

Pulsatile Tinnitus Triggered by Cerumen: A Case Report

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Abstract

Tinnitus is described as any sound deriving from the head, which does not originate from an external source. Tinnitus can be caused by various underlying conditions because it is a symptom rather than a disease entity. Objective tinnitus is sound produced by paraauditory structures which transmit it to the ear by conduction in body tissues. Besides the influenced person, it is able to be heard by anybody. On the other hand, subjective tinnitus is the false perception of sound without any environmental source; it is heard only by the patient and is more common. The management of tinnitus should be directed toward treating the underlying cause. This article presents a case in which objective tinnitus occurs instead of subjective tinnitus when the underlying case is examined. This shows that the pathology of tinnitus is very complex and poorly understood. Therefore, clinicians should be cautious when making a diagnosis and investigate the underlying main case.

Keywords: Pulsatile tinnitus; Cerumen; Etiology-pathology-treatment of tinnitus

Introduction

Tinnitus is described as any sound deriving from the head or the ears. This sound is experienced by individuals in case of lack of outside sound and this experience is not originated from any external sound. Tinnitus can be caused by various underlying conditions because it is a symptom rather than a disease entity. Not only muscular, vascular, neuronal, otologic and ear pathologies, also psychological parameters contribute to the formation of tinnitus [1].

Tinnitus is experienced by patients in different forms namely unilateral, bilateral, transient, continuous, pulsatile or non-pulsatile. Apart from pulsatile tinnitus which perceived simultaneously with heartbeat, the rest are accepted non-pulsatile. Pulsatile tinnitus occurs less than 10% of cases [2].

Tinnitus is collected in two main groups which are objective (i.e., audible to anyone in addition to the affected individual) and subjective (i.e., audible only to the affected individual) [1]. Clinically, subjective tinnitus, being more common compared to objective tinnitus, is the false perception of hissing, buzzing, ringing, roaring or whistling sound without any environmental source. Subjective tinnitus is commonly linked to sensorineural hearing loss which results from damage to the auditory pathway anywhere between the external ear canal and auditory nerve. The reasons of subjective tinnitus are obstruction of the ear canal by cerumen, infections (e.g. otitis externa or media), sensorineural hearing loss (e.g. acoustic trauma which damage to cochlear hair cells), tympanic membrane perforation, cholesteatoma, otosclerosis, Meniere's disease (known as endolymph hydrops in the membranous labyrinth of the cochlea and characterized by episodes of subjective tinnitus, vertigo and progressive hearing loss resulting from compression of the auditory nerve itself being concluded by increased firing of afferent neurons to the auditory cortex), tumors within the internal auditory canal (e.g. vestibular schwannomas, acoustic neuromas) or tumors of the inferior colliculus

and within the cerebellopontine angle, Eustachian tube obstruction, systemic illnesses (e.g. anemia, hyperlipidemia, hypothyroidism), psychogenic diseases (such as depression, anxiety, fibromyalgia) and drugs such as salicylates, aminoglycoside antibiotics, furosemide, many chemotherapeutic agents, anti-malarial drugs [3].

Objective tinnitus is comparatively unusual. The perception of objective tinnitus is expressed by patients as clicking or pulsing sound. This sound produced by paraauditory structures such as the ear, head, or neck. Underlying reasons are either muscular or vascular etiology. Vascular causes include arterial or venous vascular pathologies (e.g. dural arteriovenous fistula, arteriovenous malformation, aneurysm, internal carotid artery stenosis or dissection, jugular bulb abnormalities), glomus tumors of jugular foramen and middle ear, hypertension or increased cardiac output (such as anemia, thrombocytopenia, thyrotoxicosis and pregnancy). Non-vascular etiologies of pulsatile tinnitus include myoclonic contractions of the tensor veli palatini, levator veli palatini, salpingopharyngeus and superior constrictor muscles, neurologic lesions or eustachian tube dysfunction [2].

This article presents a case in which objective tinnitus occurs instead of subjective tinnitus when the underlying case is examined.

Case Report

A 35-year-old female without systemic or otological disease, complained of tinnitus of pulsatile nature on the right ear, synchronous with heartbeat for three days. The patient's complaint appeared after she had cleaned my external ear canal with a cotton swab. In addition, her complaint aggravated especially at night when she was lying on my right ear. She had no history of hearing loss, dizziness, ear fullness, head or neck disease, drugs causing ototoxicity, or any other systemic disease. On the first day, she thought that it resulted from fatigue. However, she applied to a specialist of Ear, Nose and Throat Department because of three days duration of her complaint. On otologic examination, there was a little cerumen stuck on the tympanic membrane. Laboratory testing was normal. There had no radiographic

findings on craniocerebral magnetic resonance imaging (MRI). Her complaint disappeared after cerumen removal by an otorhinolaryngologist. Therefore, no cerebral angiography was conducted.

Discussion

Tinnitus is the perception of hissing, buzzing, ringing, roaring, whistling, clicking or pulsing sound without any source. It is one of the most common health problems and has disturbing effects on affected individual's quality of life. Tinnitus is collected in two main groups which are objective and subjective. Compared to objective tinnitus, subjective tinnitus is more common [1].

The pathology of subjective tinnitus is very complex and poorly understood. Abnormal conditions in the cochlea, cochlear nerve, ascending auditory pathways, auditory cortex result in tinnitus. The damage to hair cells causes hyperactivity in auditory complex and nerves forms proposed etiologies. Taking neurophysiology into consideration, the reaction of brain to the input deficiency from the auditory periphery is called as tinnitus. When an ordered tonotopic frequency mapping from the auditory periphery (cochlea), through the midbrain, to the auditory cortex that exists in the healthy auditory system gets damaged, the reorganization of central pathways (subcortical and cortical projections) occurs due to lack of output (plasticity). The lesion projection zone (LPZ) is the zone corresponding area of cochlear injury in the auditory cortex. Following cochlear injury, two significant alterations are observed in the neurons in the LPZ respectively an increase in the frequency of the neurons surrounding the injury zone (the so-called lesion edge frequencies) and an increase in the spontaneous firing rate. These results demonstrate the central disinhibition on the regions being damaged and cortical plasticity of the adjacent regions of the cortex. Therefore, the deleterious cortical adaptation to input absence from the sensory periphery plays a major role in tinnitus neurophysiology. Tinnitus being responsible from neuronal hyperactivity at different levels of the central auditory pathways, including the dorsal cochlear nucleus, the inferior colliculus, auditory cortex, and the striatum has been demonstrated in several animal and human studies [1].

As a result, two phenomena in the auditory cortex are related to peripheral deafferentation: 1) hyperactivity in the LPZ and 2) increased cortical representation of the lesion-edge frequencies in the LPZ. These two phenomena are supposed to be the neurophysiological connections of tinnitus [1].

Objective tinnitus perceived as clicking or pulsing sound is comparatively simpler to understand. While pulsatile tinnitus originating by vascular pathologies results from high-flow passage through vascular structures or turbulent blood flow at stenotic segment, pulsatile tinnitus in muscular pathologies is derived from sudden closure of the eustachian tube [4,5].

The management of tinnitus should be directed toward treating the underlying cause. When a specific reason is detected, it is more likely to treat tinnitus. For instance, if a cerumen is the reason, cerumen

removal by an otorhinolaryngologist may help relieving symptoms. On the other hand, if the infection is potentially reason, the infection being successfully treated may remove the tinnitus. If otosclerosis, which is relieved when the hearing loss, is the cause, it is resolved by a successful operation. Treatment of vascular abnormalities such as arteriovenous malformations contains embolization or ligation procedures. The evaluation of hypertension, blood lipids, thyroid function, allergies and informing patients of factors that aggravate tinnitus, such as stress, caffeine, nicotine, and aspirin is required. In addition, the other important treatment options are hearing aids for presbycusis, cochlear implants for sensorineural hearing loss and stopping ototoxic drugs [1].

In brief, excessive ear wax (cerumen), especially if the wax touches the ear drum, causing pressure and changing how the ear drum vibrates can result in subjective tinnitus [6]. In this case, pulsatile tinnitus originating by cerumen may result from the anatomic relationship between the internal carotid artery and the front-lower quadrant of the tympanic membrane. This anatomic relationship is varied significantly among different individuals [7]. The cerumen in this area causing pressure the internal carotid artery can produce pulsatile tinnitus. Therefore, it is considered that the investigation of the etiology of tinnitus is quite beneficial rather than the classification system.

Conclusion

The pathology of tinnitus is very complex and poorly understood. Therefore, clinicians should be cautious when making a diagnosis and investigate the underlying main case. In addition, anything should not be stuck into the ears to clean them and cotton swabs should only be used on the outside of the ear.

Conflict of Interests

None

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