THE ROLE OF AUDIOLOGICAL EVALUATION AND COCHLEAR IMPLANTS IN PEDIATRIC SENSORINEURAL HEARING LOSS

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Abstract*. Sensorineural hearing loss (SNHL) in children is a major cause of speech and language development delay. Early diagnosis and intervention, including audiological evaluation and cochlear implantation, are critical to improving outcomes. This study reviews the diagnostic process, indications, and outcomes of cochlear implants in pediatric patients.*

Keywords*: Pediatric hearing loss, sensorineural hearing loss, cochlear implant, audiological evaluation, speech development, otorhinolaryngology.*

Introduction:

Hearing loss affects 1 to 3 per 1000 live births worldwide, with SNHL being the most prevalent form. Untreated, it leads to significant deficits in communication and social development. Audiological evaluation helps determine the degree and type of hearing loss.

Cochlear implants provide auditory stimulation bypassing damaged hair cells, enabling hearing in children with severe to profound SNHL.

Pathophysiology of Sensorineural Hearing Loss:

SNHL results from damage to the cochlea or auditory nerve pathways. Causes include genetic mutations, perinatal infections, ototoxic drugs, and trauma. Damage leads to the loss of sensory hair cells and impaired auditory signal transmission.

Audiological Evaluation:

The diagnostic work-up includes otoacoustic emissions (OAE), auditory brainstem response (ABR), and behavioral audiometry to quantify hearing thresholds and confirm the type of hearing loss. Early and accurate diagnosis is essential to initiate timely intervention.

Indications for Cochlear Implantation:

Candidates include children with bilateral severe to profound SNHL who derive limited benefit from conventional hearing aids. Assessment involves multidisciplinary evaluation including audiologists, otolaryngologists, speech therapists, and psychologists.

Surgical Procedure:

Cochlear implantation involves inserting an electrode array into the cochlea under general anesthesia. The external speech processor converts sound into electrical signals that stimulate the auditory nerve directly.

Postoperative Rehabilitation:

Rehabilitation includes device programming (“mapping”), auditory training, speech therapy, and family counseling. Long-term follow-up optimizes hearing outcomes and language acquisition.

Materials and Methods:

This retrospective study analyzed 50 pediatric patients with SNHL who underwent cochlear implantation at Samarkand State Medical University’s ENT department. Data on preoperative audiological findings, surgical details, complications, and postoperative auditory and speech outcomes were collected over 12 months.

Results:

The average age at implantation was 3.5 years. Post-implantation, 80% of children showed significant improvement in hearing thresholds and speech perception scores. Early implantation (before 3 years) correlated with better speech and language development. Minor complications included transient vertigo and device failure in 2% of cases.

Discussion:

Cochlear implants substantially improve auditory access in children with severe SNHL, enabling spoken language development when combined with appropriate rehabilitation. Early identification and intervention are crucial. Multidisciplinary teamwork enhances overall outcomes.

Conclusion:

Audiological evaluation and cochlear implantation are essential components in managing pediatric SNHL. Early implantation coupled with intensive rehabilitation leads to optimal hearing and communicative abilities, significantly improving quality of life.

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