Auris Nasus Larynx xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Auris Nasus Larynx

journal homepage: www.elsevier.com/locate/anl

Hammer sound elicited tinnitus in car body repair worker cured by stapedial tenotomy – A case report

Ryoukichi Ikeda [a,b,*], Hiroshi Hidaka [a], Hiromitsu Miyazaki [a,b], Tetsuaki Kawase [a], Yukio Katori [a], Toshimitsu Kobayashi [a,b]

[a] *Department of Otolaryngology-Head & Neck Surgery, Tohoku University School of Medicine, Sendai, Japan*
[b] *Sen-En Rifu Otological Surgery Center, Sendai, Japan*

ARTICLE INFO

Article history:
Received 5 February 2016
Accepted 17 March 2016
Available online xxx

Keywords:
Tinnitus
Stapedius tendon
Middle ear muscle contraction
Middle ear surgery

ABSTRACT

Abnormal auditory sensations or tinnitus caused by abnormal middle ear muscle contraction are extremely rare and uncomfortable for patients. A 67-year-old man who performed paint and body work for cars presented at our hospital with complaint of an audible and annoying abnormal sound that was synchronous with the striking of his hammer against the metal of the car body during his work. The patient reported that the sound was audible of left ear with a split-second delay after his hammer struck the metal. Preoperative subjective and objective testing failed to reveal any abnormal findings in our case. The patient's symptom was successfully cured by selective transection of the stapedius tendon. The characteristic nature of tinnitus with a split-second delay after striking the metal helped our diagnosis and method of intervention in this case.

1. Introduction

Abnormal auditory sensations or tinnitus caused by abnormal middle ear muscle (tensor tympani: TT or stapedius muscles: SM) contraction are uncomfortable for patients. Several conservative treatments have been reported for abnormal middle ear muscle contraction, including the use of muscle relaxants, sedatives and anticonvulsants [1,2]. Surgical treatment such as sectioning of the middle ear muscles via tympanotomy has been reported as an effective procedure when cases are resistant to conservative treatment [1,3,4]. We report herein a case of middle ear muscle contraction caused by the sound of a striking hammer that was successfully cured by selective transection of the SM.

2. Case report

A 67-year-old man who performed paint and body work for cars presented at our hospital with complaint of an audible and annoying abnormal low-tone sound that was synchronous with the striking of his hammer on the metal car body during his job. The patient reported that the low-tone, ''pop'' sound was audible of left ear with a split-second delay after his hammer struck the metal. He did not feel auditory abnormalities in other situations such as talking, listening to music and so on. Tonsillectomy was performed for chronic tonsillitis one year ago.

Otomicroscopic examination demonstrated normal tympanic membrane without moving. Pure-tone audiometry showed a moderate sensorineural hearing loss with the averaged thresholds of 233 dBHL (averages of 500, 1000, and 2000 Hz) on the left side, and 133 dBHL on the right side (Fig. 1, left). Tympanometry indicated an A type on both sides. Stapedial reflex (SR) measured by a commercial impedance audiometer (RS-22; RION, Kokubunji, Japan) was present almost at the same degree

* Corresponding author at: Department of Otolaryngology-Head & Neck, Surgery, Tohoku University School of Medicine, 1-1 Seiryo-machi, Aoba-ku, Sendai 980-8574, Japan. Tel.: +81 22 717 7304; fax: +81 22 717 7307.
E-mail address: ryoukich@hotmail.com (R. Ikeda).

http://dx.doi.org/10.1016/j.anl.2016.03.005
0385-8146/

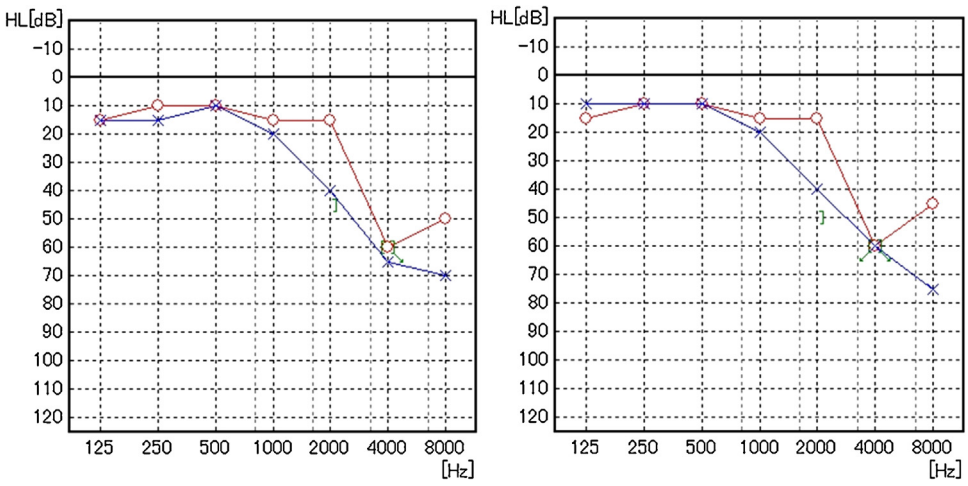

Fig. 1. Preoperative (right) and postoperative (left) audiometry.

on bilateral sides (Fig. 2, left). Computed tomography (CT) scans revealed no evidence of middle ear disease.

Therapeutic options proposed included the insertion of ear plugs to reduce the sound of hammer striking metal during his work, surgery, and other treatment modalities such as pharmacological treatment or observation. Initially, the patient opted for the insertion of ear plug. The uncomfortable auditory symptoms persisted, and the patient opted to undergo surgery.

Exploratory tympanotomy was thus performed via an endaural approach under local anesthesia. Elevation of a tympano-meatal flap and muscle contractions were not observed in either the SM or TT when the sound of metal being struck was provided. However, the patient heard a sound similar to the uncomfortable auditory sensation when the stapedius tendon (ST) was touched (Fig. 3). We thus transected the ST, resulting in resolution of the uncomfortable auditory sensation. For the TT, touching the muscle produced a sensation that was different from the perceived uncomfortable auditory sensation. Based on these findings, the TT was preserved. The patient has not experienced any recurrence of abnormal auditory sensations, and his hearing level remained the same after the surgery (Fig. 1, right). Stapedial reflex showed no reaction on the left side (Fig. 2, right). After the operation, we analyzed the sound of striking metal which annoyed the patient. Broadband noise (peak: 11,125 kHz) was measured as shown in Fig. 4.

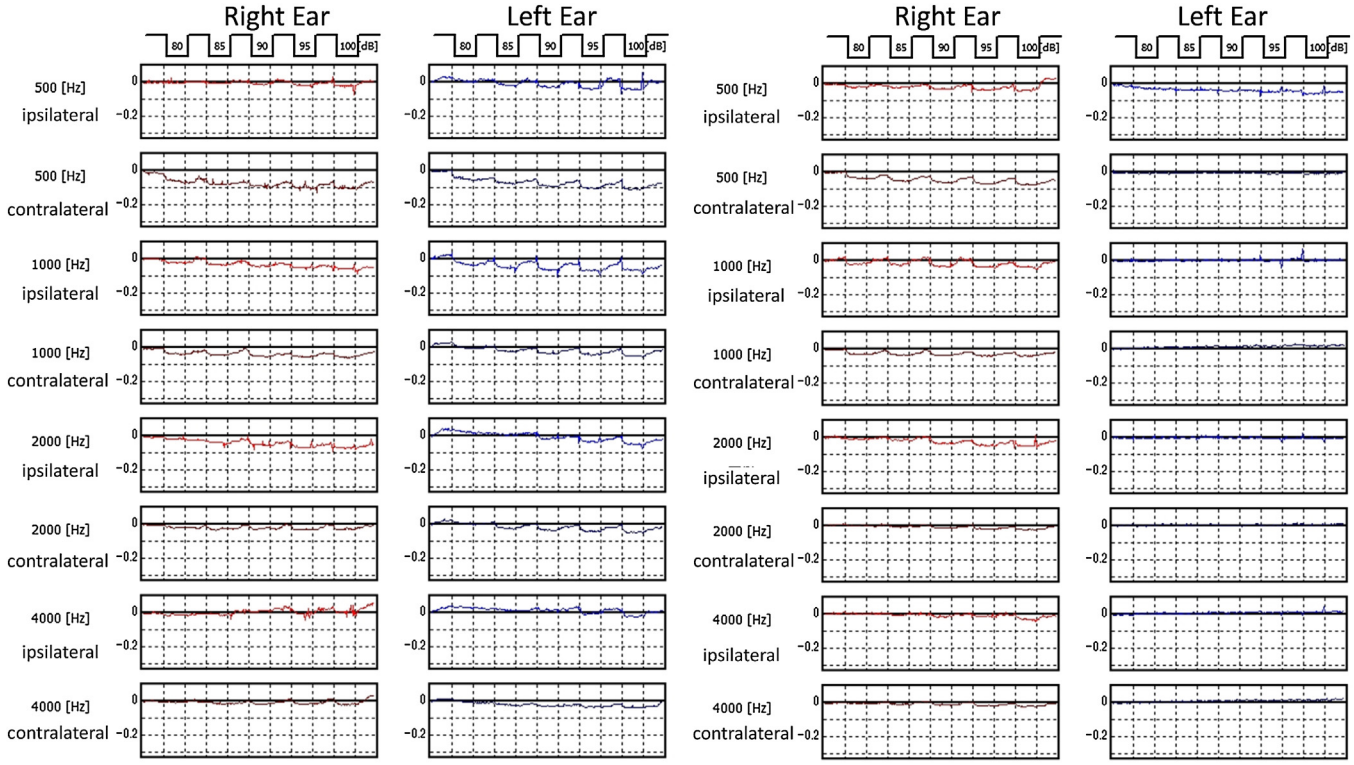

Fig. 2. Stapedial reflex preoperation (left) and postoperation (right).

Please cite this article in press as: Ikeda R, et al. Hammer sound elicited tinnitus in car body repair worker cured by stapedial tenotomy – A case report. Auris Nasus Larynx (2016), http://dx.doi.org/10.1016/j.anl.2016.03.005