Chapter 48
Clinical Otologic Assessment

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Keypoints

1. This chapter describes the diagnostic procedures of the otorhinolaryngologist, which can be performed in an office setting.
2. The otologic assessment is important for the identification of underlying causes that might be accessible to medical or surgical intervention.
3. Special attention should be paid to all kinds of objective tinnitus, which is often caused by an organic pathology of the ear or the neck.
4. The combination of otological, radiological, and audiological findings will help to make the correct diagnosis.

Keywords Tinnitus • Otoscopy • Endoscopy • Auscultation • Doppler ultrasound

Introduction

Some disorders of the conductive apparatus of the ear can cause both objective and subjective tinnitus. As already described in Chap. 23, the otorhinolaryngologist is often the first port of call for patients with new-onset tinnitus. Otologic diagnosis in patients with tinnitus should therefore concentrate on conditions that might cause tinnitus. When taking the history of a patient with tinnitus, it is essential to enquire about ear pain, sensation of aural fullness, otorrhea, sinunasal problems, hearing loss, and a history of previous infection or surgery involving the ear. Methods used in otological examination of a patient with tinnitus include tympanic microscopy, endoscopy of the nasopharynx, auscultation and Doppler ultrasound examination of the neck vessels, and auscultation of the aural region.

Inspection of the external ear can reveal developmental anomalies that may be important for diagnosis of tinnitus. Surgical scars detected during examination of the retro-auricular region may be an indication of previous middle ear surgery, another possible cause of tinnitus.

Otoscopy

Examination of the external auditory canal and tympanic membrane is performed ideally using a microscope with up to 10× magnification. Normally, the external auditory canal is wide and the tympanic membrane is transparent. Attention should be paid to bony exostoses[1] and tumors on the skin lining the ear canal. The long process of the incus is often visible through the tympanic membrane in many cases, as well as the manubrium of the malleus with the umbo. Reddening of the tympanic membrane or increased vascular markings is indicative of acute otitis media. Otoscopy can detect fluid build-up in the tympanic cavity. Negative air pressure in the tympanic cavity causes retraction of the tympanic membrane and suggests Eustachian tube dysfunction. Perforations of the tympanic membrane indicate chronic otitis media.

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[1]Exostosis: A cartilage-capped bony projection arising from any bone that develops from cartilage. From: Stedman's Electronic Medical Dictionary.

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The presence of cholesteatoma[2] may cause the epitympanic perforation to be filled with keratin debris or granulation tissue. Stinking otorrhea is also characteristic of the presence of a cholesteatoma. In many cases, large tympanic membrane perforations permit inspection of the auditory ossicular chain and assessment of the tympanic mucosa. Otoscopy findings are usually normal in otosclerosis. Schwartze's sign[3] is a rare finding, consisting of a pink blush of the mucosa near the promontory that can be seen through a translucent tympanic membrane. It is a sign of proliferation and dilatation of blood vessels at the promontory and should be regarded as indication of cochlear otosclerosis [1].

Movement of the tympanic membrane in time with the patient's respiration on forced nasal breathing is indicative of a patulous Eustachian tube. Pulsatile movement of the tympanic membrane may indicate the presence of a glomus tumor. This bluish-red tumor growing in a grape-like cluster may cause the tympanic membrane to bulge outward. In advanced cases, the tumor may also impinge into the external auditory canal. Rhythmic movements of the tympanic membrane are also noted in patients with myoclonus[4] of the tensor tympani muscle.

Valsalva's maneuver and Toynbee's maneuver are clinical tests of Eustachian tube function. In Valsalva's maneuver, patients pinch their nose tightly between thumb and forefinger and then attempt to breathe out forcibly while also keeping their mouth closed. An outward bulging tympanic membrane during a Valsalva's maneuver is an indication that the Eustachian tube functions normally and that air can reach the middle ear via the Eustachian tube. In Toynbee's maneuver, the patient is instructed to swallow, again with nose pinched closed. This normally results in a negative air pressure in the tympanic cavity that can be detected by otoscopy as an inward retraction of the tympanic membrane. Objective measure of Eustachian tube function can be obtained by tympanometry (see Chap. 49).

Endoscopy

Further examination of possible causes of dysfunction of the Eustachian tube can be done by examination of the nasal and pharyngeal structures using rigid or flexible endoscopes. Polypoid mucosal changes in the nasal cavity are indicative of chronic rhinosinusitis that may affect the function of the Eustachian tube. Attention should also be paid to the possible presence of space-occupying lesions in the nasopharynx that may obstruct the tubal orifice (hypertrophied lymphatic tissue, nasopharyngeal carcinomas). Many patients with a patulous Eustachian tube have a widening of the opening of the Eustachian tube in the nasopharynx [2]. Biopsy of suspected space-occupying lesions should be done for histopathological examination. Objective tinnitus may be caused by myoclonus of the palatine muscles (the tensor and levator veli palatini). Twitching of these muscles can be observed by endoscopy.

Auscultation

Auscultation of the ear and neck vessels can be important in the diagnosis of objective tinnitus [3]. A stethoscope can be used to detect signs of carotid artery stenosis, such as what may occur from atherosclerosis, vascular compression, and arteriovenous malformations. Dural AV fistulas can be detected by auscultation of the upper neck and in the post-auricular region. According to [4], the use of an electronic stethoscope is more sensitive than classic auscultation techniques. If a patient's tinnitus is affected by compression of the neck or from turning the head, it is a sign that the cause is of venous origin. Such maneuvers would have no effect on pulsatile tinnitus of arterial origin [5]. Abnormal auscultatory findings require further clarification using Doppler ultrasound or angiography. Direct auscultation of the middle ear performed with a Toynbee tube inserted into the external auditory canal makes it possible to hear the tinnitus that is caused by contractions of the stapedius or tensor tympani muscles of the middle ear [6].

[2]Cholesteatoma: Squamous metaplasia or extension of squamous cell epithelium inward to line an expanding cystic cavity that may involve the middle ear or mastoid, erode surrounding bone, and become filled with a mass of keratinized squamous cell epithelial debris, usually resulting from chronic otitis media. The lesion often contains cholesterol clefts surrounded by inflammatory and foreign body giant cells, hence the name cholesteatoma. From: Stedman's Electronic Medical Dictionary.

[3]Schwartze's sign: A pink blush behind the tympanic membrane, sometimes seen in otosclerosis because of hyperemia of the mucous membrane around the promontory. First described by Schwartze in 1873. From: Dorland's Medical Dictionary.

[4]Myoclonus: One or a series of shock-like contractions of a group of muscles of variable regularity, synchrony, and symmetry, generally due to a central nervous system lesion.

Supplementary Radiological Diagnosis

Radiological examinations may be justified when otologic examinations are inconclusive regarding pathologies that may be involved in causing tinnitus [7]. High-resolution computed tomography (CT) of the petrous portion of the temporal bones can be used to detect and examine structural bony changes of the external ear and its surroundings, the middle ear, and inner ear.

MRI can be used to visualize a fluid-filled cochlea. Finally, this technique is used to diagnose intra- or extrameatal acoustic neurinomas. Detailed information regarding these techniques is provided in Chap. 19.

Doppler studies of vessels on the neck are helpful in the diagnosis of pulsatile tinnitus (see Chap. 59). In some countries (e.g., Germany), ultrasound techniques are part of an otologic examination. Doppler ultrasound allows visualization of carotid stenoses, arterial dissections, and arteriovenous malformations. Sismanis and Smoker [8] also recommend extending the use of this modality to include the subclavian arteries. Digital subtraction angiography is employed for the preoperative assessment of a glomus tumor, permitting identification of the main supplying vessel on the basis of the tumor blush. Interventional embolization of the supplying vessels during the same session prepares for efficient control of bleeding during subsequent surgical resection.

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