

## REPORT ON THE 16<sup>TH</sup> SYMPOSIUM ON COCHLEAR IMPLANTS IN CHILDREN (CI2019 PEDIATRIC), JULY 2019, MIAMI, USA

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The 16<sup>th</sup> Symposium on Cochlear Implants in Children (CI2019 Pediatric) was held in Miami, U.S.A. on 10–13 June. The conference attracted over 1200 participants from all over the world. Poland was represented by a delegation from the Institute of Physiology and Pathology of Hearing (IPPH) in Warsaw – Prof. Henryk Skarzynski, Prof. Piotr Skarzynski, Prof. Artur Lorens, Dr. Anita Obrycka, and Ms. Katarzyna B. Cywka.

This year's symposium was organized by the American Cochlear Implant Alliance together with the University of Miami, Department of Otolaryngology/Ear Institute. The conference theme was "Treating the Whole Child", and was aimed at discussing innovations in the multi-disciplinary management of pediatric cochlear implant (CI) recipients. Over 400 podium and poster presentations were grouped into the following topics: medical and surgical advances, expanding CI indications to special populations, audiological outcomes, CI programming, complex cases, electrocochleography, social and emotional development of CI children, cognition, education, telemedicine, service delivery, and patient management.

Plenary sessions dedicated to medical and surgical advancements covered topics related to cochlear implantation in surgically complex cases (e.g., in ears with malformations or post meningitis ossification), use of robotics in cochlear implantation, use of imaging pre- and intra-operatively, and reducing electrode insertion trauma. The first topic was addressed by Prof. Henryk Skarzynski, who shared his experiences in overcoming difficulties like perilymphatic gushers and oozers during cochlear implantation in children who had middle and inner ear malformations. In these children CI outcomes depend on the type of malformation.

A significant amount of the conference program was devoted to audiological outcomes. Long-term results of traditional CI recipients were discussed as well as outcomes in new groups such as those with partial deafness or single-sided deafness (SSD). A Polish contribution to this topic was presented by Prof. H. Skarzynski who discussed further extension of criteria for Partial Deafness treatment

which he named Electric Natural Stimulation. He described pediatric cases who had normal hearing at 0.125–1.5 kHz but severe-to-profound hearing loss above that. He concluded that cochlear implantation is a successful way of restoring hearing above 1.5 kHz.

There was discussion on candidacy criteria for CI. The criteria differ among countries and depend on local regulations, and so there is a need to get solid evidence for the effectiveness of cochlear implantation in special populations (e.g., patients with SSD or children below 12 months of age). A big step forward in considering children with SSD for cochlear implantation is growing worldwide findings showing a significant increase in speech perception in noise and in sound localization ability in adult CI users with SSD. There is also less controversy over very early cochlear implantation (i.e., in the first year of life). Dr Anita Obrycka concluded in her talk that cochlear implantation before the first year of life promotes accelerated auditory development in children with profound deafness.

Sessions dedicated to CI programming covered the use of psychophysical and objective measures for estimating stimulation levels, particularly in complex cases. The effect of electrode frequency–stimulation place mismatch in relation to patient outcomes was debated. Preliminary results suggest that lower frequency–place mismatch is associated with better outcomes, but more exploration is necessary. The application of artificial intelligence to speech processor programming was also discussed.

A number of presentations focused on electrocochleography (ECoChG) using the CI electrode as the recording electrode. The application of intraoperative ECoChG recordings for monitoring electrophysiological cochlear status, and hence cochlear trauma during implantation, was shown. Attempts to use postoperative ECoChG measurements to assess audiometric thresholds in young children were also presented. The idea here is to use postoperative ECoChG recordings to measure residual hearing in pediatric CI recipients and hence to reliably fit the acoustic component of EAS systems.

In terms of rehabilitation after a CI, the most important aspects discussed during the conference included: educational achievements of children using cochlear implants; social and emotional development of children with a CI; predictors of psychosocial outcomes; and depression, anxiety, and bullying in the CI population. It was stressed that CI children need an inclusive social climate in which they are welcomed and can participate in order to develop their full potential. Contact with peers is crucial in this respect.

The telemedicine session discussed current practices being used for remote CI programming and auditory verbal therapy. Telemedical service delivery was recognized as a possible way of improving clinical efficacy. As the number of CIs increases, clinics are looking for ways to increase efficiency while maintaining profitability, patient satisfaction, and outcomes. This requires revising and improving current care systems or seeking new service delivery models. As an example of a new service delivery model, remote fitting sessions conducted by IPPH in Kyrgyzstan were summarized by Prof. P.H. Skarzynski.

An important message formulated during the conference was the need for a unified testing protocol. The HEARRING group proposed the Minimal Outcome Measure (MOM) test battery. The HEARRING group is an independent network of world leading centers and experts who deal with all aspects of treating hearing loss with auditory implants. The group was established in 2009 as an initiative of three leading centers (ENT university clinics at Wurzburg and Frankfurt and at IPPH in Warsaw). The group proposed that the final set of pediatric MOM results should be defined for each chronological age.

The suggested test intervals are: prior to implantation and 3, 6, and 12 months after CI activation and yearly thereafter. The set of pediatric MOM includes objective measurements, unaided and aided audiometry, speech perception tests in quiet and in noise, subjective assessments, assessment of language, mental, and motor development, and quality of life. A unified test protocol consensus would allow multi-centers to extend evidence guiding future clinical practice and would allow questions about the variability of CI outcomes to be answered.

The second initiative of the HEARRING group, presented by Prof. Lorens, was the use of the International Classification of Functioning, Disability and Health (ICF) as a clinical tool for planning and evaluating audiological rehabilitation after cochlear implantation. The third HEARRING development, used by a number of presenters as a global standard, was the Skarzynski Hearing Preservation Classification.

Delegates from IPPH presented 7 studies ranging over partial deafness treatment, CI surgery in ears with malformations, early auditory development of CI children, assessment of auditory development in young children using hearing aids, application of bone conductive devices, telemedical fitting of cochlear implants, and ICF evaluation of CI outcomes.

This year's symposium was a great opportunity to explore and discuss the world of patients with hearing loss and cochlear implants. The new ideas presented during the conference provided directions for everyday clinical practice as well as future research.