Chapter 2
Diagnosis and Evaluation of Hearing Loss

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ABSTRACT

Hearing disorders are quite common in our days, not only due to congenital causes, environmental factors but also due to the increased rate of diagnosis. Hearing loss is one of the commonest reasons to visit an ENT Department both in the clinic and in the acute setting. Approximately 15% of American adults (37.5 million) aged 18 and over report some trouble hearing. One in eight people in the United States (13 percent, or 30 million) aged 12 years or older has hearing loss in both ears, based on standard hearing examinations. About 2 percent of adults aged 45 to 54 have disabling hearing loss. The rate increases to 8.5 percent for adults aged 55 to 64. Nearly 25 percent of those aged 65 to 74 and 50 percent of those who are 75 and older have disabling hearing loss. These figures depict the impact on patients’ quality of life and the necessity for early and accurate diagnosis and treatment. It is important to mention that congenital hearing loss and deafness is also a condition that requires early diagnosis and hearing aiding in order to develop normal speech. Profound, early-onset deafness is present in 4–11 per 10,000 children, and is attributable to genetic causes in at least 50% of cases.

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ANATOMY OF THE EAR

The ear consists of the external ear, the middle and the inner ear (Figure 1). The external ear comprises the auricle and the external auditory meatus. The auricle or pinna is mainly formed by the cartilaginous framework to which the skin is tightly applied, separated only by the perichondrium. The external auditory meatus has a 3.7 cm long S-shaped course, extending to the tympanic membrane. The outer 1/3 is cartilaginous while the inner 2/3 are osseous, having the skin closely adherent to the osseous part. The tympanic membrane or ear drum consists of 3 layers, has an oval shape and is normally translucent. Points of interest on the tympanic membrane are the pars tensa, which is the largest part of the membrane, the pars flaccid, which is a small, lax triangular area above the lateral process of the malleus, the umbo, the light reflex, the handle and the lateral process of the malleus. The middle ear or tympanic cavity is a narrow cavity in the petrous part of the temporal bone and contains mainly the auditory ossicles. Anteriorly, the middle ear cavity communicates with the pharynx by the Eustachian tube, a 3.7 cm long bony and cartilaginous tube. Posteriorly it communicates with the mastoid antrum and the mastoid air cells. Conduction of sound through the middle ear is by way of the malleus, incus and stapes. The malleus is the largest of the auditory ossicles. It has a handle which is visible in otoscopy attached to the tympanic membrane, a head which articulates with the incus and a lateral process. The incus has a head, a short and a long process, which articulates with the stapes, the latter having a head a neck and a base which is fixed in the oval window. Two muscles are associated with the ossicular chain and are useful in damping high frequency vibrations. These muscles are the stapedius, attached to the neck of the stapes and the tensor tympani, inserted into the handle of the malleus (Kullar et al., 2012).

The internal ear consists of the bony labyrinth made up of a central vestibule, which communicates posteriorly with three semicircular ducts and anteriorly with the spiral cochlea (Figure 2). The cavity encloses the membranous labyrinth, comprising the utricle and the saccule which communicate with the semicircular canals and the cochlear canal. In each part of the membranous labyrinth there are specialized sensory receptor areas (maculae of utricle and saccule, ampullary crests of the semicircular canals, organ of Corti in the cochlea). The organ of Corti contains the auditory receptor cells. These are the outer and inner hair cells and they are surrounded by other structural and supporting cells (Roland et al., 2000; Kyriafinis, 2005).
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