



7th World Congress on Cochlear Implants in Emerging Nations

14-16 September 2023

Istanbul Congress Center, ISTANBUL - TURKEY

Organized by Hacettepe Cochlear Implant Group

ABSTRACTS BOOK

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“7th World Congress of Cochlear Implants in Emerging Nations”

(CONTENTS):

	<u>Page</u>
Invitation	3 - 4
Committees	5 - 8
Topics	9
Oral Presentations	10 - 115
Poster Presentations	116 - 129

“7th World Congress of Cochlear Implants in Emerging Nations”

Dear Colleagues,

As Hacettepe Implant team, we are pleased to announce that we are organizing the 7th World Congress of Cochlear Implantation in Emerging Countries in Istanbul, Turkey between 14-16 September 2023. This decision was finalized during the 6th World Congress of Cochlear Implantation which was held in India (as an online meeting) between 12-14 November 2021. On the last day, I was given the task of organizing the next meeting which we plan to perform in 2023.

This meeting series was started in 2016 by Professor Muaz Tarabichi who set up the organization Global Cochlear Implant Access Network. The aim of these meetings is to find solutions to challenges in the field of implantation in emerging nations. The meeting was used to be held every year until 2019 but because of Covid19 Pandemic, it was not possible to perform this face-to-face in India which was done as an online meeting in 2021.

Now with the gradual control of the Covid 19 pandemic, we plan to perform the meeting face-to-face between 14-16 September 2023 in Istanbul, Turkey.

The reason we prefer to make the meeting in Istanbul is that there are direct flights from many countries all over the world enabling many people to travel without connecting flights. In addition, being the capital of three empires in the past, Istanbul offers a rich history, as well as being a picturesque city. It is also the meeting point of east and west where the experience of the developed world will be shared with emerging nations.

We have set the congress date as September because this month in Turkey is quite warm and offers very good opportunities for outside activities while enjoying the beautiful city. Our aim is to make the meeting face-to-face. This is because we believe social interaction is very important between participants.

We plan to make the meeting in 3 halls. We are developing guidelines for cochlear implantation and these will be presented during the meeting. We will also have interesting case presentations, new developments and oral presentations along with satellite symposiums of companies.

Let us meet in 14-16 September 2023 in Istanbul: the meeting point of east and west.

“7th World Congress of Cochlear Implants in Emerging Nations”

Sincerely yours,

Professor Levent Sennaroglu M.D.

President of the 7th World Congress of
Cochlear Implantation in Emerging Countries,

Department of Otolaryngology,

Hacettepe University Medical Faculty

Ankara, Turkey



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14-16 September 2023

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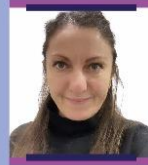
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Topics of 7th World Congress of CI in Emerging Nations

- Otitis media and cochlear implantation
- Imaging in cochlear implantation
- Vaccination
- Surgical approaches
- Electrode Choice in Cochlear Implantation
- Inner ear malformations
- Difficult CI surgery
- Simultaneous vs Sequential surgery
- Complications
- Revision Surgery
- Auditory Brainstem Implantation
- Device failure
- Middle ear implants
- Bone anchored hearing devices
- Vestibular implants
- Preoperative audiological evaluation
- Intraoperative Monitorization
- Postoperative evaluation
- Genetics and hearing loss
- Mapping in difficult situations
- Single sided deafness and asymmetric hearing loss
- Hearing preservation
- Hearing aids vs cochlear implantation: the grey zone
- CI in adults
- Tinnitus
- Management of cochlear nerve hypoplasia
- Children with additional needs
- Bimodal versus Bilateral Cochlear Implantation: Cost & Effect:
- Performance in complex situations
- Vestibular evaluation before and after Cochlear Implantations
- Auditory neuropathy

ORAL PRESENTATIONS

“7th World Congress of Cochlear Implants in Emerging Nations”

14 September 2023 Imaging in Cochlear Implantation Seminer Hall F Moderator: Afsin Ozmen 09:00 -10:15		
OP 3503	Round Window Accessibility in Cochlear Implant: Radiological Study	Saad Elzayat
OP 3539	Radio-Clinical Assessment of Posterior Tympanotomy Difficulties During Cochlear Implantation; A Prospective Case-Series Study.	Haitham Hassan Elfarargy
OP 3943	Mismatch between CT and intraoperative findings in patients with acquired inner ear pathology	Andrei Lilenko
OP 3948	Role of HRCT imaging in predicting the visibility of round window in cochlear implanted patients	Nader Saki
OP 4028	A Comparative Study of CI Eligibility Standards in Developed Countries versus Emerging Nations	Radesh Najran
OP 3966	Anatomical Investigation of Safe Trajectory Determining Factors for Robotic Keyhole Cochlear Implant Surgery with Cone Beam Computed Tomography Images	Saliha Seda Adanir
OP 4003	Preoperative Cerebral MRI Abnormalities in Pediatric Cochlear Implant Recipients: How common and how important are they?	Mashaly Magued
OP 4077	Cochlear Implantation in Patients with Far Advanced Otosclerosis	Behrooz Amirzargar

OP-3503 Round Window Accessibility in Cochlear Implant: Radiological Study

Saad Elzayat¹

1 Kaferelsheik University

Introduction: round window insertion is proved to be safest roat to cochlear implantation as hearing preservation

Method: We will show our step by step our contrubitions in radiological peridection of RW visability more than 12 internation publications were done by my Ci team i will show all our methods for this subject

Results: We insured that rw peridectabilty could be achived radiologically

Conclusion: will achived during the presentation conclusion: rw could be perdicted radiological before implantatin saad elzayat professor & chairman of ORL-HNSKaferelsheikh university-Egypt director of CI unit in kfs -u

Keywords: CI-RW-CT

OP-3539 Radio-Clinical Assessment Of Posterior Tympanotomy Difficulties During Cochlear Implantation; A Prospective Case-Series Study.

Haitham Hassan Elfaragy¹

1 Kafrelsheikh University

Introduction: Our study proposed a preoperative radiological scoring system for predicting posterior tympanotomy (PT) and mastoidectomy-associated difficulties during cochlear implantation (CI). At the same time, we tried to supply the radiologists and the CI surgeon with proper radiological methods for simply analyzing the preoperative HRCT. We aimed by this scoring system to efficiently prepare the CI operation by an accurate difficulty prediction.

Method: It was a multicenter prospective case-series study from October 2021 to April 2022. We included 73 CI candidates through the PT approach. The radiological score, composed of thirteen items, was fulfilled and evaluated before each CI surgery. Then, we correlated this score with the intraoperative difficulty and surgical duration.

Results: The operation was straightforward in 42 patients with a score of 3.87 ± 1.72 and challenging in 31 patients with a score of 10.66 ± 1.73 . The radiological score was strongly correlated with the surgical difficulty and duration (P-value <0.0001).

Conclusion: Our proposed radiological score was a valid, reliable, and precise tool to predict intraoperative difficulty during cochlear implantation. Chorda-facial angle was the strongest predictor, significantly affecting the difficulty, surgical duration, and preoperative radiological score. A score equal to or more than 7.5 was expected to be associated with surgical difficulty with high accuracy.

Keywords: Cochlear Implantation, High-resolution computerized tomography, Preoperative prediction, Posterior tympanotomy, Mastoidectomy, Surgical difficulties.

OP-3943 Mismatch Between Ct and Intraoperative Findings in Patients with Acquired Inner Ear Pathology

Andrei Lilenko¹, Vladislav Kuzovkov¹, Serafima Sugarova¹, Victoria Tanaschishina¹
1 St. Petersburg Ent Research Institute

Introduction: Any morphologic alteration of the inner ear labyrinth can affect both the results of cochlear implantation and the complications rate. Spiral canal ossification primarily affects the descending part of the basal turn in patients with acquired inner ear pathology. In some cases there is a mismatch between the CT data and intraoperative findings. To share our observations of cases of mismatch between CT and intraoperative findings in patients with acquired inner ear pathology.

Method: 127 temporal bone CTs of patients with cochlear ossification/obliteration were analyzed preoperatively with Otoplan: 12 patients with temporal bone fractures: 6 patients — axial, 6 patients – transverse; 103 patients — a consequence of meningitis, 11 cases of cochlear otosclerosis, 1 patient with intracochlear schwannoma. Temporal bone CT was carried out not earlier than 10 days before surgery. Intraoperative measurements were performed with the original calibrated silicon gauge. The preoperative and intraoperative measurements data was compared.

Results: In 17% patients with spiral canal ossification/obliteration there was a mismatch between CT and intraoperative findings. In these cases the intraoperative extension of the obliteration length was longer up to 3 mm than it could be predicted basing on the preoperative CT data. It was of particular importance when the ossification extended beyond 8 mm and the U-turn intraoperatively but was evaluated as being shorter preoperatively. In such cases we suggest to use “harpoon-technique” which enables removal of the ossificans beyond the U-turn of spiral canal. In patient with intracochlear schwannoma there were no signs of spiral canal obliteration on the preoperative CT but the type Anthony A schwannoma was observed and had to be removed from the spiral canal U-turn to obtain electrode insertion.

Conclusion: Possibility of “surprising” mismatches between preoperative temporal bone CT data and intraoperative findings in patients with acquired inner ear pathology should be kept in mind not to mislead surgeon. The use of semi-rigid instruments can in rare challenging cases help to bypass the obliteration of the spiral canal beyond the U-turn.

Keywords: Meningitis, cochlear otosclerosis, temporal bone fracture, intracochlear schwannoma, temporal bone CT, ossification

OP-3948 Role Of Hrct Imaging in Predicting the Visibility of Round Window in Cochlear Implanted Patients

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Introduction: High-resolution computed tomography (HRCT) magnifies the role of preoperative imaging for detailed inner and middle ear anatomical information and enhances more efforts for better dependent correlation and measurements of round windows (RW). The aim of this study was to find an appropriate way by HRCT imaging the prediction the visibility of the round window during cochlear implant (CI) surgery.

Method: The study was conducted using hospital information from patients referring to the Khuzestan Cochlear Implant Center (2017–2018), Ahvaz, Iran. 87 patients underwent cochlear implant surgery, and 56 patients with high-resolution CT scans were included in the study. All patients underwent surgical treatment via a posterior tympanotomy approach.

Results: 56 patients were examined. Patients were divided into three groups: children (0–12 years) and adolescence (18-13 years) and adults (19–59 years), of whom 45 patients (80.4%) were children, and 3 patients were adolescence (5.4%) and 8 patients (14.3%) were adults. 22 patients (39.3%) were fully visible and 13 patients (23.2%) were partially visible and 21 (37.5%) patients were difficult to visualize. In high-resolution imaging studies, mastoid 2 cases (3.6%) were poorly aerated and 8 cases (14.3%) were moderately aerated and 46 (86.1%) were well aerated. The amount of round window overhanging in 43 patients (76.8%) was 4.4 and in 12 patients (21.4%) was 3.4%.

Conclusion: The presence of the air cell around the facial recess may provide easier access to the facial recess. There was a significant relationship between the RW in the operation and the angle between the RW and the facial nerve and the coronal axis. There is no significant relationship between the visibility of the RW and the facial recess, Vertical height RW and facial nerve (FN), the distance between the FN and the posterior canal in the axial, the angle between the FN and inner margin of RW, and the angle between the FN and the tympanic annulus with the inner margin RW in the Axial and FRL were not found.

Keywords: High-resolution computed tomography, Cochlear implant, Round window

**OP-4028 A Comparative Study of Ci Eligibility Standards in Developed Countries
Versus Emerging Nations**

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Introduction: The field of cochlear implantation has witnessed significant advancements in surgical techniques and technology, enabling the safe and effective use of cochlear implants (CI) in various patient populations. However, the establishment of uniform candidacy criteria for cochlear implantation remains elusive, with different regions adopting diverse sets of indication criteria.

Method: To gather insights into the international differences in cochlear implantation indication criteria, a comprehensive questionnaire survey was conducted among professionals actively working in the field of cochlear implants. This survey aimed to collect data on the prevailing indication criteria in different regions, as well as any proposed modifications or future directions in cochlear implantation candidacy. The data obtained from the survey served as the foundation for the analysis and discussion presented in this paper.

Results: Data from the questionnaire will be presented.

Conclusion: The findings reveal significant heterogeneity in cochlear implantation indication criteria across the world's major markets. While certain criteria, such as SSD and AHL, have gained widespread acceptance, the inclusion of patients with moderate to severe cochlear hearing loss and/or ANSD has expanded the candidacy criteria. Furthermore, advancements in EAS and structural cochlear preservation techniques have contributed to transforming the criteria for cochlear implant candidacy in all age groups, accommodating the needs of both the elderly and the younger population. However, despite these developments, there remains a lack of consensus regarding measures, time frames, and guidelines for cochlear implant candidacy. By exploring potential future indications, this study paves the way for advancements in cochlear implantation and improved patient care worldwide. It underscores the need for continued collaboration among professionals and stakeholders to refine and standardize criteria for cochlear implant candidacy, ultimately enhancing the accessibility and effectiveness of this life-changing technology. September 2023

Keywords: CI Candidacy Criteria Indications Single Sided Deafness (SSD) Asymmetrical Hearing loss (AHL) Electric Acoustic Stimulation (EAS) Auditory Neuropathy Spectrum Disorder (ANSD)

OP-3966 Anatomical Investigation of Safe Trajectory Determining Factors for Robotic Keyhole Cochlear Implant Surgery with Cone Beam Computed Tomography Images

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3 Department of Otorhinolaryngology and Head and Neck Surgery, University Hospital Antwerpen, University of Antwerpen, Belgium

Introduction: The ideal trajectory to place a cochlear implant (CI) array is defined by an entrance through the round window membrane and continues as long as possible parallel to the basal turn of the cochlea. Here we examined the keyhole drilling trajectories of CI surgeries performed with the HEARO Procedure to compare the critical anatomical structures between easy and difficult cases.

Method: Cone-beam computed tomography (CBCT) images of patients who underwent robotic cochlear implant surgery with the HEARO procedure were included. Three of 25 cases had to be aborted because of the current HEARO safety mitigations because a distance of 0.4 mm could not be respected. Radiological images in DICOM format were transferred to dedicated software (OTOPLAN ® Cascination GMHB Bern Switzerland) for analyses. Anatomical landmarks were segmented by an anatomist observer for 3D reconstruction and measurement of parameters. Cochlear sizes, Facial recess sizes, round window sizes, cochlear orientation, and trajectory angles were calculated for comparison.

Results: Facial recess size, facial recess angle, and distance between the facial nerve and safe trajectory were statistically smaller ($p=0.001$) in patients who converted from robotic surgery to conventional. A significant positive correlation existed between basal turn angle and in-plane angle ($p=0.001$, $r=0.859$). In addition, there was a significant negative correlation between the basal turn length and the last electrode insertion angle ($p=0.007$, $r=0.545$).

Conclusion: Our results showed that the facial recess anatomy was a critical factor in whether the surgery would proceed safely in 25 cases. In addition, evaluation of cochlear orientation prior to robotic surgery helps ensure a collision-free trajectory and appropriate approach angles to the cochlea.

Keywords: Sensorineural hearing loss, Cochlear implantation, Robotic cochlear implant surgery, Cochlea anatomy, Facial nerve anatomy, Facial recess, Surgical anatomy of temporal bone

OP-4003 Preoperative Cerebral Mri Abnormalities in Pediatric Cochlear Implant Recipients: How Common and How Important are They?

Mashaly Magued¹

1 Faculty of Medicine Cairo University

Introduction: High resolution magnetic resonance imaging (MRI) can yield valuable information regarding the status of the inner ear in pediatric cochlear implant (CI) candidates. An added benefit is its ability to screen the brain and central nervous system (CNS) for findings which may adversely affect the neurodevelopment of these children. The objective of our study is to determine the incidence of brain abnormalities as detected by preoperative CNS MRI scans in pediatric CI candidates, to clarify their influence on hearing and speech outcomes after CI and to highlight whether these abnormalities should be viewed as contraindication for CI or not.

Method: Our study is a retrospective chart review to detect brain abnormalities in 197 pediatric CI recipients having preoperative temporal bone and brain MRI studies during the period October 2015 to January 2020 . -Progress in auditory perception and speech language outcomes were assessed for at least 2 years of post-operative implantation period. Performance in patients with brain lesions was compared with the age-and–sex matched control group. 3-

Results: Among the 197 pediatric CI recipients included in this study, 23 cases (11.4%) showed various brain abnormalities as follows: n=14 (60.5%) white matter changes; n=2 (8.5%) arachnoid cysts; n=2 (8.5%) encephalomalacia; n=1 (4.5%) dilated ventricle; n=1 (4.5%) mild atrophic brain changes; n=1 (4.5%) Arnold Chiari malformation; n=1 (4.5%) Dandy Walker deformity and n=1 (4.5%) hydrocephalus. -Of the 23 cases, n=19 (82%) did expectantly or well with post-operative speech and language development and n=4 (18%) with diffuse white matter changes demonstrated significant delays and difficulties in rehabilitation.

Conclusion: a-Brain abnormalities in pediatric CI recipients is not considered an absolute contraindication for CI. b-We propose that MRI of the temporal bone as part of the evaluation protocol of cochlear implantation in children should include CNS screening. c-Patients with brain abnormalities and their families should be counseled about the possibility of less than ideal post-implantation outcomes of speech and language. d-We advise that children with brain abnormalities to be implanted with an MRI-safe conditional CI device, enabling brain MRI follow-up scans without surgical magnet removal.

Keywords: cochlear implant brain abnormalities CNS MRI scans

OP-4077 Cochlear Implantation in Patients with far Advanced Otosclerosis

Behrooz Amirzargar Md¹, Masoud Motasaddi Zarandy Md¹, Hamed Emami Md¹, Alireza Safaei Md¹

1 Otorhinolaryngology Research Center, Department of Otorhinolaryngology-Head and Neck Surgery, Tehran University of Medical Sciences, Tehran, Iran

Introduction: The most effective treatment in patients with otosclerosis and profound sensorineural hearing loss is cochlear implantation. Although cochlear implantation has potential complications in these patients and the most common of which are changing the position of the electrode and stimulating the facial nerve. Also, due to the change in the bony nature of the cochlea in this disease, hearing results after cochlear implantation can be variable. Therefore, treatment in these patients is challenging. The aim of this study is to evaluate the audiological results and complications of cochlear implantation in patients with far advanced cochlear otosclerosis (FAO).

Method: In this study, from 1820 patients who underwent cochlear implantation in Amir Alam Hospital between 1997 to 2023, 14 patients with cochlear otosclerosis were investigated, and their audiological results and complications were evaluated.

Results: The mean age of patients was 57.21 ± 11.49 (31-72 years old). 50% of patients underwent cochleostomy for implantation and 50% underwent round window implantation. One patient underwent reimplantation due to device failure. The mean Pure Tone Average (PTA) and mean Speech Reception Threshold of patients before and after cochlear implantation were 109.50 ± 7.29 , 112.14 ± 13.55 , and 33.62 ± 7.94 , 33.50 ± 8.18 . None developed postoperative facial nerve stimulation, CSF leakage, meningitis, or retractable tinnitus.

Conclusion: Cochlear implantation can be considered an efficient and effective method according to hearing outcomes in FAO patients, and no significant complications such as facial nerve stimulation were reported in the patients.

Keywords: Cochlear implantation; Far advanced otosclerosis; hearing loss

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14 September 2023 Auditory Behavioural Measurements Seminer Hall F Moderator: Sule Cekic 10:45 - 12:00		
OP 4098	Satisfaction with Bone Anchored Hearing Aids; Is There Only Audiological Gain or Does It Increase Quality of Life.	Serpil Mungan Durankaya
OP 3972	Application of an individual tonotopic map in fitting cochlear implant processor	Sergey Levin
OP 3970	Development of a Quick Speech-in-Noise Test in Turkish, Based on Quick-SIN	Seda Ozturk
OP 4103	Behavioral Audiometry in hearing assessment of a child: Study of concordance with objective tests	Hajjij Amal
OP 4087	Performance of Turkish Children with Cochlear Implants on the PEACH Scale	Asuman Kucuköner
OP 3946	Evaluation Of Spectral And Temporal Auditory Processing Skills In Children With History Of Delayed Speech And Language	Fatma Yurdakul Cinar

OP-4098 Satisfaction with Bone Anchored Hearing Aids; Is there Only Audiological Gain or Does it Increase Quality of Life.

Serpil Mungan Durankaya¹, İlayda Kiremitçi¹, Yüksel Olgun², Hande Evin Eskicioğlu¹,

Enis Alpin Güneri², Taner Kemal Erdağ², Günay Kırkım¹

1 Dokuz Eylül University, Institute of Health Science, Audiology

2 Dokuz Eylül University Hospital, Department of Otorhinolaryngology

Introduction: Background The bone-anchored hearing aid (BAHA) is effective and easy solution for individuals with conductive type hearing loss. Aim of our study is to evaluate the audiological benefit and quality of life in these patients.

Method: A total of 25 patients in which BAHA surgery was conducted in Dokuz Eylül University Department of Otorhinolaryngology between 2009 and 2022 with a minimum 6 months follow-up were evaluated in the study. The audiological assessment included sound field audiometry and speech intelligibility which was tested unaided and after a minimum six months of wearing the BAHA. Subjective benefit and satisfaction with the system were assessed using the Turkish-Speech, Spatial and Qualities of Hearing Scale (Tr-SSQ).

Results: There were 25 patients (13 male, 12 female). Mean age of patients was 29.43 (9-69 years) years. The preoperative air-conduction threshold averaged 60.2 ± 15.2 dB for three frequencies. Average postoperative sound-field 23 BAHA Attract and two BAHA Connect user thresholds were 27.2 ± 13.1 dB for three frequencies. The audiological and Tr-SSQ results were statistically significant before and after the BAHA operation ($p < 0.000$). Hearing thresholds, spatial and speech perception scores improved with bone anchored hearing aids in all subjects ($p < 0.000$).

Conclusion: The preoperative and postoperative Tr-SSQ and audiological results demonstrated a subjective and objective benefit and satisfaction with the BAHA. BAHAs provided not only audiological gain, but also benefit in quality of life for the patients with conductive hearing loss.

Keywords: Conductive hearing loss, audiology, hearing aid, bone-anchored hearing aid, quality of life

OP-3972 Application of an Individual Tonotopic Map in Fitting Cochlear Implant Processor

Sergey Levin¹, Elena Levina¹, Serafima Sugarova¹, Andrey Lilenko¹, Sergey Ilyin¹, Viktor Voronov²

1 Saint-Petersburg Research Institute of Ear, Throat, Nose and Speech

2 North-Western State Medical University Named After I.I. Mechnikov, Sankt-Peterburg

Introduction: Cochlear implantation is so effective because of the known tonotopic cochlear organization. These data are used in the distribution of signals along the channels of the cochlear implant electrode. The more accurate and natural the stimulation of the auditory nerve fibers, the better will be the perception of speech, sounds and speech intelligibility. The aim of the study was to compare the clinical fitting and the anatomy-based fitting of a cochlear implant processor.

Method: The study included 22 patients aged 14 to 36 years using the Med-el cochlear implant system, implants: Concerto, Synchrony with various types of electrodes. All participants underwent computed tomography (CT) of the temporal bones with a step of 0.6 mm or less. The software used was Otoplan, Sliser 3D for CT data processing. The programs calculated the geometric dimensions of the cochlea, cochlear duct length, the angular position and tonotopic frequency of each electrode, and built a 3D reconstruction of the cochlea and the electrode. The correction of the frequency filters of the electrodes and the anatomy-based fitting of the processor were carried out using the data obtained in the Otoplan program. A comparison was made between the clinical fitting and the anatomy-based fitting.

Results: After reallocation the frequency filters, patients noted a more natural sound, improving speech intelligibility. In several patients, peculiarities in the location of the electrodes were identified, requiring additional correction of the fitting, including deactivates the electrodes.

Conclusion: Thus, with anatomy-based fitting, an exact correspondence between the central frequency of each electrode channel and the tonotopic frequency of the cochlear zone, individually determined according to computed tomography data, is achieved. A new tool has appeared that allows you to significantly improve the quality and provide an individual approach to fitting up processors after cochlear implantation.

Keywords: Cochlear implant, anatomy-based fitting, Frequency reallocation, 3D model, tonotopic mapping

OP-3970 Development of a Quick Speech-in-Noise Test in Turkish, Based on Quick-Sin

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Introduction: The study aimed to develop a Turkish version of the QuickSIN (Quick Speech-in-Noise) test used to measure the signal-to-noise ratio of individuals.

Method: First, we created sentences and bubble noise suited to the phonetic structure of the Turkish language for the test. After that, we applied three experiments to select the appropriate sentences and create the test lists. In the first experiment, all sentences were applied to individuals with normal hearing at the SNR-10 (signal in noise ratio -10) level. In the second experiment, test lists were created. Each list consists of six sentences with five keywords (one sentence each for 25, 20, 15, 10, 5, and 0 signal-to-noise ratios). Phrases found to be problematic in the first experiment were not used in the test lists. Created lists were applied to the participants with normal hearing in the presence of bubble noise. We assessed the obtained results and the suitability of the lists. In the third experiment, the final lists were applied to both participants with normal hearing, both with 750 Hz (Hertz) and 1400 Hz low-pass filtering and without filtering. We assessed the equivalent among the lists.

Results: The ANOVA analysis of variance for the material did not show statistically significant differences between the 9 lists.

Conclusion: We developed ten equivalent lists and two practice lists for the Turkish version of the QuickSIN test. Any one of the nine lists is sufficient to measure SNR loss, and the test takes approximately one minute.

Keywords: Speech in noise, Signal in Noise Ratio, QuickSIN, hearing loss

OP-4103 Behavioral Audiometry in Hearing Assessment of a Child: Study of Concordance with Objective Tests

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Introduction: Pediatric deafness can have a major impact on the language development but also on the psychosocial and emotional well-being of a child. Its diagnosis constitutes a real emergency. Objective auditory explorations do not require the child's cooperation but are insufficient to establish precise auditory thresholds. The so-called subjective auditory explorations allow the evaluation of the child's auditory thresholds based on its reaction to sound stimuli. They depend on the child's age and development and can be made difficult in case of behavioral disorders or disorders commonly associated with cognitive delay. The objective of this study is to describe the results of behavioral audiometry and their comparison with other objective explorations of hearing in a population of children referred to the Casablanca Audition Center for hearing assessment.

Method: Retrospective, descriptive and monocentric study, carried out in the Casablanca Audition Center at a tertiary Hospital. We included in this study all children aged from 1 to 7 years old, who had a behavioral audiometry with or without an ABR for a hearing assessment.

Results: 35 children were included in the study. The mean age was 4.17 years old with extremes of 1 and 7 years old. Language delay or disorder was found in 71.4% of cases. More than half of our patients had one or more risk factors for deafness (65.7%). Clinically, 65.7% of the cases had a normal clinical examination without any particularity, a serous otitis media was found in 22.9% of the cases. Regarding the results of the behavioral audiometry, a conditioning was possible in 74.2% of the children and showed a severe to profound deafness in 30.8% of the cases. ABR was performed on 88.6% of the children and showed bilateral hearing loss in 71% of cases. Of these bilateral hearing loss group of children assessed by ABRs, 54.4% were severely to profoundly deaf. A clinical concordance, between behavioral thresholds and ABR was found in 70% of cases.

Conclusions: Subjective auditory exploration by behavioral audiometry is essential in the auditory assessment of the child and should be performed in combination with objective explorations in “Cross checking fashion”.

Keywords: pediatric deafness, Behavioral audiometry , hearing assessment

OP-4087 Performance of Turkish Children with Cochlear Implants on the Peach Scale

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1 Ondokuz Mayıs University

Introduction: Cochlear implantation is a safe and reliable treatment for children with severe to profound hearing loss. The primary benefit of these medical devices in children is the acquisition of the sense of hearing, which supports the development of spoken language [1]. The Parents' Evaluation of the Aural/Oral Performance of Children (PEACH) Rating Scale was developed to evaluate the effectiveness of amplification based on the systematic use of parental observations of children's auditory performance in their natural home environment [2]. It has been reported that the PEACH scale can be used as a reliable tool to evaluate communicative and auditory skills in Turkish children using cochlear implants and hearing aids [3]. In this study, it was aimed to evaluate the auditory performance of unilateral and bilateral cochlear implant users attending primary education.

Method: Twenty children who had surgery in Ondokuz Mayıs University Faculty of Medicine ENT clinic, attended primary school, with no additional disability, and used bilateral and unilateral cochlear implants were included in the study. The ‘Ebeveynlerin Çocukların İşitsel / Sözel Performansını Değerlendirme Ölçeği, adapted into Turkish by Eroğlu et al., was applied.

Results: A total of 20 children, including 13 bilateral cochlear implant users and 7 unilateral cochlear implant users, participated in the study. The mean age was 7.23 ± 1.83 (min-max 5-11) in bilateral cochlear implant users and 8.43 ± 1.98 (min-max 6-11) in unilateral cochlear implant users. No statistically significant difference was found between the quiet score, noisy score and total scores of the children using bilateral and unilateral cochlear implants in the PEACH scale ($p < 0.05$).

Conclusion: It is possible to evaluate the effectiveness of auditory rehabilitation and amplification with the PEACH scale. There was no difference found in PEACH scale performance between children using bilateral and unilateral cochlear implants. It was thought that this situation was due to the small sample group. There is a need for more studies done with variables such as age, parental education level, and hearing age. Our study includes the preliminary results of the ongoing study. **Keywords:** Cochlear Implant, PEACH, Auditory amplification, auditory oral performance.

Keywords: Cochlear Implant, PEACH, Auditory amplification, auditory oral performance.

OP-3946 Evaluation of Spectral and Temporal Auditory Processing Skills in Children with History of Delayed Speech and Language

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Introduction: One of the most important processing skills in speech and language development is auditory processing. The spectral and temporal components of the acoustic signal are processed in the central auditory system and contribute to speech and language processing. The aim of this study was to evaluate the spectral and temporal auditory processing skills of children with a history of speech and language delay in early childhood.

Method: Thirty (7-12 years old) children with history of delayed speech and language in early childhood as the study group and thirty (7-12 years old) typically developing children as the control group were included in the study. Age- and sex-matched groups had normal audiometric hearing thresholds between 125 Hz and 8 kHz (≤ 20 dB HL) without middle ear pathology. Temporal modulation transfer function test, spectral temporally modulated ripple test, speech intelligibility in noise test and frequency following response test were used to evaluate spectral and temporal auditory skills.

Results: The study group performed lower than the control group in the temporal modulation transfer function test, spectral temporally modulated ripple test, speech intelligibility in noise test ($p < 0.005$). When the time domain of the frequency following response is evaluated, the V, A and O latencies of the study group were delayed when compared with the control group ($p < 0.005$).

Conclusions: The results indicated that even if children with a history of speech and language delay in early childhood catch up with their typically developing peers in speech and language skills in middle and late childhood, the auditory processing skills should be evaluated. Considering the relationship between auditory processing skills and communication, academic and psychosocial skills, auditory processing skills should definitely be evaluated in this group which can be overlooked, and, if necessary, they should be directed to auditory processing therapy/ rehabilitation.

Keywords: Delayed speech; spectral auditory processing; temporal auditory processing

“7th World Congress of Cochlear Implants in Emerging Nations”

14 September 2023 Hearing Aids and Auditory Implants Seminer Hall F Moderator: Merve Batuk 12:00 - 12:30		
OP 3991	Evaluation of Theory of Mind, Social Competence, and Emotional Development in Preschool Children with Hearing Aids	Hilal Mecit Karaca
OP 4076	Comparison of fitting formulas in tinnitus patients for tinnitus management and speech perception in noise	Eser Sendesen
OP 3871	Aided Cortical Auditory Evoked Potential (CAEP) In Hearing-Impaired Children Who Are Consistent Hearing Aid Users	Nurnazeha Isnan
OP 4949	Sensory Integration in Hearing Loss: Case Report	Banu Bas

OP-3991 Evaluation of Theory of Mind, Social Competence, and Emotional Development in Preschool Children with Hearing Aids

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Introduction: Theory of Mind (ToM), known as an individual's attribution of mental states such as thoughts and beliefs to others and oneself, is an important social life skill. The ability to represent mental states is a concept that explains human social interaction as well as awareness of how such mental states shape the intentional actions of oneself and others. Hearing-impaired students with hearing aids (HA) and cochlear implants (CI) experience significant social difficulties such as loneliness, exclusion, and problems with peer relationships. These difficulties are attributed to deficits in ToM skills, which affect their understanding of others' perspectives and intentions. The first aim of this study is to examine ToM skills in HA-recipient children compared to those with typical hearing. These difficulties may prevent them from taking full advantage of social interaction and incidental learning about the intentions and beliefs of others. The second aim of this study is to define separately the relationships between social competence, emotion recognition, language skills, and ToM in HA recipient children.

Method: The study compared the outcomes of typically developing children and children using HA. The participants' ages ranged from 60 to 72 months. The HA group consisted of children with moderate to severe (41-91 dB) hearing loss, fitted with conventional amplification devices for more than one year. All participants were evaluated on the social skills and expressive abilities designed for preschool children. Children's wishes, beliefs, and mental states were evaluated with the tasks in the ToM Scale.

Results: Data collection is ongoing and will be presented at the conference. The mental states, wishes, beliefs, emotional expression skills, and social competencies of HA and typically developing groups will be compared.

Conclusion: It is expected that hearing loss in children may have a significant effect on social cognition. However, early intervention both for amplification and habilitation may help general social skills and mental status, it might be important to better understand social-cognitive skills in these children with hearing loss in order to support their ability to infer mental states. Preliminary results suggest that early intervention may be a predictor of social skills for children using HA.

Keywords: Children, Hearing aid, Theory of Mind, Social cognition, Language

OP-4076 Comparison of Fitting Formulas in Tinnitus Patients for Tinnitus Management and Speech Perception in Noise

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Introduction: In this study, we aimed to compare the outcomes of the NAL-NL2 and DSL pediatric formula (each applying the most frequency-specific gain in the NAL and DSL group) in terms of tinnitus management and speech perception in noise (SPIN) in hearing aid fittings.

Method: Forty-five participants aged between of 21-52 were recruited and randomly divided into two groups, based on the fitting formula: NAL-NL2 and DSL pediatric. They were followed up for three months. SPIN skills was assessed with the SPIN test. Tinnitus Loudness Level (TLL), Minimum Masking Level (MML) and Tinnitus Handicap Inventory (THI) were used to assess tinnitus perception.

Results: Statistical comparisons were made at the end of the third month. Participants' SPIN scores were significantly lower in the DSL pediatric formula compared to NAL-NL2 ($p < 0.001$). The NAL-NL 2 fitting had significantly higher THI scores than the DSL pediatric procedure ($p < 0.001$). For TLL and MML, DSL pediatric formula has lower scores compared to the NAL NL2 formula ($p < 0.001$).

Conclusions: The NAL-NL2 formula was superior in terms of improving speech understanding in noise in tinnitus patients, while the DSL pediatric formula was more successful in tinnitus management.

Keywords: Tinnitus-Hearing aid-Speech perception-Tinnitus management

OP-3871 Aided Cortical Auditory Evoked Potential (Caep) in Hearing-Impaired Children Who are Consistent Hearing Aid Users

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Introduction: Limited studies have investigated the use of cortical auditory evoked potential (CAEP) to measure hearing aid outcomes in children. As such, more research efforts are needed to provide better insight into this aspect. In the present study, the waveforms of aided CAEP of hearing-impaired children (who used hearing aids consistently) were compared with those of normal children.

Method: In this study that employed a repeated-measures design, 18 normal-hearing (NH) children and 13 children with sensorineural hearing loss (SNHL) (aged 5 to 12 years) were enrolled. The aided CAEP testing was carried out according to the recommended protocol. A natural speech syllable /ba/ was used as the stimulus, and it was presented repetitively at 65dB SPL through a loudspeaker in a dedicated soundproof room. While sitting comfortably, the children were asked to watch voiceless movies during the CAEP testing.

Results: Interestingly, the response rates for each of CAEP peaks did not differ significantly between the two groups ($p > 0.05$). Except for N1 amplitude ($p < 0.05$), the amplitudes and latencies of other CAEP peaks were found to be comparable between NH and SNHL groups ($p > 0.05$). Further analyses (with Bayesian inference) found that only P1 and N1 amplitudes were found to be statistically larger in NH children than in SNHL children ($BF_{10} > 1$). Other CAEP peaks revealed insignificant results, i.e., the null hypothesis was in favor ($BF_{10} < 1$).

Conclusion: The SNHL children revealed nearly normal CAEP findings implying the positive outcomes of using hearing aids consistently. The brain maturation appears to continue over time even among hearing aids users. The aided CAEP should be considered as a potential test to document the effectiveness of amplification, particularly among children.

Keywords: CAEP, Cortical Auditory Evoked Potential, hearing aids, children

OP-4949 Sensory Integration in Hearing Loss: Case Report

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Introduction: Children with severe to profound hearing loss have difficulties with speech-language development, academic achievement, balance and attention skills. These difficulties are based not only on hearing, but also on the interactions of tactile, visual, vestibular and many other sensory, motor, learning and behavioral functions.

Method: OEP, a 4-year-old auditory rehabilitation patient with a cochlear implant, presented with frequent anger attacks, frequent falls, tactile sensitivity, prolonged toileting and short-term attention problems. Children’s Auditory Performance Scale (CHAPS) , Test of Early Language Development (TELD-3), Sensory Profile and Evaluation Ayres Sensory Integration (EASI) were applied. As a result of the evaluations, she was included in the Ayres sensory integration therapy program for 48 sessions (6 months), 2 days a week for 45 minutes. the assessment battery was reapplied after the therapy.

Results:The family reported that after the therapy, regulation skills improved and behavioral problems decreased to a great extent. The applied EASI, sensory profile, CHAPS and TELD-3 scores improved.

Conclusion:We think that sensory integration therapy should be included in the auditory therapy program by evaluating the sensory processing skills of children with hearing loss.

Keywords: Hearing loss, auditory rehabilitation, cochlear implant, sensory integration

“7th World Congress of Cochlear Implants in Emerging Nations”

14 September 2023 Challenging Cases of CI Around the World Seminer Hall F Moderator: Zahide Mine Yazıcı 13:30 - 14:45		
OP 3919	Difficult Situations in Cochlear Implantation	Rohit Mehrotra
OP 4113	Obstacles and challenges of cochlear implantation in French subsaharan African countries	Samia Labassi
OP 4083	Cochlear Implantation in Senegal: Challenges, Limitations and Prospects	Sy Abdou
OP 3999	Mechanic ventilation during Cochlear Implant (CI) surgery: Myth of ventilation	Yasemin Tekdos Seker
OP 3949	Cholesteatoma Cases and Cochlear Implantation: Surgical Algorithms	Olga Panina
OP 4061	Challenging Post-Cochlear Implant Surgery Audiology Services: 20 Years of Experience	Semiramis Zizlavsky
OP 3940	Plain film interpretation of the electrode array after cochlear implantation	Neelam Vaid
OP 3980	Cochlear implant and post-operative otitis media	Zahide Mine Yazıcı

OP-3919 Difficult Situations in Cochlear Implantation

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Introduction: A cochlear implant (CI) is a surgically implanted neuroprosthetic device to provide a person with moderate to profound sensorineural hearing loss with a modified sense of sound. CI bypasses the normal acoustic hearing process to replace it with electric signals which directly stimulate the auditory nerve. Inner ear malformations constitute about 20% of congenital sensorineural hearing loss. Operating on a patient with an inner ear anomaly is associated with greater risks of surgical complications, such as facial nerve injury, labyrinthine fistula, and cerebrospinal fluid (CSF) gushers. Therefore, the purpose of this study was to evaluate the surgical aspects of cochlear implantation, including the intraoperative findings, surgical difficulties, and postoperative complications, and to review the management of these cases.

Method: This retrospective study includes 25 patients (14 patients with incomplete partition type II, 5 with incomplete partition type I, 3 with incomplete partition type III, 2 patients with cochlear hypoplasia and 1 with common cavity) who were cochlear implanted during 2017-2022 in Mehrotra ENT Hospital Kanpur, India. The data collected included the types of inner ear anomalies, intraoperative findings, clinical management strategies, and outcomes of surgery. The patient's age ranged from 12 months to 5 years. All of the patients underwent a preoperative evaluation that included high-resolution computed tomography (HRCT) scans of the temporal bone and magnetic resonance imaging (MRI). Patients with identified inner ear anomalies were included in the study.

Results: The average age of implantation was 12 months to 5 years for the control group and the case (complex anatomy) group, respectively. There were no significant differences in outcome when comparing the entire cohort of case subjects and their matched control subjects in this study. However, the improvement in CAP-II scores and SIR scales among the case subjects between the first and second evaluations was statistically significant.

Conclusion: Children with radiographically malformed inner ear structures who were implanted before the age of 5 years have comparable performance to their matched counterparts, evident by their similar improvement of CAP-II scores and SIR scales over time. Therefore, this group of children benefited from cochlear implantation.

Keywords: Congenitally deaf children, Cochlear malformations, Ossification

OP-4113 Obstacles and Challenges of Cochlear Implantation in French Subsaharan African Countries

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Introduction: Cochlear implantation programs started in 2016 in sub-Saharan African countries, especially in Ivory Coast, Senegal and Mali

Method: This presentation will talk about the main obstacles and challenges that had to be overcome (among others surgeons and speech pathologists training).

Results: Cochlear implantation in French speaking sub-Saharan African countries had to face several challenges. Among others, the cultural challenge was and is still the most important one to overcome.

Conclusion: Solutions are to be found to face the different challenges that prevent cochlear implantation to develop well in French speaking sub-Saharan African countries.

Keywords: Africa, challenge, cochlear implantation

OP-4083 Cochlear Implantation in Senegal: Challenges, Limitations and Prospects

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Introduction: Cochlear implant is an electronic device used in the rehabilitation of profound bilateral hearing loss. It directly stimulates cochlear nerve fibers by bypassing the hair cells. This high performance technology, which appeared 60 years ago, has spread widely throughout the world and is regularly used in hearing rehabilitation. In developing countries, the adoption and development of this tool are still lagging behind.

Method: The authors analyze factors delaying the penetration of cochlear implants in Senegal.

Results: Limitations include the lack of reliable epidemiological data on the exact prevalence of deafness in the country; neonatal screening is not yet systematic; diagnostic resources are lacking; and cochlear implants are still expensive, out of the reach of the average Senegalese. However, efforts are being made: ENT departments are springing up across the country, more and more otolaryngologists are taking an interest in otology, and temporal bone dissection courses are being organized throughout the country.

Conclusion This situational analysis has enabled us to identify persistent obstacles to the development of cochlear implantation in Senegal. It highlights the major gaps that need to be filled, not only in terms of raising awareness among the general public and decision-makers, but also in terms of training surgeons and equipping health facilities.

Keywords: Hearing loss, Cochlear implantation, Africa, Senegal

OP-3999 Mechanic Ventilation During Cochlear Implant (Ci) Surgery: Myth of Ventilation

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Introduction: Cochlear implant (CI) surgery is an effective treatment option for children with severe-to-profound hearing loss, offering the potential to restore auditory function by bypassing damaged parts of the ear. However, the administration of anesthesia during early auditory restoration in pediatric patients raises concerns regarding potential risks and complications.

Method: This study involved a comprehensive analysis of 65 pediatric patients who underwent cochlear implant surgery at the ENT department operation theater of Bakırköy Dr. Sadi Konuk Training and Research Hospital, covering 12 years from 2011 to 2023. Data regarding sex, age, comorbidities, and postoperative complications were meticulously collected and examined, and an anesthesia protocol based on sevoflurane inhalation was applied to the patients. Orotracheal intubation was followed by muscle relaxation (rocuronium, 1 mg/kg) and fentanyl (1-2 mcg/kg). Facial nerve monitoring during the CI surgery was unaffected. Ventilation utilizes sevoflurane inhalation and volume control mode. Ventilation parameters: Vt:5-8 ml/kg, PEEP,5 cmH₂O; respiratory frequency:15-18/min, FiO₂,40%; Trigger, -1 cmH₂O. However, elevated End Tidal CO₂ (ETCO₂) levels were also observed. Attempted regulation through increased respiratory frequency. Vt adjusted to 10 ml/kg due to persistent hypercarbia. CO₂ levels were normalized to the tidal volume at 10 ml/kg. Airway pressure pathology was not observed. Perioperative anesthesia complications were observed. Postoperative analgesia was achieved with paracetamol.

Results:62 cases were analyzed after excluding three with invalid data. The median patient age was 3 years (range:1-5 years). The evoked stapes reflex threshold(ESRT) is present in 79.1% of cases. Epilepsy was detected in 4.8% of cases, and pituitary senile adenoma in 3.2% of cases. Postoperative complications included vomiting in 2 patients, otitis in 1, hematoma in 3, and implant-related mechanical complications in 4. Two pediatric patients required postoperative anesthesia care in the pediatric intensive care unit because of a low to moderate Aldrete score.

Conclusion: The pediatric cochlear implant surgery anesthesia protocol involved sevoflurane inhalation, oro-tracheal intubation, and precise ventilation control. Adjustments were made to respiratory frequency and tidal volume to manage elevated ETCO₂ levels. Postoperative complications were also monitored. This study provides valuable insights into anesthesia challenges and outcomes in pediatric cochlear implant surgery, emphasizing the need for

Keywords: pediatric ventilation, cochlear implant surgery, anesthesia protocol, tidal volume control, pediatric anesthesia.

OP-3949 Cholesteatoma Cases and Cochlear Implantation: Surgical Algorithms

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Introduction: To evaluate surgical outcomes of CI in patients with different types of chronic suppurative otitis media (CSOM) and petrous bone cholesteatoma (PBC), to propose a management algorithm for those patients.

Method: Forty-two consecutive patients with CSOM who underwent single stage or staged CI were enrolled. In cases of safe type of CSOM and limited cholesteatoma sanation and CI were performed during canal wall-up surgery with double layer tympanoplasty (fascia and cartilage). In cases of unsafe type of CSOM and open cavity mostly 2 stages procedure was performed. On 1st stage sanation and preparation of the cavity were performed. In classic technique autocartilage plates and fascia were used to provide reliable results of tympanoplasty. In the novel one posterior wall of the external auditory canal was fully reconstructed with use of modelled “Osteomatrix” bricks. On the 2nd stage cochlear implantation was performed. Bony tunnel was drilled above the facial nerve for the active electrode placement in the trepanation cavity; electrode array was additionally covered by autocartilage plates. In 4 cases of extended cholesteatoma process subtotal petrosectomy was performed. Patient demographics, type of CSOM, previous surgeries, presence of cochlea or semicircular canals destruction, silent intraoperative findings at the time of implantation and follow-up (local status and complications) were evaluated.

Results: Mean age of patients was 41.87 years. There were 22 cases of safe type chronic otitis media; 20 cases of unsafe CSOM, among them 14 open cavities, 8 primary cholesteatomas, 5 PBCs, 4 patients underwent CI before with electrode extrusion. The average follow-up was 2.4 years (range 0.5-4.2 years). In 2 cases of PBCs during 2nd stage recurrent cholesteatoma matrix was detected, totally removed and followed by CI. Use of “Osteomatrix” allowed to successfully reconstruct posterior wall of EAC, reduced the cavity and made following stage of CI easier. There were no cases of electrode array extrusion occurred after CI. In all cases good anatomical results were revealed.

Conclusion: Based on these current findings, a management algorithm was proposed according to type of CSOM, presence of open cavity.

Keywords: cholesteatoma, cochlear implantation, chronic otitis media, radical cavity, cul-de-sac closure, osteomatrix

OP-4061 Challenging Post-Cochlear Implant Surgery Audiology Services: 20 Years of Experience

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Introduction: Most cases of hearing loss are found in developing countries. Cochlear implant is currently one of the habilitation options for children with profound sensorineural hearing loss. As an archipelagic and developing country with more than 17 thousand islands and 38 provinces, Indonesia has its own unique challenges in implementing cochlear implant program, including in terms of human resources, habilitation facilities, and associated costs. Data presented were retrieved from Dr. Cipto Mangunkusumo Hospital in Jakarta, Indonesia.

Method: Data was taken from Dr. Cipto Mangunkusumo Hospital medical record from 2009 to 2023. Descriptive analysis was made using secondary data.

Results: The first cochlear implantation surgery in Indonesia was conducted in Jakarta in 2002. Implantation had been done in Dr. Cipto Mangunkusumo Hospital since 2009. Most patients are pediatrics ranged from 3 - 5 years. Most procedures were done unilateral according to government insurance policy. Obstacles found in conducting cochlear implant program in Indonesia are: pricing of implants, geographical issue for habilitation, and parent's commitment.

Conclusion: Children with profound sensorineural hearing loss would benefit from cochlear implantation. There is strong evidence that cochlear implant use helps accelerate their speech development. Challenges related to implementing cochlear implant program in Indonesia include a lack of human resources, relatively expensive cochlear implant devices, and weak parental commitment to post-implantation evaluation. Some of the recipients also come from remote areas without habilitation facilities.

Keywords: cochlear implant, challenges in developing countries, Indonesia

OP-3940 Plain Film Interpretation of the Electrode Array After Cochlear Implantation

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Introduction: Electrode positioning issues represent a significant proportion of perioperative CI complications which can effect the outcomes of the implantees. To ensure that the electrode assumes a typical coil location within the cochlea, many cochlear implant center's take a postinsertion plain skull radiograph (modified Stenvers view). This enables evaluation of electrode array kinks or tip rollover, which are challenging to detect with conventional telemetry. For the last 16 years, cochlear implantation is routinely done in our department. All our patients undergo a post implantation plain X ray to evaluate the electrode position and insertion depth. **Aim** 1. To estimate the incidence of complications associated with the surgical placement of cochlear implant (CI) electrode arrays and to discuss the implications and management of these complications. 2. To compare the incidence of these complications in the different electrode arrays **Methods and material** Study design Retrospective study Study duration 16 years

Method: Post-operative day one modified X-ray Stenver's view images were retrospectively investigated by a third party for the presence of any electrode positioning complications from 600 cases in a single tertiary care hospital in India. Post operative films of all patients implanted from 2006 onwards were evaluated for electrode related issues.

Results: Electrode related complication were seen in 30 patients (5%). Electrode kinking was observed in 67%, followed by basal fold 16.7%, tip fold over 3.4% and misplacement (6.67%). The CI24 RST electrode had the maximum issues.

Conclusion: Postoperative radiographic evaluation of the stimulating electrode is essential for all implanted patients to document correct placement of the intracochlear electrode. Prompt detection by imaging and correction of any such complication will increase the hearing benefit to these patients.

Keywords: electrode, kinking, basal fold, tip fold over, plain radiography.

OP-3980 Cochlear Implant and Post-Operative Otitis Media

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Introduction: Cochlear implant (CI) surgery is a widely accepted treatment for severe hearing loss, and its use in pediatric patients has been increasing, with surgeries performed as early as possible. However, some common complications following CI surgery in children include Acute Otitis Media (AOM) and Otitis Media with Effusion (OME). In this study, we retrospectively analyzed patients who underwent CI surgery in our clinic, focusing on the management of Otitis Media (OM) and its complications in the postoperative period.

Method: We conducted a retrospective analysis of 70 CI surgeries performed in 46 pediatric patients at our center between January 2020 and May 2023. The follow-up period allowed us to identify cases of OM and its complications in these patients, which included those diagnosed with AOM, OME, and acute mastoiditis. We assessed the duration of these conditions, the affected ears, and the treatment approaches used.

Results: We identified cases of postoperative OM or its complications in 15 of 70 CI surgeries. Of these cases, nine were diagnosed with OME, four with AOM, and two with acute mastoiditis. OME cases were managed with a two-week course of oral antibiotics, without requiring myringotomy or ventilation tube placement. All patients with OME recovered completely. Four patients developed AOM, three of whom received intravenous antibiotics in the hospital, whereas the fourth patient was treated with a two-week course of oral antibiotics. No complications occurred during the follow-up period. Two patients developed acute mastoiditis, One patient received parenteral antibiotic therapy only. The other patient underwent myringotomy due to ongoing signs of infection, and the treatment plan was customized based on culture results; no complications were observed in either mastoiditis case during the follow-up period.

Conclusion: Postoperative OME, AOM, and mastoiditis are common complications of cochlear implant surgery. Aggressive antibiotic therapy is warranted in this specific population. This study highlights the importance of vigilance in diagnosing and managing OM and its associated complications in children with cochlear implants to ensure successful outcomes and long-term implant function.

Keywords: cochlear implant, otitis media, mastoiditis, complication

14 September 2023 Advancements in CI Technology and Mapping Strategies Seminer Hall F Moderator: Mehmet Yaralı 15:15 – 16:30		
OP 4086	Assessment of the Impact of Different Types of Speech Processors on Localization and Speech Understanding Skills in Cochlear Implant Users	Eda Yalçınkaya
OP 4091	Investigation of the Effect of Processor Type on Daily Implant Use Time in Cochlear Implant Users	Ayşegül Eşdoğan
OP 4092	Clinical Compatibility of Remote Check: Preliminary Results	Birgül Gümüş
OP 4167	Selecting an Encoding Strategy for Speech Processor Adjustment in Children After Cochlear Implantation	Makhmudov Makhsud
OP 4170	Analysis of electrical thresholds and maximum comfort levels in cochlear implant patients	Mukhlisa Abdukamilova / Nuriddinova Dilnoza
OP 3989	Preliminary Findings for the Effects of Simulated Cochlear Implant Listening on Postural Control in Typical-Hearing Listeners	Semire Özdemir

OP-4086 Assessment of the Impact of Different Types of Speech Processors on Localization and Speech Understanding Skills in Cochlear Implant Users

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¹ Hacettepe University

Introduction: Speech processors vary among different brands and models of external components. Essentially, there are two main types of speech processors: behind-the-ear (BTE) and off-the-ear (OTE). Although these processors share similar features in terms of their purpose, the placement of the external component on the head leads to significant differences in microphone positions. The aim of this study is to investigate the impact of BTE and OTE speech processors on localization and speech understanding abilities in cochlear implant users.

Method: The study included unilateral cochlear implant users aged between 20 and 50 years. Two separate sample groups were formed, consisting of 16 participants using BTE processors and 14 participants using OTE processors, resulting in a total of 30 participants. The localization abilities of the participants were assessed using the Azimuth and Interaural Level Differences Localization Tests within the Audioqueen software. The root mean square (RMS) deviation angle was calculated by the software. For evaluating speech understanding abilities, Turkish Hearing in Noise Test (T-HINT) was employed. This test was administered adaptively under three different conditions, and the signal-to-noise ratio (SNR) was calculated by the program for each condition.

Results: While there was no significant difference between the two groups in localization tests ($p>0.05$), a significant difference was observed between the groups in NFrontSFront ($p=0.014$) and NILSFront ($p=0.005$) conditions in T-HINT results ($p<0.05$), it was found that BTE speech processor users performed better. While there was no significant difference in the NCLSFront condition, it was found that BTE model users performed much better ($p=0.09$).

Conclusion: The outcome of the study showed that the position of the microphone did not affect the outcomes of the localization test, while the T-HINT results showed that BTE users performed better.

Keywords: Cochlear Implant, localization, behind-the-ear speech processor, off-the-ear speech processor, speech perception in noise

OP-4091 Investigation of the Effect of Processor Type on Daily Implant Use Time in Cochlear Implant Users

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Introduction: In individuals with cochlear implants (CI), continuous wear of the hearing devices is crucial for maintaining auditory input and supporting auditory development. It is recommended that cochlear implant processors be used throughout waking hours. Modern cochlear implant systems provide clinicians with data on the usage of sound processors by CI users through a process known as "data logging." This data logging enables the automatic and objective measurement of CI usage based on average daily usage hours. Previous studies examining data records of patients with CIs have revealed significant variations in the duration of CI use among individuals. The aim of this study was to investigate whether the type of sound processor (behind-the-ear or off-the-ear) used in individuals with Cochlear Nucleus cochlear implants affects the average daily CI usage time.

Method: In this research, we conducted a retrospective cross-sectional analysis of Cochlear Nucleus sound processor data logs. Records were obtained from a total of 72 individuals, including 36 off-the-ear sound processor users and 36 behind-the-ear sound processor users, within the age range of 2-34 years. The SPSS 25 statistical package program was used for data analysis. Bivariate relationships were evaluated using the Independent Groups Student's t-test when the normality condition was met, and the Mann-Whitney U test when it was not.

Results: The mean \pm standard deviation values for on-air times were 11.64 ± 3.59 hours for behind-the-ear processors and 12.11 ± 2.44 hours for off-the-ear processors. Although no statistically significant difference was found between behind-the-ear and off-the-ear processors in terms of average daily CI usage time ($p > 0.05$), off-the-ear processors showed higher on-air times.

Conclusion: The average daily CI usage time was found to be higher in off-the-ear sound processor users compared to behind-the-ear sound processor users. This finding suggests that the increased comfort, ease of use, and more aesthetically pleasing appearance of off-the-ear sound processors may contribute to their higher usage.

Keywords: cochlear implant, sound processor, data logging

OP-4092 Clinical Compatibility of Remote Check: Preliminary Results

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Introduction: Cochlear implant recipients need lifelong follow-up post-operative. Remote Check is designed to supplement traditional clinic-based follow-up and offer a safe and convenient alternative for patients without compromising the quality of care they receive. Remote Check is a tool that allows cochlear implant recipients to check their implant and to do a hearing test on their compatible mobile device in the comfort of their home. The aim of our study was to investigate the relationship between the results of the Remote Check and the audiological evaluation results performed face-to-face in the clinic.

Method: Participants who had used Nucleus 7 (n= 9) or Kanso 2 (n= 7) sound processor for at least three months were included in this study. The hearing thresholds with cochlear implants were determined at each frequency between 250 Hz and 6 kHz. Speech understanding performance in noise was measured with the Turkish Matrix sentence test and Digit Triplet Test. The impedance telemetry measurement for each electrode was measured in all stimulation modes via Custom Sound Pro fitting software and Remote Check App. Speaker was positioned 1 m away from cochlear implant side in a free field. Remote check measurements were made through the participant's Nucleus Smart App. **Result:** The hearing thresholds with cochlear implant for all frequencies and speech perception thresholds in noise obtained with the Remote Check were significantly better than according to the results in free-field ($p < 0.001$). In addition, no correlation was obtained in hearing thresholds and speech understanding in noise between these methods. However, a strong positive correlation had been obtained impedance results between Remote Check and Custom Sound Pro fitting software in 22 electrodes.

Conclusion: Remote Check can assist remote monitoring of cochlear implant due to the compatibility of electrode impedance measurement between these methods. Better results with Remote Check are related to the direct streaming of the sound. Remote Check is a promising tool in terms of tele-audiology.

Keywords: Remote Check, Cochlear Implant, Tele-audiology, Telemedicine

OP-4167 Selecting an Encoding Strategy for Speech Processor Adjustment in Children After Cochlear Implantation

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Introduction: to compare two new encoding-stimulation strategies "FS4" and "FS4-p" and to evaluate speech perception, sound quality and subjective feelings in children after cochlear implantation.

Method: 30 children who underwent cochlear implantation in 2014 were included for observation. The implants were model: Mi1000 CONCERTO PIN with a standard electrode of 31 mm. **Investigation:** All children used the OPUS 2 Speech Processor with a complete set up. Connection was performed using the MAX interface unit programmer with MAESTRO 5.0 software and a personal computer. The SP was connected according to the common method, an individual fitting map was created for each child, and "FS4" was selected as the default stimulation coding strategy in MAESTRO. Eight years later, in 2022, OPUS2 SPs were replaced with RONDO 3 SPs as part of a state program.; the same MAP was used to replace the latest generation of SP, only the stimulation coding strategy was changed from "FS4" to "FS4-p". Children were followed up for four months after SP replacement.

Results: All children after RP replacement were administered a questionnaire for a specific examination according to the following criteria: 1. Average SP putting on per day - determined using the MAESTRO program. 2. SP use in quiet and noisy environments. 3. Subjective sound quality - quieter, louder, better before and after changing the stimulus encoding strategy 4. speech intelligibility in quiet and noisy environments (e.g., school vacations and outdoors), assessed using sign language tests. 5. Listening to music of any genre (classical, pop, rock) assessed with a sign language proficiency test.

Conclusion: Thus, according to the results of the questionnaire, 23 out of 30 children who used the stimulus encoding strategy "FS4-p" were satisfied and preferred not to change this strategy, and 7 children who used the stimulus encoding strategy "FS4-p" were dissatisfied and stayed with the previous stimulus encoding strategy "FS4".

Keywords: cochlear implantation, children, coding-stimulation strategies , Speech Processor

OP-4170 Analysis of Electrical Thresholds and Maximum Comfort Levels in Cochlear Implant Patients

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Introduction: Analysis of electrical thresholds and maximum comfort levels in patients with cochlear implantation. The purpose of this study is to analyze electrical thresholds in patients with cochlear implantation.

Method: the study was conducted in the ENT department of the RSNPMC Pediatrics. A retrospective analysis of tuning programming cards was carried out in 410 patients aged 1 to 5 years, which included boys in the number of 273 patients and girls in the number of 137 patients who had cochlear implants installed in 2021. Patients were divided into several groups depending on age, anatomical features of the inner ear, and past auditory experience. Of these, 403 patients with normal inner ear anatomy were fitted with unilateral cochlear implants of the MEDEL company Sonata Standard type (115 patients) and Synchrony Standard (288 patients), the remaining 7 patients who were diagnosed with malformation of the inner ear and also with severe damage to the cochlea were fitted with unilateral cochlear implants of the Synchrony Compressed type (1 patient) and Synchrony Medium (6 patients) of the same company.

Results: correlations were found between the programming parameters of speech processors and the following factors, such as age at the time of implantation, auditory experience (wearing a hearing aid before implantation) and the presence of defects and malformations of the inner ear. In 195 patients of the age category from 1 to 3 years, THR (TELEMETRY HIGHT RATE) levels were lower by 1.95-2.05 than in 204 patients of the age category from 4 to 5 years. The age of the patients at the time of implantation had virtually no effect on MCL levels (Most Comfortable level). A significant increase in the parameters of both MCL by 40-45qu and THR by 6.02-7.5qu was observed in 7 patients with the presence of snail malformation. The most comfortable level was from 22-25qu in 99% of 410 children who wore hearing aids from 6 to 12 months before implantation and connection of speech processors.

Conclusion: The results of this work are of great importance for programming speech processors, whereas subjective responses of patients are not enough.. This study also showed how using the MCL and THR parameters it is possible to estimate the electrical thresholds and the functionality of the auditory nerve with sufficient accuracy. In 195 patients of the age category from 1 to 3 years, THR (TELEMETRY HIGHT RATE) levels were lower than in 204 patients of the age category from 4 to 5 years. A significant increase in the parameters of both MCL by 40-45qu and THR by 6.02-7.5qu was observed in 7 patients with the presence of snail malformation. The most comfortable level was from 22-25qu in 99% of 410 children who wore hearing aids from 6 to 12 months before implantation and connection of speech processors.

Keywords: cochlear implant, MCL, THR, program charts, malformation, patients

OP-3989 Preliminary Findings for the Effects of Simulated Cochlear Implant Listening on Postural Control in Typical-Hearing Listeners

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Introduction: When auditory input quality is degraded due to hearing loss or adverse acoustic environments, listeners need to exert more mental effort than usual in order to focus their attention on the target source. Although assistive devices can reduce listening effort in individuals with hearing loss, those who use such devices still require higher levels of concentration to understand speech, and experience greater fatigue as a result of this listening effort compared to individuals with normal hearing. Furthermore, an increased listening effort resulting from hearing loss may lead to poorer balance performance, especially in older adults. This study aimed to investigate the effects of listening efforts on postural control by typically hearing adults who are presented a CI- simulated speech both in quiet and noise.

Method: Twenty adults with typical hearing (aged between 20-26) participated in the study. Turkish Hearing In Noise Test (HINT) sentences were used as the speech material. The Modified Clinical Test of Sensory Interaction in Balance (mCTSIB) was used to evaluate static balance. Static balance test was performed by using Computerized Static Posturography. In the experimental design of the study, healthy typical hearing participants listened to non-simulated and CI-simulated sentences and repeated what they heard while the participants were performing the mCTSIB test on the force platform of static posturography.

Results: Data collection is ongoing and will be presented at the conference. The static balance performance of individuals will be compared in three situations: (1) mCTSIB without secondary task, (2) mCTSIB while listening to speech-in-noise, and (3) mCTSIB while listening to CI-simulated speech-in-noise.

Conclusion: It is expected that increased listening effort for CI-simulated speech-in-noise may result in poorer postural balance. A better understanding of such a difficulty may help us to evaluate postural balance from different perspectives and plan an appropriate vestibular rehabilitation program.

Keywords: balance, cochlear implant, listening effort, mental effort, postural control

15 September 2023 Cochlear Implantation in Inner Ear Malformations Seminer Hall F Moderator: Hakan Tutar 09:00 - 10:15		
OP 3934	Cochlear Implant in Common Cavity – a Review	Varun Dave
OP 3951	Retrofacial Approach for Cochlear Implantation in Cases of Congenital Ear Malformations	Khassan Diab
OP 3965	Cochlear implantation in Patients with Cochlear Nerve Deficiency	Serafima Sugarova
OP 3971	Role of Transcanal (Veria)Technique for gaining Wider access for Cochlear Implant in Abnormal Cochlea: Our Experience	Amit Kumar Keshri
OP 3976	Surgical Challenges for Cochlear Implantation in Anomalous Ear	Vasanthi Anand
OP 3990	Cochlear Implantation in Inner Ear Malformations : Surgical Challenges and Audiological Outcomes	Jawwad Ahmad
OP 4146	Facial Nerve Injury as a Complication of Cochlear Implantation: a Description of Three Clinical Cases.	Olimov Jakhongir
OP 4185	Cochlear Malformations and Ci- Experience in Emerging Country	Adriana Neagos
OP 3988	Prevalence and Features of Inner Ear Malformations Among Children with Congenital Sensorineural Hearing Loss	Jawwad Ahmad

OP-3934 Cochlear Implant in Common Cavity – A Review

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Introduction: Until the 1990s, cochlear implant in patients with common cavity was contra-indicated as patient performance was dismal and the complication rate was high.(1) The 21st century saw a paradigm shift in management of such patients.(2) Newer advances in technology, better understanding of anatomy and innovative surgical techniques have shown that implanting patients with IEMs, albeit not as impressive as patients with normal cochleae, can help lead a much improved life as compared to what they do with conventional hearing aids. In common cavity, the cochlea, vestibule and semicircular canals are confluent and form a common cystic cavity. There is no modiolus. Thus the question arises as to where the electrode must be placed so it stimulates the cochlear nerve.

Method: Here we discuss the scope, difficulties, surgical modifications and realistic expectations the implant team should be aware of while managing a patient with common cavity. A MEDLINE search on cochlear implants on common cavities was done, 83 articles and 27 studies were reviewed.

Results: Different surgical approaches have been used by surgeons throughout the world. Here we discuss the common ones and some modifications that could be made to help improve surgical outcome. All studies unanimously state that the performance scores improve after implantation but the degree of improvement varies but is almost never as good as in patients with normal cochlea as the average performance, time taken to improve were poorer and rate of explantation and complications were higher.

Conclusion: Cochlear implant is no longer a contra-indication in patients with common cavity. Customizing the electrode array, defining your surgical approach beforehand and using fluoroscopy can help achieve better surgical outcomes. Managing expectations, continuous long term motivation by patient's family and the implant team is vital.

Keywords: common cavity, inner ear malformations

OP-3951 Retrofacial Approach for Cochlear Implantation in Cases of Congenital Ear Malformations

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Introduction: To describe a method of cochlear implantation (CI) in cases of abnormal facial nerve (FN) position in patients with malformed ear.

Method: 5 patients with complex ear malformations underwent surgery on the base of NRMCO FMBA Russia from 2016 to 2022. 2 of them were with congenital atresia of external auditory canal (EAC) type C and 3 with EAC stenosis. All patients had an abnormal FN position, based on CT scan data. Measuring the parameters of facial recess we determined that the retrofacial approach can be safely used instead of the typical facial recess approach. After cortical mastoidectomy, identifying the FN in the mastoid segment, retrofacially we performed an approach to the middle ear (exposition of the round window niche). Removing of the overhang of the round window transmembrane insertion was performed.

Results: In all cases there was full transmembrane insertion of the electrode array (standard type). 2 patients had a temporary FN dysfunction after surgery (II grade according to House-Brackmann). No other complications were detected.

Conclusion: Retrofacial approach for CI is preferable in cases with an ear canal atresia and aberrant FN. CI in cases of ear atresia requires a high level of expertise of the temporal bone anatomy.

Keywords: retrofacial approach, external auditory canal atresia, cochlear Implantation

OP-3965 Cochlear Implantation in Patients with Cochlear Nerve Deficiency

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Introduction: Cochlear nerve deficiency (CND), which includes aplasia and hypoplasia, is observed up to 18% of children with sensorineural hearing loss (SNT). These patients are considered as candidates for a CI for the goal of hearing rehabilitation. Previously, CND was a contraindication for CI, so the method was proposed of direct stimulation of the cochlear nuclei using auditory brainstem implantation. However, in recent years, some authors have shown satisfactory results after CI in CND. They suggested that the lack of an identifiable cochlear nerve on imaging does not exclude auditory innervation of the cochlea. **Study Objective.** To conduct a retrospective research on the possibility of hearing rehabilitation after CI in children with CND.

Method: The depth of the search was 35 years (1987-2022). The results of auditory-verbal rehabilitation of 22 children with CND after CI in the St. Petersburg Research Institute of ENT in the period from 2016 to 2022 were investigated. **Results.** According to the literature, patients with confirmed CND are able to understand spoken language in 68% situations after CI. The use of total communication after CI, combining spoken and sign language, was found in 55% of 22 children with CND. Used electrophysiological methods can be to assess the generation of activity in the auditory nuclei of the brainstem through electrical stimulation. Therefore, evaluation of auditory nerve function using extracochlear and intracochlear electrical auditory brainstem response (eABR) is recommended when CND is suspected. **Discussion.**

Results: The results of CI in children with CND are extremely variable, ranging from cases where overt speech perception and mastery of spoken language is achieved to cases where only improved intelligibility of environmental sounds is developed.

Conclusion: CI and long-term hearing rehabilitation may be effective for children with CND

Keywords: Cochlear nerve deficiency, cochlear nerve aplasia, cochlear nerve hypoplasia

OP-3971 Role of Transcanal (Veria) Technique for Gaining Wider Access for Cochlear Implant in Abnormal Cochlea: Our Experience

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Introduction: Cochlear Implant are traditionally done by Posterior Tympanotomy approach. There is an alternative Transcanal (Veria) Technique described by Dr Trifon Kiratzidis. Cochlear Malformations and Ossifications are not uncommon in a busy Cochlear Implant Clinic and sometimes pose difficult situations during surgery. Transcanal technique give wide and panoramic access to all part of Cochlea and related middle ear structures and this is very useful in Cochlear Malformation and Ossifications. We are sharing our experience in above situations with Transcanal Surgery.

Method: This is a retrospective study done amongst 275 patients who underwent cochlear implantation by Veria technique between January 2015 to December 2022. Based on pre-operative imaging with high-resolution computed tomography and magnetic resonance imaging the cochleovestibular malformations in this study were classified according to Sennaroglu classification and the Cochlear ossification was graded from I to IV.

Results: Amongst the 275 patients who underwent cochlear implantation during the study period there were 79 cases with abnormalities of cochlea. This included 45 patients (16%) with congenital malformations, 20 patients (7%) with cochlear fibrosis and 15 patients (5%) with cochlear ossification. The commonest cochlear malformation was Incomplete Partition 2 (IP-II) which was present in 15 patients out of which 7 was associated with enlarged vestibular aqueduct. Cochlear Hypoplasia was 2nd common malformation. Out of the 20 patients with cochlear fibrosis, 10 patients had fibrosis only in the proximal basal turn. 15 patients with cochlear ossification 8 patients had a grade 1 ossification, 4 patients had a grade 2 ossification and 3 patients had a grade 3 ossification. One of the patients required re-exploration for correcting the placement of electrode. The type of implant were chosen depending on individual malformation or length of ossification and fibrosis.

Conclusion: In the past, inner ear anomalies were considered as a contraindication for cochlear implantation based on histopathological reports of substantially reduced population of spiral ganglion cells. However it is now possible to implant most of these abnormal cochlea by careful planning, a possible modification of surgical technique by transcanal technique when wider access is needed along with appropriate electrode selection.

Keywords: Cochlear Implant, Transcanal Veria technique, Abnormal Cochlea, Cochlear Malformations

OP-3976 Surgical Challenges for Cochlear Implantation in Anomalous Ear

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Introduction: Inner ear malformations constitute about 20% of congenital sensorineural hearing loss(1). Imaging gives an important roadmap in anomalous cases. Surgical challenges may be encountered in these cases. The surgeon may need to change his technique at times. In addition to intra-op telemetry, intra-operative radiology is important. We explain our experience with anomalous cochlea and how Trans-canal Veria technique helps in complex anatomical situations.

Method: 40 patients with inner ear malformations underwent Cochlear Implantation between 2014 and 2023. The anomalies included Common Cavity, IP-I, IP-II, IP-3, Hypo-plastic Cochlea, Enlarged Vestibular aqueduct and Hypo-plastic cochlear nerves. After complete evaluation, they were implanted by Trans-canal Veria technique. The same surgeon operated all cases using Nucleus and Med El implants. The type of electrodes were selected based on pre-op imaging and nature of anomaly. The electrode placement was confirmed using C-arm and with Intra-op telemetry. Patients were followed up for any complications.

Results: We achieved complete electrode insertion into cochlea in all cases. Veria technique helped in getting good visibility. (2) In gusher situations, even a “Three hand technique” could be done. Varied intra-operative neural responses were obtained. Intra-op radiology helped in proper placement of electrodes. Hospital stay was for 24 hours in all of them. No complications such as infection and facial palsy were seen. Eg. A child aged 4 yrs with IP-I deformity and cyst overlying stapes footplate underwent cochlear implantation. Child had dehiscent facial canal and fistula on footplate. CSF gusher from fistula and stoma were sealed with muscle tissue and fibrin glue. Postoperative management included antibiotics and Injection Mannitol without any Lumbar drain. Patient recovered without any facial palsy or infection and with good audiological outcomes.

Conclusion: In CI surgery with varied anatomy, pre-operative radiological evaluation using High Resolution CT scan and MRI is essential. For the surgeon, good visibility and accessibility of surgical site is important. When there is variation in anatomy, it is mandatory to have intra-operative C-arm visualisation for confirmation of proper electrode placement before wound closure. Neural responses alone are not to be relied for confirmation of electrode positioning in anomalous cases. Surgeon should be experienced in different approaches and modify the technique as per the need of the situation. References 1.Sennaroglu L. Cochlear implantation in inner ear malformations--a review article. Cochlear Implants Int. 2010 Mar;11(1):4-41. doi: 10.1002/cii.416. Epub 2009 Apr 8. PMID: 19358145. 2.Kiratzidis T, Arnold W, Iliades T. Veria operation updated. I. The trans-canal wall cochlear implantation. ORL J Otorhinolaryngol Relat Spec 2002;64:406–12.

Keywords: Inner ear malformation, Footplate cyst, CSF gusher, Hypoplastic cochlear nerve

OP-3990 Cochlear Implantation in Inner Ear Malformations : Surgical Challenges and Audiological Outcomes

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Introduction: To assess the surgical challenges and audiological outcomes of cochlear Implantation in inner ear malformations.

Method: This study reviewed charts of 700 children and adults who underwent cochlear implant surgery during 2015 to 2022 at CDA Cochlear Implant Centre, Capital Hospital, Islamabad.

Results: Current Study included a sample size of 33 out of 700 cases. The use of high-resolution imaging techniques resulted in the detection of a cochleovestibular anomaly in implanted ears. In this study most common malformation was isolated enlarged vestibular aqueduct. Implantation was more challenging in children with cerebrospinal fluid leak/perilymph leak. There was a significant difference in audiological outcome in children with anomalous cochlea compared with children with normal cochleovestibular anatomy. Children with narrowing of the internal auditory canal/cochlear canal performed more poorly than all other groups. Children with hypoplastic cochlea had reduced dynamic range and increased incidence of facial simulation and were judged to be more difficult to program despite the fact that few electrodes were inserted.

Conclusion: Challenging cases are becoming more common as we are expanding selection criteria and we should be prepared for surprising event during surgery, increased rate of possible complications at, and following surgery and audiological outcome that may vary considerably amongst inner ear malformations.

Keywords: Cochlear Implant, Inner ear malformation. Gusher

OP-4146 Facial Nerve Injury as a Complication of Cochlear Implantation: A Description of Three Clinical Cases.

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Introduction: to conduct a detailed analysis of the causes of CI complications, to determine the tactics for their elimination and the possibility of their prevention.

Method: The study included a three clinical complications of cochlear implantation in patient with sensorineural hearing loss, from January 2021 to December 2022. The study was conducted at the Republican Specialized Scientific and Practical Medical Center for Pediatrics in Tashkent (Uzbekistan). The study included 3 children with facial nerve paralyses. All subjects physical examination and CT scan of the temporal bone.

Results: The frequency of iatrogenic exposure with exposure of the facial nerve during CI was 46.58%. However, the incidence of postoperative facial paralysis was only 2.1%, and in cases without neural damage, it decreased to 0.72%. This was not significantly different from the 0.73% rate reported in the literature using intraoperative facial nerve monitoring ($P = 0.99$).

Conclusion: The frequency of iatrogenic effects on the facial nerve in cochlear implantation may be relatively high. This complication facilitated by the presence of pathological contents in the cells of the mastoid process and in the tympanic cavity. Inner ear malformation with an atypical location of the facial nerve increases the risk of the facial nerve damage during performing CI. However, a detailed study of CT and MRI data, intraoperative use of facial nerve monitoring, and determination of surgical tactics, taking into account all the structural features of the temporal bone, can reduce the risk of postoperative complications. Timely revision surgery using an adequate facial nerve reconstruction technique allows obtaining good results of its recovery.

Keywords: Facial nerve, cochlear implantation

OP-4185 Cochlea Malformations and Ci- Experience in Emerging Country

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Departemnt, Targu Mures, Romaniaia.

2 Ent Clinic, Emergency County Hospital Targu Mures, Romania

Introduction: Preoperative analysis of cochlear shape issues is important in the preoperative assessment of intraoperative risks. Analysis by imaging measurements of the shape and size of the cochlea is essential in this context. One of the most common intraoperative complications is Gusher syndrome. The CSF gusher represents a sudden extravasation of the cerebrospinal fluid at the time of the cochleostomy, surgical time prior to the insertion of the cochlear implant.

Method: We would like to present our experience in the preoperative evaluation of cochlear malformations and the different situations in which Gusher syndrome has occurred. e have analyzed the different shapes of the cochlea and we have performed measurements of its length in order to establish some coordinates related to its shape and intraoperative implications.

Results: Preoperative imaging assessment is essential in determining intraoperative risks. Cochlear malformations are common in children with hypoacusis, with incomplete partitions 1 and 2 being the most common. Reduced experience in imaging assessment and inconsistency between preoperative findings and intraoperative imaging means that some malformations are missed.

Conclusion: CSF gusher is a rare intraoperative complication, but specific to cochlear malformations, which can be anticipated but not quantitatively and requires specific intra- and post-operative treatment.

Keywords: gusher, hearing loss, cochlear implant, round window

OP-3988 Prevalence and Features of Inner Ear Malformations Among Children with Congenital Sensorineural Hearing Loss

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Introduction: Cochlear implant services for deaf children got established in Pakistan over the last two decades, however, no local studies report the prevalence of inner ear malformations. This is important in planning surgical treatment and predicting prognosis. Inner ear anomalies of both membranous and bony malformations are usually encountered while diagnosing and operating pediatric cases with non-serviceable hearing. Joshi VM et al, have reported a high prevalence of IEMs (15 to 20%) in cases with severe or profound hearing loss (HL) with fear of intra-operative complications. Hence identification of bony anomalies is essential in planning cochlear implant (CI) surgery. These anomalies have been grouped into eight groups by Bajin SL. With this subject lacking in local literature in Pakistan, this study is of immense importance keeping in view the high prevalence of HL in Pakistan. Also, this could be helpful in providing reliable statistical data regarding IEMs in patients with congenital HL and will be helpful to plan effective treatment strategies and for research purposes.

Method: This retrospective study reviewed charts of children with congenital SNHL, who presented to the Department of Otolaryngology & Auditory Implant Centre, Capital Hospital Islamabad over a period of 2 years from 1st May 2017 to 30th April 2019. These included 481 cases of both genders aged between 1 to 12 years. After gathering demographic data, audiological data, and computed tomography findings of the temporal bone were analyzed. Data were analyzed using SPSS 22.

Results: Inner Ear Malformations were identified in 48(10%) children including 28 (58.33%) males and 20 (41.67%) females. Most 20(41.67%) presented at >3-5 years of age followed by 19(39.58%) at 2-3 years. However, no significant association of gender ($p=0.57$, $p=0.076$) and age of presentation ($p=0.344$, $p=0.697$) for right and left ears was noted with inner ear malformations. The most common anomaly noted were CLA, CH-III, and CH-II in decreasing order of frequency in both ears.

Conclusion: The prevalence of IEMs was found to be 48(10%). The commonest anomalies noted were CLA, CH-III, and CH-II. No significant association between gender and age of presentation was noted with the type of anomaly.

Anahtar Kelimeler: Computed tomography scan, Inner ear malformations, Prevalence, Congenital sensorineural hearing loss

15 September 2023 Electrophysiological Measurements in CI Seminer Hall F Moderator: Betül Çiçek Çınar 10:45 - 12:00		
OP 3885	The relationship between the electrical stapedial muscle reflex threshold and electrical and behavioral measures in cochlear implant patients	Samir Assal
OP 3606	Cochlear implants: Visual evoked potentials study	Takwa Gabr
OP 3776	Effects of Stimulus Intensity on Cortical Auditory Evoked Potential in Adult Cochlear Implant Users	Rosninda Abdullah
OP 4042	Hearing loss, depression and cognition in younger and older adults and cochlear implant candidates	Huber Maria
OP 4109	Examining the Relationship Between ECAP Thresholds with THR and MCL Levels in Cochlear Implant Users: Preliminary Results	Aysenur Aykul Yagcioglu
OP 4084	Examination of the Relationship Between Electrical Dynamic Field and Dizziness in Cochlear Implant Users: Preliminary Results	Nizamettin Burak Avcı
OP 4096	Comparison of Impedance Values in Individuals with Different Implant Types	Nazire Irem Karakuluk
OP 4090	Evaluation of AutoART's Effectiveness in Identifying the Most Comfortable Levels in Adult MED-EL Cochlear Implant Users	Atılım Atılğan

OP-3885 The Relationship Between the Electrical Stapedial Muscle Reflex Threshold and Electrical and Behavioral Measures in Cochlear Implant Patients

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Introduction: Programming of multichannel cochlear implants (CIs) requires subjective responses to a series of sophisticated psychophysical percepts. It is often difficult for young prelinguistically deaf children to provide adequate responses for device fitting. This is especially true in setting levels of maximum comfortable loudness, whereby failure to indicate growth of loudness may result in elevation of stimulus levels to the threshold of pain. The acoustic or stapedial muscle reflex has been used previously to provide objective confirmation of acoustic stimulation, and there have been attempts to use the reflex in hearing-aid fitting. It has also been suggested that electrically elicited middle-ear muscle reflexes [electrically evoked stapedial reflex threshold (ESRT)] may have applicability in confirming and quantifying electrical stimulation through a CI.

Method:To assess the relationship between ESRT characteristics and levels of loudness perception with CIs, determine the reliability of the response, and investigate the potential use of ESRT in CI programming, 26 prelinguistically deafened CI users were evaluated.

Results: Reflexes have also been attempted on 312 electrodes, with responses present in 213 (68.3%). Comfort levels predicted by subjective judgments were highly correlated with the ESRT in individuals with CI.

Conclusion: ESRT provides an objective, accurate, and rapid method of estimating maximum comfortable loudness levels, which may be useful in the initial programming of young implant recipients.

Keywords: cochlear implants, electrical and behavioral measures, stapedial muscle reflex threshold

OP-3606 Cochlear Implants: Visual Evoked Potentials Study

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Introduction: Cochlear Implants: Visual Evoked Potentials Study Author: Takwa Gabr Professor of Audiovestibular Medicine Kafrelsheikh University Egypt Cochlear implants (CIs) are a successful alternative in cases with severe-to-profound HL. In these individuals, visual cross-modal re-organization can occur because of hearing loss where the visual cortex will recruit auditory cortical areas for visual processing. This work is designed to study visual evoked potentials (VEPs) in children fitted with CIs in comparison to normal hearing children.

Method: This work included 2 groups of children: Group I included 20 normal hearing children and the study group included 25 children fitted with unilateral CIs. All cases were subjected to Thorough otological history. Check up on CIs performance using physical check and Aided sound field examination, ophthalmic examination, and Pattern Visual Evoked Potentials (pVEPs).

Results: Both groups showed no significant difference as regard age or sex. And both had normal ophthalmic examinations. Children of the study groups showed a satisfactory aided response. As regard pVEPs, the study group showed significantly higher P100 amplitude in comparison to the control group.

Conclusion: This study showed that deafness could induce cortical organization in the visual cortex and is not limited to the auditory cortex only.

Keywords: Cochlear implants Visual evoked potentials (VEPs) Hearing loss

OP-3776 Effects of Stimulus Intensity on Cortical Auditory Evoked Potential in Adult Cochlear Implant Users

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Introduction: Cortical Auditory Evoked Potential (CAEP) is an emerging technique to assess the efficacy of cochlear implant (CI) use. Prior to its clinical application among pediatric CI recipients, the effects of fundamental variables on CAEP should be studied.

Method: The primary objective of this study is to determine the effects of stimulus intensity on the P1, N1, P2 and N2 of CAEP from 10 adult CI users in response to four naturally produced speech (syllable /ba/ and phonemes /m/, /g/ and /t/). Using a repeated-measures design, subjects were tested at three intensity levels (50-, 65- and 75-dB SPL) presented via a loudspeaker with subjects' CIs programmed at the subjects' usual setting.

Results: Descriptively, all wave peaks were present in all subjects. As expected, syllable /ba/ produced the highest P1 amplitude while phoneme /m/ elicited the shortest P1 and N1 latencies. The amplitude and latency decreased slightly as the intensity increased from 50 to 75 dB SPL. However, there was no statistical difference in amplitudes and latencies neither between stimuli nor across stimulus levels for each stimulus except for P1 amplitude and P2 latency. The pairwise comparisons showed P1 amplitude at 75dB SPL was statistically different from the P1 amplitude at 50 dB SPL. No statistical significance was seen when comparing amplitude at other intensities. The smaller amplitude elicited at lower intensity is believed to be resulting from less neural firing in the auditory pathways. On contrary, the increase in amplitude at 65- and 75-dB SPL, despite being almost equal, reflect a more synchronous neural firing. To conclude, the intensity level appears to have little effect on CAEP among CI users. This could be attributed to how the CI signal processor processes the acoustic inputs.

Conclusion: This preliminary study demonstrates the usefulness of CAEP in assessing the central auditory pathways to best reflect the signal processing of CI.

Keywords: Cortical Auditory Evoked Potential, adults, cochlear implant, speech stimulus, stimulus intensity

OP-4042 Hearing Loss, Depression And Cognition in Younger and Older Adults and Cochlear Implant Candidates

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Introduction: Hearing loss in old age is associated with cognitive decline and with depression. Our study addressed the question of whether these secondary depressive symptoms mediate between hearing loss and cognitive decline and whether there are differences between younger (25-54 years) and older (55-74 years) individuals.

Method: This retrospective study is part of a larger cohort study. All participants were cochlear implant candidates with normal hearing (up to an average of 40 dB at 500, 1000, 2000, and 4000 Hz) in both ears up to age 19 years. Individuals with a primary affective disorder, psychosis, below-average intelligence, poor German language skills, visual impairment, and a diagnosis with potential impact on cognition (neurodegenerative diseases, CNS diseases, malignancies) were excluded. The Abbreviated Profile of Hearing Aid Benefit was used to assess hearing in noise. The severity of depressive symptoms was assessed with the Beck Depression Inventory (BDI II). Cognitive status was assessed with a neurocognitive test battery.

Results: Four-frequency hearing thresholds (dB, PTA) in the better ear of 61 individuals were not related to clinical and subclinical severity of depressive symptoms or to cognitive variables. Subjective hearing in noise (APHAB) was significantly negatively associated with depression (BDI II) but not with any cognitive variable. Depression was not related to cognition. Furthermore, we found no difference between younger and older subjects in either depression or age-adjusted cognitive performance. The results of exploratory analyses showed that subjective hearing in quiet (APHAB) was significantly positively associated with phonemic fluency (Regensburg Word Fluency), cognitive flexibility (TMTB), and nonverbal episodic memory (Nonverbal Learning Test). Subjective hearing of aversive sounds (APHAB) was associated with depression, semantic word fluency (RWT), and inhibition (Go/Nogo). No association was found between APHAB scores and working memory (n-back). Duration of hearing loss and speech recognition at quiet (Freiburg Monosyllables) were not significantly related to depression and cognitive performance.

Conclusion: Effects of hearing loss on mood and cognition appear to be independent of each other, that is, appear to be related to different aspects of hearing loss (peripheral hearing, central hearing) to mood and cognition of younger and older individuals.

Keywords: Hearing loss from adulthood, secondary depression, cognition, younger and older adults, peripheral and central hearing loss

OP-4109 Examining the Relationship Between Ecap Thresholds with Thr Level and Mcl in Cochlear Implant Users: Preliminary Results

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Introduction: Electrically Evoked Compound Action Potential (ECAP) objectively evaluates the synchronous response from auditory nerve fiber using the telemetry function of the cochlear implant. In addition, this measurement helps to determine the threshold of hearing (THR) and maximum comfort levels (MCL). In various studies examining the relationship between ECAP thresholds and the stimulation levels used to program the speech processor, the correlation between ECAP thresholds with THR and MCL levels varied. In this study, it was aimed to compare the ECAP thresholds in MEDEL cochlear implant users according to the electrode regions and to determine the correlation between the ECAP threshold with THR and MCL levels.

Method: Nine cochlear implant users using sonatati100 and mi12xx cochlear implant types aged 7-18 years, without inner ear malformations were included in the study. Auditory Nerve Response Telemetry (ART) measurement was performed to determine ECAP thresholds in MAESTRO 9.0 System Software. MCL and THR levels were determined for 12 electrodes whose AutoART threshold was determined. The first 4 electrodes were determined as apical, 4-8 electrodes as middle, 8-12 electrodes as basal region and comparisons were made in this way.

Results: A statistically significant difference was obtained between the apical and basal regions in ART thresholds ($p=0,02$). Although there was no statistically significant difference between other regions, an increase was observed in ART thresholds towards the baseline region. A positive, moderate and statistically significant relationship was found between the ART thresholds of the apical ($r=0.44$) and middle ($r=0.44$) regions and the THR/MCL levels of the same regions ($p<0.05$).

Conclusion: It was thought that the decrease in ART thresholds towards the apical region may be due to the narrowing of the distance between the recording electrode and the stimulated neural tissue due to the decrease in the diameter of the cochlear turns towards the apex or the high density of neuronal structures in the apical region. It has been observed that ART measurements are successful in determining THR and MCL levels in cochlear implant users, especially in their apical and middle regions.

Keywords: Cochlear Implant, ECAP, THR, MCL

OP-4084 Examination of the Relationship Between Electrical Dynamic Field and Dizziness in Cochlear Implant Users: Preliminary Results

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Introduction: Vestibular complications associated with cochlear implantation include dizziness, vertigo, and imbalance. Although vestibular symptoms commonly appear shortly after surgery, they may occasionally appear later. It is believed that the vestibular system may be affected by the electrical stimulation that extends from the cochlear implant (CI) to the adjacent tissues. Therefore, the electrical stimulus propagating to the tissues may vary between individuals. Electrode impedance measurements are conducted, and the individual electrical dynamic field measured during CI adjustments. In addition, scientific literature suggests that an increase in electrode impedance values may be associated with vertigo. Our research aims to determine the relationship between CI users' electrical dynamic field values and their vertigo and balance confidence levels.

Method: This study included 20 unilateral CI users (mean age: 25.1 ± 6.93 years). The participants' average duration of CI use ranged from 20 to 235 months, with a mean of 115.3 ± 71.67 months. During CI adjustment, impedance, electrical dynamic field values and c levels were recorded from 3 electrodes as apical, medial, and basal. In addition, questionnaires were utilized in which participants described their vestibular symptoms and subjectively rated their daily balance experiences. The Dizziness Handicap Inventory (DHI), which is used to determine the presence and severity of the vertigo complaint, and the Activity-Specific Balance Confidence Scale (ABC), which measures confidence in balance, were applied to participants.

Results: There was no statistically significant correlation ($p > 0.05$) between the scale scores (DHI and ABC) and the electrical dynamic field values, also with c levels ($p > 0.05$). There was no correlation between the scale scores (DHI and ABC) and the impedance values ($p > 0.05$). However, a moderately negative correlation ($r: -0.554$, $p: 0.011$) was observed between DHI and ABC scores.

Conclusion: Electrical dynamic field and impedance values are unrelated to the vertigo and balance confidence reported by CI users. Long-term use of CI can explain why impedance values have no effect on dizziness. Our initial analysis suggests that electrical stimulation may not affect individuals' perception of vestibular symptoms. In future studies, it is recommended to use objective tests for evaluation and to enhance the size of the study group.

Keywords: Cochlear Implant, Dizziness, Electrical Dynamic Field, Balance Confidence

OP-4096 Comparison of Impedance Values in Individuals with Different Implant Types

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Introduction: Electrode impedance is the measure of resistance to the flow of electric current through an electrode and should be evaluated regularly during the routine control in individuals with cochlear implant (CI). After implant surgery, an increase is observed in the impedances due to the growth of the fibrous tissue layer and protein adsorption on the electrode surface during the 10-14 day healing period, while the impedances decrease over time after implant activation. It is thought that impedances may vary for the length, shape and apical, mid and basal electrode positions of the electrode in different implant types. The objective of this study is to investigate how impedances change over time in different implant types in MEDEL users and the difference of implant type according to different tonotopic regions.

Method: It was included retrospectively data of 53 ears with 25 SONATAti100 and 28 Mi12xx implant between 4-18 years to this study. Inner ear malformations were excluded from the study. Impedance measurements were collected using the “MAESTRO” software. Analyzed data included initial activation, 1st, 3rd, 6th, and 12th months. SPSS 25 statistics program was used in the analysis of data. Bivariate relations were evaluated with the “Independent Groups Student’s t-test”.

Results: When impedance values of SONATAti100 and Mi12xx implants were compared, a statistically significant difference was observed in the mid and basal regions during the initial activation, and in the apical region on 1st, 3rd, and 6th months. There was no significant difference the apical region during the initial activation, and in the mid and basal regions on 1st, 3rd, and 6th months, and in the apical, mid, and basal regions on 12th months. Higher impedances were obtained in the apical region compared to the mid and basal regions.

Conclusion: In the different implant types were concluded that electrode impedances could change, and this change was greatest in the apical region. Especially, electrode impedances between SONATAti100 and Mi12xx differed in the apical region.

Keywords: electrode impedance, cochlear implant, implant type, pediatrics

OP-4090 Evaluation of Autoart's Effectiveness in Identifying the Most Comfortable Levels in Adult Med-El Cochlear Implant Users

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Introduction: Electrically compound action potentials (ECAP) are utilized to evaluate the response of auditory nerve fibers to electrical stimulation, thereby confirming neural function. ECAP could assist audiologists in determining threshold and comfort levels. AutoART is a clinical tool that defines ECAP thresholds automatically and enables post-analytical correction. We examined the relationship between AutoART, clinician-corrected thresholds, and most comfortable levels (MCL).

Method: Twenty adult unilateral cochlear implant users (10 males and 10 females) between the ages of 20 and 82 (mean age 52) were included in this study. We collected Impedance and Field Telemetry values, most comfortable levels (MCL), and AutoART thresholds. On the basis of a visual examination of the amplitude growth of ECAPs, we revised the AutoART threshold. We compared the response profiles of MCL, AutoART threshold, and corrected AutoART threshold as well as investigated the relationship between these three values across electrodes.

Results: MCL levels are higher compared to AutoART and clinician-corrected AutoART thresholds. In addition, clinician-corrected AutoART thresholds were obtained at a higher level than AutoART thresholds, although not statistically significant. When the distribution of responses is examined as a profile according to electrodes, no difference is observed among the three methods. We found a statistically significant, moderately positive correlation between MCL and AutoART thresholds at 5, 6, and 7 electrodes. The correlation was not strong for other electrodes. The rate of obtaining ECAP with AutoART was lower for basal electrodes compared to apical electrodes. However, using the visual inspection method increased the rate of ECAP determination in basal electrodes.

Conclusion Although it is not possible to determine the MCL level of a patient with a cochlear implant using AutoART thresholds alone, modifying the thresholds with a visual inspection of amplitude growth could aid the clinician in determining programming parameters.

Keywords: Most comfortable level, Electrically evoked compound action potential, Cochlear Implant Mapping

“7th World Congress of Cochlear Implants in Emerging Nations”

15 September 2023 Alternative Rehabilitative Interventions in CI Seminer Hall F Moderator: Burcu Ozkan Atak 12:00 - 12:30		
OP 3974	On-Line Teaching of Singing of CI Children – International Project	Svetlana Burnos
OP 3984	Rehabilitation Of Deaf-Blind Adults After Cochlear Implantation – Speech And Music	Inna Koroleva
OP 3521	Listen with Smile Augmented Reality App making the Rehabilitation of CI Users Easy	Dagmar Herrmannova
OP 3522	Because I hear I live - International Awareness Campaign and song in 9 languages supporting Hearing Impaired Children from Developing Countries	Dagmar Herrmannova

OP-3974 On-Line Teaching of Singing of CI Children – International Project

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1 City'S Center For Rehabilitation of Hearing Impaired Children

2 Med-El

Introduction: Purpose of the study. To develop the methodology for on-line teaching of singing for CI children in different countries.

Method: The participants were CI children living in 5 countries – Belarus, Russia, Uzbekistan, Georgia, Kazakhstan (15-25 children in every group). At 1-st step in every country the songs for training were chosen and CI children were invited through social network to participate in the project “Sing with MED-EL”. 20 author's songs in Russian for guitar were used for children from Belarus and Russia. Children living in Uzbekistan and Georgia trained with 4 national songs. For children from Kazakhstan 5 songs in Russian and English were used. The second step included on-line group singing lessons for children with professional music teacher (from Belarus) once a week during 3 months and homework for daily self-training for 15 minutes with video recording of singing teacher. Parents sent the recordings of the child singing the small piece of song to the teacher 3 times a week. The teacher gave next task depending on the child's results. The questionnaire was used to evaluate the child's ability to manage voice, speech skills, enjoy listening to music and singing, the parent's inclusion in the child's passion for music. The 3-rd step was the recording the video clip with children singing together. The clip was demonstrated at social events and networks.

Results: A full course of classes completed 60-70% of children in every country because some parents did not have enough time, could not support the child's motivation for training. Children who completed the course improved in terms of voice control, distinguishing changes in speech prosodic characteristics, auditory memory, speech communicative skills.

Conclusion: On-line teaching of singing can be an effective tool for developing voice control, speech and listening skills in CI children. They used the acquired skills during daily communication, began to listen to music and sing for pleasure. The method helps to involve most parents in the auditory rehabilitation of their child and integrate CI children in hearing society. The peculiarities of the realization of the method in every country are discussed.

Keywords: cochlear implanted children, singing, speech development, on-line rehabilitation

OP-3984 Rehabilitation of Deaf-Blind Adults After Cochlear Implantation – Speech and Music

Inna Koroleva¹, Sergey Levin¹, Elena Levina¹

¹ Saint-Petersburg'S Research Institute of Ent & Speech

Introduction: Purpose of the study. To develop the program for rehabilitation of deaf-blind (DB) adults after cochlear implantation.

Method: 8 deaf-blind patients (age 16-65 years): 2 blind patients from birth and acquired deafness in adulthood. 1 blind patient from birth with progressive hearing loss from childhood. 1 patient with progressive hearing and vision loss (Usher's syndrome). 3 patients who have lost hearing and vision at the same time in adolescence or adulthood after an illness (traumatic brain injury, autoimmune disease, oncological disease). Patient who has lost hearing and sight at the age 2,5 years after meningitis, 1-st implantation at the age 4, implantation at 2-nd ear at the age 22 years.

Results: The auditory training started after 1-st fitting of CI-processor. The patients got daily auditory therapy sessions during 10 days and then in 3, 6, 12 months. The sessions included the detection and discrimination of everyday sounds during the manipulation with objects, human voice, discrimination and identification in closed set of frequently used words, phrases, listening to own voice and speech while repeating, reading aloud, singing. After 5-10 days new directions for training were added – the recognition of all phonemes, recognition of words and sentences in open set, recognition of intonations, human voices, fast speech, speech in noise, music perception, sound localization. A caregiver actively participated in the training sessions, as an interpreter, assistant and learns to perform exercises between classes and then at home.

Conclusion. Preliminary preparation of the DB-patient and his caregivers for the postoperative rehabilitation is necessary. Auditory-speech training of DB patients, especially at the initial stage, is based on tactile sensations and taking into account the acoustic and communicative characteristics of sounds and speech material. Listening to favorite songs and singing is an important part of auditory rehabilitation of DB adults. It helps to restore speech intelligibility in close set and in noise, recognition of melodies, auditory feedback of voice and pronunciation, social skills and increases the motivation to self-training in patients.

Keywords: deaf-blindness, cochlear implantation, auditory-speech rehabilitation, music perception, singing

OP-3521 Listen with Smile Augmented Reality App Making the Rehabilitation of Ci Users Easy

Dagmar Herrmannova¹

1 Med-El

Introduction: "Listen with Smile" is augmented reality app game series. Augmented reality (AR) is an enhanced version of the real physical world that is achieved using digital visuals, sound, or other sensory input delivered through technology like cellphone or tablet.

Method: This App is aimed to help developing hearing, listening and communication skills of hearing impaired children - hearing aids and cochlear implant users, but also pre-school children and younger age school children without any needs enjoy to use it and have fun. While using this app series children are able to imagine different environments and learn different sounds related to real objects and play games which will train them to develop their skills further. This augmented reality application will teach children to recognize the sounds of objects with the help of their phones or tablets in an intuitive and playful way and will have the games which would develop their listening skills from detection to discrimination, identification and finally understanding of the sounds and can help to develop their vocabulary. It can bring "the therapies" to home use and saves some the time and cost to travel to special centres and therapists. "Listen with Smile" is not language related and can be used in any country. It will work in any smart phone or tablet devices and it is child friendly. Our application does not need any other device, e.g. a virtual helmet, just a regular phone is enough. The game takes place in the child's natural environment, e.g. at home, or perhaps in the garden, but also at school.

Conclusion: It is MED-EL company supported app and profit of this app goes to charity supporting hearing impaired children living in poverty in developing countries. The lecture will explain this technology as well as will show practical videos and results of testing it in different countries.

Keywords: Augmented Reality Rehabilitation Cochlear Implant Developing Countries

OP-3522 Because I Hear I Live - International Awareness Campaign and Song in 9 Languages Supporting Hearing Impaired Children From Developing Countries

Dagmar Herrmannova¹

1 Med-El

Introduction: Worldwide there are about 650 million people with a disability and 466 million people worldwide have disabling hearing loss. People with hearing loss can benefit from devices such as hearing aids, cochlear implants, assistive listening devices. They all need rehabilitation, language training, educational and social support. Current production of hearing aids and CIs meets less than 10% of global need. Most people/children with a disability, especially with the hearing loss, have a lack of access to different services, rehabilitation, care and education and are in many places discriminated and excluded from the mainstream society, especially in developing countries.

Method: Smiling Crocodile, established in 2009 (projects since 2001) is an international non-profit organization that is focused on supporting hearing impaired and complex needs children living under disadvantaged circumstances. Smiling Crocodile specifically supports the rehabilitation, services and education for hearing impaired children and children with complex needs in Europe, in Asia and in Africa. Currently supporting more than 1000 CI users in India and Sri Lanka in different regions and centers and aims to further expand its activities in the region of Asia. The lecture will explain the long term results in developing countries especially and will introduce the campaign #BecauseIhearILive campaign which is focused on quality of life of CI children living in poverty. Campaign “Because I hear I live” is based on real stories and outcomes of more than 1000 CI users living in poverty from Asia and Africa. Smiling Crocodile supported together with MED-EL. The general message of the campaign “Because I hear I live” is to: Create awareness about the conditions of hearing impaired children living in poverty. Highlight that everybody has the right to hear in spite of the economic situation or life circumstances. Very different – life changing - benefits of implants for children from developing countries. The campaign song Because I hear I live which aims to be an anthem of deaf children in developing countries is recorded in different languages with professional singers and deaf children.

Conclusion: The international version of song and videoclip will be presented during the presentation.

Keywords: hearing impaired developing countries campaign support song

“7th World Congress of Cochlear Implants in Emerging Nations”

15 September 2023 CI in Special Situation Seminer Hall F Moderator: Secaattin Gülşen 13:30 - 14:45		
OP 3923	The Outcomes of Cochlear Implantation in Solid Organ Transplant Patients	Seyed Basir Hashemi
OP 3952	Our Experience of Cochlear Implantation Under Local Anesthesia	Khassan Diab
OP 3994	Benefits of Cochlear Implantation in Cases with Asymmetrical Hearing Loss – Our Experience	Rohit Udaya Prasad
OP 4065	Cochlear Implantation in Otitis Media with Effusion: Are Ventilation Tubes Really Necessary?	Ergin Eroğlu

OP-3923_The Outcomes of Cochlear Implantation in Solid Organ Transplant Patients

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Introduction: As far as it is known long-lasting immunosuppressive therapy might prone the patients with solid organ transplantation (SOT) at increased risk for severe to profound sensorineural hearing loss and eventually leads to cochlear implantation (C.I). So, the main aim of the present study is to evaluate their level of auditory perception performance after cochlear implantation.

Method: This case-series study assessed the level of auditory perception performance of 6 organ transplanted patients who underwent cochlear implantation in our center. The patients' age range was between 3 to 68 years old. Two of the participants (Female/ male), had received liver transplantation and the rest (2 males, 2 females), were undergone kidney transplantation. The assessment was carried out through CAP (Categories of Auditory Performance) test in the first month of cochlear implantation and 12 months later.

Results: Except for one patient (3 years old girl) who has recently received a cochlear implantation device and her rehabilitation program is in progress, the CAP scores of others improved from 2 to at least 6 scores. Also, complications such as wound infection, mastoiditis, or meningitis were not occurred after cochlear implantation.

Conclusion: Immunosuppressive therapy specially in kidney transplanted patients who have received more than one cycle hemodialysis per week can lead to severe to profound sensory neural hearing loss. In recent years, cochlear implantation is considered as a final solution to help these group of patients to hear and better communication.

Keywords: Solid organ transplantation, Cochlear implantation, Immunosuppressive therapy

OP-3952 Our Experience of Cochlear Implantation Under Local Anesthesia

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Introduction: To report the outcomes and the patient's subjective experience of cochlear implantation (CI) performed under local anesthesia (LA). To describe a new form of intraoperative cochlear monitoring based on the patient's subjective sound perception during CI.

Method: During the period from June 2016 to September 2022, 38 patients with comorbidities underwent CI under LA with (n = 22) or without conscious sedation (n = 16) aged from 28 to 73 years. Primarily elderly patients with elevated risks for general anesthesia according to American Society of anesthesiologists Physical Status classification (mild, severe or incapacitating disease) were included. The infiltration of the Ultracain solution, and conscious sedation (Dexdor/Propofol) intravenously was used, avoiding the introduction of muscle relaxants. A standard approach with retro-auricular C-shaped incision, mastoidectomy, posterior tympanotomy, and electrode array insertion through the round window membrane was performed in all cases. The value of electrically evoked stapedius reflex in the maximum auditory comfort and minimum hearing level was identified at the end of the surgery in contact with reaction of patient. Telemetry of the implant stapedius reflex measurements was performed. A questionnaire was sent to all patients in which they assessed their subjective experience.

Results: All patients (n=38) were successfully operated under LA without the need to intraoperatively convert to general anesthesia. 92,1% of the patients reported that the surgery was a positive experience. The vast majority (89,5%) of patients were satisfied with the overall treatment and with intraoperative pain management and 86,8% of the patients would opt for local anesthesia again. The average length of the operation was 39±4 min. The intraoperative measurements showed normal impedance and normal neuronal response telemetry, all the patients had sound experience during the intraoperative examination of the engineer. No complications were observed.

Conclusions: CI under LA was well tolerated and recommended by the vast majority of patients.

Keywords: cochlear implantation, local anesthesia, ci in elderly patients, ci in patients with comorbidities

OP-3994 Benefits of Cochlear Implantation in Cases with Asymmetrical Hearing Loss – Our Experience

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Introduction: Asymmetrical hearing loss (AHL) is defined as a condition where severity and shape of hearing loss (HL) is different on both sides. Severity of HL is the guideline to decide treatment option either to be bimodal, with cochlear implant (CI) on poorer side and hearing aid (HA) on better side, or HA on both sides. In pediatric population with AHL, decision to switch over to CI in poorer side can be made by evaluating delay in hearing and speech milestones compared to a peer with normal hearing. While in adult cases with AHL, subjective and objective hearing tests with quality of life (QoL) tool will assist in making an informed decision to switch over to CI. The aim of our study is to highlight measurable and non-measurable benefits of CI in AHL cases.

Method: 4 Patients (2 adults (65yrs – 70yrs); 2 children (3yrs– 4yrs)) with AHL from our hospital were included in the study. Audiological test results of all 4 subjects revealed AHL with HA candidacy and good speech discrimination on better side and CI candidacy on poorer side with poor discrimination with HA. History of HA usage was documented on poorer side with infrequent usage in adults and consistent usage in children. All 4 patients underwent CI surgery in poorer ear and post operatively they were assessed on audiological tests. QoL tests were administered at different time points in all 4 subjects.

Results: In all 4 subjects, post CI, qualitative improvement in hearing and speech results was noted with binaural hearing improvement in localization. QoL assessment presented compelling evidence specially in adult cases where prior to CI, both subjects reported of social exclusion, isolation, and depression. While post-CI, both adults returned to professional, social life with increased hearing confidence.

Conclusion: Even though AHL is not considered as typical candidacy for CI, results of our study and published research show benefits from bimodal fitting. In AHL cases appropriate testing and counselling is important to help patients switch over from a non-benefitting HA in poorer ear to CI, since optimum binaural hearing is achievable in these cases.

Keywords: Asymmetrical Hearing loss, Cochlear implants, Quality of Life

OP-4065 Cochlear Implantation in Otitis Media with Effusion: Are Ventilation Tubes Really Necessary?

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1 Hacettepe University Faculty of Medicine

Introduction: We aimed to evaluate the clinical findings of our cochlear implant (CI) patients with untreated otitis media with effusion (OME) and CI patients treated with ventilation tube for OME.

Method: A retrospective chart review of patients who underwent CI operation at Hacettepe University, Department of Otorhinolaryngology between November 1997 and March 2023 was conducted. Patients who had active OME or had ventilation tube (VT) in the implanted ear at time of surgery were identified and included in the study. Demographic features, perioperative findings, complication status, revision status and reason of revision (if any) were recorded. Revision status of the non-OME and non-VT total patient cohort of our clinic was also recorded and compared with the OME group.

Results: A total of 2945 ears were operated for cochlear implantation in our clinic. Of these cases, 169 (5.7%) had OME and 55 (1.86%) had VT at time of surgery (A total of 180 patients). There were not any significant difference between the two groups in terms of demographic parameters and follow up duration. None of the investigated parameters showed any significant difference between the two groups except the revision status. Revision rate of OME group was significantly higher than VT group (10.65% vs null, $p=0.008$). Non-OME and non-VT total patient cohort had significantly lower revision rate than the OME group (5.91% vs 10.65%, $p=0.006$).

Conclusion: VT inserted patients and patients with OME does not have any significant difference in terms of surgical difficulty and perioperative complications following CI operation. Delaying the CI operation for VT insertion may not be mandatory. Reasons of higher revision rate in OME patients should be further investigated.

Keywords: Otitis Media, Coclear Implantation, Effusion

15 September 2023 Outcomes of Auditory Implants (1) Seminer Hall F Moderator: Hilal Dincer D'Alessandro 15:15 – 16:30		
OP 3998	Predicting Outcomes of Cochlear Implantation in Vestibulocochlear Malformations using Artificial Intelligence and Machine learning: Opportunities and Challenges.	Prahlada Nayaka Basavanthappa
OP 4018	Voice Acoustic Characteristics of the Cochlear Implant Children with Older Age at Implantation: Correlation to Auditory Performance	Mahmoud Mahrous
OP 4020	A Preliminary Study: Does Sequential or Simultaneous Bilateral Cochlear Implantation Have an Effect on Cognitive Skills in Children?	Nuriye Yildirim Gökay
OP 4021	The Effect of Aging on Temporal and Spectral Auditory Processing in Cochlear Implant Recipients	Cennet Reyhan Tanboğa
OP 4033	The Relationship Between Electrode Neuron Interface and Hearing in Noise in CI Users with and without Inner Ear Malformation: Preliminary Results	Merve Ozses
OP 4089	The Effects of Sequential Bilateral Cochlear Implantation on Speech in Noise Perception in Children: Preliminary Findings	Merve İkiz Bozsoy
OP 4095	Auditory Attention and Speech Recognition in Noise in Children with Hearing Aids	Samet Kiliç
OP 3996	How Artificial Intelligence and Machine Learning can help in advancing CI science?	Prahlada Nayaka Basavanthappa

OP-3998 Predicting Outcomes of Cochlear Implantation in Vestibulocochlear Malformations Using Artificial Intelligence and Machine Learning: Opportunities and Challenges.

Prahlada Nayaka Basavanthappa¹

¹ Basaveshwara Medical College & Hospital

Introduction: Cochlear implantation offers a significant breakthrough in managing severe to profound sensorineural hearing loss, especially in patients with vestibulocochlear malformations. Accurate prediction of post-implantation outcomes is paramount for effective patient counseling, surgical decisions, and setting realistic expectations. Traditional outcome prediction tools encompass audiological assessments, imaging studies, and functional evaluations. However, with the advent of Artificial Intelligence & Machine Learning, there's potential to harness extensive datasets, combining patient data, imaging findings, and surgical outcomes, to unearth intricate patterns and correlations. These advanced algorithms promise greater prediction accuracy. In this context, we introduce our early experiences with employing AI & ML techniques for such outcome predictions.

Method: Within a tertiary care teaching institution, this pilot study encompassed 26 patients with a range of vestibulocochlear malformations. An artificial neural network, grounded in Artificial Intelligence and Machine Learning, was crafted. Emphasis was on two main elements: temporal bone imaging, which incorporated both High-Resolution Computed Tomography and Magnetic Resonance Imaging, and predictive heat maps specifically designed to classify types of vestibulocochlear anomalies and their associated clinical indicators. Outcomes predicted through Artificial Intelligence and Machine Learning were then contrasted with findings from other distinguished research studies.

Results: Algorithms rooted in Artificial Intelligence and Machine Learning showcased remarkable efficacy. They adeptly utilized expansive datasets that spanned patient demographics, audiological records, imaging outcomes, anatomical categorizations, functional evaluations, and surgical results. These methods displayed a unique capacity to decipher intricate data relationships, unveiling predictive patterns that might otherwise remain undiscovered to human scrutiny. By merging diverse data sources, Artificial Intelligence and Machine Learning models demonstrated potential in creating predictive constructs with superior accuracy.

Conclusion: Techniques grounded in Artificial Intelligence and Machine Learning manifest considerable promise in predicting the outcomes of cochlear implantations in individuals with vestibulocochlear malformations. Their prowess in handling voluminous datasets and discerning complex data correlations suggests they could play a pivotal role in refining the accuracy of surgical outcome projections.

Keywords: Cochlear Implantation, Vestibulocochlear malformations, Artificial Intelligence, Machine Learning, Outcomes prediction.

OP-4018 Voice Acoustic Characteristics of the Cochlear Implant Children with Older Age at Implantation: Correlation to Auditory Performance

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1 Imam Abdulrahman Bin Faisal University

Introduction: To study the voice acoustic parameters in relatively late cochlear implant (CI) children with different auditory performances and compare them to normal-hearing children.

Method: The study included 84 children: a control group consisting of 50 children with normal hearing and normal speech development; and a study group consisting of 34 pediatric CI recipients. The study group was further subdivided into two subgroups: study group one: 24 children with excellent auditory performance, and study group two: 10 children with fair auditory performance (according to speech recognition scores and aided pure-tone thresholds). The mean age at the time of implantation was 3.6 years for study group one and 3.2 years for study group two. Voice acoustic analysis was performed on all children in the study.

Results: Analysis of voice acoustic parameters revealed a statistically significant delay in both study groups in comparison to the control group. However, there was no statistically significant difference between the two study subgroups.

Conclusion: On the suprasegmental speech perception level, objective acoustic voice measurements demonstrated a significant gap between late-onset CI children, even those with excellent auditory performance, and normal hearing children.

Keywords: Voice Acoustic Characteristics, Cochlear Implant

OP-4020 A Preliminary Study: Does Sequential or Simultaneous Bilateral Cochlear Implantation Have an Effect on Cognitive Skills in Children?

Nuriye Yıldırım Gökay¹, Bülent Gündüz¹, Drilon Pula¹, Recep Karamert¹, Hakan Tutar¹,
Mehmet Birol Uğur¹
1 Gazi University

Introduction: The aim of this study was to investigate the effect of sequential or simultaneous surgery on attention and memory skills in children with bilateral cochlear implants.

Method: This study included 30 volunteer children (15 sequentially and 15 simultaneously operated) between the ages of 6 and 9 years with bilateral cochlear implants. Test of Language Development - Primary (TOLD-P:4) was used to assess school-age language skills and STROOP Test, Visual Aural Digit Span Test (VADS), and Cancellation test were performed to evaluate attention and memory skills. The children had no additional cognitive disabilities preoperatively and were all literate. Nonparametric test methods were used in the analysis and the statistical significance level was determined as 0.05.

Results: All children showed below-average performance compared to age-normal values of the school-age language test. Furthermore, the median and range values of hearing thresholds in the free field with bilateral cochlear implants were 33 and 20 dB HL, respectively. Statistically significant differences were found between children with sequential and simultaneous bilateral cochlear implants in terms of STROOP test completion times and VADS test auditory verbal scores (respectively, $p = 0.021$ and $p = 0.044$). The two groups showed statistically similar performance in the Cancellation test and other subtests ($p > 0.05$).

Conclusion: This study is one of the limited numbers of studies investigating attention and memory skills in children with sequential and simultaneous bilateral cochlear implants. Even with similar hearing and language development, children with sequential bilateral cochlear implants underperformed in some selective attention and short-term memory skills. If an appropriate candidate is available, it is advised to continue with the second cochlear implantation immediately.

Keywords: Bilateral Cochlear Implantation, children, cognitive

OP-4021 The Effect of Aging on Temporal and Spectral Auditory Processing in Cochlear Implant Recipients

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2 Marmara University, School of Medicine, Audiology Department, İstanbul, Turkey

Introduction: Aging and hearing loss have negative effects on auditory processing and speech understanding in noise. In our study, a multidimensional evaluation was made by measuring spectral and temporal auditory processing skills, speech understanding in noise and auditory discrimination skills with acoustic change complex (ACC) in the same age individuals with normal hearing and with cochlear implants. The aim of our study is to investigate the age-related changes in cochlear implant according to these parameters and to evaluate the differences compared to individuals with normal hearing.

Method: A total of 57 individuals using cochlear implants and 60 individuals with normal hearing were included in our study, stratified into six age groups: 18-30, 31-40, 41-50, 51-60, 61-70, and 71 years and above. Temporal modulation transfer function (TMTF) (10 Hz- 50 Hz), Spectral-temporally modulated ripple test (SMRT) , Turkish Matrix Test [Adaptive Non-Adaptive (+10 SNR and 0 SNR)], ACC (without noise, +10 SNR and 0 SNR) tests were administered.

Results: Statistically significant differences were obtained between cochlear implant and individuals with normal hearing in TMTF, SMRT, Turkish Matrix (without noise, +10 SNR and 0 SNR) tests in all age groups ($p<0.05$). Statistically significant differences were observed in the study groups compared with control groups in the ACC N1 and P2 latencies in the without noise condition and in the presence of +10 SNR noise in the 18-30, 31-40, 41-50 age groups. When the intra-group wave latencies were evaluated, no statistically significant difference was observed with aging.

Conclusion: The results of the study showed that aging impairs central auditory processing and speech comprehension skills in both normal hearing and cochlear implant. This deterioration was higher in cochlear implant compared to individuals with normal hearing. The effect of aging was more pronounced on temporal-spectral resolution and speech understanding with noise than on auditory discrimination.

Keywords: cochlear implant, aging, central auditory processing, electrophysiology

OP-4033 The Relationship Between Electrode Neuron Interface and Hearing in Noise in Ci Users with and Without Inner Ear Malformation: Preliminary Results

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1 Hacettepe University

Introduction: The postoperative performance, especially speech perception, of cochlear implant users is affected by factors related to individual differences, anatomical changes, and the status of intracochlear electrodes. The position of the intracochlear electrode, the distances from the electrode-neuron interface to the corresponding modiolus, the amount and density of excitable nerve fibers, and the depth of insertion of the electrode play a significant role in the postoperative performance and needs more research from this perspective among CI users. The study aims to examine the effect of electrode neuron interface on hearing in noise test in CI users with normal cochlea and inner ear anomalies.

Method: The study included 21 cochlear implant users with 10 normal cochlea (mean age= 8,6±2,4) and 11 inner ear anomalies (mean age= 9,09±2,07). Cochlear implant users were tested on four conditions of the HINT. To obtain information about the electrode-neuron interface, electrode position and insertion angle from intraoperative X-RAY images were calculated using the ‘cochlear view’ method described by Xu et al. (2000). The angles of insertion of all the electrodes were determined and analyzed according to variables. Between-group analysis were conducted.

Results: CI users with normal cochlea achieved better results in all three HINT conditions than CI users with inner ear anomalies. These were quiet, NipsilateralSFront and NFrontSFront conditions ($p<0,001$, $p=0,001$, $p=0,02$, respectively). There was no significant difference in the condition of NcontralateralSFront ($p=0,51$). In the CI groups with normal cochlea and inner ear anomalies, the electrode insertion depth was $680,0\pm122,2^\circ$ and $453,5\pm111,5^\circ$, respectively ($p=0,004$). Also, the insertion angle moderately correlated with quiet and NipsilateralSFront conditions. The results from these experiments will provide an improved understanding of the effects of suboptimal CI electrode-neuron interfaces on the speech perception in noise of CI users. According to the preliminary analysis, findings result in differences between CI users with and without normal cochlea.

Conclusion: Our initial analysis may indicate that the electrode-neuron interface may affect hearing in noise results in pediatric CI users with normal cochlea and inner ear anomalies. A more precise analysis is going to be made after the addition of new cases.

Keywords: electrode neuron interface, speech perception, cochlear implant, insertion angle

OP-4089 The Effects of Sequential Bilateral Cochlear Implantation on Speech in Noise Perception in Children: Preliminary Findings

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Introduction: Bilateral cochlear implant (BiCI) offers advantages over unilateral cochlear implant (UCI), including greater speech recognition in quiet and noise by virtue of binaural hearing benefits. BiCI may be performed sequentially or simultaneously. It seems that the shorter time between the implantations improve the hearing results. In this study, we aimed to compare the speech in noise (SiN) perception between UCI and BiCI condition in children with BiCI users and to investigate the relation between implantation time intervals and SiN perception.

Method: The present study used the Turkish version of the Hearing in Noise Test (HINT) to investigate SiN perception in 15 children aged 6.0-8.8 years (mean age 7.33 ± 1.03), including children with BiCIs sequentially. All children had congenital severe to profound hearing loss, and they received their first implant between 12 and 24 months of age. The mean inter-implant delay was 2.13 ± 0.84 years. The HINT test was administered to participants in both the condition of their first implant (UCI) and the condition of bilateral use (BiCI).

Results: There was a significant difference between the SiN perception performance of UCI and BiCI conditions ($p < 0.001$). Also, there was no significant correlation between implantation time intervals and SiN perception ($p > 0.05$).

Conclusion: This study showed that children require a higher signal to noise ratio in the UCI condition than in the BiCI condition.

Keywords: sequential bilateral cochlear implant, speech in noise, cochlear implantation, pediatric audiology

OP-4095 Auditory Attention and Speech Recognition in Noise In Children with Hearing Aids

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1 Trakya University

2 Hacettepe University

Introduction: Speech recognition, or the ability to accurately perceive and encode information in a speech signal, is a basic requirement for vocabulary development in all children, including those who wear hearing aids (HAs). Relative to children with normal hearing, children with HAs generally show poorer speech perception performance on word recognition tasks. A number of factors have been shown to be associated with better speech perception in children with HAs, including higher aided audibility and cognitive skills like working memory and auditory attention. **Purpose:** The aim of this study is to examine the relationship between speech recognition in noise (SPIN) and auditory attention (AA) performances of children with hearing aids and to compare the performances of these two skills with those of their peers with normal hearing.

Method: The study group included 36 bilateral behind-the-ear HA users (14 females and 22 males) between 9 and 15 years old. All participants had at least six months of experience using HAs. The age and gender of the control group participants were determined to be compatible with the study group. Data Collection and Analysis Test of Attention in Listening (TAIL) was used to evaluate the AA skills of participants. Hearing in Noise Test (HINT) was used to evaluate SPIN. All tests were carried out in a single session in a sound-isolated room via a computer. MANOVA tests were used to compare HINT and TAIL scores between groups. Pearson Correlation Analyses were used to investigate the relationship between TAIL and HINT scores.

Results: MANOVA showed a significant main effect between groups ($p=0.001$, $F=14.107$, partial $\eta^2=0.516$). Post hoc analyses showed significant differences between groups in all conditions of TAIL and HINT. There was a significant relationship between TAIL and HINT scores ($p=0.01$, $r=0.69$) in the study group.

Conclusion: Children with HAs have less attention and the ability to understand in noise than their normal peers. There is a significant relationship between AA and SPIN. With the measures to be taken to increase the attention performance of children using hearing aids, their ability to understand speech and their academic-social performance can be increased.

Keywords: children hearing aids attention speech recognition in noise

OP-3996 How Artificial Intelligence and Machine Learning Can Help in Advancing Ci Science?

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Introduction: The field of artificial intelligence (AI) and machine learning (ML) has experienced significant growth, finding increasing applications in healthcare research and personalized precision medicine. These technologies are being utilized to manage and analyze vast volumes of health data, health insurance claims, medical imaging, surveillance, and more. With advancements in hardware components and rapid progress in machine learning algorithms, particularly deep learning methods, the healthcare industry is benefiting in various ways. AI and ML are enabling early disease detection, improving diagnosis, uncovering novel treatments and drug interactions, enhancing disease monitoring, and much more. The development and research in this field are progressing at an unprecedented pace, offering immense potential for transformative advancements in healthcare. Even though cochlear implants have become mainstay in the management of patients with sensory-neural hearing, there are still many uncertainties waiting to be addressed at every stage of the cochlear implantation process. Hereby we present our experience with AI & ML platforms in addressing those issues.

Method: In this pilot study, artificial neural networks based on artificial intelligence and machine learning algorithms were developed for ten critical steps in cochlear implantation. These steps are 1. Aetiology of the SNHL, 2. Pre-operative imaging, 3. Audiological evaluation, 4. Electrode selection based on cochlear morphology, 5. Anatomical variations and probable surgical difficulties, 6. Speech and sound processing, 7. Personalized mapping, 8. Predictive maintenance, 9. Prediction of outcomes. 10. Data analysis and research. In this combined retrospective and prospective data evaluation, the AI & ML findings were with conventional evaluation methods.

Results: Preliminary findings regarding the usability of AI and ML in various critical stages of Cochlear Implantation are promising. Significant statistical results have been observed in areas such as speech and sound Processing, personalized mapping, noise Reduction, predictive maintenance, signal processing optimization, and data analysis and research when incorporating AI and ML technologies.

Conclusion: AI and ML offer immense potential to revolutionize cochlear implant science. By enhancing the cochlear implant outcomes, the AI and ML can contribute to the ongoing advancement of cochlear implants, ultimately improving the quality of life for individuals with hearing loss.

Keywords: Cochlear implantation, Artificial Intelligence, Machine learning, Profound Sensorineural deafness.

“7th World Congress of Cochlear Implants in Emerging Nations”

16 September 2023 Miscellaneous Seminer Hall F Moderator: Emre Ocak 09:00 - 10:15		
OP 3546	Our Experience with Auditory Brainstem Implant in Children	Norma Pallares
OP 3931	Cochlear implantation experience in 135 cases: analysis and results	Kussainova Dina
OP 3975	Surgical Results of Cochlear Implantation in 500 Patients by Veria Technique	Vasanthi Anand
OP 4104	Ambulatory paediatric cochlear implantation: safety, efficacy and faisability from a study of 220 infants	Hajjij Amal

OP-3546 Our Experience with Auditory Brainstem Implant in Children

Leticia Diamante¹, Vicente Diamante¹

¹ C1c Profesor Diamante

Introduction: The aim of this study was to evaluate results with the Auditory Brainstem Implant (ABI) in 16 children with aplasia or hypoplasia of cochlear nerve.

Method: This is a retrospective case review study of 16 children with ABI. 13 children with cochlear nerve aplasia and 3 children with hypoplasia of the cochlear nerve underwent retro sigmoid approach for placement of the ABI on the Cochlear Nucleus (CN) surface. Children underwent otological, audiological, neurological, psychological evaluation pre-ABI. 13 children had radiological contraindications to CI surgery because the MRI revealed bilateral cochlear nerve aplasia and 3 children had hypoplasia of the cochlear nerve. TA, MRI evaluation, subjective and objective audiological assessment was performed in these congenital deaf children who do not have benefits with hearing aids or CI previous the ABI indication. The correct position of the electrodes was monitored during surgery through the Electrical Auditory Brainstem Responses (eABR). The eABR (during cx and previous to tune up) was used as useful orientation to map the speech processor. The audiological outcomes were evaluated using the CID Speech Perception Categories (Geers, 1994) through the Latin American Protocol, Free Field with ABI, it-MAIS-MAIS scales and Quality of Life evaluations (KINDL and CCIPP questionnaires) were performed.

Results: No surgical or postoperative complications were observed. Auditory sensations were observed in some patients with the activation of the device. They are showing variable auditory improvements through specific audiological evaluation and Scales through the parents' opinion. Children show better quality of life in accordance with parent's evaluation after ABI use.

Conclusions: In these children with absent or hypoplastic cochlear nerves the ABI was an effective way of providing hearing. The presence of other handicaps and the age at implant (after sensible periods) produce poorer results. Surgery, programming, auditory habilitation, family support are variables that influence in results. Results are slower and poorer when compared with CI children with normal cochlea and cochlear nerve.

Keywords: Auditory Brainstem Implant, aplasia, hypoplasia of the cochlear nerve, speech perception, it-MAIS and MAIS scales. retrosigmoid approach, quality of life

OP-3931 Cochlear Implantation Experience in 135 Cases: Analysis and Results

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Introduction: The aim of this study was to analyze pediatric population undergone a cochlear implantation and evaluate the effectiveness of this procedure in 8 months period. Such parameters as age, gender, implanted device, complication rate and post operative efficacy were evaluated. **Study design:** Retrospective analysis of patients undergone cochlear implantation.

Method: Our retrospective study included a total of 135 children (65 males, 70 females) undergone cochlear implantation in Aksay University Clinic from January 2022 to August 2022. Follow-up period ranged from 8 to 15 months.

Results: Mean age at the time of cochlear implantation was 3,9 years (age range 6 months – 17 years 8 months). A total of 21 (15,5%) complications were registered among 135 patients. Of these, 9 (6,6%) were major and 12 (8,8%) were minor complications. 84% (n=113) of parents noted the presence of reaction to a noise after device setup in 2 month follow up period, 98% (133) noted the presence of reaction to a noise after device setup in 4 month follow up period. Our study showed almost the same complication rate as reported in the literature and found no statistically significant differences between implant type and it's efficiency.

Conclusion: Cochlear implantation is a safe and modern surgical procedure for treatment of sensorineural hearing loss associated with a low complication rate and contributing to a hearing performance. These benefits appear to keep stable over the years giving the patients an opportunity to live a quality life.

Keywords: cochlear implantation, minor complications, major complications, hearing loss, efficiency.

OP-3975 Surgical Results of Cochlear Implantation in 500 Patients By Veria Technique

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Introduction: Veria technique of Cochlear Implantation is non-Mastoidectomy trans-canal approach to the Cochlea. This technique is done by endaural approach and uses a tunnel drilled in outer canal wall for the electrode to reach the middle ear and cochlea. (1) We present our experience in intra-operative surgical challenges, postoperative complications, device failure, revision, explantation, re-implantation and device extrusion. This presentation aims at explaining our experience with 500 cases and to see the usefulness and safety of this technique.

Method: It is a retrospective study of 500 Cochlear Implantation surgeries done from Jan 2014 till May 2022. The age of patients in the study ranged from 8 months to 79 Yrs. This comprised Pre-lingual, Perilingual, and Post-lingual subjects. The severity and nature of hearing loss included bilateral Severe to Profound sensorineural hearing loss, Auditory neuropathy, Single sided deafness, Ossified cochlea and various inner ear anomalies. These patients underwent Cochlear Implantation using implants from Cochlear, Medel, Neurelec, and Advanced Bionics companies. These patients were followed up for a minimum of 1 year to maximum of 7 yrs. after implantation. Intra-op telemetry of all patients was compared with their latest maps to understand changes which signified electrode handling.

Results: Among 500 cases, intra-operative and post operative infections were nil. Two patients died unrelated to cochlear implantation later. One patient had explantation. Two underwent explantation and re-implantation in the same sitting. Three patients had facial paresis post-operatively and they recovered completely with steroids and physiotherapy. Injury to chorda tympani happened in 5 cases. Some patients complained of vertigo and Tinnitus. Receiver stimulator was exposed in two patients due to trauma which was covered by flap rotation surgery. Intra cochlear pressure changes and handling the electrode during insertion have significant impact on neural responses. It is evident from the data gathered that there was no damage caused to electrodes during insertion and Intra cochlear pressure changes are kept minimal. This is evident from the values of neural responses.

Conclusion: In our experience with this large series, we had all kinds of variables in terms of anatomy, age group, different manufacturers, and geographic socio-economic status. The technique used was trans-canal Veria in all cases. The same surgeon performed all surgeries. The above data suggests that the surgical technique has minimal complications and is safe procedure for cochlear implantation. References: 1.Kiratzidis T, Iliades T, Arnold W. Veria Operation. II. Surgical results from 101 cases. ORL J Otorhinolaryngol Relat Spec. 2002 Nov-Dec;64(6):413-6. doi: 10.1159/000067577. PMID: 12499765.

Keywords: Cochlear, Transcanal Technique, Anomalies, Facial nerve, Neural Response

**OP-4104 Ambulatory Paediatric Cochlear Implantation: Safety, Efficacy and Faisability
From a Study Of 220 Infants**

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Introduction: Outpatient surgery for cochlear implantation is still not generalized in Morocco. We present here the first report in our country on the surgical technique used, the anaesthetic technique, the postoperative data and the success rate of outpatient surgery in our department and also the follow up of these patients. This study aims to evaluate the safety and efficacy of outpatient cochlear implantation as primary objective. The secondary objective is to report the outcome of cochlear implantation in these infants.

Method: Retrospective, observational, single centre study of paediatric cases admitted in our outpatient surgery department at Cheikh Khalifa International University Hospital and followed at the Casablanca Audition center between January 2016 and January 2022. We included children aged between 8 months and 15 years, candidate to cochlear implantation in an ambulatory fashion.

Results: The mean age of our patients was 4.41 years 3.46 years, 57% of them were male (125 patients). The majority of our patients came from an urban environment and the majority (89.1%, 196 patients) had no social security coverage. 51% of our patients had risk factors of deafness and these were dominated by consanguinity (25%), family history of deafness (7%), history of neonatal asphyxia (6.8%), prematurity (4%) and meningitis (3%). The average hospital stay of our patients did not exceed 8 hours. Our outpatient success rate was 91% with 189 patients implanted and discharged the same day from the hospital. The remaining 9% were kept for surveillance surveillance because of social reasons (5 patients) or for treatment of their minor complications (5 cases of dizziness and 8 cases of vomiting). The mid-term complications were minor (oedema, pain, infection) and only one case required explantation .

Conclusions: Cochlear implant surgery can be performed safely and effectively on an outpatient fashion without increasing morbidity. Ambulatory surgery offers similar surgical outcomes to conventional management with benefits to the patient and the healthcare system. A larger study on the cases of ambulatory surgery and its generalization to other hospitals in Morocco would help to better define the advantages of this type of surgery and to evaluate its safety.

Keywords: Cochlear implant, ambulatory surgery, paediatric cochlear implant

“7th World Congress of Cochlear Implants in Emerging Nations”

16 September 2023 Outcomes of Auditory Implants (2) Seminer Hall F Moderator: Merve İkiz 10:45 - 12:00		
OP 3985	Difficulties Encountered By Patients Post Cochlear Implantation In India And Our Solution For It	Akshay Wachasundar
OP 3921	Outcomes of 1100 Cochlear Implants in the state of U.P. under Govt. Program	Rohit Mehrotra
OP 3935	Comparison of Cortical Auditory Maturation Between Children with Cochlear Implants vs Normal-Hearing Children Attending Mainstream School	Noor Dina Hashim
OP 4191	Assessing Quality of Life via Patient Reported Outcome Measures in Adults with Cochlear Implant Users: A Systematic Review	Mustafa Karabulut
OP 4287	Investigation of Cognitive and Linguistic Abilities in Bilateral and Unilateral Pediatric Cochlear Implant Users: A Preliminary Study	Beyza Demirtas

OP-3985 Difficulties Encountered by Patients Post Cochlear Implantation in India and Our Solution for it

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¹ Moraya Multispecialty Hospital

Introduction: Cochlear implants (CIs) are remarkable solutions for severe to profound sensorineural hearing loss globally. Access to cochlear implants in developing countries is not without challenges. This study examines the challenges of CI users in in developing nation like India.

Method: The study is a cross-sectional survey that used a convenient sampling technique to sample 170.

Results: Results revealed that majority of CI users belonged to low socio-economic strata having yearly income below Rs. 75000/-(905.01 USD) per year. The majority had severe to profound hearing loss bilaterally but used CI unilaterally. Cost and access to CI accessories and management have affected the economic, social and psychological life of the CI users and that of their relations. Another major issue encountered was unavailability of special educators providing Auditory Verbal Therapy in the post implant rehabilitation phase. Most of our patients hailed from rural area and this warranted to be a hurdle in attending speech therapy as AVT services were mostly available in the urban parts. Another challenge in paediatric cochlear implantation is mandating physical attendance of a responsible parent/guardian for AVT of the child which is mostly difficult considering that both parents are breadwinners of their family. Maximum patients and their family were from rural areas which came with a typical rigid attitude and unawareness towards post operative AVT.

Conclusion: To tackle all these issues, we propose a novel idea of a residential rehabilitation centre which houses the mother and her cochlear implanted child for 2 years where in, not only the child get therapy by special educator, but even the mother is trained to become a special educator herself. Mothers who are educationally qualified can be motivated to undergo DECSE. We also propose a special ‘parent training programme’ for the mothers who are not educationally qualified to undertake certified courses. With this, the mother will be able rehabilitate not just her own child but can also extend her skills to rehabilitate children living in her rural locality as well and thus can create awareness herself. It can also provide herself a source of income to support to her child’s cochlear implant accessories.

Keywords: cochlear implantation, difficulties, hearing loss,

OP-3921_Outcomes of 1100 Cochlear Implants in the State of U.p. Under Govt. Program

Rohit Mehrotra¹

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Introduction: This retrospective study is based on assessment of outcome of cochlear implantation at Late Dr. Shiv Nath Mehrotra Charitable ENT foundation between 2016 to march 2023 under ADIP (assistance to disable persons) scheme by taking into account various scoring systems like category of auditory performance (CAP), Speech intelligibility rating (SIR) and Glasgow children benefit inventory (GCBI).

Method: 1100 children who were implanted between 2016 to march 2023 at Late. Dr. Shiv Nath Mehrotra Charitable ENT Foundation were included in the study. The results were analyzed using the above scoring system to assess the performance level and quality of life of each implanted children taking into consideration practical issues in Indian set up.

Results: 90% of total children implanted showed significant improved hearing, 80% with significant speech benefit and 90% with improved quality of life.

Conclusion: Outcome in terms of quality of life, auditory perception and rehabilitation was very good. The ADIP (assistance to disabled persons) scheme of central government has been a blessings for lower socio economic status children. Considerable improvement in hearing, speech and overall quality of life in almost 80% of children.

Keywords: category of auditory performance, speech intelligibility rating, Glasgow children benefit inventory

OP-3935 Comparison of Cortical Auditory Maturation Between Children with Cochlear Implants vs Normal-Hearing Children Attending Mainstream School

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Introduction: The cortical auditory evoked potential (CAEP) test is an objective and non-invasive method of assessment to quantify the development of central auditory pathways. Children with congenital hearing loss who received hearing restoration early have more neural plasticity opportunities than those without hearing assistance. **Objective:** We aimed to assess the auditory growth and learning abilities of children who had cochlear implants and were attending mainstream school and compare them with their normal-hearing peers through the cortical auditory maturation measurement.

Method: This was a quasi-experimental design- post-test with control. Subjects were cochlear-implanted children and normal-hearing peers attending mainstream schools, as well as parents and teachers of the children. A total of 60 children from 7 to 12 years old were divided into intervention (n=30) and control groups (n=30) in this study. The P1 wave latency value of CAEP of each group was measured and compared. The auditory performances of the implanted children were performed using CAPS-II and SIRS. Educational performance measurements were done using a validated parents' questionnaire and Screening Instrument for Targeting Education Risk (SIFTER) from a teacher. The association of auditory speech perception with academic performance among children with CI was assessed.

Results: The results showed the P1 wave latency value of the CAEP in implanted children was prolonged as compared to their normal-hearing peers. However, there was a positive correlation between auditory speech perception with academic performance among children with CI.

Conclusion: CAEP is a useful test to quantify the development of central auditory pathway in implanted children. Cochlear implantation improves auditory speech perception as well as the academic performance of these children, putting them on par with their normal-hearing peers.

Keywords: cortical auditory evoked potential; cochlear implant; central auditory pathway

OP-4191 Assessing Quality of Life Via Patient Reported Outcome Measures in Adults with Cochlear Implant Users: A Systematic Review

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Introduction: This systematic review aims to assess the most commonly used patient-reported outcome measures (PROMs) regarding the quality of life in adults with cochlear implants.

Method: We conducted a comprehensive systematic review of the PubMed and WoS databases, covering the period from 1973 to March 1, 2023. PROMs were defined as measures that capture the subjective experience of quality of life in adult cochlear implant users. Two independent reviewers selected studies that utilized PROMs, encompassing full-text clinical trials to case-control studies, all written in English. Discrepancies were resolved through consensus between the reviewers. Out of the initial 2435 articles identified in the literature search, 221 full-text articles were assessed, and 28 studies met the inclusion criteria for data collection.

Results: We identified a total of 13 PROMs. The three most commonly used PROMs were Nijmegen Cochlear Implant Questionnaire, Glasgow Benefit Inventory, and Health Utility Index- 3. These PROMs were validated to assess the impact of cochlear implants on hearing-related quality of life, benefits of cochlear implants, and overall health-related quality of life in adults with cochlear implants, respectively. The items from these PROMs were further categorized into three domains based on the International Classification of Functioning, Disability, and Health: Activity, Participation, and Body Functions and Structures.

Conclusion: This systematic review highlights the commonly used PROMs for evaluating the quality of life in adults with cochlear implants. The identified PROMs offer valuable insights into various domains, contributing to a better understanding of the subjective experiences in this population.

Keywords: Quality of life, cochlear implant, patient-reported outcome measures, questionnaire

OP-4287 Investigation of Cognitive and Linguistic Abilities in Bilateral and Unilateral Pediatric Cochlear Implant Users: A Preliminary Study

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1 Health Sciences Institute

Introduction: A total of 17 cochlear implant users, 10 unilateral and 7 bilateral, between the ages of 7 and 11, were included in the study. Turkish marking test and working memory scale were applied to evaluate the cognitive skills of the participants. Language skills were evaluated with the phoneme discrimination test included in the Asse test battery. The effect of unilateral and bilateral implantation on quality of life was evaluated with Hear-ql-26.

Method: A total of 17 pediatric cochlear implant users, 10 unilateral and 7 bilateral, between the ages of 7 and 11, were included in the study. Turkish marking test and working memory scale were applied to evaluate the cognitive skills of the participants. Language skills were assessed with the phoneme discrimination test included in the Asse test battery. The effect of unilateral and bilateral implantation on quality of life was evaluated with Hear-ql-26.

Result: The Mann Whitney U test was used to investigate the difference between cognitive and linguistic skills of unilateral and bilateral pediatric cochlear implant users. There was no statistically significant difference between Turkish marking test, working memory scale, phoneme discrimination test findings and quality of life ($p>0.05$).

Conclusions The results of the study suggested that both unilateral and bilateral implantation were approximately equally effective in facilitating the development of cognitive and language skills in children with cochlear implants. More research is needed to determine the effects of this result on other cognitive or linguistic functions and to explore other potential benefits and disadvantages of unilateral and bilateral cochlear implant use in children.

Keywords: Cochlear implants, working memory, pediatric hearing loss, cognitive skills

“7th World Congress of Cochlear Implants in Emerging Nations”

16 September 2023 Rehabilitative Approaches in CI Seminer Hall F Moderator: Aysun Kocabay 12:00 - 12:30		
OP 4068	Association Between Cochlear Implant Usage and Changes in Depressive Symptoms Among Adults	Sıdıka Cesur Coskun
OP 4071	Sensory Processing and Balance in Adult Cochlear Implant Users; Preliminary Findings	Sevgi Kutlu

OP-4068 Association Between Cochlear Implant Usage and Changes in Depressive Symptoms Among Adults

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2 Near East University

Introduction: To examine the impact of hearing loss on mental well-being, particularly depressive symptoms, and the role of CIs in addressing these issues.

Method: This study comprised two distinct groups: the study group, consisting of 20 individuals with bilateral profound hearing loss who were recipients of CIs (mean age=40.1±12.4 years), and the control group, consisting of 21 adults with normal hearing (mean age=32.9±9.3 years). Participants in both groups filled out the Beck's Depression Inventory (BDI) and Demographic Information (DI) form, which was developed by using a cross-sectional questionnaire design and delivered to the participants by telephone.

Results: While the mean rank of BDI scores of the group with normal hearing was 20.32, it was 21.73 in the group with CI. There was no statistically significant difference in BDI scores between the CI group and the normal hearing group ($p=0.704$). Multiple regression analysis was conducted to examine the relationship between gender, age, marital status, income level, education level, and depressive symptoms. The model was not statistically significant, $F(5,35) = 1.022$, $p = 0.420$, and it explained only 0,3% of the variance in depressive symptoms. None of the independent variables had a significant effect on depression symptoms.

Conclusion: The findings of this study show that individuals with CI and people with normal hearing have similar depressive symptoms. The lack of statistically significant difference between the two groups indicates that the presence of a cochlear implant does not contribute to an increased likelihood of experiencing depressive symptoms. In addition, the results of multiple regression analysis obtained in our study suggest that demographic and socioeconomic factors such as educational status, income level, and marital status do not have a statistically significant effect on depression symptoms. The low percentage of variance explained by the model indicates that other unexplored factors may play a more effective role in determining depressive symptoms. It is also important to note that these findings are specific to the participants in this study and cannot be generalized to the wider population.

Keywords: Cochlear Implants, Depression, Socioeconomic Factors, Mental Well-being, Hearing Loss

OP-4071 Sensory Processing and Balance in Adult Cochlear Implant Users; Preliminary Findings

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Introduction: Sensory integrity enables us to use our bodies effectively in interacting with our environment. Pathologies affecting the visual, vestibular, and somatosensory systems, which are parts of sensory processing, result in balance disorders. Dizziness and vestibular problems are frequently reported potential complications after cochlear implant surgery. Cochlear implantation has been shown to reduce postoperative vestibular function in the implanted ear. The study aimed to evaluate adult cochlear implant users' quality of life, balance performance, and sensory integration.

Method: The study included 10 subjects with normal hearing and 8 cochlear implant users. The mean age of both groups was 33 (± 3.06) and 30.75 (± 5.02) years, respectively. All subjects underwent a hearing evaluation and their balance performance was assessed by Computerized Dynamic Posturography (CDP). The Adolescent/Adult Sensory Profile completed by the individual was used to evaluate sensory processing skills. Finally, a 36-Item Short Form Survey (SF-36) assessed the quality of life.

Results: In the Adolescent/Adult Sensory Profile a significant difference was obtained between both groups in low registration and sensory avoidance patterns. In the evaluation with CDP, a difference was obtained between the composite and vestibular scores of both groups. This difference was statistically significant. The difference between the quality of life of cochlear implant users and groups with normal hearing was significant only in the physical function sub-parameter.

Conclusion: Factors such as the inability to reach sufficient auditory stimuli due to hearing loss and the occurrence of vestibular problems that may be seen after cochlear implant surgery limit the amount and quality of sensory stimuli obtained from the environment by individuals with hearing loss. Individuals who use cochlear implants may prefer to live isolated from society due to problems and this situation may negatively affect the quality of life of individuals. In conclusion, it should be kept in mind that multisensory assessment and therapy programs should be implemented when working with cochlear implant users.

Keywords: sensory integrity, cochlear implant, balance

“7th World Congress of Cochlear Implants in Emerging Nations”

16 September 2023 Miscellaneous Seminer Hall F Moderator: Filiz Aslan 13:30 - 14:45		
OP 3523	Deaf Free Villages in India Documentary about the support of villages in India with big prevalence of hearing loss in the population	Dagmar Herrmannova
OP 3525	Bangladesh and hearing impaired children working in factories Documentary about the support of hearing impaired children working in factories from Dhaka, Bangladesh	Dagmar Herrmannova
OP 4112	Examination of Working Memory and Attention Skills in Cochlear Implant Users	Oğulcan Gündoğdu
OP 4286	The Impairment of Peripheral-Level Stimuli Reduces the Right Ear Advantage	Yağız Korkut
OP 4123	Evaluation of Audiological Applications and Working Conditions in Hearing Aid Sales and Application Centers Operating in Turkey	Muhammed Furkan Sağmak
OP 4094	Evaluation of Wideband Tympanometry Results in Patients with Tinnitus who Have Normal Hearing	Osman Tığ
OP 4081	The effects of virtual binaural audio on balance in Specific Learning Disability	Belde Culhaoglu
OP 4188	Evaluation of Communication Skills of Children with Hearing Loss Between 8-36 Months	Gülce Kirazlı
OP 3986	The Impact of Language Capacity on Theory of Mind in Children with Cochlear Implants	Özlem Topçu

OP-3523 Deaf Free Villages in India Documentary About the Support of Villages in India with Big Prevalence of Hearing Loss in the Population

Dagmar Herrmannova¹

1 Med-El

Introduction: Deaf Free Villages in India Documentary about the support of villages in India with big prevalence of hearing loss in the population Dagmar Herrmannova Senior Education & Special Projects Manager, Emerging Markets and Disadvantaged Groups Worldwide there are about 650 million people with a disability and 466 million people worldwide have disabling hearing loss People with hearing loss can benefit from devices such as hearing aids, cochlear implants, assistive listening devices They all need rehabilitation, language training, educational and social support Current production of hearing aids and CIs meets less than 10% of global need Most people/children with a disability, especially with the hearing loss have a lack of access to different services, rehabilitation, care and education and are in many places discriminated and excluded from the mainstream society, especially in developing countries.

Method: The lecture will explain the project supporting hearing impaired people from the villages in India where is big prevalence of deafness because of gens shared between the small population. Whole population of the villages is being systematically screened and helped with the devices they need and rehabilitation support from local organization of MERF from Chennai. Smiling Crocodile Charity organization is helping in India, collaborating with MERF organization and monitored and documented the project of deaf free villages in India.

Conclusion: During the presentation very unique short documentary movie (7 min) from the filed will be shown to the participants.

Keywords: deaf villages India hearing impaired support cochlear implants

**OP-3525 Bangladesh and Hearing Impaired Children Working in Factories
Documentary About the Support of Hearing Impaired Children Working in Factories
From Dhaka, Bangladesh**

Dagmar Herrmannova¹

1 Med-El

Introduction: Bangladesh and hearing impaired children working in factories Documentary about the support of hearing impaired children working in factories from Dhaka, Bangladesh Dagmar Herrmannova Senior Education & Special Projects Manager, Emerging Markets and Disadvantaged Groups and director of Smiling Crocodile Charity Worldwide there are about 650 million people with a disability and 466 million people worldwide have disabling hearing loss People with hearing loss can benefit from devices such as hearing aids, cochlear implants, assistive listening devices They all need rehabilitation, language training, educational and social support Current production of hearing aids and CIs meets less than 10% of global need Most people/children with a disability, especially with the hearing loss have a lack of access to different services, rehabilitation, care and education and are in many places discriminated and excluded from the mainstream society, especially in developing countries. Deafness is a major public health problem in Bangladesh. The country has a population of over 160 million, and about 13 million people are suffering from variable degrees of hearing loss of which 3 million are suffering from severe to profound hearing loss leading to disability. There are various causes of deafness in Bangladesh. Many children are forced to work in factories in Bangladesh where the conditions of work are very difficult. Most of the children are also exposed to a lot of noise and becoming hearing impaired.

Method: The lecture will explain the situation of these children, will show the evening schools for them and support of various organizations. Smiling Crocodile Charity organization supports Bangladesh, collaborating with local organizations and monitored and documented the project of hearing impaired children working in factories.

Conclusion: During the presentation very unique short documentary movie (7 min) from the factories and evening schools will be shown to the participants.

Keywords: hearing impaired Bangladesh Cochlear Implants

OP-4112 Examination of Working Memory and Attention Skills in Cochlear Implant Users

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Introduction: In addition to many factors, cognitive skills also contribute to Cochlear Implant (CI) performance. In this study, working memory and attention skills in CI users were evaluated.

Method: The verbal working memory of 36 adults with unilateral CIs was tested using digit span tests. Attention and inhibition abilities were assessed by using the Stroop test (both congruent and incongruent tasks).

Results: The mean score of the backward test was 4.38 ± 0.76 , and that of the forward test was 5.41 ± 0.84 . The mean digit span total score was found to be 11.22 ± 1.85 . The mean response times obtained in Stroop 1, Stroop 2, and Stroop 3 were 37.08 s, 29.25 s, and 65.33 s, respectively, and the interference time (incongruent trial) was found to be 36.08 s.

Conclusion: Compared to the standardization values of the digit span and stroop tests, lower scores were observed in CI users. Cognitive factors may be adversely affected by the use of CI compared to a person with normal hearing.

Keywords: Cochlear implant · Working Memory - Attention - Cognitive Abilities

OP-4286 The Impairment of Peripheral-Level Stimuli Reduces the Right Ear Advantage

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Introduction: Cochlear implant systems constitute a valuable intervention for individuals with severe to profound sensorineural hearing loss, under certain specified conditions. Dichotic listening, a significant testing method reliant on binaural hearing, entails the presentation of distinct auditory stimuli to each ear, thereby requiring information integration from both ears. Studies investigating dichotic listening consistently reveal a phenomenon known as the "right ear advantage," whereby information is processed more swiftly and accurately in the right ear. The primary aim of this research is to examine whether this advantage persists in individuals with bilateral severe to profound sensorineural hearing impairment who receive cochlear implants.

Method: The study involved participants with normal hearing, and the right ear advantage was evaluated through a dichotic word recognition task. The participants were tested under two conditions: bilateral normal hearing and bilateral vocoder processing. For the vocoder simulations of cochlear implant processing, a custom MATLAB script was used, employing 8 spectral channels with a 48 dB/octave filter bandwidth and a noise carrier. The dichotic listening assessment consisted of a list of 4 monosyllabic words, each comprising 25 monosyllabic words, resulting in a total of 100 words randomly presented to both the right and left ears. Participants were required to repeat the words, and the performance of the right ear was recorded as a percentage. To minimize bias and ensure reliable data, the administration of the 2 conditions was randomized for each participant.

Results: A statistically significant difference was obtained between the right ear performances in the bilateral normal hearing condition and the bilateral cochlear implant simulation condition, as indicated by the repeated-measures t-test result.

Conclusion: The right ear advantage was diminished with the use of a cochlear implant simulation in this study. This indicates that the disruption of auditory signal at the peripheral level adversely affects the right ear advantage at short term. In the following studies, we are planning to evaluate the impact of neural plasticity to provide insights into whether this advantage can be regained or not.

Keywords: Right ear advantage, dichotic listening, cochlear implant simulation

OP-4123 Evaluation of Audiological Applications and Working Conditions in Hearing Aid Sales and Application Centers Operating in Turkey

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¹ İstanbul Gelişim University

The aim of the study was to examine the working environment and conditions of audiologists and audiometrists working in hearing aid centers in Ankara, Istanbul and Konya, the audiological examinations they perform on patients, and the audiological equipment and other tools they use. Method: This study was planned to be conducted with audiologists and audiometrists working in hearing aid centers in Ankara, Istanbul and Konya. The survey will be conducted via Google Forms. First, the consent of the participants will be obtained. 48 questions will be asked to the participants. Statistical Data: Data are in the process of being collected. The data obtained will be analyzed with appropriate statistical techniques and the findings will be discussed in the light of the relevant literature. The results of similar studies in the literature are as follows: In the first study, it was observed that 56% of those working in the hearing aid sector studied Audiometry, 14% had previously sold medical devices, and 10% entered the sector with guidance. It was determined that 52.9% of the participants worked with Audiologists and/or Audiometrists, while 5.8% did not work with any professional staff. It was determined that 30% of the participants had 5 years or less professional experience. In another study, 45 of the participants were audiometrists and 9 were audiologists. 39 of the participants (72%) learned REM application in the company where they worked. Discussion: There are several studies in the literature on audiologists and audiometrists working in hearing aid centers. When we evaluate the studies, in one study, the expectations and complaints of hearing aid center owners and the staff working in these centers were examined and their reasons were determined. Another study aimed to investigate REM techniques in hearing aid centers. In addition to all these studies, in my study, the working environment and conditions of audiologists and audiometrists, and the audiological examinations they perform on patients will be examined more comprehensively by including more detailed questions. With this study, it is aimed to give a different perspective to new employees and existing employees who will enter the sector.

Keywords: hearing aid centers, working conditions, hearing test, REM

OP-4094 Evaluation of Wideband Tympanometry Results in Patients with Tinnitus Who Have Normal Hearing

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Introduction: In this study, it was aimed to compare the middle ear mechanical-acoustic properties, high frequency pure tone audiometry thresholds and energy absorbance characteristics of patients with chronic tinnitus with the results of healthy individuals without tinnitus.

Method: This study was approved by the Medical Research Ethics Committee (decision no 21-11.1T/42, dated 22/11/2021). A total of 80 individuals (160 ears) were included in the study, including 40 patients with chronic tinnitus who have normal hearing (80 ears) and 40 healthy individuals (80 ears) for the control group. Wideband tympanometry (WBT) for energy absorbance measurements and pure tone audiometry for hearing assessment were performed. Ambient pressure and tympanometric peak pressure absorbance values were measured and analyzed in the range of 226-8000 Hz with WBT. The tinnitus handicap level was evaluated with 25-item Tinnitus Handicap Inventory (THI).

Results: There were 40% female participants in the control group and 42.5% female participants in the study group. The mean age of the study group was 42.9 ± 11.4 , while the mean age of the control group was 38.4 ± 12.3 . According to the THI, tinnitus handicap level was mild in 8 (20%) patients, moderate in 16 (40%) patients, severe in 15 (37.5%) patients, and catastrophic in 1 (2.5%) patient. Equivalent ear canal volume (Vea) between genders was found to be statistically significantly higher in males than females ($p < 0.05$). There was no statistically significant difference between the study and control groups in terms of immittance findings (equivalent ear canal volume (Vea), compensated static acoustic admittance (Y_{tm}), tympanometric peak pressure (TPP), Gradient, resonance frequency (RF)) ($p > 0.05$). In pure tone audiometry test results, hearing thresholds were found to be statistically significantly higher in the study group at frequencies between 4 kHz and 16 kHz compared to the control group ($p < 0.05$). In ambient and tympanometric peak pressure absorbance measurements, a statistically significant decrease was found in the study group at a frequency of 1542 Hz - 2000 Hz compared to the control group ($p < 0.05$).

Conclusion: WBT will make an important contribution in reaching the source of the symptom in patients with tinnitus and in the follow-up of these patients.

Keywords: Tinnitus, Wideband Tympanometry, high frequency audiometry, normal hearing

OP-4081 The Effects of Virtual Binaural Audio on Balance in Specific Learning Disability

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Introduction: Specific learning disability (SLD) is a heterogeneous disorder that emerges with delay or deterioration in acquiring writing, speaking, reading, comprehension, balance or postural control. Postural stability is very important for all ages. In humans, posture is controlled by the central nervous system interpreting multi-sensory inputs. Visual information plays an important role in maintaining balance. Auditory information has a role in providing balance as much as visual information. Environmental sound increases postural control and reduces postural sway with the auditory feedback mechanism. Auditory functions become effective and necessary in maintaining balance in individuals. Therefore, this study aimed to examine the effects of virtual binaural audio on balance in SLD.

Method: Our study included 19 experimental subjects aged of 6-15 years who were diagnosed with SLD and 19 subjects in the same age group with no SLD as a control group. Data were collected using a descriptive information form, the Flamingo Balance Test, and the Y Balance Test (YBT). Both the Flamingo Balance Test and YBT tests were applied on all participants in the absence and presence of binaural audio. A total of 38 children (19 with SLD and 19 healthy) with normal hearing. The mean age of participants was 11.44 ± 2.44 years.

Results: The Flamingo Test results of SLD participants in the presence of sound were found to be significantly better than their results in the absence of sound ($p < 0,05$). Their YBT results were also significantly improved in the presence of sound compared to their results in the absence of sound ($p < 0,05$). Balance is associated with multi-sensory information flow from the visual, vestibular, somatosensory, and auditory pathways. Auditory cues from the surrounding environment have positive effects on maintaining balance.

Conclusion: As a result, we determined an improvement in static and dynamic balance scores in the presence of binaural audio in SLD children. We consider that binaural audio can be used in exercise programs to reduce postural sway in balance disorders in therapeutic treatment and rehabilitation processes.

Keywords: specific learning disability, balance, binaural audio

OP-4188 Evaluation of Communication Skills of Children with Hearing Loss Between 8-36 Months

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Introduction: In this study, it was aimed to evaluate the communication skills of children with hearing loss (HL) aged 8-36 months whose native language is Turkish.

Method: This study was carried out by including the ages of 8-36 months children with normal hearing (NH) (control group) and children with HL between the ages of 8-36 months (study group) who applied to the ENT clinic for the first time or were followed up in University Hospital, Department of Ear Nose and Throat (ENT). The Turkish Communication Development Inventory (TCDI) was used to evaluate the communication and language skills, movements and gestures, vocabulary and grammar skills of the children in the study. TCDI inventory consists of TCDI-I and TCDI-II. While TCDI-I evaluates language development between 8-16 months of age, TCDI-II evaluates language development between 16-36 months of age.

Results: There was no significant difference in the communication skills of the study groups according to gender. TCDI I - early words, receptive and expressive vocabulary, movements and gestures (early gestures and late gestures) scores of children with HL aged 8-16 months were significantly lower than the control group. TCDI II - expressive vocabulary, whether they refer to past events, future events, people or objects that are not there at the time, by using words before using grammatical structures, and in all of the sentences and grammar section scores were significantly higher in control group compared to children with HL aged 16-36 months.

Conclusion: According to these results, it was determined that the average scores of communication skills of children with HL between 8-36 months were lower than those of children with NH. Evaluating the early communication skills of children with HL in detail and forming children's therapy and education programs according to the results obtained will contribute to the language, speech and academic success of children in the future.

Keywords: hearing loss, children, communication skills, gesture, vocabulary, grammar

OP-3986 The Impact of Language Capacity on Theory of Mind in Children with Cochlear Implants

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Introduction: Theory of Mind (ToM) refers to the ability to understand others' desires and thoughts and to attribute mental states to oneself, acknowledging that these mental states may differ from reality and impact behavior. It plays a crucial role in comprehending human behavior, encompassing desires, beliefs, knowledge acquisition, and emotional expressions. Previous research on children with cochlear implants (CI) has often focused on isolated aspects such as speech perception, social competence, or ToM performance. However, understanding the interrelationships among these factors might be essential for comprehending social cognition and planning effective social integration strategies for implanted children, similar to their typically developing peers. The aim of this study is to investigate the relationships between language, emotion, social competence, and ToM performance in CI recipient preschoolers. More specifically, we seek to determine if early auditory access to spoken language significantly influences the development of social cognition in this population.

Method: This study was conducted on three groups: two CI groups - each consisting of 10 CI patients with normal cochlea or with inner ear malformation, and a control group comprising 5 normal-hearing children. All participants were between 60 and 72 months old at the time of evaluation. ToM scale, Test of Early Language Development – Third Edition, Child Emotion Expressiveness Questionnaire, Social Competence and Behavior Evaluation—Preschool Edition are used to evaluate social cognition.

Results. Data collection is ongoing and will be presented at the conference. Social cognition will be compared between the two CI groups as well as with the control group.

Conclusion: It is hypothesized that early implanted children may exhibit superior social cognition performance compared to the control group. On the other hand, cochlear malformation may have significant effects on overall social cognition performance. In addition to demonstrating the potential advantages of early implantation, preliminary results may facilitate the identification of indicators of deficit areas in terms of social cognition in children with cochlear implants and inform the development of rehabilitation strategies.

Keywords: cochlear implant, theory of mind, social cognition, speech perception, preschoolers

“7th World Congress of Cochlear Implants in Emerging Nations”

16 September 2023 Miscellaneous Seminer Hall F Moderator: Gorkem Ertuğrul 15:15 – 16:30		
OP 4088	Evaluation of the Effect of Sudden Hearing Loss on Vestibular Evoked Myogenic Potentials	Nazlı Akkaya Kurt
OP 3955	Cochlear implant candidacy and auditory neuropathy	Elena Levina
OP 4100	Do Musical Emotion Perception and Language Development Are Affected in Children Using Cochlear Implants? The Invisible Part Of The Iceberg: Musical Emotion	İrem Sendesen
OP 4105	The Effect of Intermittent Fasting on the Vestibular System : Preliminary Results	Aysun Parlak Kocabay
OP 4110	Effects of Demographic Factors on Speech Recognition in Noise in Cochlear Implant Recipients	Oğulcan Gundogdu

OP-4088 Evaluation of the Effect of Sudden Hearing Loss on Vestibular Evoked Myogenic Potentials

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2 Memorial Hospital, Department of Otolaryngology Head and Neck Surgery, Ankara, Turkey

Introduction: The aim of this study was to investigate the cervical VEMP (cVEMP) and ocularVEMP (oVEMP) responses of patients diagnosed with idiopathic sudden hearing loss (SHL) before and after treatment. The diagnostic criterion for sudden hearing loss was defined as sensorineural hearing loss of 30 dB HL or more at at least three consecutive frequencies within 3 days of symptom onset.

Method: Thirty patients diagnosed with idiopathic SHL (Study Group) and 30 healthy individuals (Control Group) were included. The inclusion criteria for both groups were to be between 18-65 years of age, to have no vestibular symptoms, to have no history of neurological, psychiatric and systemic diseases, and to have normal otological examination and ear MRI findings. Patients with middle ear pathology, history of ototoxic drug use, history of radiotherapy in the head and neck region were excluded from the study. Pure tone and speech audiometry, immittance metric evaluation, cVEMP, oVEMP were performed in all individuals in the control group and in all individuals in the study group on the day of diagnosis. In addition, the Dizziness Handicap Inventory (DHI), Visual Analogue Scale (VAS) were administered to individuals (n=30) with a detailed anamnesis and complaints of dizziness or imbalance that started simultaneously with idiopathic sudden hearing loss, and the presence of tinnitus was asked to individuals (n=30) diagnosed with sudden hearing loss.

Results: When the pre- and post-treatment VEMP values of the ear affected by idiopathic sudden hearing loss were compared, there was a significant decrease in N1 latency in cVEMP after treatment ($p < 0.05$). When the pre-treatment and post-treatment values of the ear affected by idiopathic sudden hearing loss were compared, no statistically significant difference was found in the cVEMP and oVEMP responses of individuals with and without vertigo ($p > 0.05$). When the pre-treatment and post-treatment DHI, VAS and tinnitus status of patients diagnosed with idiopathic sudden hearing loss were compared, it was found that the total scores before treatment were significantly higher than after treatment ($p < 0.05$).

Conclusion: In conclusion, it was found that individuals with idiopathic SHL were prone to be affected due to the anatomical proximity of otolith organs to cochlea. It is thought that VEMP test and evaluation of dizziness and tinnitus with questionnaires may be useful in vestibular function investigations of patients with SHL.

Keywords: Dizziness, idiopathic sudden hearing loss, otolith organs, tinnitus, vertigo, vestibular evoked myogenic potentials

OP-3955 Cochlear Implant Candidacy and Auditory Neuropathy

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Introduction: Auditory neuropathy (ANSD) is a clinical syndrome characterized by impaired speech intelligibility. Hearing thresholds can range from normal to deaf. In most cases, the function of the outer hair cells of the cochlea remains intact. Possible mechanisms of violation are: damaged internal hair cells impaired synaptic transmission between internal hair cells and spiral ganglion neurons, impaired synchronization of the impulse along the fibers of the auditory nerve some patients have one of the possible mechanisms, and some have a combination of 2 or 3 disorders. The main methods for diagnosing this disease are the ABR registration method. The most persistent sign is the registration of the microphone potential of the cochlea. Behavioral responses to sounds in patients with auditory neuropathy are highly variable. It is important to understand that the sensitive age of developing one's own speech, understanding the speech of others is limited to 2 years. From the moment of diagnosis to the examination, the audiologist is given a short period of time to make a decision. This determined the aim of our study - to develop decision criteria for cochlear implantation in children with (ANSD).

Method: Our study included 45 patients with (ANSD) who were followed up at our center for 4 years. Questionnaires, behavioral audiometry and testing of a deaf teacher were conducted every 6 months from the moment of diagnosis.

Results: As a result of longitudinal observation, in 49% of cases, a decision was made to perform cochlear implantation. In 27% of patients, hearing aids were used, and 24% used regular sessions with a deaf teacher without using hearing aids.

Conclusion. The group of patients with (ANSD) is very heterogeneous. In some patients, the responses to tone signals are close to normal, in others the thresholds are significantly increased. Some patients used only classes with a teacher to develop speech, some required surgical treatment - cochlear implantation. A set of criteria was developed to optimize the auditory rehabilitation of this category of patients, taking into account the short period of time for making a decision.

Keywords: Cochlear implant, auditory neuropathy, ANSD,

OP-4100 Do Musical Emotion Perception and Language Development are Affected in Children Using Cochlear Implants? The Invisible Part of the Iceberg: Musical Emotion

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Introduction: While the primary purpose of cochlear implant (CI) fitting is to improve individuals' receptive and expressive skills, musical emotion perception (MEP) is generally ignored.

Method: This study evaluates the relationship between MEP and language development (LD) in children using CI. Study Sample 26 CI users and 26 matched healthy controls between the ages of 6 and 9 were included in the study. The Test of Language Development (TOLD) was applied to evaluate the LD of the participants, and the Montreal Emotion Identification Test (MEI) was applied to evaluate the MEP.

Results: MEI test scores and all subtests of TOLD were statistically significantly lower in the CI group. Also, there was a statistically significant and moderate correlation between the listening subtest of TOLD and the MEI test.

Conclusion: MEP should not be ignored both in the evaluation of CI performance and in the regulation of training programs by integrating them with other developmental areas such as gross motor, sensory integration, fine motor and cognitive level. The relationship between music and LD may show that LD can be supported by giving the necessary importance to MEP. Exclusive language assessment may be insufficient in the comprehensive assessment of CI users' performance in daily life.

Keywords: Cochlear implant - Musical emotion perception - Language development - Montreal emotion identification test

OP-4105 The Effect of Intermittent Fasting on the Vestibular System : Preliminary Results

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Introduction: The purpose of this study is to determine the effects of intermittent fasting (IF) on the vestibular system.

Method: Participants were recruited among the volunteers who responded to the social media announcement. The study comprised six healthy young adults (1 males, 5 females; ages 21-30 years) who had experienced IF at least one month. The subjects visited the testing laboratory twice. The first appointment was arranged while the patient was in the IF condition, and the second visit was scheduled while the patient was in the daily dietary (DD) condition (ie, a daily meal cycle with breakfast, lunch, and dinner). The second appointment was scheduled for up to 90 days after the subjects stopped IF. Head-Shake Sensory Organization Test Condition 5 (head movements with eyes closed while standing on a sway-referenced surface) was performed on both visits using the Computerized Dynamic Posturography System.

Results: Wilcoxon test was conducted to compare the results obtained in IF condition to those obtained in DD condition. There was a statistically difference between IF and DD condition in Head-Shake Sensory Organization Test scores ($p = 0.004$).

Conclusion: In the light of this study, it has been determined that IF has a negative effect on balance when only the vestibular system is active.

Keywords: Intermittent fasting, head-shake, sensory organization test, vestibular system

OP-4110 Effects of Demographic Factors on Speech Recognition in Noise in Cochlear Implant Recipients

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Introduction: There are substantial differences in speech recognition performance of adult cochlear implant (CI) recipients. In this study, the effects of age of onset of hearing loss, age of implantation, duration of implant use, and duration of deafness with speech recognition performance in noise was investigated in CI recipients.

Method: Thirty-six participants using unilateral CI were recruited for this study. Participants who had at least 1 year of CI experience and who performed better than 50% in the Turkish monosyllabic word test were included in the study. Speech recognition in noise was measured using the Turkish matrix test with adaptive method.

Results: There was no correlation observed between CI participants' age of onset of hearing loss, age at implantation, duration of implant use, and duration of deafness, and the critical signal-to-noise ratio.

Conclusion: We were observed that onset of hearing loss, age of cochlear implantation, auditory deprivation and duration of implant use did not have a direct effect on speech perception in cochlear implant users.

Keywords: Cochlear implant · Speech recognition · Speech in noise · Duration of deafness

POSTER PRESENTATIONS

Poster Presentations		
PP 3886	Study of telemetry changes over time in children with a cochlear implant	Samir Assal
PP 3962	Perspective of children with autism spectrum disorder receiving cochlear implants: sharing experience from single institution	Lun Cheh Chong
PP 3963	Revision of a Displaced Cochlear Implant Electrode in the Internal Auditory Canal: Case Report	Tajaddin Muradov
PP 3968	Cochlear implantation with a “Combined approach” in the case of Wegener's granulomatosis	Amirhossein Babaei
PP 3977	Delayed-onset facial paralysis after cochlear implant	Filiz Gulustan
PP 3979	Cochlear Implant and Hematoma	Filiz Gulustan
PP 3997	A Rare case of Intracochlear Schwannoma with Simultaneous Cochlear Implant.	Achala.G. Kamath
PP 4106	Cochlear Implantation in Auditory Neuropathy Spectrum Disorder and Biotinidase Enzyme Deficiency: a Case Report	İlayda Kiremitçi
PP 4114	Role Of HRCT In The Evaluation Of The Round Window Accessibility For Cochlear Implantation	Mohamed Amin Chaabouni
PP 4150	Three Cases of Facial Paralysis After Cochlear Implantation	Jakhongir Olimov
PP 4169	A Clinical Case of Cochlear Implantation in Children With Extracochlear Position of The Electrode Array	Abdukhalil Musaev
PP 4226	Cochlear implantation with a “Combined approach” in the case of Wegener's granulomatosis	Amirhossein Babaei

PP-3886 Study of Telemetry Changes Over Time in Children with a Cochlear Implant

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Introduction: Cochlear implant (CI) is an electronic device that provides direct electrical stimulation to the auditory division of the eighth cranial nerve. The integrity of the internal CI part after implantation can be assessed through objective measures, which are a widely used and valuable tool in the field of CIs. Impedance measurement and electrically evoked compound action potential (ECAP) are the most frequently used tests to facilitate programming of the implants especially in young children. **Aim** This study was carried out to compare ECAP thresholds and electrode impedance at the time of surgery, at the first stimulation session, and monthly for the next 2 months to assess whether a significant change takes place with time.

Method: Fifteen deaf children implanted unilaterally with a MED-EL Sonata Implant System with an Opus 2 speech processor were included in this study. All patients received the implant if they fulfilled the Alexandria main hospital criteria for receiving CIs. The group studied included seven males and eight females; they ranged in age from 2 to 6 years. Two of the patients had received implantation in the left ear, whereas the rest of the patients had received a CI in the right ear.

Results: Intraoperative impedance was the lowest among all postoperative readings in all electrodes. The highest value was that measured 1 month after surgery, after which impedance values continued to decrease significantly, but not to the intraoperative values. The ECAP threshold showed no significant P values between the ECAP threshold measured in the intraoperative and the postsurgery follow-up period.

Conclusion: The measured impedance showed significant changes in the form of increasing values postoperatively relative to the intraoperative time. The ECAP threshold did not change significantly intraoperatively and postoperatively, showing that intraoperative ECAP can be useful in mapping as it shows no changes

Keywords: electrically evoked compound action potential, impedance, telemetry

PP-3962 Perspective of Children with Autism Spectrum Disorder Receiving Cochlear Implants: Sharing Experience from Single Institution

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Introduction: Cochlear implant (CI) is widely recognized as the gold-standard of intervention for children with severe to profound sensorineural hearing loss. Children with cochlear implant diagnosed with autism spectrum disorder (ASD) following implantation and posed great challenges in rehabilitation process. This study aims to investigate the management and progress of children with cochlear implantation and co-morbidity of ASD.

Case presentation: This was a 6-year retrospective case series that applied qualitative descriptive design on prelingual hearing loss children who received cochlear implantation with diagnosis of ASD in Hospital Sultan Ismail, Johor Bahru. Evaluation was conducted by audiologists and speech-language therapists that had been working closely together with the patients and families during pre- and post-cochlear implant. A total of 7 children met the criteria and included in this case series. Mean age at implantation was 29.14 ± 7.73 months old. Mean duration of CI usage was 43.71 ± 18.55 months. All of them received unilateral CI and were using the device consistently at least 8 hours per day. Mean age of diagnosis of ASD was 45.71 ± 12.433 months old. 6 cases were diagnosed with ASD post CI. The category of auditory performance II (CAP-II), meaningful auditory integration scale (MAIS), meaningful use of speech scale (MUSS), showed increment following CI for most cases except for one case with abnormal inner ear. Most of the cases that received good rehabilitation and family support, demonstrated improvement in their social communication, listening, speech and language post CI. Children with more severe ASD and limited family support showed poorer communication, listening, speech and language outcomes.

Conclusion: Timely referral to developmental pediatrician for further evaluation, introduction of Augmentative and Alternative Communication (AAC) to support communication needs, rehabilitation services addressing both listening and social communication needs, early intervention program (EIP) and family acceptance of additional co-morbid are recommended to support children with CI and ASD. The management of children with CI and ASD is highly individualized to support the children and families' priorities and needs and involves different professionals working together interdisciplinary in both clinical and education setting.

Keywords: Hearing Loss, Cochlear Implant (CI), Autism Spectrum Disorder (ASD), Rehabilitation, Outcome

PP-3963 Revision of a Displaced Cochlear Implant Electrode in the Internal Auditory Canal: Case Report

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Introduction: In recent years, cochlear implantation provides a reliable procedure and the management of choice for rehabilitation of bilateral severe to profound sensorineural hearing loss (SNHL). As the number of cochlear implantations increases, a growing number of revision procedures is faced. The most likely reasons reported for revision surgery with reimplantation include wound infection and subsequent device extrusion, device failure, and electrode misplacement [1]. Misplaced cochlear implant array although is not a common complication after surgery, and has been reported in individual case report by different authors, bad consequences are usually encountered, this includes failure to provide the desirable auditory outcome, and injury to important adjacent neurovascular structures that are located within millimeters from the cochlea such as the vestibular system and neural structures within the internal auditory canal, facial nerve, and the internal carotid artery canal [3,4]. Intraoperative electrophysiologic testing is universally accepted to be a robust way to determine the final electrode position after surgery, electrophysiologic protocols differ from one center to another, the test battery includes; electrical impedance, electric stapedial reflex (eSRT), implant evoked electric potentials (Imp eABR), and neural response telemetry. If implant testing results are unsatisfactory or absent, postoperative imaging is mandatory.

Case presentation: Cochlear implantation surgery was performed on a 55-year-old male patient with postlingual sensorineural hearing loss. Due to the suspicion that the electrode was not in the cochlea in the postoperative transorbital graph, temporal CT was performed on the patient and the implant electrode was found to be in the internal acoustic canal. Revision surgery was planned for the patient.

Conclusions: Electrode array malpositioning is a rare, but serious and correctable complication in cochlear implant surgery. A multidisciplinary approach, including prompt audiologic evaluation and imaging, is important, particularly when benefit from the implant is limited or absent. Management of electrode arrays in the IAC may be more challenging. Failure to identify the round window is the most common reason for CI misplacement, despite most patients having normal cochlear anatomy. Surgical strategies to localize the round window and basal turn are imperative for proper electrode placement.

Keywords: cochlear implant, cochlear implant displaced, internal auditory canal

PP-3968 Cochlear Implantation with a “Combined Approach” in the Case of Wegener's Granulomatosis

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Introduction Cochlear implantation in Wegener's granulomatosis patients faces two challenges: access to the round window and control mastoid and middle ear inflammation such as tympanic membrane perforation before or after surgery. The combined approach in cochlear implantation (CI) is a classic trans-facial recess approach facilitated with a trans-canal view

Case presentation: A 20-year-old lady presented with hearing loss and recurrent serous otitis media without response to ventilation tube insertion for 3 years ago. positive C-ANCA (anti-neutrophil cytoplasmic antibodies), high erythrocyte sedimentation rate (ESR), and cystic lesion in lung computerized tomography (CT) scan confirmed her diagnosis. As a bilateral profound hearing loss, she was scheduled for CI. Due to severe retraction and inflammation in the middle ear, the combined approach “classic trans-facial recess approach facilitated with a trans-canal view” was selected instead of other invasive approaches such as subtotal petrosectomy. Post-operative free field audiometry revealed a 30 dB speech reception threshold and 80% speech discrimination score.

Conclusion: The “Combined approach” seems to be a safe, easy, and fast technique for cochlear implantation in the case of chronic otitis media with an atelectatic middle ear and retracted tympanic membrane or narrow facial recess space.

Keywords: Cochlear implantation Wegener granulomatosis

PP-3977 Delayed-Onset Facial Paralysis After Cochlear Implant

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Introduction: Cochlear implantation (CI) is a surgical treatment for severe hearing loss in both pediatric and adult patients. It is a safe and effective procedure with low complication rates. However, one rare complication is iatrogenic facial nerve paralysis, occurring in approximately 0.67-1.2% of cases. Early-onset facial paralysis, which occurs within the first 3 days after surgery, is believed to result from inflammation and mechanical trauma. Delay-onset facial paralysis mechanisms remain unclear, but latent virus activation is a possible cause.

Case presentation: This case report describes a 48-year-old male patient who presented with severe sensorineural hearing loss and underwent cochlear implantation due to the lack of benefit from conventional hearing aids. Initial planning involved right cochlear implantation due to a high jugular bulb on the left side. However, on the 12th day after surgery, the patient developed facial paralysis (FP) of House-Brackmann grade 3. Various tests were conducted, including imaging, laboratory tests, and herpes simplex virus (HSV) and varicella-zoster virus (VZV) antibody tests. The patient was treated with intravenous prednisolone, acyclovir, and ceftriaxone. By the third week of treatment, the facial paralysis completely regressed, and no abnormalities were found in the facial nerve examination. **Discussion** Delayed-onset facial paralysis after otological surgeries is associated with HSV immunological markers. However, we were able to identify one case report in the literature showing increased IgG levels in delayed facial palsy after cochlear implantation, and another single case report showing increased IgM levels after cochlear implantation. Further studies are needed to investigate the potential role of latent virus activation as one of the causes of delayed facial paralysis following cochlear implantation. In the case series of Thom et al. that investigated delayed facial palsy after implant, no significant difference was found between the group that received corticosteroid treatment and the group that did not. Previous studies have also reported favorable prognoses for delayed facial paralysis after cochlear implantation.

Conclusion: In conclusion, aggressive treatments and early surgical interventions should be avoided in patients with favorable prognostic outcomes who develop delayed facial paralysis after cochlear implantation.

Keywords: Facial paralysis, cochlear implant, complication

PP-3979 Cochlear Implant and Hematoma

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Introduction: Cochlear implantation is a safe and effective surgical procedure, but it can be associated with minor complications, including hematoma formation. Hematomas typically occur in the early postoperative period when the surgical site is not fully healed, but they can also occur years after surgery. Coagulation disorders and trauma history are known risk factors for hematoma formation, particularly in pediatric patients. Hematomas and seromas, although rare in the late period, can cause complications such as flap thickening, scar formation, and implant extrusion if left untreated.

Case presentation: 1) In a 3-year-old girl whose swelling did not regress despite the pressure dressing, needle drainage was performed on the 3rd postoperative day. Family history revealed von Willebrand disease leading to further evaluation. The patient received appropriate hemostatic therapy and had a complete recovery with no subsequent hematoma. 2) A three-year-old girl underwent left cochlear implantation. Postoperatively, persistent swelling led to drainage of 4 ccs of hematoma on the fourth day. Despite daily drainage and pressure dressings, symptoms persisted, and reoperation was performed to control bleeding. Intraoperatively, hemostasis was achieved, and the patient was discharged without further complications. 3) Two-year-old boy showed no abnormalities in preoperative evaluations. Postoperatively, the patient experienced recurrent swelling in both implant areas without a history of trauma. Hematoma drainage and pressure dressings were performed as needed, but no hematological pathology was identified as the cause. No hematoma occurred during subsequent follow-up examinations.

Conclusion: The etiological factors detected in patients who develop hematoma after a cochlear implant are coagulopathy, history of trauma, and revision surgeries. In addition, the selected incision technique and extensive elevation of skin flaps are also predisposing factors. Although etiological factors are usually not found in delayed-onset hematomas; coagulation disorders and trauma history are among the causes that can be detected. Delays in treatment can lead to flap necrosis, infections and abscesses in the receiver area, difficulties in magnetic adherence of the receiver, and rarely, implant extrusion. Therefore, early diagnosis and appropriate treatment will prevent permanent morbidities. Pressure dressing, needle drainage, and surgical drainage are the treatment modalities used to manage hematomas.

Keywords: cochlear implant, hematoma, complication

PP-3997 A Rare Case of Intracochlear Schwannoma with Simultaneous Cochlear Implant

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Introduction: Vestibular Schwannomas(V.S) benign neoplasms are derive from the schwann cells of the vestibulocochlear nerve.VS are classified depending on the location as: Intracanalicular(IAC),Extrameatal where it partially involves the cerebellopontine angle and Intralabryinthine.Intralabryinthine Schwannomas (ILS) are rarely encountered. Depending on the anatomical location they are classified as:intravestibular, intracochlear, intravestibulocochlear, transmodiolar, transmacular, transotic, and tympanolabyrinthine.Our case was of the Intracochlear Schwannoma (I.S)presenting with unilateral profound hearing loss leading to the diagnosis of cochlear otosclerosis.

Case Presentation : A 48year/male presented with left ear progressive hearing loss since 3 years.Audiogram:Left -profound mixed hearing loss and Right-moderately severe to severe mixed hearing loss. Rinnes B/L negative,Webers to right.Used left ear hearing aid since 3 months but of no benefit .HRCT Temporal bone showed subtle focal abnormal tissue is seen in the region of the Round Window on left side and subtle symmetrical focal ill-defined lucency seen in the area of fissula ante-fenestrum s/o bilateral fenestral otosclerosis ,MRI Brain T2 weighted sections showed small portion of the middle turn was seen, the basal and apical turns not well visualized and diffuse hypointensity seen in the left vestibule s/o left Labryinthitis Ossificans.Left ear cochlear implantation was done where intra-operatively soft tissue was seen at the Round Window (R.W) niche was excised and sent for HPE. R.W was identified, cochleostomy done and styleted active electrode inserted . Intra-opertaive :Impedence ,NRT - all responses achieved,C-ARM:active electrode in correct position. The HPR was s/o Schwannoma cells.Labyrinthitis is a significant differential diagnosis for ILS.Labyrinthitis will show a less enhancement and often the complete cochlea and/or vestibular system as non-enhancing on Mri,whereas the I.S appears as a nodular enhancing lesion involving the modiolus, basal turn of cochlea commonly and times involving the vestibule.Repeated scanning shows labyrinthitis as non-enhancing but the I.S shows increased enhancement or remain same or growth of the lesion.

Conclusion: I.S is a rare entity and should be considered as a differential diagnosis with a patient having progressive hearing loss as clinically and on imaging can mimic cochlear otosclerosis.

Keywords: Intracochlear, Schwannoma, Cochlear Implant

PP-4106 Cochlear Implantation in Auditory Neuropathy Spectrum Disorder and Biotinidase Enzyme Deficiency: A Case Report

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Introduction: Biotinidase deficiency (BD) was described in 1983 by Wolf et al. For the recycling of biotin vitamin, the enzyme biotinidase, which is found in the human body under normal conditions, is needed. In case of deficiency, it causes accumulation of toxic products in the body. BD is among to the autosomal recessive diseases. It is characterized by neurological and cutaneous symptoms, including sensorineural hearing loss. Auditory neuropathy (AN) is a pathology that manifests itself with hearing loss and impaired speech intelligibility due to problems in the transmission of auditory stimuli at the level of the inner hair cell, the inner hair cell-cochlear nerve, or the synapse between the inner hair cell and the cochlear nerve.

Case presentation: In this study, we presented our clinical approach to a 4-year-old patient diagnosed with both BD and AN. The patient who has a history of surgery due to premature birth, developmental delay and multiple gastrointestinal system disorders was diagnosed with AN in our clinic. We referred to the pediatric metabolism outpatient clinic with the suspicion of BD. The patient started replacement therapy after being diagnosed with biotin deficiency and also started rehabilitation with hearing aid bilaterally. As a result of subjective and objective audiological evaluations, cochlear implant surgery was performed on the patient who was found to have no benefit from the hearing aids.

Conclusion: It has been reported in the literature that BD causes irreversible hearing loss. It is recommended to question the biotinidase enzyme values of patients with AN, hearing loss and neurological disorders. If there is no response from appropriate medical treatment in these patients, a cochlear implant can be applied.

Keywords: biotin, hearing loss, auditory neuropathy spectrum disorders, cochlear implant

PP-4114 Role of Hrct in the Evaluation of the Round Window Accessibility for Cochlear Implantation

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Introduction: To predict round window (RW) accessibility using high-resolution computed tomography (HRCT) in pediatric cochlear implant surgery.

Method: This study included children who underwent cochlear implant surgery in our department from 2018 to 2020. Two radiologic parameters were measured on preoperative axial temporal HRCT images (width of the facial recess and location of the FN relative to the basal turn) and one measurement was performed on the oblique coronal HRCT (distance between oval window and RW). Intraoperative assessment of round window access was done by the surgeon in a blinded fashion and was correlated with the radiological findings.

Results : Thirty-two ears of 32 children were included in the current study. A significant correlation was found between the RW accessibility and the following two parameters : the location of the FN relative to the basal turn and the distance between oval window and RW. On the other hand, nonsignificant correlation was found between the width of the facial recess and the RW accessibility.

Conclusion: This study shows that pre-op HRCT of the temporal bone was useful in predicting potential difficulties encountered during cochlear implantation and thereby planning the safe surgery.

Keywords: Cochlear Implantation, CT, Surgery, Round Window

PP-4150 Analysis of the Prevalence of Inner Ear Anomalies in Patients with Sensorineural Hearing Loss

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Introduction: to identify the proportion of inner ear malformations in children with sensorineural hearing loss and to study their types.

Method: The study included a retrospective review of patient records with sensorineural hearing loss, aged 0-5 years (mean age 3.4 years), from January 2020 to December 2022. The study was conducted at the Republican Specialized Scientific and Practical Medical Center for Pediatrics in Tashkent (Uzbekistan). The study included 1136 children (boys - 60.9%, n=692, and girls - 39.1%, n=444). All subjects underwent thin-section CT scan of the temporal bone and MRI.

Results: Totally 1136 patients records were reviewed. Malformations of the inner ear were detected in 209 patients, which is 18.4%. By types of anomalies, we identified (according to the classification of L. Sennaroglu, 2017): cochlear aplasia - 6.2%, n=13, narrow internal auditory canal - 2.8%, n=6, incomplete partition type I (IP-I) - 26.7%, n=56, incomplete partition type II according to Mondini (IP-II) - 38.7%, n=81, common cavity - 7.6%, n=16, cochlear hypoplasia - 11, 4%, n=24, narrow internal auditory canal - 5.7%, n=12, enlarged vestibule aqueduct - 58.8%, n=123. Cochlear implantation was performed in 1120 patients. In 16 cases, patients were denied cochlear implantation due to the absence of the auditory nerve and the absence of the cochlea. In 92.3% of cases of all identified anomalies, cochlear implantation was possible with an adequate auditory response.

Conclusion: we found a high proportion of inner ear anomalies in children with severe hearing loss, which amounted to 18.4%, which made it possible to perform cochlear implantation in 92.3% of cases. We believe that the high level of inner ear anomalies is due to the presence of closely related marriages in the region, which requires large-scale studies to determine genetic hearing loss and the proportion of closely related marriages in its structure.

Keywords: Inner ear malformations, sensorineural hearing loss

PP-4169 Cochlear Implantation in Children with Extracochlear Position of the Electrode Array: A Case Series

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Introduction: To review cases of extracochlear electrode array placement in children who underwent cochlear implantation (CI).

Case presentation: Case 1: A 3-year-old child underwent cochlear implantation on the right ear (SYNCHRONY STANDARD by MED-EL, Austria). The length of the electrode array was 31.5 mm. The surgery proceeded without any intraoperative peculiarities, and intraoperative telemetry measured 0.42 Ohm. Autoart registration on all channels was positive. On the second day post-surgery, a temporal bone X-ray showed the electrode array located in the mastoid cavity (Figure 1). Case 2: A 4-year-old child underwent cochlear implantation on the right ear (SYNCHRONY STANDARD by MED-EL, Austria) with a 31.5 mm electrode array. No intraoperative features were noted, and intraoperative telemetry measured 1.02 Ohm. Autoart was recorded on channels 10-11-12. Postoperative temporal bone radiography revealed the electrode array positioned in the projection of the auditory tube, with the end located at the level of the nasopharynx (Figure 2). Case 3: A 4-year-old child with IP-I underwent cochlear implantation on the right ear (Sonata COMPRESSED by MED-EL, Austria), with a 15.0 mm electrode array. Intraoperative features included cochleostomy and Gusher, with intraoperative telemetry measuring 0.46 Ohm. Autoart was recorded only on channel 8. Postoperative MSCT of the temporal bones showed the proximal end of the implant's electrode array in the projection of the right internal auditory canal. All surgeries were performed by experienced surgeons (Figure 3).

Conclusion: These clinical examples highlight that intraoperative audiological diagnosis may not reliably indicate the correct placement of the electrode array within the cochlea. The use of intraoperative radiological control to confirm the implant's correct placement and electrode anchors in the mastoid cavity can help prevent cases of extracochlear migration of the implant electrode.

Keywords: cochlear implantation, extracochlear position, electrode array

PP-4226 Cochlear Implantation with A “Combined Approach” in the Case of Wegener's Granulomatosis

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Introduction: Cochlear implantation in Wegener's granulomatosis patients faces two challenges: access to the round window and control mastoid and middle ear inflammation such as tympanic membrane perforation before or after surgery. The combined approach in cochlear implantation (CI) is a classic trans-facial recess approach facilitated with a trans-canal view

Case presentation: A 20-year-old lady presented with hearing loss and recurrent serous otitis media without response to ventilation tube insertion since 3 years ago. positive C-ANCA (anti-neutrophil cytoplasmic antibodies), high erythrocyte sedimentation rate (ESR), and cystic lesion in lung computerized tomography (CT) scan confirmed her diagnosis. As a bilateral profound hearing loss, she was scheduled for CI. Due to severe retraction and inflammation in the middle ear, the combined approach “classic trans-facial recess approach facilitated with a trans-canal view” was selected instead of other invasive approaches such as subtotal petrosectomy. Post-operative free field audiometry revealed a 30 dB speech reception threshold and 80% speech discrimination score.

Conclusion: The “Combined approach” seems to be a safe, easy, and fast technique for cochlear implantation in the case of chronic otitis media with an atelectatic middle ear and retracted tympanic membrane or narrow facial recess space.

Keywords: Cochlear implantation Wegener granulomatosis