SELECTED ABSTRACTS

POSTER PRESENTATIONS

IN ORDER OF PRESENTATION

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Bilateral Cochlear Implantation in the Elderly Patient Population

Maya Hatley, BA; Younes Attlassy, BS; Emily Spitzer, AuD; Susan Waltzman, PhD

Objective: Bilateral cochlear implantation (CI) is not routinely recommended in patients of advanced age due to concerns regarding cost effectiveness and the medical risks of multiple operations in this population. This study seeks to evaluate outcomes of bilateral CIs in post-lingually deafened adults over 65 years old.

Study Design: Retrospective cohort study

Setting: Tertiary referral center

Patients: 46 post-lingually deafened adults older than 65 years of age

Interventions: Bilateral cochlear implantation

Main Outcome Measures: The change in CNC word scores from before their 2nd CI (CI2) to 1 year follow-up.

Results: In this study population, the mean pre-CI2 bilateral CNC word score was 54.4%. Bilateral CNC scores were significantly improved compared to pre-CI2 scores at 3 months ($p<0.01$), 1 year ($p<0.01$), and most recent follow-up ($p<0.001$). Simple linear regression failed to detect a significant correlation between the change from pre-CI2 bilateral CNC scores and age at the time of either implantation or length of time between implantations. Multiple paired t-test showed the increase in bilateral CNC scores to be significantly greater in those who wore hearing aids before implantation at 3 months post-operatively ($p<0.05$), but not at 1 year post-operatively ($p>0.05$).

Conclusions: Patients > 65 years old who underwent bilateral cochlear implantation showed significant improvements in speech perception scores compared to pre-CI2 scores. Speech perception outcomes in this population of elderly patients who received bilateral CIs were not correlated with age at the time of implantation or length of time between implantations, suggesting that significant benefit can be seen even with advanced age at the time of implantation and longer time between implantations. One potential mediating factor of improvement in speech perception is the use of hearing aids prior to implantation, shown here to result in earlier gains of improved speech perception. However, a small sample size limits the strength of these conclusions as only 5 patients did not wear hearing aids before implantation.

Professional Practice Gap & Educational Need: There is a lack of literature on the outcomes of bilateral cochlear implantation in elderly patients. In the past, bilateral implantation was not done due to concerns about medical frailty of older patients undergoing multiple operations. Of particular importance is understanding the factors which may lead to improved or poorer speech outcomes in elderly patients to improve identification of candidates for bilateral implantation.

Learning Objective: To understand the outcomes of bilateral cochlear implantation in older adults.

Desired Result: Providers involved in the treatment of hearing loss understand the potential benefits of bilateral CIs in an elderly patient population, as well as factors to consider in the identification of candidates for bilateral implantation in this population.

Level of Evidence: IV

Indicate IRB: Approved at the New York University Grossman School of Medicine, IRB #: i23-01017.

The Impact of Age on Outcomes of Bevacizumab Treatment in NF2-Related Schwannomatosis

Maya G. Hatley, BA; Kaleb H. Yohay, MD; J. Thomas Roland, Jr., MD; Devorah Segal, MD, PhD

Objective: NF2-related schwannomatosis (NF2) is an autosomal dominant genetic disorder characterized by the development of schwannomas and meningiomas. Treatment with bevacizumab, a monoclonal antibody against VEGF that inhibits tumor angiogenesis, has been shown to result in decreased tumor size and hearing improvement in approximately 50% of NF2 patients. It is unknown whether the same degree of benefit is seen in younger patients compared to older patients. The objective of this study is to determine the impact of age on bevacizumab treatment outcomes in NF2.

Study Design: Retrospective cohort study

Setting: Tertiary referral center

Patients: Thirty-seven patients with NF2

Interventions: Bevacizumab

Main Outcome Measures: Change in tumor size of 20% or more, in accordance with the Response Evaluation in Neurofibromatosis and Schwannomatosis criteria, and change in hearing acuity on audiometric testing.

Results: This study included 37 patients with NF2 who were treated with bevacizumab at our institution between 2014 and 2024. They were divided into two groups: 22 adults over the age of 25 (26-71 years) and 15 adolescent and young adult (AYA) patients under the age of 25 (12-24 years). The average treatment duration was 2.93 years. Among older patients, 23.8% (n=5) had worsened hearing, 23.8% (n=5) had improved hearing, and 52.4% (n=11) had stable hearing during the treatment period. Of AYA patients, 21.4% (n=3) had worsened hearing, 42.9% (n=6) had improved hearing, and 35.7% (n=5) had stable hearing over the treatment period. There was no significant difference in the proportion of older and younger patients with hearing decline, improvement, or stability ($p>0.05$). Regarding radiographic response, tumor size was increased in 9.1% (n=2) of older patients, decreased in 42.9% (n=9), and stable in 50% (n=11) compared to pre-treatment imaging. Among AYA patients, 46.7% (n=7) had increased tumor size, 26.7% (n=4) had decreased tumor size, and 26.7% (n=4) had stable tumor size during treatment. The younger patient group had a significantly higher proportion of patients with tumor progression during the treatment period ($p= 0.017$).

Conclusions: AYA patients were significantly more likely to exhibit progression of tumor growth during bevacizumab treatment. However, there was no significant difference in hearing outcomes between the two groups. This study is limited by a small sample size of children with NF2 being treated with bevacizumab.

Professional Practice Gap & Educational Need: Further research is needed to understand how pediatric, adolescent, and young adult NF2 patients respond to bevacizumab, and how this response differs from that of older adults.

Learning Objective: To understand the impact of age on treatment response to bevacizumab in NF2.

Desired Result: Providers involved in the management of NF2 will better understand the likely outcomes of bevacizumab treatment in young adult and pediatric patients.

Level of Evidence: IV

IRB: New York University Grossman School of Medicine, IRB #S23-00840 (approved on 7/7/2023)

Analyzing Persistent Postoperative Vestibulopathy in Vestibular Schwannoma Patients through Physical Therapy-Based Assessments

Robert J. Macielak, MD; Kara Gillum, DPT; Matthew Bjelac, DPT; Yin Ren MD, PhD
Edward. E. Dodson, MD; Oliver F. Adunka, MD, MBA; Desi P. Schoo, MD

Objective: To define and assess vestibulopathy in vestibular schwannoma (VS) patients who have undergone microsurgical resection and have received vestibular rehabilitation therapy (VRT).

Study Design: Retrospective case series

Setting: Tertiary care center

Patients: Patients with persistent dizziness following microsurgical resection of sporadic VS referred to VRT from 1/2023 to 8/2024 using recently published Peripheral Vestibular Hypofunction Clinical Practice Guidelines.

Interventions: Microsurgical resection, VRT

Main Outcome Measures: Horizontal-Dynamic Visual Acuity (H-DVA), Functional Gait Assessment (FGA), and Dizziness Handicap Inventory (DHI)

Results: Eighteen patients (11 females, 61%) received VRT with a median age at surgery of 51-years-old (interquartile range [IQR] 41-55). Fifteen patients (83%) had tumors with a cerebellopontine angle component with a median tumor size of 17.7 mm (IQR 9.9-21.2), and 3 patients (17%) had intracanalicular tumors with sizes of 9.3, 12.5, and 13.0 mm. Seven patients (39%) underwent a translabyrinthine approach, and 11 patients (61%) underwent a retrosigmoid approach. After a median of 5 (IQR 3-10) guided VRT sessions, the H-DVA error to side of the tumor was 3.5 lines (IQR 2.0-4.3), with >2 lines representing dysfunction of the vestibulo-ocular reflex. The H-DVA error to the non-operative side was 2.5 lines (IQR 1.8-3.5) suggesting unanticipated contralateral gaze instability despite VRT. After VRT, the median FGA score was 26 (IQR 22.5-27.5), signifying near normal gait function, and the median DHI was 8 (IQR 4-34), representing minimal handicap.

Conclusions: Most VS patients with postoperative dizziness and H-DVA-confirmed vestibulopathy experience minimal dizziness symptoms and have near-normal dynamic balance skills after evidence-based guided VRT despite their continued gaze instability. Notably, the majority of patients undergoing H-DVA testing showed results consistent with bilateral gaze instability despite a course of VRT.

Professional Practice Gap & Educational Need: Despite the expectation for vestibulopathy after vestibular schwannoma resection, only limited prior studies have attempted to objectively analyze and define the prevalence, severity, and cause of post-resection dizziness.

Learning Objective: To better understand vestibulopathy in the postoperative period for vestibular schwannoma patients. To recognize the implications of different functional and symptom-based assessments in this population.

Desired Result: Increase awareness of the impact and course of postoperative vestibulopathy after vestibular schwannoma resection and the role of vestibular rehabilitation therapy.

Level of Evidence – Level V

Indicate IRB or IACUC: The Ohio State University IRB Protocol #2019H0363

Evaluating the Audiologic Implications of an Absent Round Window Reflex during Stapedectomy

Robert J. Macielak, MD; Vikas Munjal, BS; Edward E. Dodson, MD

Objective: The present study seeks to evaluate the implications of an absent round window reflex (RWR) during stapedectomy.

Study Design: Retrospective case series

Setting: Tertiary care center

Patients: Patients with conductive hearing loss treated via stapedectomy from 7/1/1996 to 1/1/2024 who were noted to have an absent RWR and had adequate records for analysis.

Interventions: Stapedectomy with placement of a bucket handle prosthesis

Main Outcome Measures: Pure-tone average (PTA) air-bone gap (ABG) on most recent postoperative audiometric testing

Results: During the study period, 7 out of 768 patients met inclusion criteria. Of these patients, 5 patients (71%) carried a diagnosis of otosclerosis, 1 patient (14%) had severe tympanosclerosis, and 1 patient (14%) had congenital stapes footplate fixation. No patients underwent prior stapes surgery. Preoperatively, the median PTA ABG of the cohort was 33.75 dB HL (interquartile range [IQR] 20.0-38.75). Intraoperatively, all patients underwent uncomplicated surgery with appropriate prosthesis positioning but did not have a visible RWR. Postoperatively, the median PTA ABG was 12.5 dB HL (IQR 6.87-20.0) at a median of 8.2 months after surgery. Only 3 patients (43%) obtained a PTA ABG less than 10 dB HL with an additional patient approaching this threshold (11.25 dB HL). Despite this, there was statistically significant improvement in PTA ABG (30.0 vs. 13.3 dB HL, p=0.004). No patients have undergone revision surgery, and two patients (29%) currently utilize hearing aids in their operative ear.

Conclusions: Despite its potentially negative implications, an absent RWR appears to have limited impact on the ultimate audiometric outcome after stapedectomy, with patients still having a statistically significant improvement in their hearing and almost half of patients obtaining a PTA ABG of 10 dB HL. Further study of this phenomenon is warranted.

Professional Practice Gap & Educational Need: The round window reflex appears to be a good marker of successful reconstitution of the conductive hearing mechanism, but its true implications on postoperative audiometric outcomes during stapedectomy are not well known.

Learning Objective: The learner should be able to comprehend the implications of an absent round window reflex during surgery.

Desired Result: The desired result is that providers can utilize these data in their own practice when performing surgery to guide intraoperative technique and decision-making.

Level of Evidence – Level V

Indicate IRB or IACUC: The Ohio State University IRB Protocol #2024H0071

Complication and Re-Operation Rates of Different Obliteration Materials in Subtotal Petrosectomy with Blind Sac Closure and Mastoid Obliteration: A Systematic Review and Meta-Analysis

Ronald S. Wang, BS; Allen Khudaverdyan, BS; Wenqing Yang, MA
Michele Santacatterina, PhD; J. Thomas Roland Jr, MD

Objective: To evaluate and compare the post-operative outcomes of different obliteration materials used in subtotal petrosectomy (STP) with blind sac closure in non-cochlear implant patients

Data Sources: A comprehensive search of Pubmed, Embase, Cochrane CENTRAL, Scopus, CINAHL complete, and Web of Science was performed from the databases' inception to July 1st, 2024.

Study Selection: Studies without missing data that included non-cochlear implant patients undergoing subtotal petrosectomy with blind sac closure were included. Of the initial 524 studies, 49 (9.4%) met selection criteria.

Data Extraction: Two reviewers independently assessed study eligibility using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Five mastoid obliteration techniques were identified: abdominal fat, bioactive material, fascial flaps, muscle grafts, and no obliteration material. Other extracted data included patient demographics, indication for subtotal petrosectomy, eustachian tube obliteration, follow-up time, follow-up imaging, and post-operative outcomes (complications and re-operation rates).

Data Synthesis: For the overall complication and re-operation rates across all obliteration material types, data was pooled through meta-analysis of inverse variance. Based on the heterogeneity across the selected studies, the random-effects model was used. The weighted summary proportion was calculated by the Freeman-Tukey transformation. Analysis of variance was used to separately compare complication and re-operation rates between the different obliteration material types used.

Conclusion: Out of all the mastoid obliteration techniques for subtotal petrosectomies with blind sac closure, abdominal fat grafts were by far the most used. No significant difference was found between the five types of obliteration techniques for post-operative complication or re-operation rates. Further studies utilizing non-abdominal fat grafts as mastoid obliteration material for subtotal petrosectomies with blind sac closure are needed.

Professional Practice Gap & Educational Need: Neurotologists have used different obliteration techniques for subtotal petrosectomies with blind sac closure. This study aims to compare post-operative complications and re-operations between commonly used obliteration techniques to guide future clinical care.

Learning Objective: Better understand the overall and individual post-operative outcomes associated with the different mastoid obliteration techniques in subtotal petrosectomy with blind sac closure

Desired Result: Increased knowledge regarding the outcomes associated with different obliteration material types in subtotal petrosectomies with blind sac closure in non-cochlear implant patients.

Level of Evidence – Level III

Indicate IRB or IACUC: Exempt.

The Effect of Otologic Comorbidities on Readmission Following Resection of Vestibular Schwannoma

Aneesh A. Patel, MD; Dean Kennedy, MSc; Genevieve Dupuis, MS
Jessica R. Levi, MD; Peter C. Weber, MD, MBA

Objective: To determine the impact of comorbid otologic comorbidities on readmission following vestibular schwannoma (VS) resection.

Study Design: Database review.

Setting: Nationwide Readmissions Database (NRD).

Patients: Patients with history of VS, identified by International Classification of Disease (ICD) 9 code 225.1 and ICD-10 code D33.3, who were readmitted following surgical resection (ICD-9 04.01, ICD-10-PCS 00BN0ZZ) in 2020. Those with otologic symptoms and otologic comorbidities identified by ICD-9/10 codes were compared to those without.

Main Outcome Measures: Duration of readmission stay, patient death, need for additional procedures, need for rehabilitation, demographic variables, comorbidities.

Results: The NRD query yielded a total of 1997 patients who were readmitted following resection of vestibular schwannoma in 2020. The 197 patients with vertigo had a significantly higher number of procedures completed (5.1 vs 4.3, p=0.016), longer length of readmission (6.3 vs 5.4 days, p=0.003), and need for rehabilitation (13.90% vs 4.40%, p<0.001). The 316 patients with cranial nerve had significantly more likely to have longer length of stay (7.7 vs 5.0 days, p<0.001) and need for rehabilitation services (15.80% vs 3.30%, p<0.001). Asymmetric loss and tinnitus largely did not demonstrate significant differences. Patients with migraines had higher need for rehabilitation (16.00% vs 4.60%, p<0.001).

Conclusions: Patients with vertigo and cranial nerve neuropathy had significantly longer readmission stays, more procedures performed, and higher need for rehabilitation.

Professional Practice Gap & Educational Need: There is limited evidence on the impact of otologic comorbidities on patients readmitted following resection of VS.

Learning Objective: Describe the impact of otologic symptoms and comorbidities on readmission following resection of VS.

Desired Result: Improved knowledge of the impact of otologic comorbidities on readmission following resection of VS.

Level of Evidence - IV

Indicate IRB or IACUC: Exempt

Evaluating Cochlear Implant Outcomes in Children with Cochlear Nerve Deficiency and Single-Sided Deafness

Daniel Swanson, MD; Jasmine Gulati, MAPP; Christina Zhu, BS (presenter)
Anuja Shah, BA; Paul Chisolm, MD; Michael Hoa, MD

Objective: To evaluate cochlear implantation (CI) outcomes in children with cochlear nerve deficiency (CND) and single-sided deafness (SSD).

Study Design: Systematic review and meta-analysis.

Setting: Multiple retrospective and prospective studies on pediatric cochlear implantation.

Patients: Children with single-sided deafness due to CND, classified into cochlear nerve hypoplasia and aplasia subgroups.

Interventions: Cochlear Implantation

Main Outcome Measures: Key auditory and speech performance metrics, including the Meaningful Use of Speech Scale (MUSS), Meaningful Auditory Integration Scale (MAIS), Categorical Auditory Performance (CAP), Speech Intelligibility Rating (SIR), and word recognition scores.

Results: Cochlear nerve deficiency accounted for 37% of pediatric SSD cases. Children with cochlear nerve hypoplasia showed intermediate CI improvement (MUSS: 12, MAIS: 30, CAP: 5, SIR: 2, monosyllabic recognition: 60%, bisyllabic recognition: 90%), while those with aplasia had the least benefit (MUSS: 8, MAIS: 29, CAP: 4, SIR: 2, monosyllabic recognition: 38%, bisyllabic recognition: 40%). Control group scores were significantly higher.

Conclusions: Cochlear implants improve auditory and speech outcomes in children with CND and SSD, with better results in those with hypoplastic nerves. The outcomes indicate the need for more standardized measures and tailored CI candidacy criteria for this population.

Professional Practice Gap & Educational Need: Lack of standardized outcome measures and criteria for cochlear implantation in pediatric CND and SSD cases.

Learning Objective: Understand the variability in cochlear implant outcomes based on cochlear nerve status in pediatric SSD patients.

Desired Result: Improve candidacy guidelines for cochlear implantation in pediatric SSD cases due to CND.

Level of Evidence – Level III

Indicate IRB or IACUC: Exempt

Time and Treatment Efficacy in Sudden Sensorineural Hearing Loss: A Large Retrospective Study

Chanan Shaul, MD PhD; Yehuda Taranovsky MD; Itay Chen, MD
Riki Salem, MD; Jean-Yves Sichel, MD; Ronen Perez, MD

Objective: To evaluate the relationship between time-to-treatment and hearing improvement in sudden sensorineural hearing loss (SSNHL), and to assess the efficacy of corticosteroid treatment by comparing outcomes of early-treated and late-presenting untreated patients.

Study Design: Retrospective cohort study.

Setting: Tertiary referral center**.**

Patients: 943 patients diagnosed with SSNHL between 2012 and 2023**.**

Interventions: Oral corticosteroids followed by intratympanic dexamethasone injection as salvage treatment when indicated.

Main Outcome Measures: Pure-tone average (PTA), speech recognition threshold (SRT), and speech discrimination (SD) scores.

Results: Patients were categorized into groups based on the presentation time: weeks 1-2 (early treatment group) and weeks 3-4 (late treatment group). We used their pre-treatment audiometric tests for the late-treatment group as a comparison point. This allowed us to compare hearing outcomes between those who received early treatment and the baseline of those who presented later, effectively serving as a snapshot of natural progression. A significant difference in hearing improvement was found between patients treated within two weeks of symptom onset and those treated after two weeks ($p < 0.001$). A weak but significant correlation was observed between time-to-treatment and degree of hearing improvement ($R = 0.23$, $p < 0.001$ for PTA). However, when comparing treated patients (weeks 1-2) with yet-untreated patients (weeks 3-4) at equivalent time points post-onset, no significant differences were found in PTA, SRT, or SD (e.g., PTA for week one vs. week 3: 36.7 ± 28 vs 37.5 ± 19 dB, $p = 0.55$).

Conclusions: While earlier treatment initiation correlates with better hearing outcomes, the lack of significant difference between treated and yet-untreated patients at equivalent time points questions the efficacy of corticosteroid treatment. The observed improvements may be mainly attributable to the natural healing process, which appears to occur predominantly within the first two weeks after symptom onset. These findings challenge current treatment guidelines and highlight the need for further research into SSNHL management.

Professional Practice Gap & Educational Need: Current guidelines emphasize early corticosteroid treatment for SSNHL, but evidence for its efficacy is limited. This study addresses the need to critically evaluate both the timing and overall effectiveness of current treatment protocols.

Learning Objective: To understand the complex relationship between treatment timing, apparent efficacy, and natural recovery in SSNHL and to critically evaluate current treatment paradigms.

Desired Result: Clinicians will consider both the timing and overall necessity of corticosteroid treatment in SSNHL**,** recognizing the need for further research to establish truly evidence-based treatment protocols.

Level of Evidence: Level III.

Indicate IRB or IACUC: Approved by the Institutional Review Board of Shaare-Zedek Medical Center.

Cochlear, but not Vestibular, Endolymphatic Hydrops Predominantly Affects Vestibular Function in Patients with Unilateral Meniere's Disease

Takeda H, MD; Morita Y, MD, PhD; Yagi C, MD, PhD; Izumi S, MD, PhD
Yamagishi T, MD, PhD; Ohshima S, MD, PhD; Horii A, MD, PhD

Objective: This study aimed to elucidate the role of cochlear and vestibular endolymphatic hydrops in audio-vestibular function in patients with unilateral Meniere's disease (MD).

Study Design: Retrospective.

Setting: University hospital.

Patients: Forty-eight patients with unilateral MD with mild or significant cochlear/vestibular hydrops on gadolinium-enhanced MRI were enrolled.

Main Outcome Measures: Audio-vestibular function, duration and stage of MD, and their correlation with the grades of cochlear and vestibular hydrops.

Results: Disease duration in patients with stage 3 MD was significantly longer than that with stage 1 MD. Patients with stage 2 and 3 MD showed significant cochlear or vestibular hydrops more frequently than those with stage 1 MD. The mean hearing thresholds in patients with significant cochlear or vestibular hydrops were significantly higher than those with mild hydrops. The percentage of canal paresis in the caloric testing and the deviation angle in the stepping test in patients with significant cochlear hydrops were significantly greater than those with mild hydrops. However, the results of caloric testing and stepping test in patients with significant vestibular hydrops did not differ from those with mild hydrops. The results of other vestibular function tests, such as vestibular-evoked myogenic potentials, video head impulse test, and questionnaires for vestibular and mental symptoms, did not differ between patients with significant and mild cochlear/vestibular hydrops.

Conclusions: Cochlear and vestibular hydrops gradually develop over time with the deterioration of hearing function, resulting in the progression of MD stage. Cochlear hydrops predominantly affects vestibular function in patients with MD, suggesting that potassium intoxication after rupture of cochlear hydrops, rather than high endolymphatic fluid pressure in the vestibule, impairs audio-vestibular function.

Professional Practice Gap & Educational Need: The correlation between endolymphatic hydrops and vestibular function in patients with MD remains controversial.

Learning Objective: To learn the role of endolymphatic hydrops in audio-vestibular function.

Desired Result: To understand that cochlear hydrops predominantly affects vestibular function in patients with MD.

Level of Evidence: V

Indicate IRB or IACUC: No. 2015-2449, Institutional Review Board of Niigata University Hospital.

Increased Costs and Complication Rates in Vestibular Schwannoma Resections for Neurofibromatosis Type 2

Rance J.T. Fujiwara, MD, MBA; Julia J. Shi, BA
Donald Tan, MD; J. Walter Kutz, MD

Objective: To characterize inpatients costs and complication rates in sporadic and neurofibromatosis type 2 (NF2) patients undergoing resection of vestibular schwannoma (VS)

Study Design: Cross-sectional analysis

Setting: National Inpatient Sample, 1998-2021

Patients: 56,623 inpatient admissions after VS resection

Interventions: resection of VS

Main Outcome Measures: Patient- and hospital-level demographics for admissions following resection of VS, as well as postoperative medical and surgical complications, were tabulated. We evaluated average hospitalization costs and compared them between sporadic and NF2 patients. Multivariate analysis was performed to determine whether NF2 admissions had increased costs and length of stay.

Results: A total of 51,459 and 1,164 resections were recorded for sporadic and NF2 patients, respectively. Patients with NF2 were younger (mean age 35.3 [SE 0.9] vs. 51.1 [SE 0.2] years) and more likely insured by Medicaid (12.8% [SE 3.1] vs. 5.4% [SE 0.4]). The average cost for NF2 admissions was $49,141 (95% CI 42,527-55,754), relative to sporadic tumors at $38,204 (95% CI 36,408-40,000, $p<0.001$). NF2 patients had increased rates of surgical and medical complications, including facial nerve dysfunction (31.7% [SE 3.8] vs. 17.3% [SE 0.7], $p<0.001$), dysphagia (8.8% [SE 2.7] vs. 2.8% [SE 0.3], $p<0.001$), aspiration pneumonia (3.4% [SE 1.3] vs. 0.6% [SE 0.1], $p<0.001$), and sepsis (1.8% [SE 1.0] vs. 0.4% [SE 0.1], $p=0.01$), all of which were associated with increased costs. On multivariate analysis, NF2 as an independent factor was *not* associated with increased inpatient costs (b=$3,867 [95% CI -221 to 7,956], $p=0.06$).

Conclusions: Resections of NF2-related VS are associated with increased surgical and medical complications. While NF2 is not independently associated with increased hospital costs following surgery, the increased rates of complications in this patient population are likely the primary driver of increased costs.

Professional Practice Gap & Educational Need: Several studies have utilized national administrative databases to describe trends in treatment patterns in vestibular schwannoma. To date, few studies have described differences in postoperative inpatient outcomes and hospitalization costs following resection of sporadic and NF2-related vestibular schwannomas.

Learning Objective: To understand differences in complication rates and hospitalization costs following vestibular schwannoma resections in sporadic and NF-2 related tumors

Desired Result: To increase awareness of costs and complications in unique patient populations following vestibular schwannoma resections, which may aid in counseling patients preoperatively

Level of Evidence - IV

Indicate IRB or IACUC: Exempt

Increasing Inpatient Costs and Complication Rates following Vestibular Schwannoma Resections from 1998 to 2021

Rance J.T. Fujiwara, MD, MBA; Donald Tan, MD; Hitomi Sakano, MD, PhD
Brandon Isaacson, MD; J. Walter Kutz, MD

Objective: To examine temporal trends in inpatient costs and postoperative surgical and medical complications following vestibular schwannoma (VS) resections

Study Design: Cross-sectional analysis

Setting: National Inpatient Sample, 1998-2021

Patients: 50,991 admissions

Interventions: VS resection

Main Outcome Measures: Surgical and medical complications following VS resection were recorded annually. The annual average cost of inpatient hospitalization and length of stay were also documented each year. Multivariate analysis was performed to determine whether subsequent calendar years were associated with changes in costs.

Results: From 1998 to 2021, the annual average number of VS resections decreased 32.7% from 3,813 to 2,557. Rates of surgical and medical complications increased from 18.2% to 34.2% (b=0.73% [95% CI 0.53-0.93], p<0.001), and from 4.3% to 7.6% (b=0.17% [95% CI 0.11-0.22], p<0.001), respectively. While the percentage of admissions with complications increased, no significant changes were observed in the absolute number of complications from 1998 to 2021. Concurrently, comorbidity burdens significantly increased, with 84.8% (SE 1.5) of patients from 1998 to 2001 presenting with ≤1 comorbidity, compared to 58.5% (SE 1.5) in 2018 to 2021. The mean inpatient cost per admission increased from $30,922 to $45,973, which was statistically significant on multivariate regression (b=$412 [95% CI 208-615], p<0.001), despite a decrease in average inpatient stay from 5.4 (SE 0.5) to 4.5 (SE 0.3) days.

Conclusions: As the number of VS surgeries has decreased, the percentage with postoperative complications has increased, likely due to changes in patient selection as well as increasing comorbidities in operative cases. Healthcare expenditures for postoperative admissions have increased significantly over the last two decades, resulting in a roughly $15,000 increase in mean inflation-adjusted inpatient costs per postoperative admission.

Professional Practice Gap & Educational Need: Several studies have utilized national administrative databases to describe trends in treatment patterns in vestibular schwannoma. No study to our knowledge has analyzed long-term trends in hospitalization costs or changes in rates of surgical and medical complications over time.

Learning Objective: To understand rates of postoperative complications and hospitalization costs following vestibular schwannoma surgery

Desired Result: As increasing importance is placed on quality of care and quality measures, we hope to increase awareness of costs and complications following vestibular schwannoma surgery, as well as the potential role of comorbidities and patient selection.

Level of Evidence - IV

Indicate IRB or IACUC: Exempt

Middle Fossa Approach for Preserving Hearing in Small Neurofibromatosis-2 (NF-2) Related Vestibular Schwannomas

Osama Tarabichi, MD; Nir Ben-Shlomo, MD; Marlan R. Hansen, MD
Bruce J. Gantz, MD; Alexander D. Claussen, MD

Objective: To evaluate audiometric outcomes and hearing preservation rates in NF-2 patients undergoing vestibular schwannoma resection by middle fossa approach.

Study Design: Retrospective review.

Setting: Tertiary referral center.

Patients: NF2 patients with small vestibular schwannomas undergoing resection by middle fossa approach with goal of hearing preservation from 2012-2022 at the University of Iowa.

Interventions: microsurgical resection by middle cranial fossa approach.

Main Outcome Measures: Pre- and post-operative word recognition scores (WRS).

Results: 10 NF-2 patients were identified who underwent middle fossa approach to remove vestibular schwannomas over review period. A total of 12 tumors were excised as 2/10 patients underwent bilateral surgery. Age at time of surgery ranged from 7-63 years old with average age of 31.58 +/-17.95. Gross total resection of the tumor was achieved in all but one case in which residual tumor adherent to the facial nerve was left behind. Average tumor size was 6.17 +/- 3.14 mm in greatest dimension on axial T2 MRI sequence. All patients had preoperative WRS >70% and this was preserved postoperatively in 10/12 cases. 2/12 cases had significant decline in hearing postoperatively. Auditory brainstem responses were present and persisted throughout tumor dissection in all but one case in which thresholds were present but reduced after tumor dissection and this was associated with decline in hearing postoperatively.

Conclusions: Removal of NF-2 related vestibular schwannomas by middle fossa approach with goal of hearing preservation is feasible and yields comparable outcomes to those seen in patients with sporadic vestibular schwannomas.

Professional Practice Gap & Educational Need: Surgical management of small NF-2 related vestibular schwannomas.

Learning Objective: Middle cranial fossa approach for resection of small NF-2 related vestibular schwannomas is effective at achieving hearing preservation**.**

Desired Result: Poster presentation.

Level of Evidence – Level IV.

Indicate IRB or IACUC: University of Iowa IRB 201410713.

Association of Patient Factors and Safety-Net Hospital Status with Complications Rates and Cost following Vestibular Schwannoma Resection

Dakota D. Lipps, MD; Rance J.T. Fujiwara, MD, MBA; Hitomi Sakano, MD, PhD
Brandon Isaacson, MD; J. Walter Kutz, MD

Objective: To examine the impact of patient characteristics and safety-net hospital status on complication rates and healthcare costs for patients who underwent resection of vestibular schwannoma (VS).

Study Design: Cross-sectional analysis.

Setting (Data Source): National Inpatient Sample, 1998 to 2021.

Patients: The National Inpatient Sample was queried for adults aged ³18 years who underwent excision of a sporadic VS using pertinent *International Classification of Diseases (ICD)* coding. Patient demographic information as well as preexisting medical comorbidities were obtained for each encounter. Hospital characteristics including hospital bed capacity, geographic region, and teaching status were obtained. Safety-net burden was calculated as the proportion of Medicaid or uninsured patients admitted to a given hospital for any indication annually, and centers in the highest quartile were defined as safety-net hospitals.

Interventions: Resection of vestibular schwannoma.

Main Outcome Measures: 1) any surgical/central nervous system (CNS)-related or medical complication in the postoperative setting, 2) total inpatient costs associated with each hospital encounter.

Results: The final cohort included 50,991 (SE 3,995) inpatient admissions following VS resection, with 13,245 (SE 1,832) occurring at safety net hospitals. For surgical complications, safety-net hospitals had increased rates of hydrocephalus (6.0% [SE 0.6] vs. 3.8% [SE 0.3], p=0.001) and dysphagia (4.3% [SE 0.6] vs. 2.2% [SE 0.3], p<0.001); there were no differences in rates of facial nerve dysfunction. Among medical complications, patients in safety-net hospitals had increased rates of pulmonary edema (2.1% [SE 0.4] vs. 1.1% [SE 0.2], p=0.01) and sepsis (0.9% [SE 0.3] vs. 0.2% [SE 0.1], p<0.001). Safety-net hospitals were independently associated with increased odds of medical complications (OR 1.30 [95% CI 1.01-1.70], p=0.04) but not surgical complications (OR 1.10 [95% CI 0.94-1.27], p=0.23). Higher comorbidity burden, as measured by Elixhauser comorbidity indices, was independently associated with increased odds of complications. Mean admission cost was significantly greater in safety-net hospitals, with a mean of $42,749 (SE 1,892) relative to $36,456 (SE 993) for non-safety net hospitals (p=0.003). After controlling for patient- and hospital-related factors which were associated with hospital costs, safety net designation was independently associated with $3,566 (95% CI $503-6,630, p=0.02) increased costs per admission. There was no difference in the average number of surgeries performed between safety-net and non-safety net hospitals, though each additional surgery performed at a given hospital was associated with $75 (95% CI $58-92, p<0.001) decrease in average inpatient costs.

Conclusions: Safety net hospitals provide valuable care regardless of an individual's payor status. However, among patients undergoing VS resection, safety-net status alone is associated with increased post-operative medical complications and certain surgical complications, as well as increased overall admission costs.

Professional Practice Gap & Educational Need: Need for further investigation into safety net hospital specific factors that lead to increased expenses and medical complications for VS admissions.

Learning Objective: To understand safety net status impact on complications and cost for resection of VS.

Desired Result: Increase clinical awareness of the cost and post-operative complication differences based on safety net status for resection of VS with future aims to improve healthcare quality and/or lower costs at these institutions.

Level of Evidence: Level IV.

Indicate IRB or IACUC: Exempt.

HearRing HP Classification System in Assessment of HP in Different Group of Recently Implanted Patients, According to Initial Hearing

Piotr Henryk Skarzynski Prof.; Artur Lorens Prof.; Elzbieta Gos PhD; Henryk Skarzynski Prof.

Objective: The aim of this analyses was to apply the HearRing HP classification system in assessment of HP in different group of recently implanted patients, according to initial hearing.

Study Design: The retrospective study included adult patients with profound hearing loss who underwent cochlear implantation.

Setting: Tertiary referral center.

Patients: There were 70 patients who underwent cochlear implantation (40 women and 30 men) aged between 18 and 83 years. Their mean age was 52.0 years (SD = 14.4). The patients were categorized into four groups based on their preoperative hearing thresholds (EC, EAS, and ES) and the type of electrode used (Flex 24 or Flex 26).

Interventions: Minimally invasive cochlear implantation via round window.

Main Outcome Measures: Hearing thresholds were measured using pure-tone audiometry before operation and during activation (about month after surgery). Hearing preservation rate was calculated according to the hearing preservation formula by Hearring Group.

Results: The best HP was observed in EC patients who received the Flex 24 electrode, the HP rate at CI activation ranged from 1.3% to 92.9%, averaging 61.3% (*SD* = 22.9). The lowest HP rate was observed in ES patients who received the Flex 26 electrode, with rates at CI activation ranging from 0% to 112.2%, averaging 52.0% (*SD* = 42.2).

Conclusions: Better hearing preoperatively predicts better hearing preservation.

Professional Practice Gap & Educational Need: Currently, studies are comparing HP for different electrodes in patients with different initial audiograms.

Learning Objective: Proper qualification of patients and use of appropriate electrodes in patients with different types of hearing loss.

Desired Result: Comparison of HP achieved for different electrodes will be done for patients with similar initial audiograms.

Level of Evidence – III

Indicate IRB or IACUC: KB.IFPS 16/2021

Natural History of Incidental Vestibular Schwannomas in the Better Hearing Ear

Douglas J. Totten, MD, MBA; Hunter L. Elms, MD
Evan C. Cumpston, MD; Rick F. Nelson, MD, PhD

Objective: To describe and assess a unique phenomenon whereby vestibular schwannomas (VS) are identified in a better hearing ear

Study Design: Retrospective case series

Setting: Tertiary referral center

Patients: Eight patients who underwent magnetic resonance imaging (MRI) to assess unilateral sensorineural hearing loss (SNHL) and/or tinnitus and were found to have unilateral VS in the contralateral, better-hearing ear.

Main Outcome Measures: Audiometric results including pure-tone average (PTA), MRI findings, tumor laterality, change in symptoms and imaging findings over time.

Results: Eight patients (6 females) aged 45-81 presented with left-sided asymmetric hearing loss or pulsatile tinnitus at an average of 62 (standard deviation 14) years of age. Patients presented with normal ranging to severe left SNHL (PTA 44 [range 16 – 74] dB) and mean word recognition score (WRS) of 84.5 (range 68-100). Patients had normal-to-moderate right hearing (PTA 16 [range 12-44] dB) (WRS 97.5 [92-100]) with 5 of 8 (62.5%) patients having WRS of 100% in the right, tumor ear. All patients had MRI showing right intracanalicular tumor consistent with VS with an average size of 4.1 (standard deviation 1.9) mm. All patients were managed with wait-and-scan approach. Fluid fundal cap was present in four (50%) patients. No patients reported change in hearing in either ear at an average follow-up period of 23 (SD 19) months. No patients experienced tumor growth (defined as ³1 mm in any dimension) or symptom progression over the follow-up period.

Conclusions: Patients with small incidental intracanalicular tumors in a better hearing ear exhibit no hearing decline or change in tumor size at an average follow-up of nearly 2 years. A wait-and-scan approach is recommended. Longer follow-up is needed.

Professional Practice Gap & Educational Need: While VS are often found incidentally, it is rare to identify a VS in a better hearing ear when the purpose of imaging was assess for asymmetric hearing loss of the contralateral ear. This study describes this unique phenomenon and proposes a reasonable management strategy.

Learning Objective: VS identified in the better hearing ear are rare, often small, and should be managed with a wait-and-scan approach.

Desired Result: VS identified in better hearing ears are rare and should be managed conservatively

Level of Evidence – Level IV

Indicate IRB or IACUC: Indiana University IRB #13133 (approved 10/14/2022)

Superior Semicircular Canal Dehiscence Patients Have Reduced Skull Thickness Compared to Matched Controls and Patients with Spontaneous Cerebrospinal Fluid Leaks

Douglas J. Totten, MD, MBA; William Schneider, BS; Hunter L. Elms, MD
Leah Dauterman, BS; McKenzie Stewart; Evan Cumpston, MD; Rick F. Nelson, MD, PhD

Objective: To assess whether semicircular canal dehiscence (SSCD) may result from pressure-induced thinning or developmental factors

Study Design: Retrospective cohort study

Setting: Tertiary referral center

Patients: Patients with radiographically confirmed SSCD without spontaneous cerebrospinal fluid (sCSF) leaks and control patients without SSCD were matched by age, gender, body mass index (BMI) and race. Skull base height was also compared to non-matched sCSF leak patients without SSCD.

Main Outcome Measures: Differences in thickness of calvarium, zygoma and/or skull base between SSCD and control and/or sCSF leak patients

Results: 38 SSCD patients [21 (61%) female, 53 (95%) white, 17 (45%) with bilateral SSCD] presented at an average (standard deviation) age of 55 (14) years with an average BMI of 30 (9). Control patients were selected to match gender, age, BMI, and race. There was no significant difference in rates of obstructive sleep apnea (SSCD: 36%, Control: 24%, $p=0.27$). SSCD patients had significantly thinner calvarium thickness [1.93 (0.37) mm] compared to control patients [2.35 (0.51) mm, $p<0.0001$] and lower calvarium to zygoma thickness ratio [0.43 (0.09) vs. 0.50 (0.10), $p=0.0008$], but did not have significantly different zygoma thickness [4.54 (0.89) vs. 4.72 (0.72) mm, $p=0.0889$]. SSCD patients had significantly thinner skull base height compared to the both the control cohort [2.86 (0.87) vs. 4.61 (1.15) mm, $p<0.0001$] and compared to 83 non-matched sCSF leak patients [2.86 (0.87) vs 3.37 (1.25) mm, $p=0.0003$).

Conclusions: SSCD patients have significantly reduced calvarium and skull base thickness compared to matched controls and thinner skull base compared to sCSF leak patients. SSCD may occur as a defect in skull base development rather than from pressure-related thinning.

Professional Practice Gap & Educational Need: Factors contributing to the development of SSCD remain controversial. This study utilized matched controls and sCSF leak patients to assess whether skull and calvarial thinning may be more likely to occur due to developmental factors or due to pressure-induced thinning.

Learning Objective: The development of SSCD may be related to defective skull base development as opposed to chronic pressure-induced thinning.

Desired Result: Patients with SSCD appear to have reduced calvarium and skull base thickness compared to matched controls

Level of Evidence – Level IV

Indicate IRB or IACUC: Indiana University IRB #13133 (approved 10/14/2022)

Hearing Damage Induced by Precise Blast Overpressure in a Rat Model

José D. Ríos, PhD; Wensheng Zhang, MD, PhD; Tushar Kailu, MS
Ricardo Mejia-Alvarez, PhD; Tony T. Yuan, PhD; Isaac D. Erbele, MD

Hypothesis: A single-level blast to one ear can cause threshold shift without injury to the contralateral ear in a rat model.

Background: Hearing loss is a leading cause of disability in veterans and injury may come from noise or blast. In this study, we fabricated a tunable shock tube with controllable overpressure duration and pressure level to model and better evaluate blast-induced auditory injury resulting from improvised explosive devices.

Methods: Eighteen rats in three groups of six had one ear exposed to single-blast overpressure levels of 73 kPa (~10 Psi), 119 kPa (~17 Psi), and 138 kPa (~20 Psi), respectively, compared to two controls. Auditory brainstem response (ABR) was measured in pre-blast and post-blast at day 8 post-blast. Animals were euthanized 8 days after blast exposure and tissues (cochlea, brain, and brainstem) were harvested for histopathology assessment.

Results: On day 8 post-blast, there was a significant threshold shift of 60–80 dB SPL in the exposed rats' ear at 8, 16, and 32 kHz in all three groups. The threshold value on the contralateral ear and control ears was 20 dB SPL at 8, 16, and 32 kHz. Higher blast overpressure was correlated with greater hearing loss. Thresholds were elevated compared to the contralateral ears, baseline, and controls, and remained elevated 8 days post-blast.

Conclusions: A single blast to the ear causes threshold shifts in rats, and the designed shock tube injures a single ear without significant exposure to the contralateral ear.

Professional Practice Gap & Educational Need: Elucidate the injury mechanisms and functional pathways that drive sensorineural hearing loss after direct blast overpressure exposure to the ear. A mechanistic understanding of blast injury may lead to effective therapeutic interventions. Additionally, consistent with humane experimental technique, use of animals as a self-control allows for minimizing the number of animals used in experimentation.

Learning Objective: To understand the natural history of sensorineural hearing loss due to blast exposure.

Desired Result: Recognize blast as a cause of hearing disability.

Level of Evidence: Does not apply (animal study)

Indicate IRB or IACUC: FWH20230035AR

A Novel Translational Model of Ovine Auditory Injury

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Objective: Assess temporary and permanent auditory threshold shifts of single and repeated low-level blast overpressures (shockwaves) in an ovine model.

Hypothesis: Sheep exposed to a single 4psi overpressure would experience a temporary auditory threshold shift while repeated exposure to overpressures would result in a permanent threshold shift.

Background: Given similarities between the sheep and human auditory system, sheep may be an especially valuable preclinical model for hearing injury due to sound overpressures.

Methods: Ten female sheep had a single ear subjected to either a single 4psi blast overpressure (n=5) or 10 consecutive 4psi blast overpressures (n=5) each delivered 30 minutes apart. The blast overpressures were created by bursting a PTFE membrane in a custom-fabricated shock tube having a Helium-pressurized driver. Auditory brain response testing was conducted at baseline, immediately following the application of the blast overpressures, and repeated at day 3, 7, and 14. The contralateral ear was used as a control at each time point. Differences in auditory threshold compared to the control ear were assessed using a Fisher's Exact test.

Results: Sheep receiving a single 4psi blast overpressure experienced a temporary threshold shift immediately following blast exposure (P=0.028) with no increase in threshold compared to the contralateral ear by day 3. Sheep receiving multiple 4psi blast overpressures had an increased auditory threshold compared to the control ear immediately following blast exposure (P=0.016) and 14 days following exposure (P=0.047). No other adverse effects were found.

Conclusions: Application of low-level blast overpressures using a custom-fabricated shock tube resulted in a reproducible threshold shift in an ovine pre-clinical model of auditory injury.

Professional Practice Gap & Educational Need: Rodents are frequently used in foundational research to evaluate hearing changes, but their frequency range is much higher than that of humans. There are expected physiologic differences between auditory systems of rodents and humans, and the physics of high frequency sound limit the ability to evaluation air-bone gaps. Reliable large animal models of hearing loss may allow closer approximation to human hearing.

Learning Objective: Understand roles of animal studies in modeling human hearing, evaluate blast as a source of hearing injury, and evaluate multiple blasts as a source of permanent threshold shifts.

Desired Result: Recognize the ovine model as a reliable hearing injury model, recognize multiple blast as a source of permanent threshold shift.

Level of Evidence – Does not apply (animal study)

Indicate IRB or IACUC: Cornell University, IACUC #2022-0176

Transmastoid Endoscopic Assisted Outpatient Repair of Superior Semicircular Canal Dehiscence Syndrome

Lawrance Lee, MD; Benjamin Johnson, MD; Henna Murthy, MD
De'Andre Warren, MD; Nauman F. Manzoor, MD

Objective: Investigate outcomes of trans-mastoid endoscopic-assisted (TM-EES) underwater repair of superior semicircular canal dehiscence (SSCD) in an outpatient setting and describe audiometric, vestibular, and quality of life (QOL) outcomes as well as safety profile of an outpatient approach for SSCD repair.

Study Design: Retrospective review.

Setting: Single provider neurotology practice spanning two institutions.

Patients: Adult patients who meet diagnostic criteria for SSCD (Barany Society).

Interventions: TM-EES underwater repair/plugging of SSCD.

Main Outcome Measures: Surgical, audiometric, vestibular, and QOL outcomes.

Results: A total of 8 patients were included in this study with the mean age of 56 (range 36-91) years. Average length of the SSCD defect was noted to be 4.375mm (range 3.5-5.7mm) and most involved the arcuate eminence only. Majority of the patients presented with audiologic and sound induced symptoms. All patients underwent successful plugging of the SSCD under endoscopic guidance and all, but one was discharged on the same day. There were no peri-operative complications. Post-operative short term audiometric evaluation showed no significant changes in word recognition scores in all patients. Patients who presented with elevated dizziness handicap inventory (DHI) scores pre-operatively showed improvement after the procedure.

Conclusion: Trans mastoid endoscopic assisted underwater repair of SSCD is a safe and effective procedure for outpatient repair of symptomatic SCD. Short term outcomes (subjective, audiometric, and QOL) are encouraging and high powered multi-institutional studies with long term follow-up are needed to further investigate its safety and efficacy in surgical management of SSCDs.

Professional Practice Gap & Educational Need: Improve upon current surgical approaches for superior semicircular canal dehiscence.

Learning Objective: Understand TM-EES approach and its utility in repair of SCD as well as expected outcomes.

Desired Result: Demonstrate feasibility of an outpatient repair with no increased risk of hearing loss

Level of Evidence - Level III

Indicate IRB or IACUC: IRB 20211639

Delayed Facial Nerve Weakness Following Middle Fossa Tegmen Repair

Armand A. Jacques, MD; Katelyn N. Robillard, MD, PhD
Ethan Hoasjoe, BS, MS; Moises A. Arriaga, MD, MBA

Objective: Identify the incidence and risk factors associated with delayed facial nerve weakness after middle fossa repair of tegmen dehiscence.

Study Design: Cross-sectional study

Setting: Tertiary referral center

Patients: From a cohort of 594 middle fossa tegmen repairs (MFTR) between 2017 and 2024, 15 cases (13 patients) experienced ipsilateral delayed facial paresis (DFP) and 0 immediate paralysis. Two patients underwent bilateral surgery on different dates and developed DFP following both surgeries. Average age was 49 years and 10 cases (66.7%) were female.

Interventions: Preauricular**,** MFTR using a three-layer repair (acellular dermis (AD) + autologous bone + AD). The procedures included intraoperative steroids but did not utilize a retractor, lumbar drain, foley catheter, or osmotic diuresis.

Main Outcome Measures: DFP, defined as House-Brackmann (HB) grade II – VI, beginning ≥1 day following surgery.

Results: DFP mean operative time was 52.6 minutes (SD = 16.4) and onset of weakness was 5.1 days (SD = 3.2). None had aberrant intraoperative facial nerve activity, and all had normal GSPN stimulation. No cases had postoperative CSF leakage, intracranial complications, or wound complications. Facial nerve function reached a nadir of HB grade II in 4 (26.7%), III in 7 (46.7%), IV in 1 (6.7%), V in 2 (13.3%), and VI in 1 (6.7%). DFP was treated with steroids, antivirals, and eye care. The final recovery was HB grade I in all cases reported. Preoperative imaging showed 6 (40%) with geniculate ganglion dehiscence, 4 (26.7%) with "honeycomb" pneumatization incorporated into the tegmen defect, and 11 (73.3%) with multiple distinct tegmen defects. Statistical analysis did not identify significant patient factors or operative techniques associated with DFP.

Conclusions: While the incidence is low (2.5% overall, 0.5% HB grade V/VI) and recovery complete, DFP is distressing. The two patients with bilateral DFP suggest viral reactivation, and prospective investigation of prophylactic antiviral medication should be considered.

Professional Practice Gap & Educational Need: There is a need to identify patients at risk of developing delayed facial nerve weakness following surgical repair of tegmen dehiscence.

Learning Objective: The learner is expected to gain knowledge of increased risk factors of delayed facial nerve weakness after surgical repair of tegmen dehiscence.

Desired Result: The present study aims to increase knowledge of risk factors that correlate with higher risk of postoperative facial nerve weakness. This new knowledge can be used to counsel patients on expected postoperative course and possible complications.

Level of Evidence: Level III

Indicate IRB or IACUC: LSU Health Sciences Center, IRB Protocol #581

ANS 2025 POSTER F021

Impact of Adult Cochlear Implantation on Caregiver Disability and Quality of Life

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Tara Brigham, MLIS, AHIP-D; Mallory J. Raymond, MD

Objective: Assess the impact of adult cochlear implantation on the disability and quality of life (QOL) of caregivers of cochlear implant (CI) recipients

Data sources: MEDLINE, Embase, Cochrane CENTRAL, Science Citation Index Expanded and Emerging Sources Citation Index were searched from inception to June 14, 2024.

Study selection: Retrospective, prospective and randomized controlled studies in any language that reported disability or QOL measures of caregivers of adult CI recipients either pre- or post-CI.

Data extraction: Three reviewers independently screened studies for inclusion, extracted data and evaluated risk of bias. Outcomes were both qualitative and quantitative pre- and post-CI measures of caregiver disability or QOL.

Data synthesis: 1615 studies were screened. Nine studies with 549 caregivers met the inclusion criteria. Five studies utilizing different scales (Significant Other Scale for Hearing Disability Questionnaire (SOS-HEAR) [1], Index Relative Questionnaire [1], unvalidated QOL questionnaires [1], open-ended questionnaires [2]) demonstrated improvement in caregiver pre- to post-CI QOL measures. One study assessed associations between caregiver characteristics and post-CI SOS-HEAR scores, but did not assess pre- to post-CI score change. One study utilizing an open-ended questionnaire found significantly higher scores among caregivers of CI recipients than caregivers of patients awaiting implantation, however one assessing spouse pleasant activity between groups found no difference. Only one study assessed disability and found that caregivers scored worse than the general population. Duration of CI recipient hearing loss did not impact caregiver QOL in any study.

Conclusions: Though homogenous data on QOL of caregivers of CI recipients is limited, studies suggest that caregivers of CI recipients may have worse QOL than the general population but better QOL than caregivers of patients who qualify for a CI. Additionally, cochlear implantation may improve caregiver QOL.

Professional Practice Gap & Educational Need: Much attention has been devoted to improvement in CI recipient quality of life after cochlear implantation but there is limited data on the impact of cochlear implantation on the caregivers of cochlear implant recipients. This data could aid in preoperative counselling of patients and their families.

Learning Objective: To understand the impact of cochlear implantation on the disability and quality of life of caregivers of adult cochlear implant recipients

Desired Result: Participants will recognize 1) that limited data suggests that caregivers of adult cochlear implant recipients experience an improvement in quality of life after cochlear implantation and 2) caregivers of adult cochlear implant recipients still have worse quality of life than the general population.

Level of Evidence: Level III

Indicate IRB or IACUC: Exempt

Comparison of Significant Improvements in Speech Perception Versus Patient-Reported Outcome Measures in Adult Cochlear Implant Users

Natalie Schauwecker, MD; Barak Spector, BS; Ankita Patro, MD, MS; Terrin N. Tamati, PhD
David S. Haynes, MD; Theodore R. McRackan, MD; Aaron C. Moberly, MD

Objective: 1) To assess clinically significant improvements in speech perception and patient-reported outcome measures (PROMs) in cochlear implant (CI) users and 2) to identify factors that influence both outcomes.

Study Design: Retrospective cohort.

Setting: Tertiary referral center.

Patients: Adult CI users with pre- and 6-12 month-post-operative CI-specific PROMs and speech perception testing.

Main Outcome Measures: Pre- and post-operative CI-only AzBio Quiet and CIQOL scores; datalogging, hearing history, demographic variables.

Results: For 86 patients, average age at implantation was 65 years (SD=15.7), and average device use was 11.3 hours/day (SD=3.8). Mean CI-only AzBio score increased from 21% (SD=23.9, median 10%, IQR=38) preoperatively to 65% (SD=29.1, median 76%, IQR=37) 6-12 months post-operatively. Mean CIQOL outcome scores were 38.5 (SD=7.3, median 37.5, IQR=11) preoperatively and 51.1 (SD=6.8, median 51, IQR=14) post-operatively. 85% showed significant improvement in CI-only speech perception testing, and 62% showed significant improvement in CIQOL. Only 2 (2%) patients demonstrated no improvement in AzBio nor CIQOL. CIQOL and AzBio improvements were significantly associated with lower pre-CI AzBio scores (below cohort's median, 9.5, p=0.014 and p=0.032). Younger age (p=0.039) was only associated with CIQOL improvement. Datalogging and duration of hearing loss were not associated with significant CIQOL or AzBio improvement.

Conclusions: Speech perception and PROMs should be viewed as complementary assessments of CI outcomes. Individual patient factors may contribute differently to these outcomes and can inform counseling regarding expected outcomes.

Professional Practice Gap & Educational Need: The relationship between speech perception testing and PROMs is complex. Ultimately, a better understanding of this relationship will allow clinicians to identify specific patient factors that may influence individual outcomes and allow for more personalized and realistic CI counseling.

Learning Objective: Understand the relationship between speech perception and PROMs in CI users; identify patient-specific factors that may influence these outcomes.

Desired Result: Improve individual CI counseling and outcome prediction by providing further evidence of the relationship between speech perception and PROMs and the impact of specific patient factors.

Level of Evidence – Level IV: Historical cohort or case-controlled studies.

IRB: IRB Exempt (240876, Vanderbilt University, approved 8/23/24).

Development and Evaluation of a Novel Pitch Discrimination Test for Cochlear Implant Users

Angeline A. Truong, MS, Audrey Limb, Patpong Jiradejvong, Charles Limb, MD

Objective: To develop and evaluate a novel pitch discrimination test in cochlear implant (CI) users and normal hearers (NH).

Study Design: Cross-sectional survey.

Setting: Tertiary care center.

Patients: Phase 1 - 24 CI, 20 NH. Phase 2 - 12 CI, 13 NH.

Interventions: The test involved a volume-roved, pseudo-randomized semitone sequence on a C4 chromatic scale. Participants clicked a button upon detecting pitch changes. Phase 1 utilized pure tones, while Phase 2 employed piano tones. Average test duration was 97±5 seconds.

Main Outcome Measures: Precision, recall, accuracy, F1-score

Results: In Phase 1, CI users clicked more often (20 vs. 13), with wider response range (75 vs. 16) than NH. CI users demonstrated lower precision (0.49 vs. 0.86, $p<0.001$), recall (0.66 vs. 0.91, $p<0.01$), accuracy (0.84 vs. 0.97, $p<0.001$), and F1-score (0.51 vs. 0.88, $p<0.001$) than NH. Average semitone resolution was poorer for CI users (1.41 vs. 1.08) than NH. No significant F1-score differences were found amongst CI users by musical background, age of deafness onset, duration of CI use, or length of deafness without CI. In Phase 2, CI users had lower precision (0.78 vs. 0.93, $p=0.06$), recall (0.66 vs. 1.00, $p<0.001$), accuracy (0.93 vs. 0.99, $p=0.001$), and F1-score (0.67 vs. 0.96, $p<0.001$) than NH. CI users had higher precision (0.78 vs. 0.49, $p=0.002$), recall (0.93 vs. 0.84, $p=0.005$), and F1-score (0.67 vs. 0.51, $p=0.03$) on piano vs. pure tones, but similar accuracy (0.66).

Conclusions: We demonstrate the feasibility of a <5 minute pitch discrimination test feasible in busy clinical settings, starting with a piano tone test to gauge initial capabilities and a pure tone version for a more rigorous evaluation.

Professional Practice Gap & Educational Need: CI users are known to have poor music perception, but few studies have explored solutions for this gap.

Learning Objective: Understand the potential for implementation of a rapid pitch discrimination test.

Desired Result: Promote importance of exploring factors that impact pitch discrimination in CI users.

Level of Evidence - III

Indicate IRB or IACUC: 15-17330, UCSF

Patient-Reported Changes in Vestibular Symptoms Following Cochlear Implantation

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Christine M. Lohse, MS; Brian A. Neff, MD; James R. Dornhoffer, MD

Objective: To describe patient-reported changes in dizziness severity and frequency following cochlear implantation (CI) among adults with a preexisting diagnosis of dizziness.

Study Design: Historical cohort.

Setting: Tertiary academical medical center.

Patients: Adults with a preoperative diagnosis of dizziness who underwent CI from 2000 to 2024.

Interventions: Cochlear implantation.

Main Outcome Measures: Patient-reported changes in vestibular symptoms following CI, including dizziness severity and frequency.

Results: In total, 222 patients (55% men) undergoing CI with a preexisting diagnosis of dizziness were eligible for study, with a median age of 66 (IQR 56-76) years. The most common etiologies of dizziness included Ménière's disease (60%), vestibular hypofunction (20%), and recurrent benign postural positional vertigo (BPPV) (10%), with most patients (70%) reporting rotary vertigo as their predominant symptom phenotype. Overall, 84% of patients reported either improvement or stability in both dizziness severity and frequency following CI after a median of 1.1 (IQR 0.2-2.8) years of post-CI follow-up. Patient-reported changes in dizziness severity or frequency did not significantly differ between men and women ($p=0.19$ for severity and $p=0.2$ for frequency), by age at CI ($p=0.18$ for severity and $p=0.7$ for frequency), or among those with Ménière's disease, vestibular hypofunction, and BPPV ($p=0.9$ for severity and frequency).

Conclusions: In patients with a preoperative diagnosis of dizziness, the severity and frequency of symptoms generally improved, rather than worsened, after CI. While likely representative of disease progression/resolution or continued compensation with time, these data provide some assuredness that patients with preexisting dizziness can receive benefit from CI with a low likelihood of worsening sensations of dizziness.

Professional Practice Gap & Educational Need: To understand the changes to dizziness amongst adult patients undergoing cochlear implantation.

Learning Objective: To characterize the changes in dizziness in patients undergoing cochlear implantation.

Desired Result: To demonstrate that cochlear implantation in patients with preoperative diagnosis of dizziness is associated with subjective improvements in both dizziness severity and frequency.

Level of Evidence – Level IV

Indicate IRB or IACUC: IRB ID: 22-000183

20 Years of Surgical Management and Outcomes of Pediatric Lateral Skull Base Malignancies: The MD Anderson Experience

Kaitlyn A. Brooks, MD; Marc-Elie Nader, MD; Paul W. Gidley, MD

Objective: To present surgical management paradigms and outcomes of pediatric patients with malignant lateral skull base pathology.

Study Design: Retrospective case series.

Setting: Single institution academic center.

Patients: Eleven pediatric patients (aged 1 to 17 years) with lateral skull base resection and treatment course from 2004 to 2024.

Interventions: Surgical management and reconstruction.

Main Outcome Measures: Treatment course, complications, facial nerve function, hearing rehabilitation, 5-year overall survival with Kaplan-Meier analysis.

Results: Five (45.5%) patients had a primary parotid malignancy, 5 (45.5%) patients had a primary head and neck sarcoma, and 1 (9%) patient had an endolymphatic sac tumor. Surgical approaches included transmastoid with facial nerve decompression (5), lateral or subtotal temporal bone resection (5), middle fossa craniotomy (1), transcochlear approach (1), and total petrosectomy (1). Gross-total resection was achieved in 9 (82%) patients. Four (36%) patients had disease recurrence or progression requiring salvage treatment; median time to salvage was 5 months (range 2 – 55 months). Six (55%) patients received adjuvant chemotherapy while 9 (82%) patients received adjuvant radiotherapy. Seven (64%) patients had intact facial function pre-operatively; 6 (55%) patients required facial nerve resection at time of surgery and underwent cable graft reconstruction with best obtained final function as a House-Brackmann score 3. Four (36%) patients experienced maximal conductive hearing loss and were rehabilitated with bone-anchored hearing aid placement. Three (27%) patients died in follow-up and overall 5-year survival was 66%.

Conclusions: Pediatric malignancies requiring lateral skull base resection are extremely rare, with outcomes varying based on tumor aggressiveness, location, and pre-operative symptomatology.

Professional Practice Gap & Educational Need: The educational need is because this pathology in pediatric patients is very rare, which makes reporting of outcomes limited, leaving no clear guidelines, particularly in challenging cases.

Learning Objective: To consider surgical management strategies and learn outcomes, particularly as it pertains to adjuvant treatment, rate of recurrence, and survival, for this patient population.

Desired Result: Improved pre-operative counseling and multidisciplinary discussion of challenging pediatric skull base malignancy cases.

Level of Evidence: Level V

Indicate IRB or IACUC: MD Anderson Cancer Center IRB # PA19-0106.

Extended High-Frequency Audiometry and Imaging Characteristics in Vestibular Schwannoma Patients

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Enrique Perez, MD; Maura K. Cosetti, MD; George B. Wanna, MD, MHCM

Objective: The purpose of this study is to identify magnetic resonance imaging (MRI) risk factors associated with extended high-frequency hearing loss in treatment-naive patients with vestibular schwannoma

Study Design: Retrospective cohort

Setting: Tertiary, specialty clinic

Patients: Adult patients with treatment-naive vestibular schwannoma

Interventions: Extended high-frequency (EHF) audiometry from 8 – 20 kHz

Main Outcome Measures: Pure-tone average (PTA) at 500, 1, 2, 4 kHz; EHF-PTA (including all measured frequencies from 8kHz to 12.5kHz), word recognition score (WRS), cochlear fluid intensity on T2 MRI), fundal cap, tumor location and size (cm)

Results: 26 patients (mean age 60 years, range 29-88; n=12 female,) underwent EHF audiometry with an average: PTA of 44 dB (range 9-110), WRS 60% (range 0-100), and EHF-PTA of 63 dB (range 5–110). Tumors with abnormal MRI T2 cochlear signal were significantly different from those with normal signal at 3kHz (34 vs 59 dB, p=0.03), 6kHz (37 vs 59 dB, p=0.04), 8Khz (41 vs 66 dB, p=0.04), 11.2KHz (50 vs 75 dB, p=0.03), response at 16kHz (8 vs 3, p=.04), and WRS (83 vs 45% p=0.01). There were no statistically significant differences between PTA, WRS, or EHF PTA comparing IC or CPA tumors or between those with/without a fundal cap. Ultra-EHF thresholds (14-20 kHz) were assessed categorically (present yes/no), and there was no significant difference in comparison of presence of a fluid fundal cap or tumor location. Linear regression showed no correlation between tumor size and EHF-PTA.

Conclusions: EHF audiometry is a promising tool for monitoring and evaluating patients with vestibular schwannoma and may have imaging correlates, such as abnormal cochlear T2 signal, useful for predicting hearing outcomes. Further study is needed to assess the role of EHF in timing of intervention or tumor surveillance.

Professional Practice Gap & Educational Need: The role of extended high-frequency audiometry has not been well established within the field of neurotology.

Learning Objective: Learners will recognize the utility of assessing extended-high frequency hearing in patients with vestibular schwannoma.

Desired Result: Improve understanding of the role of EHF audiometry in evaluation and management of patients with vestibular schwannoma.

Level of Evidence - IV

Indicate IRB or IACUC: Icahn School of Medicine at Mount Sinai IRB, 22-01733

Radiomorphometric Comparison of Internal Auditory Canal Access: Retrolabyrinthine, Retrosigmoid, and Middle Cranial Fossa Approaches

Arman Saeedi, MD, MPH; Lawrance Lee, MD; Nauman F. Manzoor, MD

Objective: To compare predicted internal auditory canal (IAC) volume access via retrolabyrinthine, retrosigmoid, and middle cranial fossa (MCF) approaches.
Study Design: A radiomorphometric analysis of cadaveric temporal bones.
Interventions: High-resolution computed tomography scans of six cadaveric temporal bones were used to generate 3D segmentations of the internal auditory canal. A 30° angle, at the level of the IAC, was utilized to project the exposure of the IAC without violating the inner ear structures via retrolabyrinthine, retrosigmoid, and middle cranial fossa approaches.

Main Outcome Measures: Radiographically predicted accessible volume of the internal auditory canal.

Results: Four cadaveric temporal bones (2 right, 2 left) were included. The mean IAC volume was 0.23 ± 0.07 cm^3. Of the three hearing preservation approaches, the retrosigmoid approach was projected to have the greatest relative IAC volume exposure (81.1%), followed MCF (73.2%), and retrolabyrinthine (53.3%) approaches. The mean lengths of inaccessible posterior IAC wall were 0.58 cm, 0.51 cm, and 0.29 cm, for the retrolabyrinthine, retrosigmoid, and MCF approaches, respectively, while the mean total posterior IAC wall length was 1.27 cm.

Conclusions: While established hearing preservation approaches to the IAC remain the gold standard for maximizing lateral IAC exposure, the retrolabyrinthine approach may be suitable in select patients with limited involvement at the fundus of the IAC. This approach has the substantial advantage of avoiding craniotomy as well as complications associated with intracranial manipulation and prolonged parenchymal retraction. Larger feasibility studies to delineate favorable anatomy and disease phenotypes are needed.

Professional Practice Gap & Educational Need: With improvement in endoscopic-assisted surgical techniques, there is a critical need to understand how to further optimize existing techniques for approaching the IAC and explore the benefits and limitations of previously inaccessible approaches.

Learning Objective: Predict the degree of IAC exposure between various hearing-preserving surgical approaches to guide pre-surgical decision-making.

Desired Result: Highlight need for preoperative surgical planning to identify optimal approach to IAC tumors.

Level of Evidence - III

Indicate IRB or IACUC: Exempt

Factors Associated with Pursuance and Deferral of Cochlear Implantation among Adult Candidates

Kevin Biju, MD; Kaitlin Hori, BS; Diba Nayeri, BS; Debra Schrader, EdD| Janet S. Choi, MD, MPH

Objective: The aim of this study is to identify and compare demographic and clinical factors between those who pursue and those who defer cochlear implant (CI) surgery.

Study Design: Retrospective case-control study

Setting: Tertiary academic center in an urban setting

Patients: Adult patients 18 years of age or older who met criteria for CI at a tertiary care center between 2021 and 2023

Interventions: Cochlear implantation

Main Outcome Measures: Demographic and clinical factors associated with pursuance and deferral of CI were identified based on logistic regression analysis

Results: A total of 324 patients met criteria for CI between 2021 and 2023. Our cohort consisted of a racially diverse population with varying socioeconomic backgrounds (59% non-White, 28.7% Hispanic, 13% below federal poverty level). In this cohort, 150 patients (46.3%) elected to defer surgery. Patients who pursued surgery tended to be more privately insured than publicly insured (odds ratio 1.61; 95% CI [1.01, 2.58]), have less co-morbid anxiety (OR 0.39; 95% CI [0.14, 0.98]), and have lower age of hearing loss onset (43.5 vs. 49.9; p=0.031). In multivariable logistic regression analysis, anxiety (OR 0.30; 95% CI [0.11, 0.74]), public insurance status (OR 0.58; 95% CI [0.34, 0.99]), and single-sided deafness (OR 0.51; 95% CI [0.30, 0.85]) were significant predictors of cochlear implant deferral.

Conclusions: Consistent with prior studies, the deferral rate of cochlear implant surgery remains high in our cohort. Patients with anxiety, public insurance, and single-sided deafness were more likely to defer cochlear implant surgery. These patients may benefit from enhanced support and pre-operative counseling following their CI evaluation.

Professional Practice Gap & Educational Need: Despite the demonstrated benefits of cochlear implantation, there continue to be high deferral rates. In order to provide a personalized approach, it is essential for surgical providers to understand potential patient barriers associated with deferral of cochlear implantation.

Learning Objective: Providers will recognize the demographic and clinical characteristics of CI candidates who chose to defer surgery.

Desired Result: Providers may identify patients who require additional socioeconomic support or medical management prior to CI surgery. This could facilitate personalized discussions and treatment plans to navigate these barriers and increase patient pursuit of CI.

Level of Evidence - III

Indicate IRB or IACUC: Exempt (USC ID UP-24-00059)

Comparative Utility Study of CT versus MRI in the Assessment of Adult Cochlear Implant Candidates

Jasmine Wu, BS; Kevin Wong, MD; Randall Harley, MD; Keshav V. Shah, BS
Tiffany P. Hwa, MD; Douglas C. Bigelow, MD; Michael J. Ruckenstein, MD

Objective: The purpose of this study was to compare the clinical utility of computed tomography (CT) and magnetic resonance imaging (MR) for the preoperative workup of adult cochlear implant (CI) candidates.

Study Design: Retrospective chart review.

Setting: Single tertiary care center.

Patients: 499 consecutive adults who underwent cochlear implantation.

Interventions: CT, MRI

Main Outcome Measures: Finding on CT or MR leading to a change in patient management

Results: 499 subjects were included, with a mean age of 63.7 years (range: 19 to 96 years, SD=16). Most subjects (450, 90%) were post-lingually deaf, 44 subjects (9%) were congenitally deaf and 5 subjects (1%) were pre-lingually deaf. In total, 371 patients (74.3%) had preoperative MR scans, 327 patients (66%) had CT scans, and 216 patients (43%) had both. Among those with both scans, MR was the initial scan in 92 patients (43%) while CT scan was first in 36 patients (16%). MR led to a change in management in 6 cases (2%, 6/371), including 3 reports of decreased T2 cochlear signal, one labyrinthitis ossificans, one cochlear malformation, and one vestibular schwannoma. CT led to a change in management in 14 cases (4%, 14/327): 5 reports of labyrinthitis ossificans, 7 related to surgical anatomy (aberrant facial nerve, sclerotic mastoid, obstructing jugular bulb), one cochlear malformation, and one petrous apex lesion. Among subjects with an initial CT, two required subsequent MR imaging based on CT findings; no subjects with an initial MR required additional CT imaging based on MR findings.

Conclusions: Both CT and MR are suitable for preoperative candidacy planning before cochlear implantation. CT may provide more insight into surgical anatomy, however, MR is the preferred single-modality option due to superior ability to offer definitive diagnostic information.

Professional Practice Gap & Educational Need: As a part of the preoperative assessment of adult CI candidates, CT and MR scans may be ordered to evaluate candidacy and surgical anatomy. While some surgeons opt for MR scans only, others prefer CT scans, and still others routinely order both. As there is no standardized practice, this study aims to evaluate the comparative clinical utility of CT versus MR in the preoperative assessment of implant candidates.

Learning Objective: The objective of this study is to investigate the utility of preoperative MR vs. CT imaging in adult patients undergoing cochlear implantation.

Desired Result: 1) improve understanding of the variable benefits and limitations of available preoperative imaging modalities for CI candidacy evaluation and 2) recognize the indications for which each modality may be most helpful.

Level of Evidence – Level 4

Indicate IRB or IACUC: 856621 - University of Pennsylvania

Short-term Vestibular Functional Outcomes after Blast Exposure in a Preclinical Rodent Model using a Novel Blast Apparatus

Pavan S. Krishnan, MD; Yuan Gao, MS; Megan Barber, BS; Federica M. Raciti, PhD
Curtis King, MS; Michael Hoffer, MD; Suhrud Rajguru, PhD

Objective: Developing a standardized blast apparatus is crucial for establishing a preclinical model to study injury mechanisms an explore therapeutic interventions post-blast. Our objective was to (1) develop and characterize a blast apparatus that generates reliable and reproducible blast overpressures, and (2) evaluate cervical vestibular evoked myogenic potentials in a preclinical rodent model at varying blast intensities.

Study Design: Equipment validation, cohort study using a rat preclinical model

Setting: Concrete blast room; ambient temperature and humidity of the blast apparatus environment was monitored and kept constant at 20-25 degrees Celsius and 50-5%, respectively.

Patients: NA (animal study)

Interventions: Blast overpressures

Main Outcome Measures: Blast output characterized by peak pressure measurements (ICP® pressure sensors, PCB Piezotronics), cervical vestibular evoked myogenic potentials (cVEMPs)

Results: A blast apparatus was constructed at a local machine shop and uses a 1:4 acetylene to oxygen ratio for complete combustion The blast apparatus was modulated to produce peak pressure between 0.8 and 20 psi based on number of loading cycles. The generated peak pressures showed a positive correlation (r^2=0.96) with the number of loading cycles, with significant increases observed between each incrementing loading cycle (*$p<0.05$) except for between 2 and 3. Furthermore, peak pressure did not significantly vary when blasts were performed on different days nor when different operators performed blasts. We found that blasts with peak pressures of 10-12 psi caused significant threshold shifts in cVEMP responses of Brown Norway rats at 1 and 8 kHz (*$p<0.05$). Thresholds increased by 31.2±5.0 and by 33.8±13.7 dB SPL for 1 kHz and 8 kHz, respectively, on day 1 post-blast. No tympanic membrane perforations were observed.

Conclusions: We constructed a blast apparatus generating reproducible and reliable blasts translating to varying intensities of blast injury. This system offers a flexible setup that can be adapted to explore mechanisms of injury in the cochlea and vestibular endorgans as well as other physiological systems. Our team and others will use this apparatus to elucidate the functional, behavioral, morphological effects and mechanisms of blast injury in the preclinical rodent model.

Professional Practice Gap & Educational Need: The most reported symptoms after blast exposure are audiovestibular in nature, including hearing loss, tinnitus, dizziness, vertigo, and balance problems. There are few studies that have investigated the impact blast overpressures have on the peripheral vestibular endorgans. Further, the existing literature features non-standardized blast delivery systems which often deliver varying levels of blast intensities at different distances resulting in a wide range of reported outcomes. Ultimately, this work will change how our field implements blast injuries in the preclinical rodent model.

Learning Objective: To learn about preclinical vestibular functional and behavioral testing, how blast overpressures affect the inner ear, and how blast overpressures can be delivered in a standardized manner to a preclinical model.

Desired Result: Attendees will learn about a novel blast apparatus that reliably produces predictable blast overpressures, and how studying blast injuries can further the field's basic understanding of vestibular physiology and pathophysiology.

Level of Evidence – Does not apply (equipment validation and animal study)

Indicate IRB or IACUC: IACUC-approved (IPROTO202100000129)

Management of Persistent Nystagmus, Tinnitus, Imbalance, and Oscillopsia after Pontine Hemorrhage

Pavan S. Krishnan, MD; Hillary Snapp, AuD, PhD

Objective: To describe a case of pontine hemorrhage causing nystagmus, tinnitus, imbalance, and oscillopsia

Study Design: Case report

Setting: Tertiary care hospital system

Results: This case study describes a 56-year-old male who developed persistent vertical oscillopsia related to pendular nystagmus following pontine hemorrhage in 2022. Upon initial evaluation he was noted to have binocular horizontal diplopia, skew deviation, constant bilateral tinnitus, and imbalance with sensations of sliding and being pushed. Despite early recognition of his symptoms, the patient went untreated for 24 months due to a series of mismanaged referrals and lack of sufficient expertise from consulting healthcare providers, resulting in him becoming wheelchair bound. Eventual neuro-ophthalmic consult led to collaborative evaluation and management by vestibular specialists. Cervical vestibular-evoked myogenic potentials showed absent responses bilaterally for 1000 and 500 Hz. Auditory brainstem response testing was absent bilaterally. Videonystagmography showed a constant vertical pendular nystagmus that upon right gaze, right eye took on a horizontal pendular nystagmus while left eye remained vertical. There was failure of fixation suppression. Although these exam findings indicated a central lesion, it was not possible to rule out a peripheral component. To stabilize the eyes, patient underwent bilateral orbitotomy with titanium T-plate placement in the inferior rectus. Subsequent vestibular assessment found significant reduction in the degree of vertical nystagmus, and the patient reported significant improvement in gaze stabilization and imbalance. Following stabilization of the eye the patient was able to reduce reliance on his wheelchair, initiate physical therapy, and has improved functioning in oculomotor reliant tasks such as reading.

Conclusions: We describe a patient who experienced delays in management of his imbalance and severe nystagmus due to lack of access to appropriate healthcare. This case demonstrates how coordinated interdisciplinary collaboration enabled accurate diagnosis effective management of this patient's complex post-stroke nystagmus.

Professional Practice Gap & Educational Need: Nystagmus is a key exam finding that can distinguish causes of dizziness. However, it often remains poorly documented and poorly described by many clinicians. Due to this, patients with vestibular symptoms can experience significant delays in accurate diagnosis and treatment. This case highlights the critical need for timely and accurate referral pathways for post-stroke complications. Discrimination of central and peripheral vestibular disorders is highly critical in the clinical environment, and inability to identify causes of symptoms can lead to suboptimal management and thus suboptimal outcomes.

Learning Objective: To understand the vestibulo-ocular reflex pathway, differentiate the effects of central versus peripheral insults to the vestibular system, and learn how to implement multidisciplinary approaches for managing vestibular disorders.

Desired Result: Attendees will gain familiarity with the vestibular reflex pathways, identify classical exam signs of central versus peripheral disorders related to the vestibular system, and understand potential surgical options for recalcitrant nystagmus.

Level of Evidence – Level V

Indicate IRB or IACUC: Exempt

Impact of COVID-19 Pandemic and Associated Lockdowns on Acute Otitis Media and Mastoiditis: A Comprehensive Retrospective Study

Moriah Peyser-Rosenberg, MD; Aylon Hadar MD; Nitzan Sofer
Jean-Yves Sichel, MD; Ronen Perez, MD; Pierre Attal MD, PhD; Chanan Shaul MD, PhD

Objective: To evaluate the impact of the COVID-19 pandemic and associated lockdowns on the incidence, severity, complications, and microbiology of acute otitis media (AOM) and acute mastoiditis (AM) in pediatric patients.

Study Design: Retrospective cohort study.

Setting: Tertiary referral center**.**

Patients: Pediatric patients diagnosed with AOM or AM between March 2014 and February 2023**.**

Interventions: None.

Main Outcome Measures: Incidence of AOM and AM, complication rates, types of complications, mastoidectomy rates, clinical parameters (age, WBC count, CRP levels), and microbiology across three periods: pre-COVID (March 2014 - February 2020), during COVID (March 2020 - February 2021), and post-COVID (March 2021 - February 2023).

Results: AOM cases decreased significantly during the COVID period (312/year) compared to pre-COVID (556/year, $p<0.001$), but increased substantially post-COVID (770/year, $p<0.001$). AM cases showed a similar trend with 38, 25, and 45 cases per year in the pre-, during, and post-COVID periods, respectively ($p<0.05$ for all comparisons). The average age of AM patients was lower during COVID (1.52 years) compared to pre- and post-COVID periods (2.38 years, $p<0.01$). Complication rates for AM changed from 25% pre-COVID to 32% during COVID-19 and then to 23% post-COVID ($p=0.07$ for trend). Complications included sigmoid sinus thrombosis, meningitis, epidural abscess, and brain abscess. In response to these complications, mastoidectomy rates were 21% pre-COVID, increased to 28% during COVID, and then decreased to 18% post-COVID ($p=0.06$ for trend). The main pathogens identified in AM cases were Streptococcus group A, Fusobacterium, and Streptococcus pneumoniae, with no significant change in their prevalence across the three periods.

Conclusions: The COVID-19 pandemic and associated lockdowns significantly altered the patterns of AOM and AM in pediatric patients. The initial decrease in cases during lockdowns, likely due to reduced transmissibility, was followed by a substantial rebound effect post-pandemic. The lower average age during the pandemic suggests more severe presentations in younger children, possibly due to delayed care-seeking. The consistency in the prevalence of main pathogens throughout the study period suggests that changes in disease patterns were primarily due to factors such as reduced social contact during lockdowns and altered healthcare-seeking behavior rather than shifts in microbial etiology. The fluctuation in mastoidectomy rates, particularly the increase during COVID-19, highlights the pandemic's impact on managing severe cases, possibly influenced by delayed presentations during lockdowns.

Professional Practice Gap & Educational Need: There is a lack of comprehensive understanding of how the COVID-19 pandemic and associated lockdowns affected the incidence, severity, complications, and microbiology of common pediatric otolaryngological conditions like AOM and AM.

Learning Objective: To understand the changes in incidence, severity, complications, management, and microbiology of AOM and AM in pediatric patients before, during, and after the COVID-19 pandemic, focusing on the impact of lockdowns and reduced transmissibility.

Desired Result: Attendees will gain insights into the pandemic's impact on pediatric ear infections, including the effects of lockdowns on disease transmission, types of complications encountered, and the stability of causative pathogens.

Level of Evidence: Level III.

Indicate IRB or IACUC: Approved by the Institutional Review Board of Shaare-Zedek Medical Center.

Cochlear Implantation in Patients with CHARGE Syndrome: A Systematic Review and Meta-Analysis

Kalena Liu, BS; Jacob Beiriger, BS; Eric Fei, BS; Jacob B. Hunter, MD

Objective: Currently, there are limited large studies exploring cochlear implantation (CI) outcomes in patients with CHARGE Syndrome. We aim to evaluate pre- and post-operative speech and auditory outcomes in patients with CHARGE syndrome undergoing CI from a review of published single center studies.

Data Sources: A comprehensive search was conducted across databases from January 2000 onwards, in collaboration with a medical librarian.

Study Selection: Studies reporting on patients with CHARGE syndrome undergoing CI were included (n=22). Exclusion criteria included review articles, non-English manuscripts, and studies that did not report both pre- and post-operative outcomes.

Data Extraction: A total of 22 studies were included for analysis, encompassing 169 CHARGE patients with a total of 158 implanted ears. Extracted data included demographic information, study characteristics, and speech perception and auditory outcomes.

Data Synthesis: Pooled analyses of scaled auditory outcome measures were performed using standardized mean differences (SMDs). Risk of bias was assessed using the Joanna Briggs Critical Appraisal Checklist to evaluate the quality and validity of included studies.

Conclusions: This meta-analysis demonstrates significant global postoperative improvement in auditory outcomes for patients with CHARGE syndrome who underwent CI. Individual level data showed improvements across several auditory outcomes, including IT-MAIS (2.41 pre vs 17.23 post-implantation, n=18, $p<0.0001$) CAP (0.54 pre vs 3.43 post-implantation, n=49, $p<0.001$), and SPC (0.99 pre vs 2.69 post-implantation, n=42, $p<0.001$). Despite the complexity of inner ear malformations in this population, our findings contribute to the growing body of evidence supporting the use of CIs in CHARGE patients.

Professional Practice Gap & Educational Need: This study addresses the limited understanding of the efficacy of CI in patients with CHARGE syndrome, especially given their diverse presentations.

Learning Objective: To understand the impact of cochlear implantation on speech and auditory outcomes in patients with CHARGE syndrome.

Desired Result: Improved clinical decision-making regarding the suitability of CI for patients with CHARGE syndrome, leading to optimized auditory rehabilitation strategies.

Level of Evidence: Level III

IRB or IACUC Approval: Exempt.

Socioeconomic and Demographic Trends of Non-English Speaking Cochlear Implantees: A Large National Database Analysis

Christopher Z. Wen, MD; Marcelina Puc, MS; Charlyn Gomez, BS; Danielle S. Powell, AuD, PhD
David J. Eisenman, MD; Adam C. Kaufman, MD, PhD

Objective: To describe national trends in cochlear implantation for non-English speaking cochlear implant (CI) users

Study Design: Retrospective cohort study

Setting: US institutions participating in the Epic Cosmos database

Patients: Cochlear implantees between 2015 and 2023

Main Outcome Measures: Implantation rate, age at implantation, and measures of socioeconomic status

Results: 25883 patients (47% female) received 29693 cochlear implants. 1138 (4.4%) spoke a non-English language, with the largest languages represented being Spanish (73.4%), Arabic (4.7%) and Chinese (3.0%). Non-English speakers were implanted at lower population-adjusted rates across all age groups compared to English speakers. However, the percentage of non-English speaking CI recipients (4.6±0.4%) changed little from year to year. A greater proportion of non-English (53.8%, OR 4.31; 95% CI 3.86-4.82) and Spanish-speaking (58.5%, OR 5.23; 95% CI 4.60-5.95) CI users were children compared to English-speaking (21.2%) cochlear implantees. Compared to English-speaking CI users (79.5%), non-English speaking CI recipients (93.1%, OR 3.49; CI 2.76-4.41) and Spanish-speaking CI recipients (91.8%, OR 2.88, CI 2.24-3.71) were more likely to live in urban areas. Both were also more likely to live in ZIP codes with greater social vulnerability as measured by the social vulnerability index (V=0.15, V=0.16). There were no differences in explantation rates between English and non-English speakers.

Conclusions: There exists evidence of disparities in rates of cochlear implantation based on spoken language at a national level, with rates of cochlear implantation in non-English speakers remaining unchanged over the past nine years. Non-English CI users are more likely to be implanted as children and are more likely to live in urban areas and ZIP codes with higher SES and SVI compared to English-speaking CI users.

Professional Practice Gap & Educational Need: Few studies have investigated the ways in which non-English speaking CI users within the US compare to their English-speaking counterparts.

Learning Objective: To describe the disparities that exist for non-English speaking CI users and the unique aspects of this population.

Desired Result: Greater awareness of disparities facing the non-English speaking CI population and potential areas for further investigation and improvement

Level of Evidence: IV

Indicate IRB or IACUC: Exempt

Changing Patterns of Cochlear Implant Use Over Time and Associations with Quality of Life

Isabelle J. Chau, BS; Kelly C. Harris, PhD; Theodore R. McRackan, MD, MSCR
Kara C. Schvartz-Leyzac, AuD, PhD

Objective: To examine changes in datalogging characteristics, specifically average hours of daily cochlear implant (CI) use and time spent in different sound environments, in adults during their first post-CI year and evaluate their impact on Cochlear Implant Quality of Life (CIQOL) scores.

Study Design: Retrospective longitudinal cohort study.

Setting: Tertiary medical center.

Patients: 108 adult CI users with bilateral hearing loss.

Main Outcome Measures: Hours of device use per day, proportions of use in various sound environments (quiet, noise, speech, music), and pre-/post-CI CIQOL-35 Profile domain scores were recorded at 1, 3, 6, and 12 months post-activation and assessed using a linear mixed-effects model. Individual patient differences, as well as changes in speech recognition scores in relation to datalogging patterns, will be evaluated in forthcoming analyses.

Results: Daily hours of CI use increased significantly between 1 and 6 months post-activation and returned to 1-month usage by 12 months. Between 1 and 12 months, the proportion of time patients spent in quiet increased (41% vs. 46%, $p<0.01$), while time spent in speech declined (31% vs. 28%, $p<0.05$). When assessing CIQOL domains, positive correlations were observed between time spent in music and CIQOL-Entertainment (r=.33, $p=0.007$) and between time spent in speech and CIQOL-Social scores (r=.39, $p=0.006$).

Conclusions: These results suggest that patients increasingly use their CI during the first six months post-activation but spend less time listening to speech over time. Associations between listening environments and certain CIQOL domains demonstrate how listening patterns and functional abilities might influence each other. Determining causality between use patterns and functional abilities in future studies may enable more individualized counseling on device use for an improved early CI experience.

Professional Practice Gap & Educational Need: Prior studies have demonstrated an association between CI use and speech recognition performance in adults over the first year of use, but associations between use patterns and CIQOL scores are poorly understood. While device use and experience in certain sound environments may impact patient-reported outcome measures, patient perspectives may also impact how patients use their device. Understanding this relationship may allow for improved CI counseling during this early adjustment period.

Learning Objective: To recognize the associations between CI device use, time spent in different sound environments, and cochlear implant-related quality of life outcomes in adult CI users during the first year of CI experience.

Desired Result: The audience will gain a better understanding of how patients use their CI device in the first postoperative year and be able to recognize associations between patterns of device use and functional abilities.

Level of Evidence: III.

Indicate IRB or IACUC: IRB #Pro00126243 approved (exempt) on March 10, 2023.

Cochlear Implantation: What Patients are Hearing from the Internet

Arpan Bose; Keelin Fallon; Soomin Myoung; Kassia Love; Aaron K. Remenschneider, MD
Judith S. Kempfle, MD; Divya A.Chari MD

Objective: In May 2024, Google Chrome introduced an artificial intelligence (AI) overview feature that generates AI responses to user queries. Here, we examine the types of sources and the reliability of both AI-generated responses and traditional webpages related to cochlear implantation.

Study Design: SearchResponse.io, a database that archives People Also Ask (PAA) data from Google was used to determine the most popular questions using the keyword "cochlear implant". Google Chrome's AI response to these questions along with the top five webpage results were recorded. Questions were categorized using the Rothwell classification (fact, policy, value) and sources were sorted into categories (social media, government, medical practice, academic, commercial). Reading ease was measured using the Flesch Reading Ease and Flesch-Kincaid Grade Level. Quality of sources was determined using DISCERN criteria.

Results: Of 28 unique questions identified, 16 questions were fact-based, 3 were policy-based, and 9 were value-based. Of 140 webpages, 26 were from government sources, 16 from social media, 28 from commercial, 58 from a medical practice, and 12 from academic. Fact and value-based questions were more likely to stem from medical practice sources and policy-based questions had no commercial responses ($p<0.05$). Medical practice and social media sources were significantly easier to read than the other sources ($p<0.0001$). The average DISCERN rating for all sources was 3.27 out of 5, while commercial sources and AI-generated responses had significantly lower DISCERN scores of 2.7, and 2.9, respectively ($p<0.05$).

Conclusions: Webpage source is significantly associated with question type. AI-generated responses provided significantly lower quality compared to government and medical practice sources, but not compared to commercial sources.

Professional Practice Gap & Educational Need: Google Chrome is the most commonly used search engine in the United States. Patients may rely on information from online sources to guide decision making. Physicians should be aware of the questions raised by patients and the quality and readability of the information being delivered.

Learning Objective: Recognize that question type impacts the quality of internet responses and that AI generated responses may be inferior compared to other sources. Generally, not high quality.

Desired Result: By understanding the types of questions being asked on the internet, physicians will be better able to counsel patients regarding cochlear implantation, thereby improving therapeutic relationships.

Level of Evidence - IV

Indicate IRB or IACUC: Exempt

Cochlear Implantation in Patients with Charcot-Marie-Tooth Disease: A Case Series on Auditory and Genetic Challenges

Sarah Hughes, BA; Emily Z. Stucken, MD

Background: Charcot-Marie-Tooth disease (CMT) is a hereditary neuropathy sometimes presenting with sensorineural hearing loss (SNHL) or auditory neuropathy spectrum disorder (ANSD). While cochlear implants (CIs) are widely used for rehabilitation of SNHL, their effectiveness in CMT is not well understood due to the central neurological profile.

Methods: Three CMT patients with SNHL or ANSD received CIs. Preoperative clinical profile and postoperative outcomes of auditory performance were assessed.

Results: Case 1: A 60-year-old woman with CMT (confirmed on genetic testing), bilateral ANSD, and multiple sclerosis received a CI. Her Consonant-Nucleus-Consonant (CNC) word score improved from 8% to 68% in the implanted ear, with AzBio score of 64% postoperatively (not tested preoperatively). Case 2: A 20-month-old boy with X-linked CMT1X, developmental delay, and bilateral ANSD, received a CI at age 2. Postactivation speech testing demonstrated Multisyllabic Lexical Neighborhood Test (MLNT) score of 100% in the implanted ear. Finally, a 32-year-old man with CMTX5, severe bilateral congenital (prelingual) SNHL, and progressive vision loss received a left CI at age 32. Post-CI, he achieved environmental sound awareness, detecting sounds at 20-30 dB HL. Speech perception gains were neither expected nor observed due to prolonged auditory deprivation (AzBio 0% pre- and postoperatively).

Conclusions: In patients with CMT that receive CI, auditory outcomes were similar to those expected in the mainstream population of CI recipients. Despite the neurologic complexities of CMT, patients can achieve speech recognition if their timeline of implantation is otherwise favorable. As in the general population, speech understanding with CI is not anticipated following prolonged auditory deprivation. These cases underscore the importance of a personalized approach to hearing rehabilitation, considering genetic background and early intervention to rehabilitation to optimize outcomes.

Professional Practice Gap & Educational Need: Limited understanding exists regarding CI outcomes in CMT patients, highlighting a need for comprehensive genetic profiling and tailored intervention strategies.

Learning Objective: To assess CI outcomes in CMT patients, considering the impact of central and genetic factors on auditory prognosis.

Desired Result: Improved selection and management of CI candidates with CMT.

Level of Evidence – Level V

Indicate IRB or IACUC: IRB HUM00224858, University of Michigan

Association Between Neighborhood Socioeconomic Status and Cochlear Implant Outcomes

Dorothy W. Pan, MD, PhD; Kaitlin Hori, BS; Diba Nayeri, BS
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Objective: Examine associations between neighborhood socioeconomic status (SES) and pre- and post-cochlear implant (CI) word scores among adult CI recipients.

Study Design: Retrospective cohort.

Setting: Tertiary academic medical center.

Patients: 216 adult patients who underwent CI 2/2014 to 7/2023.

Main Outcome Measures: CNC word scores at CI evaluation and 1-year post-CI. Neighborhood SES variables extracted from census data based on patients' addresses included social vulnerability index; old age dependency ratio; median household income; percent of occupied housing with: no vehicle, no computers including smartphones, no internet subscription, limited English, high school graduates, and bachelor's degrees.

Results: Study cohort mean±SD age was 59.5±18.2 years; 42.1% were female; 46.8% identified as white race, 26.4% Hispanic, 7.9% Black, and 7.9% Asian; 88.4% were English speaking. 38.9% had Medicaid, 35.6% Medicare, and 23.6% private insurance. Multivariable analysis controlling for demographic factors found neighborhood SES factors significantly associated with lower pre-CI CNC scores were: higher percentage of housing without computers (β:-0.91, 95% CI: -1.5 to -0.3), without internet (β:-0.46, 95% CI: -0.8 to -0.1), and higher old age dependency (β: 0.11, 95% CI: 0.02 to 0.18). There were no associations between neighborhood SES [including no computers (β: 0.22, 95%CI -0.85 to 1.3), no internet (β: -0.11, 95% CI: -0.75 to 0.53), and old age dependency (β:0.11, 95% CI: -0.28 to 0.5)] and post-CI CNC scores in multivariable models adjusting for demographic factors. Post-CI CNC scores were comparable between those with low and high-SES neighborhoods.

Conclusions: In this cohort, there was significant association between lower neighborhood SES and poorer pre-CI CNC scores, indicating patients from low-SES neighborhoods may experience delays in CI evaluation resulting in poorer hearing at presentation. However, there was no association between neighborhood SES and post-CI CNC scores, suggesting lower SES does not necessarily lead to poorer CI outcomes.

Professional Practice Gap & Educational Need: Socioeconomic status (SES) plays an important role in health outcomes. Prior studies demonstrated that adult patients with lower SES are more likely to qualify for a CI, but less likely to undergo implantation. However, outcomes of adult CI recipients have not been studied in relation to neighborhood SES.

Learning Objective: Patients with lower neighborhood socioeconomic status have worse pre-CI CNC word scores but still gain benefit and attain similar outcomes at 1 year after cochlear implantation.

Desired Result: Increase awareness of hearing loss especially in communities with lower socioeconomic status and encourage patients to seek treatments and referral for hearing healthcare and potential CI evaluation.

Level of Evidence – Level IV – Historical cohort study

Indicate IRB or IACUC: IRB Exempt (USC HS-24-00185, approved 4/5/2024)

Outcomes of Bilateral Eustachian Tube Balloon Dilation: Impact of Procedural Order on Audiometric and Surgical Outcomes

Adriana I. Baez Berrios, BS; Jason K. Adams, MD
Maura Cosetti, MD; Enrique Perez, MD

Objective: Balloon dilation of the eustachian tube (BDETD) may be performed concurrently with otologic surgery, however best practices for procedural order are unknown. This study investigates whether timing of BDETD (before/after the primary otologic procedure) impacts audiologic and surgical outcomes.

Study Design: Retrospective cohort study.

Setting: Tertiary, specialty clinic.

Patients: Adult patients (n = 25) who underwent otologic surgery in combination with simultaneous bilateral BDETD.

Interventions: Bilateral ETD performed before or after primary otologic procedures, with subgroup analysis by tympanoplasty, mastoidectomy, and ossiculoplasty.

Main Outcome Measures: Pre- and post-operative Word Recognition score (WRS), 4-frequency (500, 1000, 2000, 4000 Hz) Pure Tone Average (PTA), and Air-Bone Gap (ABG).

Results: Patients (n = 25) with BDETD before primary otologic procedures had a mean ABG improvement of -12.8 dB compared to -12.5 dB for those with BDETD after the primary procedure (p = 0.954). There were no significant differences in WRS or PTA between the groups. Neither group experienced any complications, including no residual perforation. Subgroup analysis by cholesteatoma history revealed greater ABG improvement in patients with prior cholesteatoma (-21.9 dB, p = 0.003), while no significant differences were observed between the yes/no tympanoplasty, mastoidectomy, or ossiculoplasty groups.

Conclusions: The timing of BDETD relative to simultaneous otologic procedures did not significantly impact hearing or surgical outcomes. Prior history of cholesteatoma may be associated with greater improvement in ABG post-operatively.

Professional Practice Gap & Educational Need: Further research is needed to determine the clinical significance of procedural order in ETD and its impact on audiometric outcomes.

Learning Objective: To understand the effect of procedural order of ETD on audiometric outcomes.

Desired Result: Optimize the procedural approach for patients undergoing combined otologic and ETD interventions to improve hearing outcomes and reduce complications.

Level of Evidence - IV

Indicate IRB or IACUC: Icahn School of Medicine at Mount Sinai IRB, 22-01733.

The Association of Anxiety and Depression with Meniere's Disease and Benign Paroxysmal Positional Vertigo

Koyal Ansingkar, MS; Najm S. Khan, MBS; Kayla Powell, MD; Jeffrey T. Vrabec, MD

Objective: Investigating the prevalence of anxiety and depression in patients with Meniere's Disease (MD) and benign paroxysmal positional vertigo (BPPV).

Study Design: Retrospective cohort database study of All Of Us Research Program from Summer 2017 to January 1, 2022

Setting: The National Institute of Health's All Of Us Research Program is a national database containing health data from a diverse population of 409,425 patients.

Patients: Patients were categorized into three groups based on ICD-10 codes: Meniere's Disease, BPPV, or both Meniere's Disease and BPPV. Controls were matched to experimental groups in a 4:1 fashion based on the racial distribution of the US 2020 Census.

Interventions: Observational

Main Outcome Measures: Multivariate logistic regression was conducted with anxiety and depression as output variables, while accounting for the following comorbidities: tobacco dependence syndrome, alcoholism, diabetes, dyssomnia, hypothyroidism, osteoporosis, and migraine.

Results: Among a total of 46,095 (including controls), there were 983 patients with Meniere's Disease, 7,938 BPPV patients, and 298 patients with both. Prevalence of anxiety was 8% in controls, 16% in Meniere's Disease, 17% in BPPV, and 27% in both. Prevalence of depression was 23% in controls, 40% in Meniere's Disease, 40% in BPPV, and 43% in both. Patients with both diagnoses (OR=3.23, [95% CI, 2.52, 4.14]) had the highest likelihood of having anxiety, followed by BPPV (OR=2.12, [95% CI, 2.00-2.25]), and Meniere's Disease (OR=1.90, [95% CI, 1.60-2.25]). Patients with both diagnoses had the highest likelihood of having depression, with Meniere's Disease (OR=1.72, [95% CI, 1.53-1.93]), and BPPV (OR=1.72, [95% CI, 1.65-1.79]) having a similar association.

Conclusions: This study using the All Of Us database suggests that mental health disorders are common among patients with Meniere's Disease and BPPV. Additionally, patients with both conditions have an increased likelihood of anxiety and depression.

Professional Practice Gap & Educational Need: Psychological factors can contribute to the morbidity of Meniere's Disease and BPPV. This study aimed to determine the relationship between mental health disorders and BPPV in a diverse national sample.

Learning Objective: Understand the prevalence of anxiety and depression in patients with Meniere's Disease and BPPV.

Desired Result: Promote discussion and future research surrounding the psychological factors that contribute to Meniere's Disease and BPPV.

Level of Evidence: Level III

Indicate IRB or IACUC: Exempt

AI-Powered Automated Speech Perception Scoring

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Hypothesis: Whisper, an open-source speech-to-text AI tool, can automate CNC word and phoneme scoring with accuracy comparable to expert human scorers.

Background: Speech perception testing is crucial for evaluating outcomes in cochlear implant (CI) users. While manual scoring is the current standard, automated methods could potentially offer advantages in efficiency and consistency, particularly in settings where expert scorers are not readily available.

Methods: Two experienced CI users each completed word recognition tests using six unique CNC30 word list pairs. Audio recordings were transcribed using Whisper AI, supported by voice activity detection and grapheme-to-phoneme mapping. Orthographic transcriptions by CI users served as the benchmark. We calculated Intraclass Correlation Coefficient (ICC) estimates and their 95% confidence intervals (CIs) to assess inter-rater reliability between Whisper and two expert human scorers.

Results: Whisper-produced transcription errors relative to the orthographic benchmark averaged -1.38% ± 3.35% for words and -1.00% ± 1.87% for phonemes, compared to expert human scorers' errors of 2.38% ± 2.71% for words and 2.11% ± 1.43% for phonemes. Speech perception scores based on orthographic transcriptions averaged 73.67% ± 4.3% and 40.08% ± 4.72% for the two CI subjects. The ICC for Whisper against orthographic transcriptions was 0.979 (95% CI: 0.931–0.994). The ICCs for human scorers against orthographic transcriptions was 0.970 (95% CI: 0.832-0.992) and 0.981(95% CI: 0.911–0.995). The ICC for Whisper against human scorers was 0.966 (95% CI: 0.866-0.991).

Conclusions: Whisper demonstrates strong potential for automating speech perception scoring in CI users, showing excellent agreement with both manual scoring and benchmark orthographic transcriptions. This approach could contribute to standardizing CI outcome tracking, particularly in settings where access to expert evaluators is limited, and may enhance the efficiency of clinical assessments.

Professional Practice Gap & Educational Need: Current speech perception scoring for cochlear implant (CI) users relies heavily on manual methods by expert scorers. There is a need for efficient, standardized, and accessible scoring methods that can maintain accuracy while reducing reliance on expert human scorers especially in areas where access to expert evaluators is limited.

Learning Objective: Participants will be able to describe the process, accuracy, and potential benefits of using AI-based tools like Whisper for automating speech perception scoring in CI users.

Desired Result: Increased awareness and consideration of AI-based tools for standardizing and automating speech perception scoring in clinical practice and research, potentially leading to more consistent and accessible CI outcome tracking.

Level of Evidence – Level III

Indicate IRB or IACUC: Exempt.

Effect of Anti-Vascular Endothelial Growth Factor-A Monoclonal Antibody in a Xenograft Model of Vestibular Schwannoma

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Christina Fernandez-Valle, PhD; Christine T. Dinh, MD

Background: Vestibular schwannomas (VS) are intracranial tumors of vestibulocochlear nerves that cause hearing loss and dizziness. Bevacizumab is a humanized anti-vascular endothelial growth factor-A (VEGF-A) monoclonal antibody utilized as an off-label chemotherapy for patients with neurofibromatosis type 2 with variable success. To understand the effect of anti-VEGF-A antibodies for VS, we measured tumor growth, hearing, balance, renal, and hepatic function in a xenograft VS model treated with B20-4.1.1 (anti-VEGF-A antibody).

Methods: Pharmacokinetic studies were conducted in Fischer rats to assess B20-4.1.1 concentration in plasma and vestibulocochlear nerves. A xenograft model of VS was treated with vehicle (n=7) or B20-4.1.1 (10mg/kg intraperitoneal weekly for 4 weeks; n=8). Tumor bioluminescence imaging, auditory brainstem response (ABR), rotarod balance tests, and renal and hepatotoxicity test were performed. Final tumor weight was measured.

Results: B20-4.1.1 levels in plasma and vestibulocochlear nerves peaked at ~6 and 24 hours after drug administration, respectively, and persisted for at least 7 days. After 1 week of treatment, tumor size was found to be significantly smaller in B20-4.1.1-treated rats, when compared to controls ($p<0.05$). B20-4.1.1 prevented progression to severe-to-profound hearing loss at several frequencies. B20-4.1.1 improved overall survival at study endpoint (29% in vehicle- versus 63% in B20-4.1.1-treated rats), but this did not reach statistical significance.

Conclusion: Our *in vivo* study using a xenograft model of VS suggests that anti-VEGFA monoclonal antibodies may delay tumor progression, prolong hearing, and improve overall survival.

Professional Practice Gap & Educational Need: To identify combination therapies that can improve long-term tumor control, hearing preservation, balance function, and survival in NF2 patients.

Learning Objective: To understand the therapeutic utility and limitations of anti-VEGFA antibodies in treating NF2-associated VS.

Desired Result: Participants should better appreciate the potential role of anti-VEGFA antibodies in treating NF2-associated VS.

Level of Evidence: Not applicable

Indicate IACUC: Protocol #16-187

Management of Temporal Bone Fractures in Patients with Inability to Examine the Facial Nerve

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Ahmad Abdelhadi, BS; David Z. Allen, MD; Vivian F. Kaul, MD

Objective: To assess the rate of facial nerve paresis in patients with temporal bone fractures who cannot initially undergo a facial nerve examination due to intubation or neurologic injuries.

Study Design: Retrospective study.

Setting: Tertiary referral center.

Patients: Consecutive patients with traumatic temporal bone fractures confirmed via CT imaging between 10/8/2019 and 03/22/2024.

Interventions: Diagnostic evaluation.

Main Outcome Measures: Rate of facial nerve paresis among patients initially unable to undergo facial nerve exam due to intubation or neurologic injuries.

Results: Among 590 temporal bone fractures, facial nerve exam was initially unfeasible in 188 cases (32%). Of those who eventually received a facial nerve exam, 27 of 125 (22.0%) had facial nerve paresis. In contrast, facial nerve paresis was observed in 36 of 402 (8.9%) patients able to undergo immediate facial nerve exam ($p = 5.5e-05$, 95% CI: 1.8-5.9). Mean time from injury to ability to perform exam in those with facial nerve paresis was 14 days.

Conclusions: Facial nerve paresis is more likely in patients with temporal bone fractures who cannot initially undergo a facial nerve exam than those in which facial nerve exam is immediately possible. Prophylactic steroid therapy can be carefully considered for select patients to prevent delay in therapy, especially when the expected time to exam is either prolonged or unknown.

Professional Practice Gap & Educational Need: There is currently a gap in knowledge regarding the natural course of patients with temporal bone fractures who cannot initially undergo a facial nerve exam due to intubation or neurologic injuries. We hypothesize that these patients are likely to have more severe fractures with an increased rate of facial nerve paresis. The delay in assessing facial function can lead to delay in treatment.

Learning Objective: To better understand and consider the implications of inability to perform immediate facial nerve exam on patients with temporal bone fractures.

Desired Result: Improve the management and outcomes of patients presenting with facial nerve paresis secondary to traumatic temporal bone fractures.

Level of Evidence – Level IV.

Indicate IRB or IACUC: UTHealth Houston HSC-MS-24-0358.

Extent of Resection and its Impact on Long-Term Outcomes after Partial Removal of Large Vestibular Schwannomas

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Daniel M. Trifiletti, MD; Joseph T. Breen, MD

Objective: To examine how the extent of tumor resection in patients with large vestibular schwannomas (VS) relates to the need for additional treatment, including repeat surgery or stereotactic radiosurgery (SRS), and long-term facial nerve outcomes.

Study Design: Retrospective case series.

Setting: Tertiary referral institution.

Patients: Adult patients with large VS, defined as Koos grade 4 or greater than 3 cm in maximum axial dimension, treated initially with less than total tumor resection between 2003-2021.

Interventions: Microsurgical tumor removal and stereotactic radiosurgery.

Main Outcome Measures: Preoperative and postoperative tumor volume on MRI scans, rates of undergoing SRS or additional tumor removal surgery, time to additional treatment, and facial nerve outcomes using the House-Brackmann (HB) scale.

Results: Twenty-five patients with post-operative follow-up of at least 3 years (range 3.26-14.4, median 5.30 years) were included. Volumetric extent of resection as estimated by the initial postoperative MRI ranged from 43 to 99% (median 84%). Patients who underwent a greater than 90% resection were significantly less likely to require additional treatment during the follow-up period (11% vs 63%, $p = 0.033$). There was no significant difference in rates of acceptable (HB 1-2) facial nerve outcomes between patients who underwent a greater than 80% resection and those with a lesser resection ($p = 0.0518$), with a trend towards better facial function in the group with more extensive resection. No patients who underwent a greater than 80% resection required additional surgery.

Conclusions: Greater extent of resection was associated with significantly lower incidences of repeat surgery and SRS, while long-term facial nerve outcomes were not significantly worse. A more aggressive partial resection can effectively reduce the need for subsequent intervention.

Professional Practice Gap & Educational Need: There is ongoing debate regarding the efficacy of and long-term outcomes following incomplete resection for large vestibular schwannomas.

Learning Objective: To evaluate how varying extents of resections correlate with the need for additional interventions and provide insight to enhance surgical decision making in the treatment of large VS.

Desired Result: To improve understanding of treatment strategies for patients with large VS, ultimately reducing the need for additional interventions and improving long-term patient outcomes.

Level of Evidence – Level III

Indicate IRB or IACUC: Mayo Clinic IRB Protocol 24-008225. Approved 8/21/2024.

Low-Frequency Hearing Preservation in Robotically Assisted Cochlear Implant Electrode Array Insertion

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Bruce J. Gantz, MD; Marlan R. Hansen, MD

Objective: Analyze the longitudinal outcomes of robotically assisted cochlear implant electrode array on preservation of low frequency acoustic hearing.

Study Design: Retrospective cohort control study.

Setting: Single academic tertiary care center.

Patients: 57 patients implanted with Med-El Flex 20-26 with 30 robotic and 27 manual. 46 patients implanted with AB Slim-J with 14 robotic and 32 manual. A pre-operative low-frequency pure tone average (LF-PTA) threshold of at least 60 dB-HL was used for inclusion in the study.

Interventions: Robotically assisted and manually inserted cochlear implant electrode array insertion.

Main Outcome Measures: Pre- and post-operative low-frequency audiograms. Hearing preservation was defined as follow-up LF-PTA greater than 80 dB-HL. Hearing preservation ratios were calculated with chi-square to test for statistical significance.

Results: Retrospective analysis of the Med-El cohort at 1-2 year follow-up demonstrated (17/27) 63% hearing preservation for manual insertion versus (26/30) 87% for robotic ($p=0.040$); AB demonstrated (20/32) 63% hearing preservation for manual versus (10/14) 71% for robotic ($p=0.56$). With overall combined cohort (37/59) 63% hearing preservation for manual versus (36/44) 82% for robotic ($p=0.036$). Postoperative hearing remained relatively stable in patients with robotics-assisted insertion, while some of the patients with manually inserted arrays experienced ongoing hearing loss after initial preservation and some robotically inserted arrays experiencing improving audiometric thresholds.

Conclusions: Results from these initial studies suggest that robotics assisted insertion may enhance long-term hearing preservation compared with manual insertion. This finding may highlight relative surgical trauma and relative cochlear healing capacity given insertion method and severity of trauma. In addition to insertion method, multiple variables in this multidimensional space likely influence long term hearing preservation. Future studies will focus on post-operative imaging trauma analysis.

Professional Practice Gap & Educational Need: Share early outcomes of robotically driven cochlear implant array insertion with the larger community.

Learning Objective: Learn about robotically driven cochlear implant array insertion with relation to low frequency acoustic hearing preservation.

Desired Result: Understand the performance of robotically driven cochlear implant electrode array insertion with respect to low frequency acoustic hearing preservation.

Level of Evidence - Level III.

IRB: This study was approved by University of Iowa's IRB Committee.

Angiotensin Receptor Blockade Decreases the Odds for Meniere's and Defining Symptoms – A Multi-National Database Study

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Objective: Determine if angiotensin receptor blockade (ARB) therapy associates with decreased odds for Meniere's disease and defining symptoms including sensorineural hearing loss (SNHL), tinnitus, and cochlear implantation.

Study Design: Retrospective cohort database study.

Setting: TriNetX is a live HIPPA-compliant federated cloud electronic health record research network representing pooled data from 125-million patients from 95 healthcare organizations in the United States, Taiwan, Japan, Brazil, and India.

Patients: Subjects with Meniere's disease not on an ARB and no other first-line anti-hypertensive. Separate cohorts were generated for patients >30-years-old for each class of first-line anti-hypertensive drugs. Patients were matched using propensity score matching for medical comorbidities and Meniere's risk factors.

Interventions:

Main Outcome Measures: Odds-ratios with 95% confidence intervals (OR, 95%CI) for SNHL, tinnitus, cochlear implantation, and Meniere's disease (non-Meniere's cohorts only) after Meniere's diagnosis or starting the anti-hypertensive of interest.

Results:
There were 1,958 patients with Meniere's that were on an ARB and no other class of anti-hypertensive that were 1:1 propensity score matched to patients with Meniere's having never taken any anti-hypertensive medication prior to diagnosis. The average age was 67.7 years old, with 56% female patients. The risk for SNHL was 14.20% compared to 17.80% in controls (OR: 0.76, 0.61-0.96). For patients 30-years and older taking an ARB and no other anti-hypertensive medication (n=858,111) versus a thiazide diuretic (n=847,2020) demonstrated a risk for Meniere's of 0.071% versus 0.67% (OR: 0.11, 0.097-0.12). ARBs also associated with protection for SNHL, tinnitus, and cochlear implantation in these cohorts.

Conclusions: For Meniere's patients, ARB treatment associates with decreased risk for disease progression. Use of ARBs compared to other first-line anti-hypertensives associates with decreased odds for diagnosis of Meniere's, SNHL, tinnitus, and cochlear implantation.

Professional Practice Gap & Educational Need: Meniere's is in part a microangiopathic hypertensive disease process similar to hypertension-related kidney failure and hypertensive retinopathy. This work describes the protective association of ARBs compared to other first-line anti-hypertensive drugs.

Learning Objectives: Understand the protective associations of ARBs for diagnosis and progression of Meniere's.

Desired Result: Motivate future clinical trials on the topic of ARBs and otoprotection.

Level of Evidence – Level III

Indicate IRB or IACUC: Exempt

Assessing Recent Events with Magnet- Based MRI Splints in Cochlear Implant Patients

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Oliver F. Adunka, MD, MBA; Edward E. Dodson, MD; Desi P. Schoo, MD

Objective: To report non-serious adverse events in patients with earlier generation hearing rehabilitation devices undergoing magnetic resonance imaging (MRI) utilizing a magnet-based cochlear implant splint kit

Study Design: Case series

Patients: Patients with earlier generation hearing rehabilitation devices receiving MRI

Interventions: Securing of the cochlear implant with a magnet-based implant splint kit

Main outcome measures: Critical assessment of non-serious adverse events

Results: MRI safety in patients with hearing rehabilitation devices has become well-established with the introduction of self-aligning magnets. While safety concerns related to MRI in these patients have decreased, many patients continue to have earlier generation devices requiring splinting prior to MRI. Cochlear Americas Corporation designed a magnet-based cochlear implant splint to improve safety in this patient population. This study reports on 4 patients who experienced non-serious adverse advents while undergoing MRI using the magnet-based splint. 2 patients experienced splint displacement despite following the manufacturer's instructions. While patients did not experience any event-associated injuries, displacement of the splint may place the patient at risk for displacement of the internal magnet, patient discomfort, device failure, need for revision surgery, and need for repeat imaging. Additionally, 2 patients undergoing planning imaging for radiosurgery required re-imaging due to magnet artifact that substantially interfered with scan quality and precluded safe therapy. Based on these results, the authors of this study have reverted to non-magnet-based splinting with thermoplastic splints or ear mold putty.

Conclusions: While the magnet-based splint is reported as safe and effective, some concerns may still arise. In such instances, clinicians may use readily available clinical supplies as an alternative in patients with earlier generation hearing rehabilitation devices.

Professional Practice Gap and Education Need: To develop a universal approach to splinting earlier generation hearing rehabilitation devices without significant adverse events not limited to displacement, patient comfort, and imaging artifacts.

Learning Objective: To report adverse events associated with magnet-based splinting kit utilization during MRI in the setting of earlier generation hearing implants.

Desired Result: Inform providers of adverse events that may be encountered while splinting earlier generation implantable hearing devices with magnet-based splint kits.

Level of evidence: V

IRB: The Ohio State University 2023H0410

Microtia and Canal Atresia Treatment Trends and Disparities – A Multi-National Database Study

Peter D.A. Eckard, BS; Emma Jackson, BS; Zachary D. Urdang, MD, PhD; Robert A. Saadi, MD

Objective: Investigate trends in microtia and canal atresia aural rehabilitation and reconstruction. Investigate racial and ethnic disparities in management of microtia.

Study Design: Retrospective cohort database study.

Setting: TriNetX is a live HIPPA-compliant federated cloud electronic health record research network representing pooled data from 125-million patients from 95 healthcare organizations in the United States, Taiwan, Japan, Brazil, and India.

Patients: Subjects with a diagnosis of microtia and canal atresia. Separate cohorts were generated by racial and ethnic group for external ear reconstruction, bone anchored hearing aid (BAHA), or bone conduction hearing implant. Propensity score matching for age, medical comorbidities, and congenital syndromes.

Main Outcome Measures: Odds-ratios with 95% confidence intervals (OR, 95%CI) for microtia and canal repair and BAHA implantation.

Results: There were 13,265 patients identified with microtia and canal atresia. The average age was 8.86 (SD 13.3) years old with 42.98% female patients. Management with a BAHA or bone conduction hearing implant has become increasingly common with a 5.03-fold increase in incidence proportion over the last 25 years. During the same period, the incidence proportion of surgical repair had a 2.05-fold increase with a 2.81-fold increase from 1999-2014, followed by a 1.38-fold decrease from 2014-2024. Surgical repair is the most common treatment (n=2,962, 21.7%), but BAHA implantation is increasing (n=1,069, 8.1%). White non-Hispanic patients were more likely to receive reconstruction (OR 1.169, 95%CI 1.071-1.277) or BAHA (OR 1.776, 95%CI 1.533-2.058) than non-White patients.

Conclusions: Management of microtia and canal atresia involves both reconstruction and functional rehabilitation. Over the last 20 years, an increasing number of patients are receiving aural rehabilitation with a BAHA or a bone conduction hearing implant. However, treatment disparities still exist.

Professional Practice Gap & Educational Need: Microtia and canal atresia are frequently managed by a multidisciplinary team for reconstructive surgery and BAHA implantation. Clarification of treatment trends may help promote effective multidisciplinary care.

Learning Objectives: Understand treatment trends for aural rehabilitation in patients with microtia and recognize disparities in care received by racial and ethnic minorities.

Desired Result: Inform on treatment trends and disparities and motivate future clinical trials to explore the optimal aural rehabilitation for patients with microtia.

Level of Evidence – Level III

Indicate IRB or IACUC: Exempt

Cochlear Fistula by Facial Schwannomas of the Geniculate Ganglion: Incidence, Hearing Loss, and Surgical Outcomes

Steven D. Curry, MD; Armine Kocharyan, MD; Sudhir Manikavel, MD
Derald E. Brackmann, MD; William H. Slattery III, MD

Objective: Cochlear fistula by facial nerve tumors has a risk of complete ipsilateral hearing loss with tumor resection. This study aimed to identify signs and symptoms of cochlear fistula by facial schwannomas and determine risk factors for complications with tumor resection.

Study Design: Retrospective case series.

Setting: Single-institution tertiary referral center.

Patients: 23 patients with facial schwannomas.

Main Outcome Measures: Symptoms, facial nerve function, tumor characteristics, imaging, audiometry, and post-treatment outcomes.

Results: 23 patients (47.8% female) with a mean (standard deviation [SD]) age of 49.8 (15.0) years with facial schwannomas were identified. 16 of 23 patients had tumor involvement at the geniculate ganglion, and 4 patients had a mean (SD) cochlear fistula measuring 2.4 (1.1) mm. Ipsilateral hearing was significantly worse for air- (AC, 42 vs. 19 dBHL, p=.002) and bone-conduction (BC, 28 vs. 17 dBHL, p=.0497) pure tone average (PTA), but not for word recognition score (87% vs. 98%, p=.08) compared to the contralateral ear. There was no significant difference in hearing with/without cochlear fistula or pre-/post-treatment. One patient had tumor invasion of the cochlea and ipsilateral profound hearing loss. Vestibular symptoms were not significantly different between patients with/without cochlear fistula, and no patients reported mobile third window symptoms. Surgical treatments included 8 decompressions without tumor excision and 2 tumor resections with great auricular nerve grafts. One patient underwent radiosurgery. Mean (SD) facial nerve House-Brackmann grade was 2.0 (1.1) at presentation and 2.7 (1.7) at last follow-up a median (interquartile range) of 1.6 (0.85 to 4.9) years.

Conclusions: Facial schwannomas at the geniculate ganglion can cause asymptomatic cochlear fistula without mobile third window symptoms. This study identified a high incidence of cochlear fistula.

Professional Practice Gap & Educational Need: Facial schwannomas are rare tumors that can occur at any segment(s) of the facial nerve. Management guidelines are based on expert opinion, with poor facial nerve grade cited as a criterion for determining candidacy for tumor resection. The incidence of cochlear fistula with facial schwannomas, the role of hearing status in clinical decision making, and the risks of hearing loss with observation vs. intervention are incompletely understood.

Learning Objective: To characterize the presenting signs and symptoms of facial schwannoma and compare outcomes of patients with vs. without geniculate ganglion involvement of tumor and cochlear fistula.

Desired Result: Participants will understand the characteristics of facial schwannomas of the geniculate ganglion and the risk of hearing loss with observation or excision of tumors that have caused a fistula of the otic capsule of the cochlea.

Level of Evidence: Level IV

Indicate IRB or IACUC: Exempt

Racial and Ethnic Disparities in Cochlear Implant Clinical Trials

Jason E.O. Muka, BS; Peter D.A. Eckard, BS; John Dornhoffer, MD; Robert A. Saadi, MD

Objective: Investigate the racial and ethnic disparities in patients enrolled in cochlear implant (CI) clinical trials in the U.S., promote more inclusive recruitment in future trials to ensure generalizable results, and improve healthcare equity.

Data Sources: ClinicalTrials.gov was queried from inception to September 2024 for trials concerning cochlear implants.

Study Selection: Clinical trials with a primary aim concerning CI outcomes were screened for reported racial or ethnic demographic data available on ClinicalTrials.gov or associated publications indexed in PubMed. Studies without a U.S. based study location were excluded after the initial screening due to variability in study type.

Data Extraction: Demographic data on race, ethnicity, and gender were collected.

Data Synthesis: Frequencies and percentages of aggregated racial and ethnic diversity were calculated and compared to national racial and ethnic diversity levels as reported by the U.S. Census Bureau.

Results: There were 523 trials screened, and 8 met inclusion criteria, comprising a total of 164 study participants. In aggregate, participants were 47.06% (n=77) female, 79.27% (n=130) White, 1.83% (n=3) Black or African American, 0.61% (n=1) American Indian or Alaskan Native, 4.27% (n=7) Asian, 0% (n=0) Native Hawaiian or other Pacific Islander descent, and 4.88% (n=8) of other/unspecified race, compared to national distribution of 50.5%, 75.3%, 13.7%, 1.3%, 6.4%, and 0.3%, respectively. Ethnic demographics of participants were 1.22% (n=2) Hispanic and 35.98% (n=59) non-Hispanic, compared to 19.5% and 50.5% nationally.

Conclusions: CI clinical trials lack adequate racial and ethnic representation, and only a small number of trials publish demographic data. Addressing these gaps will help enable improved access to CI technology for underrepresented populations.

Professional Practice Gap & Educational Need: There is a significant underrepresentation of racial and ethnic monitories in U.S.-based cochlear implant clinical trials, leading to non-generalizable outcomes and limiting access to CI technology for these populations.

Learning Objective: Recognize the disparity in minority representation in CI trials and its impact on research validity.

Desired Result: Physicians and researchers will increase their knowledge of racial and ethnic disparities in CI trials and advocate for more inclusive practices for better health equity.

Level of Evidence - III

Indicate IRB or IACUC: Exempt.

Socioeconomic and Demographic Trends of Patients Undergoing Eustachian Tube Dilation: A Large National Database Analysis

Robert H. Weigman, BS; Christopher Z. Wen, MD; Marcelina Puc, MS; Adam C. Kaufman, MD, PhD

Objective: To describe national trends in patients receiving balloon dilation of the eustachian tube (BDET)

Study Design: Retrospective cohort study

Setting: US institutions participating in the Epic Cosmos database

Patients: Adult and pediatric patients undergoing BDET between January 2020 and June 2024

Main Outcome Measures: Sociodemographic and socioeconomic measures, procedure setting, complications

Results: 8753 patients who underwent BDET were included, of which 4873 (55.7%) were female and 493 (5.6%) were pediatric. Pediatric ($p<0.0001$; OR 1.83) patients and non-urban patients ($p<0.0001$; OR 1.28) were more likely to undergo bilateral procedures. The most vulnerable quintile of patients, as defined by the social vulnerability index (SVI), had 1.34 higher odds ($p<0.0001$) of undergoing bilateral BDET compared to the least vulnerable quintile. Black ($p=0.02$; OR 1.47), Hispanic ($p<0.001$; OR 2.02;), and rural patients ($p<0.0001$; OR 1.49) were more likely to receive care in the operating room rather than clinic. Complications included patulous eustachian tube (0.3%), acute epistaxis (0.5%), and acute otitis media (2.6%). Complications did not vary by laterality or setting but were more common in pediatric patients ($p<0.0001$; OR 2.21) and were more common in high SVI patients ($p=0.002$, OR 1.51-2.15).

Conclusions: Overall BDET is a safe and common procedure. More vulnerable patient populations were more likely to undergo bilateral BDET, less likely to have BDET performed in an office setting, and had a higher rate of complications. Further study is needed to understand the causes of these disparities.

Professional Practice Gap & Educational Need: Balloon dilation of the eustachian tube is increasingly commonly performed procedure, but little literature exists in understanding the sociodemographic

Learning Objective: To describe the disparities that exist for patients undergoing balloon dilation of the eustachian tube

Desired Result: Greater understanding that healthcare disparities exist for patients undergoing balloon dilation of the eustachian tube and highlight potential areas for further investigation and improvement

Level of Evidence: IV

Indicate IRB or IACUC: Exempt

Cochlear Implantation Outcomes in Paget's Disease of the Bone: A Systematic Review

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Objective: Review disease specific prognostic factors of Paget's disease of the bone on cochlear implant (CI) outcomes.

Data Sources: PubMed, Embase, and Web of Science were each queried from inception to January 2024 for case reports and case series available in English language.

Study Selection: Following PRISMA guidelines, articles describing CI outcomes in patients with Paget's disease were reviewed.

Data Extraction: Data were collected on demographics, Paget's disease activity and history, hearing, and surgical outcomes. Study validity was assessed using the Joanna Briggs institute's critical appraisal tools and AMSTAR2 criteria.

Data Synthesis: Incidence and percentages were calculated for imaging characteristics, insertion technique, and implant type. Temporal bone imaging findings were compared to hearing outcomes using Fischer's exact test.

Results: Of the 125 abstracts screened, 8 articles met the inclusion criteria, comprising 9 cases. The cohort included 4 males and 5 females, median age of 62 (IQR 60-77). Hyper-osteoblastic changes in the petrous part of the temporal bone and/or the otic capsule were observed on CT in 5 patients. Electrode insertion favored cochleostomy (n=4) over round window technique (n=1). All patients had initial improvement in hearing and speech recognition scores. Long term hearing outcomes at 36-72 months were reported in 4 cases with 3 maintaining improved hearing outcomes and 1 reporting gradual worsening by 36 months. Radiographic evidence of osteoblastic changes was not associated with long term hearing outcomes (p=0.81). No complications were reported.

Conclusions:
Cochlear implantation can effectively treat hearing loss in patients with Paget's disease of the bone. CT imaging may help guide planning of insertion approach. Larger cohort studies are needed to quantify the risks.

Professional Practice Gap & Educational Need: This study provides a systematic review of surgical considerations and hearing outcomes following cochlear implantation in patients with Paget's disease of the bone.

Learning Objective: To appreciate the disease specific considerations of Paget's disease of the bone and to describe hearing and surgical outcomes for cochlear implantation in this patient population.

Desired Result: Review evidence to help guide cochlear implant decisions in patients with Paget's disease of the bone and to promote future cohort investigations to quantify specific risk associated with cochlear implantation in patients with Paget's disease of the bone.

Level of Evidence - III

Indicate IRB or IACUC: Exempt.

Low-Frequency Hearing Preservation Outcomes Following Cochlear Implantation

Emily C. Wong, MD; Qianjie Fu, PhD; Akira Ishiyama, MD

Objective: To identify factors associated with hearing preservation among cochlear implant recipients at a single academic institution

Study Design: Retrospective cross-sectional study

Setting: Tertiary referral center

Patients: Adults over the age of 18 with preoperative low-frequency (125–1000 Hz) pure-tone averages (LFPTA) below 80 dB, who underwent cochlear implantation between 2020–2023 at a single academic institution

Interventions: Patients who met criteria for cochlear implantation using hearing preservation technique underwent routine pre-implantation audiometric evaluation followed by cochlear implantation. Standard post-implantation audiometric evaluations were performed at 1 and 3 months post-implantation. Clinical variables, including demographics, etiology of hearing loss, duration of hearing loss, surgical approach, type of device implanted, and surgical technique were examined.

Main Outcome Measures: Hearing preservation, measured using the Skarzynski hearing preservation classification system

Results: A total of 38 cochlear implants were performed in adults with residual low-frequency hearing during the study period. Of these patients, 42.9% of them were male and 57.1% were female. The average LFPTA preoperatively was 52.2, and there were no differences in preoperative PTA related to sex or age of the patients or implant side. Partial or complete hearing preservation (HP) was achieved in 33 patients (88.6%). The average post-operative LFPTA was 77.8. There was a trend towards higher postoperative LFPTA with longer CI electrodes, although this was not statistically significant in our limited sample size. Application of steroid to the round window intraoperatively was not associated with improved HP, and there were no differences between lateral wall or pre-curved electrode arrays in HP outcomes. CNC scores were not associated with improved LFPTA. Our study did identify female sex as a predictor of improved HP ($p=0.01$).

Conclusions: Hearing preservation following cochlear implantation is possible regardless of cochlear implant electrode type, but longer electrodes may be associated with poorer postoperative LFPTAs. Other patient-specific factors may play an under-studied role in hearing preservation surgery, and further studies are needed to better characterize these relationships.

Professional Practice Gap & Educational Need: Soft surgery techniques have been proposed for cochlear implantation in individuals with residual low-frequency hearing but whose high-frequency hearing is not serviceable for everyday functioning. However, to date it is unclear whether surgical techniques, patient-related factors, or a combination of these can play a role in improving individuals' hearing performance following hearing-preservation cochlear implantation.

Learning Objective: To characterize hearing outcomes following cochlear implantation at a single academic institution, and to explore factors associated with these hearing outcomes

Desired Result: Individuals will be able to characterize the pre- and post-operative LFPTAs in our patient population and identify some surgery-related factors and some patient-related factors associated with hearing preservation following cochlear implantation.

Level of Evidence – Level V

Indicate IRB or IACUC: IRB protocol #22-001587

The Assessment of Otology/Neurotology Functions in Patients with Vertigo/Dizziness After Sudden Sensorineural Hearing Loss

Masaharu Sakagami, MD, PhD; Tomoyuki Shiozaki, PhD; Tadashi Kitahara, MD, PhD

Objective: To assess the neuro-otological functions in patients with prolonged vertigo/dizziness after sudden sensorineural hearing loss (SSNHL).

Study Design: Retrospective cohort study

Setting: Tertiary referral center

Patients: We encountered 661 successive vertigo/dizziness patients for short-term hospitalization at the Vertigo/Dizziness Center in Nara Medical University between May 2014 and March 2023. Among those, 53 patients (53/661: 8.0%) had been previously diagnosed and treated for SSNHL. Of these patients, 23 patients who also performed vHIT were included in this study.

Interventions: None (retrospective analysis)

Main Outcome Measures: Otology/neurotology tests such as the pure-tone audiometry (PTA) test, caloric test (C-test), video Head Impulse Test (vHIT), vestibular evoked cervical myogenic potential (cVEMP) measurement, vestibular-evoked ocular myogenic potential (oVEMP) measurement.

Results: Among the 23 patients in this study, vHIT abnormalities of horizontal, anterior, and posterior semicircular canals (SCCs) were observed in 9 (39.1%), 4 (17.4%), and 12 (52.2%) patients, respectively. 9 (39.1%) patients had abnormalities in the C-test. 4 (17.4%) patients had abnormal results in cVEMP and oVEMP. Comparing the average hearing level on the affected side between the 12 patients with abnormalities in the posterior SCC in vHIT and the other 11 patients, there was no significant difference in average hearing level. Meanwhile, focusing on the high-frequency range, the thresholds for the patients with abnormal vHIT results in posterior SCC were significantly higher than those without abnormal vHIT results in posterior SCC on the affected side.

Conclusions: SSNHL patients with prolonged vertigo/dizziness with posterior SCC impairment in vHIT have hearing impairment in the high-frequency range.

Professional Practice Gap & Educational Need: Although there have been many clinical studies after SSNHL, clinical studies of SSNHL with prolonged vertigo are limited.

Learning Objective: Understand the pathophysiology of prolonged vertigo/dizziness after SSNHL

Desired Result: Considering the dominance of blood flow in the inner ear, SSNHL patients with these characteristics could present impaired blood flow in the vestibulocochlear artery branches.

Level of Evidence – IV

Indicate IRB or IACUC: Certificate number: 0889, Nara Medical University

Computerized Dynamic Posturography Outcomes in Vestibular Migraine

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Objective: Characterize computerized dynamic posturography (CDP) findings in patients with vestibular migraine (VM).

Study Design: Retrospective chart review

Setting: Ambulatory, multidisciplinary neurovestibular clinic

Patients: Patients aged 20 to 79 years diagnosed with VM who underwent CDP between 2015 and 2022.

Interventions: Sensory Organization Test (SOT), Motor Control Test (MCT), Adaptation Test (ADT)

Main Outcome Measures: SOT (composite score, condition equilibrium scores, sensory analysis ratios), MCT (composite latency and individual translation latencies), and ADT (sway energy and adaptation patterns).

Results: Among 196 patients (mean age 46.9 ± 12.7 years; 3:1 female-to-male ratio), 37.4% showed abnormal SOT composite scores. In 51.5% of the cohort, SOT scores were specifically abnormal in Condition 3, suggesting increased visual dependence. Although sensory analysis ratios were normal in half of our cohort, the most common abnormality encountered was a preference for visual input. Although 22.5% of our cohort had at least one abnormal latency on MCT, the overall composite latency was abnormal in only 3.6%. While ADT sway energy scores were largely normal, those with abnormal ADT (41.8%) showed paradoxical increases in sway energy with repeated perturbations, suggesting impaired adaptation.

Conclusions: VM patients may exhibit maladaptive visual preference on SOT and impaired adaptation on ADT. Conversely, latencies on MCT do not seem to be significantly affected. These findings add to our understanding of VM, both from a pathophysiologic and diagnostic standpoint.

Professional Practice Gap & Educational Need: A gap exists in understanding of VM abnormalities in CDP.

Learning Objective: To identify and interpret CDP abnormalities in vestibular migraine patients.

Desired Result: Establish a baseline understanding of the manifestations of vestibular migraine in CDP

Level of Evidence - III

Indicate IRB or IACUC: REB22-1122 – University of Calgary REB