Audiometric Evaluation of Children with Hearing Loss

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KEYWORDS

• Pediatric hearing loss • Evaluation • Diagnosis • Measures

KEY POINTS

- Early diagnosis of pediatric hearing loss is possible and desirable.
- Measurement tools are available to diagnosis all types of hearing loss in children of all ages.
- Medical and surgical intervention and rehabilitation can begin at a very young age because of the ability to measure hearing loss effectively.

INTRODUCTION

The goal of pediatric audiologic assessment is to determine if a hearing loss exists and to diagnose the type, degree, and specific nature of the hearing loss. The types of hearing loss include conductive, sensorineural, and mixed; the degree is defined in **Table 1**.

The accuracy of the results is crucial because the treatment plan depends on the outcome of the diagnosis. To choose appropriate techniques, consideration must be given to the child's age, developmental status, physical status, and functional age level. Best practices involve using a test battery approach and not relying solely on one measure to avoid the possibility of error by using the cross-check principle.[1]

SCREENING FOR HEARING LOSS

Early detection of any amount and type of hearing loss leads to earlier intervention increasing the possibility that a child can reach his or her developmental potential in all areas. Mandatory newborn hearing screening has significantly reduced the age

The authors have nothing to disclose.
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Otolaryngol Clin N Am 48 (2015) 891–901
http://dx.doi.org/10.1016/j.otc.2015.06.002 **oto.theclinics.com**
0030-6665/15/$ – see front matter

Abbreviations

ABR	Auditory brainstem response
BOA	Behavioral observation audiometry
CAPD	Central auditory processing disorder
CPA	Conditioned play audiometry
OAE	Otoacoustic emissions
SRT	Speech reception threshold

at which hearing loss is identified, from approximately 14 months of age for significant hearing loss and from 2.5 years of age for less severe degrees of hearing loss to ideally 3 months of age. Late identification of hearing loss causes a lag in the needed medical and audiologic treatment and increases the possibility of delayed linguistic and overall development. Because approximately 2 to 3 per 1000 babies in the United States are born with some amount of hearing loss in one or both ears, the value of newborn hearing screening programs is evident. Currently in the United States, 95% of newborn babies are screened before hospital discharge, although follow-up of all children has been more difficult to achieve.[2,3] Screening is most frequently accomplished using either auditory brainstem response (ABR) testing and/or otoacoustic emissions (OAEs) testing and is performed ideally before the newborn leaves the hospital.

Otoacoustic Emissions

OAEs are sounds given off by outer hair cells when the cochlea is stimulated by sound. The movement of outer hair cells produces an inaudible sound that echoes back into the middle ear, which can be measured with a small microphone inserted into the ear canal. The status of the middle ear affects OAEs and can prevent their detection while assisting in the diagnosis of middle ear effusion or other middle ear conditions that cause conductive hearing loss.

Auditory Brainstem Response

ABR measures the auditory nerve and brain's response to sound. It uses surface electrodes placed on the head to measure the coordinated electrical activity of the auditory nerve and brainstem relay pathways when the ear is stimulated by sound. Measuring the threshold (minimum sound intensity to elicit the electrical response) greatly assists in the diagnosis of sensorineural hearing loss.

Table 1
Classification of degree of hearing loss

Hearing Level (dB)	Classification of Hearing Loss
≤0–15	Normal hearing
16–25	Slight hearing loss
26–40	Mild hearing loss
41–55	Moderate hearing loss
56–70	Moderately severe hearing loss
71–90	Severe hearing loss
91+	Profound hearing loss

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