Hearing Loss: Diagnosis and Management

John M. Lasak, MD[a,b,*], Patrick Allen, MD[c], Tim McVay, DO[c], Douglas Lewis, MD[c]

KEYWORDS

• Hearing loss • Otoacoustic emissions • Audiometry • Hearing aids

KEY POINTS

- It is important to identify the progression, whether unilateral or bilateral, and the presence or absence of associated tinnitus and vertigo in those presenting with hearing loss.
- A thorough physical examination of the pinna, external auditory canal, and middle ear is essential for establishing a diagnosis of hearing loss.
- Otoacoustic emissions (OAEs) test the function of the cochlear outer hair cells and are an excellent screening tool for hearing loss in the infant or young child. The external auditory canal and middle ear must be normal for reliable OAEs; therefore otoscopy must be accomplished before testing.
- The Weber and Rinne tuning fork tests can readily differentiate a conductive from sensorineural hearing loss in the office setting.
- Temporal bone computed tomography and gadolinium enhanced magnetic resonance imaging of the brain and internal auditory canal are the imaging modalities of choice for hearing loss.

INTRODUCTION

Hearing loss may affect all age groups from the newborn to the elderly, impacting speech and language development in children and causing social and vocational problems for adults. Hearing loss can arise from anywhere in the auditory circuit including the external auditory canal (EAC), sound conduction mechanism, cochlea, cochlear nerve, and central auditory pathways. Rehabilitation options exist for all types of hearing loss, regardless of cause or location within the auditory system. Awareness of symptoms, signs, and rehabilitative measures aids primary care physicians in early identification and treatment of hearing loss.

[a] Departments of Surgery and Pediatrics, University of Kansas School of Medicine-Wichita, Wichita, KS, USA; [b] The Wichita Ear Clinic, 9350 East Central Avenue, Wichita, KS 67206, USA; [c] Department of Family and Community Medicine, The University of Kansas School of Medicine-Wichita, 1010 North Kansas, Wichita, KS 67214, USA
* Corresponding author. The Wichita Ear Clinic, 9350 East Central Avenue, Wichita, KS 67206.
E-mail address: Jlasak1@cox.net

Prim Care Clin Office Pract 41 (2014) 19–31
http://dx.doi.org/10.1016/j.pop.2013.10.003 **primarycare.theclinics.com**
0095-4543/14/$ – see front matter

EPIDEMIOLOGY

The incidence of infant hearing loss is estimated at 4 to 60 per 1000 neonates.[1] Approximately 3% of white children and adolescents experience hearing loss with estimates of hearing loss being higher among some minorities, and children from lower socioeconomic backgrounds.[2] Childhood hearing loss is often identified when a parent reports that their infant or child does not respond to voice, when speech or language delay is present, or when school performance is poor. Caregiver concern for hearing loss should prompt a physician to investigate further. Additional risk factors for hearing loss that may prompt screening are shown in **Box 1**.[1,3,4] The significant educational and social ramifications of hearing loss in children have prompted the United States Preventive Services Task Force to recommend newborn hearing screening for all neonates.[5] Approximately 95% of newborn infants in the United States are screened for hearing loss before hospital discharge.[4]

The prevalence of hearing loss in adults increases with age. Adult hearing loss often presents through family complaints to the physician or the affected becoming isolated and withdrawn in social situations prompting the family to seek care. It is estimated that 28 million adults in the United States have some degree of hearing impairment.[6] A 5-year study of 2837 adult individuals estimated the prevalence of hearing loss by age group in the United States as follows:

- Ages 21 to 34: 2.9%
- Ages 35 to 44: 6.4%
- Ages 44 to 54: 10.9%
- Ages 55 to 64: 25.1%
- Ages 65 to 84: 42.7%[7]

CLINICAL PRESENTATION

For patients presenting with hearing loss, it is important to identify the progression of loss, whether unilateral or bilateral in nature, and the presence or absence of associated tinnitus and vertigo. Noise exposure, use of ototoxic medications, illicit drug use, and medical conditions, such as diabetes, atherosclerosis, and kidney disease, are also important to note during the history. Furthermore, history of chronic otologic infections or otologic surgery should be noted. In children, intrauterine and neonatal risk factors should be identified.

DIAGNOSIS

Physical Examination

A thorough physical examination with attention to the anatomic survey of the ear is critical for establishing a diagnosis of hearing loss.[8] Obstruction of the EAC with cerumen, inflammation (otitis externa), or a foreign body may produce a conductive hearing loss. EAC atresia (with or without microtia) also causes a conductive loss with the degree of hearing loss being proportional to the severity of atresia. Findings consistent with clinical syndromes are also important to note. Craniofacial anomalies may have middle and inner ear abnormalities and associated conductive, mixed, or sensorineural loss.[9] Syndromic hearing loss, such as occurs with Treacher-Collins syndrome, Crouzon disease, or Robin sequence, accounts for 15% to 30% of hereditary etiologies.[10]

Otoscopy of the tympanic membrane (TM) to ascertain integrity, translucency, and the presence or absence of middle ear disease is a key component of the physical examination for hearing loss. Use of pneumatic otoscopy can enable a clinician to