1]ENT, Kuopio University Hospital, Kuopio, Finland

Introduction: The Slim Modiolar Electrode (SME) (Cochlear Company, Sydney, Australia) represents latest design of perimodiolar electrode. The SME is considerably smaller compared to other perimodiloar arrays, as the insertion stylet is replaced by a thin sheath.

Objectives: The aim of this retrospective study was to investigate the clinical results with the SME.

Methods: We included all the patients inserted with the SME between years 2016 and 2020. Presence of residual hearing ($PTA_{125\text{-}500} \leq 80$dB) pre- and postoperatively, pre- and postoperative speech reception thresholds (SRT; Finnish matrix sentence test), and patient demographics were collected from patient records. The insertion depth angle (IDA) and possible scala dislocation were examined from postoperative cone-beam computed tomography (CBCT) images.

Table:

	Pre vs Post $PTA_{125\text{-}500\ Hz}$	Pre vs 1-year $PTA_{125\text{-}500\ Hz}$
Mean change (dB_{HL})	15,4	12,4
CI95%	3,3	3,8
	N (%)	N (%)
Complete hearing preservation ($\Delta PTA_{125\text{-}500} < 15$ dB HL)	23 (56%)	18 (58%)
Partial hearing preservation ($15 \leq \Delta PTA_{125\text{-}500} \leq 30$ dB HL	11 (27%)	7 (23%)
Loss of residual hearing ($\Delta PTA_{125\text{-}500} > 30$ dB HL)	7 (17%)	6 (19%)
All cases	41	31
	days	days
Mean follow-up	29	327

Results: 61 patients (70 ears) were inserted with SME during the study period. 27 patients received bilateral cochlear implants (CI) (9 with SMEs in both ears). 35 (50%) of the cases were women and 14 were [LP1] under 12-years old during the surgery. Postoperative CBCT images were taken from all adult patients and from three of the child patients. There were 41 ears with residual hearing preoperatively.
59 of the insertions were atraumatic according to the CBCT images. Mean IDA was 386 (range 149 to 440). There were two cases (3.3 %) with tip fold over. In the both cases scala dislocation occured.
In total[LP2] , device losses at primary surgery occurred in four ears (5.7 %). In two cases, the SME were damaged during insertion and reloading and had to be discarded; in the first case the electrode protruded out of the metal tube during

insertion and in the second case, the electrode rotated after insertion and could not be reinserted. In the reoperations, the device was replaced in favour of a straight electrode array.
Mean preoperative SRT was -1.8 dB SNR (n= 64, 43 ears with hearing aids and 21 bimodal) and in one year postoperatively the mean SRT was -5.4 dB SNR (n=58, 27 bilateral CI-users, 29 bimodal and 2 CI only) . The improvement was statistically significant ($p<0.001$; Wilcoxon signed rank test). There were 41 ears with residual hearing preoperatively (6 bilaterally implanted with SME). Postoperatively (mean follow-up 29 days, range 1-to-101 days) the residual hearing was well preserved ($\Delta PTA_{125\text{-}500} < 15$ dB HL) in 23 ears and partially preserved ($\Delta PTA_{125\text{-}500}$ between 15 and 30 dB HL) in 11 ears. Loss of the residual hearing ($\Delta PTA_{125\text{-}500} > 30$ dB HL) was observed in seven ears, of which two (ears) lost hearing completely. After one year follow-up complete[LP3] [IM4] preservation was achieved in 18 ears, partial preservation in 7 ears and loss of residual hearing occurred in 6 ears (31 ears, mean follow-up 327 days, range 121 to 539 days).
Two devices were explanted due to non-use in one patient and due to skin infection in a child with syndromic HL and skin abnormalities.

Conclusions: The SME enables relatively atraumatic insertions with comparable hearing preservation results reported for other lateral wall electrodes. The SME is feasible only for normal anatomy with a patent scala tympani. Due to the array's softness and modiolar design, tip fold over is a relatively common complication and warrants mandatory intraoperative electrophysiological measurements (trans-impedance matrix and spread of excitation measurements) ***and*** intra- or postoperative imaging.

Disclosure of Interest: None Declared

Keywords: Cochlear implant, hearing rehabilitation, outcome measures

Abstract Presentations

Auditory Implants
Auditory Implants – Clinical

EAONO21-PO-080

Systematic review and meta-analysis of the effects of bone conduction devices on quality of life for single sided deafness

K. Milinis[*], T. Hampton[1 2], E. Whitehall[1], S. Sharma[1]
[1]Alder Hey Children's Hospital, [2]Welcom Trust, Liverpool, United Kingdom

Introduction: Previous studies have demonstrated that that bone conduction devices (BCDs) improve hearing outcomes in patients with single sided deafness (SSD), via the principle of rerouting sound from the affected side of the head to the contralateral normally hearing ear. However, it is currently unknown how BCDs may affect patients' quality of life (QofL).

Objectives: To perform a systematic review and meta-analysis of the effects of BCDs on QOL in patients with SSD.

Methods: Literature search of databases including Medline, Embase, Cochrane library and clinicaltrials.gov from 1978 to 9 November 2020 was performed via Healthcare Databases Advanced Search (HDAS) tool. The systematic review and meta-analysis were conducted in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Prospective interventional studies with 10 or more subjects with SSD who received an insertion of a unilateral bone conduction device and underwent pre- and post-intervention assessment of QofL using a validated tool were eligible for inclusion. Studies on adults and children were eligible for inclusion. Meta-analysis of mean change in QofL scores was performed. The risk of bias was assessed using Joanna Briggs (JBI) risk of bias tool for quasi-experimental studies.

Results: A total of 486 articles were identified and 11 studies (n=178) met the inclusion crtieria for meta-analysis. All studies were non-randomised cohort studies. Three main QofL instruments were used in the studies including the Abbreviated Profile of Hearing Aid Benefit (APHAB), the Health Utilities Index – 3 (HUI-3) and the Speech, Spatial and Qualities of Hearing Scale (SSQ). THe APHAB and the SSQ are the hearing related QofL measures, while the HUI-3 is a generic QofL measure. There was a significant improvement in the global APHAB scores (mean change 15.5, CI 12.3-18.4, I^2=0%, p=0.076) and all the SSQ subscales. There was no significant change detected in the means (mean change 0.029, CI -6.17-10.94; I^2=0, p=0.805) on HUI-3. The risk of bias was assessed to be as low to moderate.

Conclusions: This review found that generic QofL scores did not improve but hearing-specific QofL measures did improve for patients treated with BCDs for SSD. This adds to current developments in understanding of benefit from treatment of asymmetrical hearing loss, and greater understanding that even “one good ear” may still leave patients with significant morbidity.

Disclosure of Interest: None Declared

Keywords: bone conduction implants, disability, Quality of life

EAONO WEEK 2021 HOSTED BY THE UK
6-10 SEPTEMBER 2021

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-081
British Society of Otology national prospective COVID-19 audit; Resuming otological surgery

E. Warner [1], R. Ghedia [1,*], A. Alatsatianos [2], S. Lloyd [3], P. Rea [4], F. K. Seymour [5] and British Society of Otology Juniors and 157 collaborating authors
[1]ENT, Royal London Hospital, Barts NHS Trust, London, [2]ENT, Queen Elizabeth University Hospital, NHS Greater Glasgow and Clyde, Glasgow, [3]ENT, Manchester Royal Infirmary, Manchester University NHS Trust, Manchester, [4]ENT, Leicester Royal Infirmary, University Hospitals of Leicester NHS Trust, Leicester, [5]ENT, Royal London Hospital, Barts NHS Trust, London, London, United Kingdom

Introduction: The SARS CoV-2 pandemic resulted in many challenges for surgical teams across the UK. There were early concerns that otolaryngologists were especially at risk as coronaviruses had been shown to be present in the middle ear and mastoid mucosa and powered instrumentation resulted in viral particle aerosolisation.

Objectives: To assess how otological surgery resumed following the first national COVID-19 pandemic lockdown, what challenges clinicians faced, transmission of COVID-19, and the impact on surgical outcomes and training.

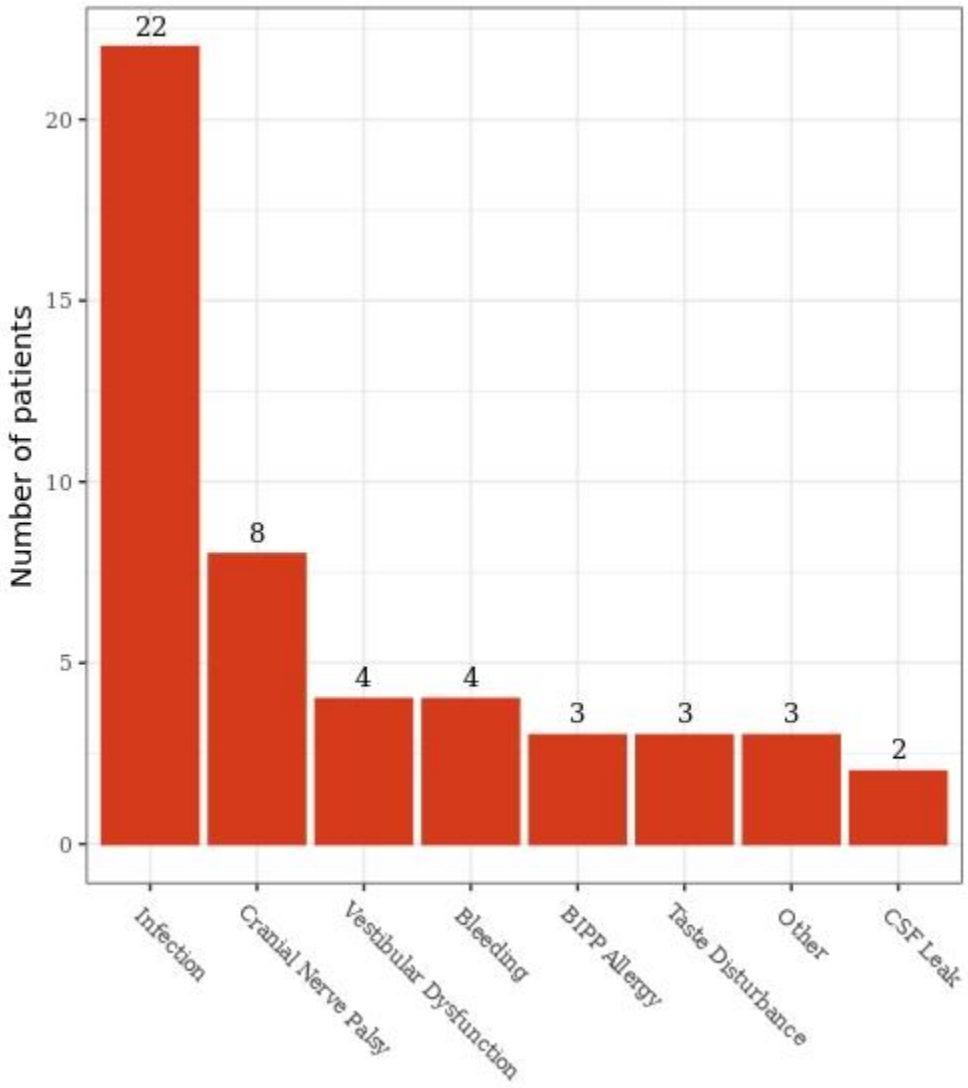
Methods: The Health Research Authority decision tool determined the study design to fall under the remit of audit, and therefore ethical approval was not required.
A multi-centre prospective audit of elective and emergency otological surgery
1130 cases from 79 hospital sites across the UK (excluding Northern Ireland). Data was collected over three, 4-week audit periods from 15th June to 6th September 2020.

Table:

	[ALL]	Audit Period 1	Audit Period 2	Audit Period 3
Surgeon Full PPE	313 (28.2%)	95 (39.6%)	118 (28.4%)	100 (22.0%)
Anaesthetic Full PPE	703 (66.6%)	166 (71.9%)	264 (66.3%)	273 (64.1%)
Scrub Full PPE	754 (68.2%)	170 (72.0%)	288 (69.9%)	296 (64.6%)
Drill used	562 (52.6%)	144 (62.6%)	223 (55.3%)	195 (44.8%)
Visual Aids:				
Microscope	880 (83.1%)	188 (82.1%)	335 (83.1%)	357 (83.6%)
Microscope and Endoscope	104 (9.8%)	25 (10.9%)	39 (9.7%)	40 (9.4%)
Endoscope	75 (7.1%)	16 (7.0%)	29 (7.2%)	30 (7.0%)

Abstract Presentations

Image:



Results: 83.2% were Caucasian and 16.8% non-Caucasian. 93.9% of patients in the study period had minimal co-morbidities (ASA 1 or 2). Middle ear procedures were the most frequently performed (69.1%) whilst hearing implant procedures accounted for 173 (15.3%) of cases. 1029 (91.1%) were known to have a negative COVID -19 status pre-operatively. COVID- 19 status was not reported in 101 cases (8.9%), 84% of these were paediatric cases. 70.4% of all patients isolated for 7-14 days preoperatively.
25.9% of patients were operated on at a COVID-free site. The proportion of cases taking fewer than 60 minutes increased across the study periods, whilst operations lasting in excess of three hours showed a reciprocal decrease ($p=<0.05$).

Abstract Presentations

Full PPE was worn by 313 (28.2%) of surgeons. Surgical challenges included poor visualisation (8.8%), communication difficulties (0.3%) and the disease encountered being more advanced than expected (5.2%).
There was a total of 46 (4%) complications reported, the most common was surgical site infection (n=20). No staff or patients tested positive for SARS-CoV-2 during the audit.
Trainees were present for 80.3 % of cases, the largest proportion of which were coded as supervisor-trainer scrubbed (34.3%).

Conclusions: Middle ear surgery (69.1%) was the most frequent operation performed throughout the audit, reflective of usual otological practice. Middle ear surgery increased over time, demonstrating an increase in surgical capacity and familiarity with COVID safety measures. Surgeon and theatre team familiarity with COVID safety precautions may have improved resulting in shorter operating time as the audit progressed.
Full PPE use reduced overtime. This may have been due to difficulties with their use, alternatives such as the 'otodrape' and microscope or decreasing anxiety about COVID-19 transmission from patients who had tested negatively. A higher proportion of both anaesthetists (66.6%) and theatre staff (68.2%) wore full PPE which may be reflective of differing attitude to risk across these professional groups.
There were no reports of staff or patients testing positively for SARS-CoV-2 post-operatively suggesting that the existing guidance with regard to testing, isolation and PPE use was adequate to protect staff and patients having otological procedures.
Complication rates are comparable to previous literature, suggesting that otological surgery is being performed safely in the UK, despite the pressure of operating within the restrictions necessitated by a pandemic.

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Disclosure of Interest: None Declared

Keywords: COVID-19, operating practices, Otology, surgical outcome

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-082
Virtual clinic for hearing loss and non-pulsatile tinnitus: initial experience of 210 cases

T. Baron[*], D. Whinney[1], V. Reddy[1]
[1]ENT, Royal Cornwall Hospital, Cornwall, United Kingdom

Introduction: Patients with hearing loss and non-pulsatile tinnitus typically face lengthy waits to be seen in the general ENT clinic. These cases rarely have surgical disease requiring intervention and typically do not demonstrate significant clinical findings. In our department, the bottlenecks for these cases to be assessed are two-fold: firstly, access to formal audiometric assessment requiring acoustically insulated rooms and trained audiologists; secondly, access to face-to-face clinic appointments with an ENT doctor. SHOEBOX audiometry involves the use of a portable, tablet based, user-operated audiometric screening tool without the need for an audiologist. In our department, we have implemented a virtual hearing loss and non-pulsatile tinnitus clinic (VHLTC) which involves an ENT specialist virtually assessing cases based on the results of SHOEBOX audiometry, a patient symptoms questionnaire, and the primary care referral letter.

Objectives: The aim of this study is to explore the performance of the virtual clinic to establish the proportion of patients that are discharged without requiring a face-to-face appointment with ENT.

Methods: A retrospective case series service evaluation was conducted on consecutive patients presenting to the VHLTC from June 2020 to January 2021. All cases were vetted by an ENT consultant to ensure they were appropriate for the VHLTC. The criteria for cases to be assessed in the VHLTC included i) patients with subjective hearing loss or bilateral tinnitus aged 18-49yrs (these did not fulfil the criteria for direct referral to audiology in our organisation), ii) asymmetrical sensorineural hearing loss and iii) unilateral non-pulsatile tinnitus.
Each patient's hearing was screened using a SHOEBOX audiometer with Radioear DD450 calibrated headphones. A consultant ENT surgeon conducted a virtual review using the SHOEBOX screening audiogram and the patient-completed questionnaire of their symptoms, ideas and concerns, and the primary care referral letter with details of their presenting complaints, medical history, and otoscopy findings. The outcomes of the virtual review, including further relevant investigations, patient information and advice, interventions and outcomes were recorded.

Results: 210 patients were included in the study (106 females, 104 males, age-range 17-86). 73 patients (34.8%) were discharged at virtual review without requiring a formal audiologist assessment or ENT face to face appointment. These patients were signposted to patient information and resources as appropriate for their symptoms. They required no further ENT input. 108 patients (51.4%) required formal audiological assessment, 76 (36.2%) required imaging, and only 28 (13.3%) required a face-to-face appointment in the ENT clinic.

Conclusions: This study demonstrates that 34.8% of patients referred with hearing loss or non-pulsatile tinnitus could be discharged upon virtual review without requiring a traditional face-to-face ENT outpatient appointment or formal audiologist assessment. Integrating the virtual clinic into the assessment pathway led to face-to-face appointments being necessary for just 13.3% of patients.

Abstract Presentations

The virtual clinic approach reduces waiting times for these benign presentations which would otherwise have a prolonged wait for a traditional face-to-face clinic appointment that would typically offer minimal additional value beyond a virtual clinic approach. This will increase availability in ENT clinics for cases for which a face-to-face appointment is necessary.

Disclosure of Interest: None Declared

Keywords: None

Abstract Presentations

Otology
Otology – Clinical

EAONO21-PO-083
Clinical assessment of tinnitus modulation factors in otosclerosis after stapes surgery: A prospective case series Study

I. Costa*

Introduction: Stapes surgery has found to improve tinnitus severity in most patients suffering from otosclerosis. Nonetheless, previous studies showed worsening of tinnitus in about 1 to 11% of patients. Although widely discussed in the literature, it is not consensual whether the degree of hearing loss prior to surgery or the type of tinnitus are associated with greater surgical benefit in what concerns to tinnitus and quality of life improvement.

Objectives: The aim of this study was to determine the effect of stapes surgery on tinnitus complaints, its impact on quality of life and to assess the relationship between reduction in tinnitus and audiometric improvement.

Methods: Prospective clinical study enrolling patients diagnosed with otosclerosis in 2019 in a tertiary hospital. Demographic data were collected and, besides a regular audiometric evaluation, the patients underwent pre-operative acuphenometry to assess the psycho-acoustic measurements. The authors assessed changes in tinnitus severity using the Tinnitus Handicap Inventory (THI) questionnaire that was performed before and at least 3 months after stapes surgery.

Results: Pre-operatively, the final sample was made of 66 patients. A female predominance (63.6%; n=42) with a global mean age of 48.7 years were found. About 72.7% complained of tinnitus which was mostly unilateral, identified in the low frequencies with median loudness of 7.5 dB. The pre-operative median score on the THI score was of 37. After surgery, from those 66 patients only 47 agreed to continue in the study. From those, we found that tinnitus presence was decreased in about 50% of patients. THI scores improved in 33 patients (70%) and female gender had a statistically significant association with the presence of tinnitus (p=.004). This group also showed significant differences between pre-operative and post-operative THI scores (39 vs 26, respectively) . The THI scores were higher in middle-aged patients before and after the surgery. No correlation was found between audiometry results and the prevalence of tinnitus or score on the THI before and after the surgery. On the other hand, high-pitched tinnitus was associated with larger ABG before but not after stapes surgery.

Conclusions: Our results about utility and effectiveness of stapes surgery on reduction of tinnitus severity and improvement of quality of life were in line with most studies reported in the literature. Half of our patients showed a reduction in THI scores after surgery. However, the existence of tinnitus and its severity were not associated with the degree of hearing loss.

Disclosure of Interest: None Declared

Keywords: Otosclerosis, Quality of life, Stapes Surgery, Tinnitus

EAONO WEEK 2021 HOSTED BY THE UK
6-10 SEPTEMBER 2021

Abstract Presentations

Otology
Otology - Clinical Science

EAONO21-PO-084
Systematic Review and Meta-Analysis on Intratympanic corticosteroids for sudden sensorineural hearing loss

S. Plontke[*], C. Meisner[1], J. Reiber[2], A. Liebau[2] and the Cochrane ITKORT International Working Group
[1]University of Tuebingen, Tuebingen, [2]Dept. of Otorhinolaryngology, Head and Neck Surgery Martin Luther University Halle-Wittenberg, Halle (Saale), Germany, Germany

Introduction: Idiopathic sudden sensorineural hearing loss (ISSNHL) is common and defined as a sudden decrease in sensorineural hearing sensitivity of unknown aetiology. It may be accompanied by vertigo and tinnitus. Systemic corticosteroids are widely used for ISSNHL worldwide, however, their value remains unclear. Intratympanic injections of corticosteroids have become increasingly common in the treatment of ISSNHL.

Objectives: To assess the effects of intratympanic corticosteroids in people with idiopathic sudden sensorineural hearing loss.

Methods: We included randomised controlled trials (RCTs) involving participants (adults and children) with treatment of ISSNHL and follow-up of more then one week comparing intratympanic corticosteroids as primary or as secondary treatment (after failure of systemic therapy) with no treatment, or with placebo, or comparing intratympanic plus systemic corticosteroids (combined therapy) with systemic corticosteroids alone.
We used the standard Cochrane methodological procedures. We used GRADE to assess the certainty of the evidence for each outcome. Our primary outcome was change in hearing threshold with pure tone audiometry (pure tone average).

Results: We included 29 RCTs with a total of 1,997 analysed participants. Some studies had more than two treatment arms and thus compared more than two types of interventions.
1. Intratympanic corticosteroids versus no treatment or versus placebo as secondary therapy
We identified 7 studies (279 patients) for this comparison. Six studies reported the change in hearing threshold and found that intratympanic therapy may not increase outcome (8.96 dB higher with intratympanic therapy, 95% confidence interval (CI) 6.35 to 11.57; 233 participants; low-certainty evidence).
2. Intratympanic corticosteroids versus systemic corticosteroids as primary therapy
We identified 15 studies (1032 patients) for this comparison. Nine studies reported the change in hearing threshold and found that intratympanic therapy may not increase outcome (2.37 dB higher with intratympanic therapy, 95% CI -0.09 to 4.83; 662 participants; low-certainty evidence).
3. Intratympanic plus systemic corticosteroids (combined therapy) versus systemic corticosteroids alone as primary therapy
We identified ten studies (788 patients) for this comparison. Five studies reported the change in hearing threshold and found that combined therapy may not increase outcome (8.55 dB higher with combined therapy, 95% CI 4.55 to 12.54; 389 participants; low-certainty evidence).
4. Intratympanic plus systemic corticosteroids (combined therapy) versus systemic corticosteroids alone as secondary therapy

Abstract Presentations

We identified one study with 76 patients for this comparison. For the proportion of patients whose hearing improved the study found that combined therapy may increase outcome, but the evidence is very uncertain (RR 2.24, 95% CI 1.10 to 4.55; very low certainty evidence).
Conclusions: We found some evidence that intratympanic corticosteroids are effective in treating patients with sudden hearing loss as secondary therapy. Intratympanic corticosteroids likely do not increase outcome when compared to systemic corticosteroids as primary therapy. Wer are uncertain about the effectiveness of a combined therapy versus systemic corticosteroids alone as primary therapy and very uncertain in secondary therapy. We are uncertain about adverse events, as these were not well reported.

Disclosure of Interest: None Declared
Keywords: meta-analysis, sudden hearing loss, systematic review