

Objective high-frequency tinnitus of middle-ear myoclonus

KHADER J. ABDUL-BAQI, M.D., PH.D.

Abstract

Tinnitus produced by middle-ear myoclonus is a rare condition. In this article, a rare case of unilateral continuous high-frequency objective tinnitus caused by middle-ear myoclonus is described. This condition appears to be the second case reported in the literature. Otoscopic examination revealed visible rhythmic movements of the tympanic membrane. Weak clicking sounds were heard around the right ear by auscultation. Direct stimulation of the soft palate showed no evidence of palated myoclonus. Tympanometry confirmed rhythmic changes in the middle-ear compliance. The condition was effectively treated with a muscle relaxant (orphenadrine citrate).

Key words: Myoclonus; Ear, Middle; Tinnitus; Orphenadrine

Introduction

Tinnitus, or sounds perceived in the ear when no external noise is present, is a common complaint among patients suffering from a variety of ear disorders. Tinnitus can be either subjective or objective. The former is more common, usually caused by auditory pathway disorders, and heard only by the patient. The objective tinnitus is much less common, produced in the patient's head around the ear or nearby structures, and can be heard by both the patient and the examiner. Objective tinnitus may be caused by many disorders including temporomandibular joint (TMJ) abnormalities, patulous eustachian tube, vascular abnormalities, palatal myoclonus, and middle-ear myoclonus.¹ Coles² classified objective tinnitus into: extrinsic, defined as sounds caused by an animated foreign body in the external ear canal, and intrinsic, defined as sounds caused by vascular murmur, palatal myoclonus, nasopharyngeal sounds, and TMJ clicks. These sounds may be pulsatile, clicks or high-frequency continuous sounds.

Middle-ear myoclonus is a rare disorder produced by repetitive contractions of the middle-ear muscles. In this report, a rare case of unilateral middle-ear myoclonus causing a high-frequency objective tinnitus is presented. In 1998, Bento *et al.*³ reported what seemed to be the first case report of continuous high-frequency objective tinnitus caused by middle-ear myoclonus.

Case report

A 52-year-old man presented to the audiology clinic, complaining of continuous clicking sounds in his right ear for the previous five days. He had had a similar, but milder, attack of tinnitus two years ago. The patient reported a long-standing sensorineural hearing loss (SNHL) in both ears. He also complained of a feeling of pressure and further deterioration of hearing in his right ear besides tinnitus. There was no otalgia, otorrhoea, nor vertigo. There was no history of any systemic disorders or medication intake.

The examination revealed normal nasal passages, nasopharynx, and larynx. Direct stimulation of the soft palate with a tongue depressor showed no signs of palatal myoclonus. On otoscopic examination, both tympanic membranes were intact with slightly increased vascularization of the right tympanic membrane and rhythmic movements were clearly seen. Tuning fork tests showed a negative Rinne test in the right ear and a positive Rinne test in the left ear, and midline Weber test. Palpation of the neck revealed no masses. Auscultation showed no bruits sounds except very weak clicking sounds around the right ear. Pure tone audiometry demonstrated moderate-to-severe (68 dB) SNHL in the left ear and severe (85 dB) mixed hearing loss in the right ear (Figure 1). Tympanometry showed a normal compliance curve from the left ear

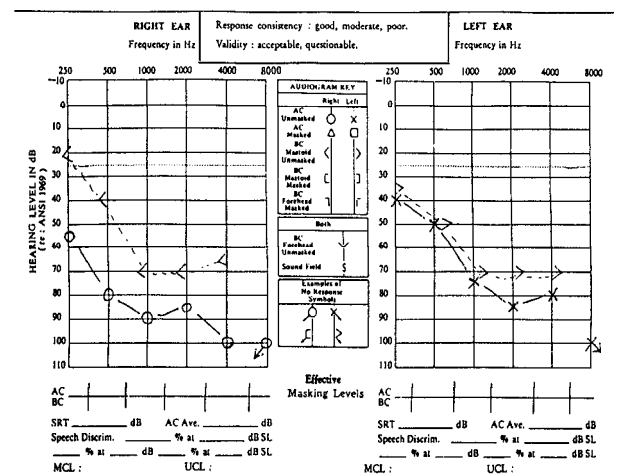


FIG. 1
Audiogram showing mixed hearing loss of the right ear and SNHL in the left ear.

From the Department of ENT, Faculty of Medicine, Jordan University Hospital, University of Jordan, Amman, Jordan.
Accepted for publication: 17 December 2003.

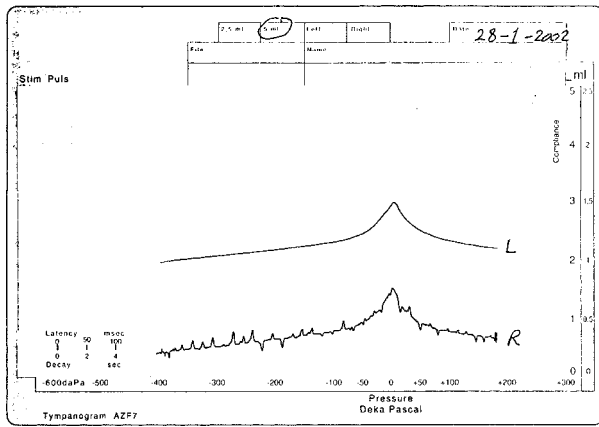


FIG. 2

Tympanogram showing right ear compliance changes.

and an irregular with multiple spikes compliance curve from the right ear (Figure 2). A tinnitus matching test showed a 6000 Hz tone.

A preliminary diagnosis of middle-ear myoclonus was established. The patient was prescribed orphenadrine citrate 35 mg plus paracetamol 450 mg three times per day after meals. The tinnitus decreased in intensity gradually and totally disappeared at the end of the third week of treatment. At this time the audiogram was repeated and showed a closed air-bone gap in the right ear. The tympanogram showed a smooth compliance curve from the right ear. Two weeks later the patient reported a very soft and tolerable tinnitus every now and then.

- This is thought to be the second reported case of myoclonus affecting the middle ear
- In this case the patient presented with recurrent tinnitus
- Myoclonic movements of the drum were observed and were relieved with orphenadrine

Discussion

Although objective tinnitus caused by middle-ear myoclonus is a rare symptom, it is usually presented as unilateral^{3,4} and rarely bilateral⁵ as in palatal myoclonus.⁶ Precise diagnosis of such a rare case of objective tinnitus is feasible and not difficult. The diagnosis is usually achieved by history, otoscopy, auscultation around the ear, audiometric and tympanometric testing.

The mechanism of production of tinnitus in middle-ear myoclonus is unknown. These muscular repetitive contractions are a form of segmental myoclonus originating from a limited brainstem segment. Myoclonus may be triggered by medullary centres discharge released from higher inhibitory control.⁷ Pathology of the brainstem can cause eyelid, facial, tongue, palatal, jaw, and middle-ear myoclonus.

Many authors described unilateral^{8,9} or bilateral¹⁰ stapedial myoclonus with facial nerve involvements, probably due to highly sensitive reflex arches, as reported

in other muscle myoclonus.⁷ Klockhoff¹¹ described the 'tensor tympani syndrome' in which there is increased muscular tones with impedance fluctuations and some auditory or vestibular symptoms. This syndrome is believed to be a response to severe emotional distress and anxiety. Stapedial muscle contraction produces bursts of buzzing noise, whereas palatal myoclonus produces a clicking sound.¹²

Several options of treatment of middle-ear myoclonus have been described. Medical treatment with carbamazepine produced complete relief of palatal myoclonus refractory to all forms of treatment,¹³ and reduced the middle-ear myoclonus intensity clearly.¹⁰ Badia *et al.*⁴ controlled middle-ear myoclonus with sedative in two patients out of six, while Zipfel *et al.*⁵ were unsuccessful in using benzodiazepine for the treatment of middle-ear myoclonus. Surgical sectioning of the stapedial and tensor tympani muscles proved to be successful in treating middle-ear myoclonus.^{3,5,8,9}

Other forms of treatment have been described. White-noise masking devices were successful in treating myoclonus¹⁴ but patients are usually reluctant to use a visible device. The 'tensor tympani syndrome' has been successfully treated with relaxation therapy.¹¹ Botulinum toxin has been used in palatal myoclonus,¹⁵ and in hemifacial spasms and blepharospasms.⁴ There have been no reports of the use of botulinum toxin in middle-ear myoclonus.

Conclusion

A case of unilateral middle-ear myoclonus causing a high-frequency objective tinnitus has been described, and it appears to be the second reported case. This case was effectively treated with a muscle relaxant (orphenadrine citrate). Medical therapy should be prescribed as first-line management of this disorder. If medical therapy fails, surgical sectioning of the tendons of the middle-ear muscles is the second-line management procedure especially when patients are disturbed and disrupted by this problem.

References

- 1 Schleuning A. Tinnitus. In: Bailey B, ed. *Head and Neck Surgery: Otolaryngology* 2nd edn. Philadelphia: Lippincott-Raven Publishers, 1993;2199–206
- 2 Coles RR, Snoshall SE, Stephens SD. Some varieties of objective tinnitus. *Br J Audiol* 1975;9:1–6
- 3 Bento RF, Sanchez TG, Miniti A, Tedesco-Morchesi AJ. Continuous, high-frequency objective tinnitus caused by middle ear myoclonus. *Ear Nose Throat J* 1998;77:814–8
- 4 Badia L, Parikh A, Brookes J. Management of middle-ear myoclonus. *J Laryngol Otol* 1994;108:380–2
- 5 Zipfel TE, Kaza SR, Green JS. Middle-ear myoclonus. *J Laryngol Otol* 2000;114:207–9
- 6 Pulec J, Simonton K. Palatal myoclonus: A report of two cases. *Laryngoscope* 1961;71:668–71
- 7 Swanson P, Luttrell C, Magladery J. Myoclonus: A report of 67 cases and review of the literature. *Medicine* 1962;41:339–56
- 8 Watanabe W, Kamagami H, Tsuda T. Tinnitus due to abnormal contraction of stapedial muscle. *J Otorhinolaryngol* 1974;36:217–26
- 9 Marchiandeo A, Per-Lee JH, Jackson RT. Tinnitus due to idiopathic stapedial muscle spasm. *Ear Nose Throat J* 1983;62:8–13
- 10 Rajah V. Tinnitus related to eyelid blinking. *J Laryngol Otol* 1992;106:44–5
- 11 Klockhoff I. Impedance fluctuation and a 'Tensor tympani syndrome' In: Penha RL, Pizarro W, eds. *Proceedings of the Fourth International Symposium on Acoustic Impedance Measurement*. Lisbon: Universidade Nova de Lisboa, 1981;69–76

- 12 Pulec J. Diseases of the eustachian tube. In: Paparella H. Shumrick D, eds. *Otolaryngology*. 2nd edn. Philadelphia: W. B. Saunders, 1980;1409
- 13 Shea JJ, Harell M. Management of tinnitus aurium with lidocaine and carbamazepine. *Laryngoscope* 1978;**88**:1477–84
- 14 East C, Hazell J. The suppression of palatal (or intratympanic) myoclonus by tinnitus masking devices. *J Laryngol Otol* 1987;**101**:1230–4
- 15 Saeed S, Brookes G. The use of *Clostridium botulinum* toxin in palatal myoclonus, a preliminary report. *J Laryngol Otol* 1993;**107**:208–10

Address for correspondence

Khader J. Abdul-Baqi,
University of Jordan,
PO Box 13001,
Amman 11942, Jordan.

Fax: +962-6-5353388

E-mail: kabaqi@msn.com

K. J. Abdul-Baqi MD, takes responsibility for the integrity of the content of the paper.

Competing interests: None declared
