



Case Report

Middle Ear Foreign Body Induced by Ear Molding Procedure: A Case-Report and a Literature Review

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During the placement of a mould for a hearing aid by a hearing aid dispenser, moulding MATERIALS entered the middle ear through preexisting perforations in the tympanic membrane. Middle ear foreign bodies are common otorhinolaryngological emergencies and must be removed to avoid complications. Surgical removal of the moulding MATERIALS by tympanotomy was necessary. Here, we report a case of a middle ear foreign body caused by an ear moulding procedure in a 74-year-old woman, and review the related literature.

KEY WORDS: Middle ear, hearing aid, foreign body, molding

INTRODUCTION

The ageing population and an increase in exposure to high-decibel sound, particularly among young people who use devices such as MP3 players and compact disc players, are causing an increase in the number of patients with hearing loss. In Korea, about 1% of the population requires a hearing aid globally. About 400,000 to 500,000 people require hearing aids, and there are about 40,000 to 50,000 new hearing aid users every year. Sixty-five percent of hearing aid users are more than 65 years old because approximately 40% of this age group complains of hearing loss. Six percent of people younger than 18 years old use hearing aids⁽¹⁾.

Hearing aids are classified by features and size. There are pocket type, earring type, behind-the-ear type (BTE), in-the-ear type (ITE), and tympanic membrane (TM) type hearing aids. Koreans prefer the ITE type, which is not visible. ITE hearing aids should be manufactured to fit the external ear canal. Thus, manufacturers should determine the status of the patient's external auditory canal (EAC) and TM accurately before performing a moulding procedure for a hearing aid. Otherwise, complications may occur if users have TM perforation or chronic otitis media.

Complications due to ear mould impression MATERIALS entering the middle ear or mastoid antrum are very rare, but when they occur, a surgical procedure is necessary. We present a case report and a review of the literature on surgical removal of materials that entered the middle ear cavity through a perforation of the TM during the process of making a hearing aid mould.

CASE REPORT

A 74-year-old woman came to our clinic because of a foreign body in her left middle ear cavity; it was ear-mould material. She had had chronic otitis media in her left ear. Two days before she visited our clinic, mould MATERIALS that had not hardened entered her left TM perforation. When the hardened mould MATERIALS was removed, some remained in her left middle ear cavity.

On inspection, we found adhesive otitis media in the right ear, and through a perforation of the left TM, we could see that blue MATERIALS completely filled her left middle ear cavity (Figure 1). Pure tone audiometry revealed that she had severe sensorineural hearing loss in her right ear and moderate mixed hearing loss in the left ear, which was her only hearing ear (Figure 2). We performed computed tomography (CT) of the temporal bone to evaluate the statuses of the moulding MATERIALS and ossicles, involving the epitympanum and Eustachian tube.

The foreign body was located in the mesotympanum and extended to the internal Eustachian tube. There was no evidence of extension to the attic or invasion of the ossicles in the temporal bone CT scan (Figure 3). We performed a surgical procedure under general anaesthesia to protect other hearing structures, considering that her left ear was her only hearing ear. Via the transcanal approach, we carried middle ear foreign MATERIALS out carefully using a curved pick. We removed foreign MATERIALS that extended to the Eustachian tube in the CT scan (Figure 4). The head of the left stapes and incus-stapes joint were dissociated due to

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Submitted: 08.08.2013 Accepted: 22.12.2013

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chronic otitis media in her left ear. The MATERIALS was not involved in the epitympanum because of peri-ossicle granulation. Thus, using the retroauricular approach, we performed mastoidectomy with posterior canal wall preservation, ossiculoplasty by removing the incus and using a titanium prosthesis on the stapes foot plate, and tympanoplasty using temporal muscle fascia. After 15 months, the patient gained hearing, as assessed by pure tone audiometry, and had had no complications (Figure 5).

DISCUSSION

Age-related and noise-exposed hearing loss is an increasingly important public health problem. This handicap impairs quality of life and can lead to social isolation. Therefore, wearing hearing aids is an important treatment for patients with hearing loss. Koreans prefer ITE hearing aids because this type is less visible to other people. ITE hearing aids are custom-moulded and fit into the EAC. EAC moulding is necessary to manufacture this type of hearing aid.

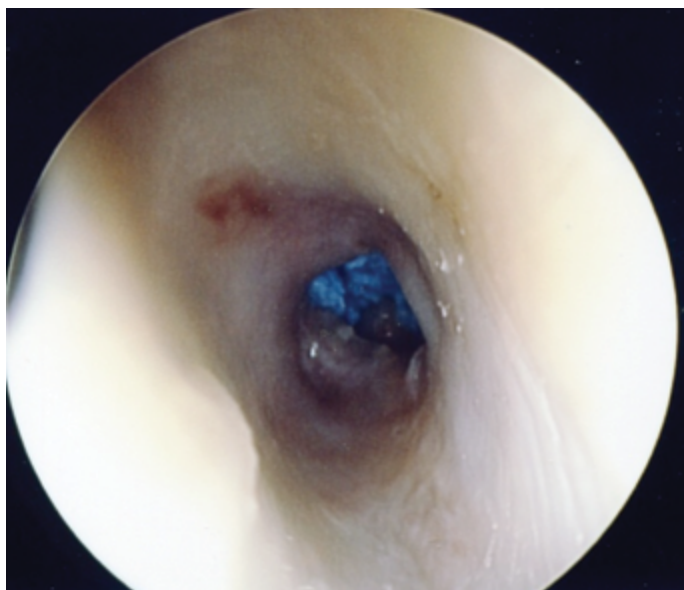


Figure 1. Photograph of the left middle ear space occupied by ear moulding material

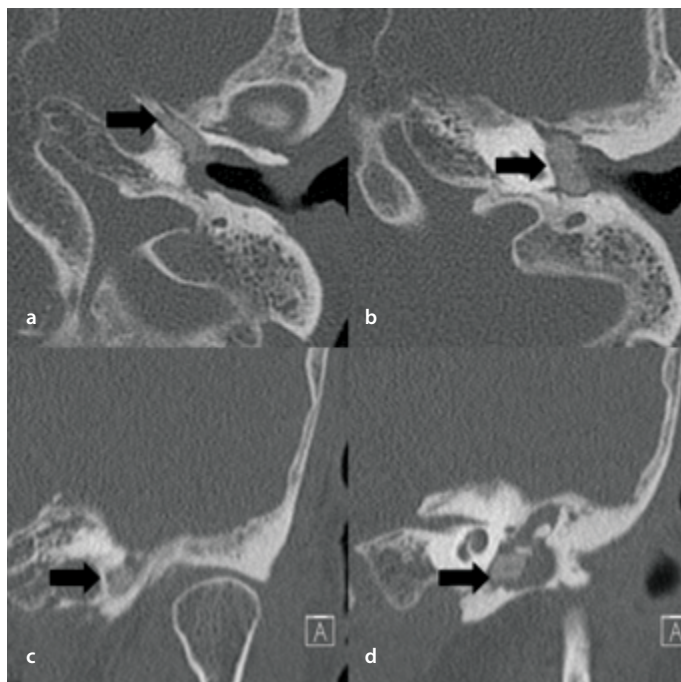


Figure 3. a-d. The findings of temporal bone CT. The density of the foreign body in the middle ear was noted in axial view (a). The foreign body extended into the Eustachian tube (b). The foreign body was noted mainly in the mesotympanum, not extending into the epitympanum in coronal view (c). The Eustachian tube was plugged by the foreign body (d)



Figure 4. Photograph of the removed foreign body

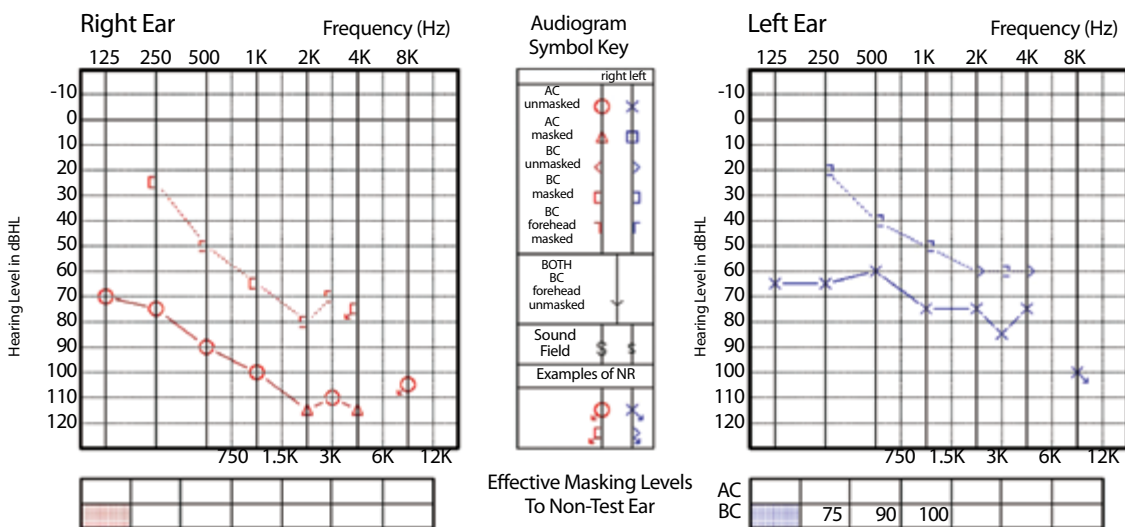


Figure 2. The results of a pure tone audiogram showing a deaf state on the right side and mixed hearing impairment on the left side

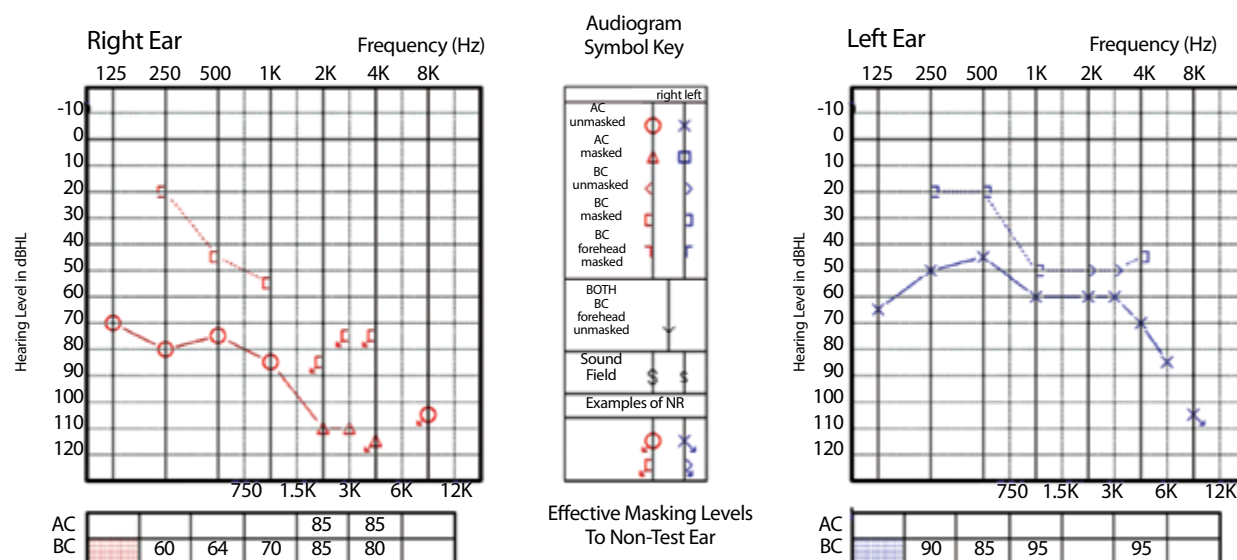


Figure 5. Postoperative pure tone audiogram showing improvement compared with the preoperative pure tone audiogram

As the number of hearing aid users increases, reducing inconvenience and complications has become increasingly important. To prevent complications when ear mould MATERIALS is inserted into the EAC, the mould should be placed using otoblock, with care not to insert it too deeply or with too much pressure [2]. When the patient has a past history of ear surgery or TM perforation due to chronic otitis media, it is difficult to know their TM condition. Therefore, they should have the TM evaluated by a physician before making a mould for a hearing aid. If the ear mould enters the patient's middle ear cavity, stapes dislocation, ossicle discontinuity, and endolymphatic fistula may occur [3]. These complications can cause permanent hearing loss, dizziness, and facial palsy. If the patient has hearing loss, dizziness, and tinnitus continuously despite bed rest and head elevation for 48 h, the doctor should suspect endolymphatic fistula. In this case, doctors should perform surgery for fistula repair using temporal muscle fascia, fat, or tragal cartilage [4]. To prevent these problems, an otorhinolaryngologist should examine the patient's TM status and obtain a history of past ear surgery, and ear moulds should be made by well-trained personnel. If the patient has had surgery or has TM perforation, the moulding process should be performed after TM perforation closure, and the ear mould should not be too soft [5]. If a foreign body has entered the middle ear cavity, a hearing test is required to assess the ossicle continuity and stapes status. Temporal bone CT is also required to evaluate middle ear and inner ear status and its relationship with the foreign body [6]. As a foreign body in the middle ear is rare, its condition should be examined closely before removal. A hearing aid made by a well-trained manufacturer seldom has complications. Rarely, however, patients who have materials in the middle ear may have otalgia, hearing loss, tinnitus, and inflammation [6]. In such cases, surgery is needed after proper recognition of the patient's condition. If the patient has a history of chronic otitis media or external ear deformity, a physical examination should be performed by a specialist. If there are abnormalities after physical examination, radiological examination such as temporal bone CT

is required to understand the patient's condition accurately. When manufacturing a custom-made hearing aid, the patient should first be examined carefully by an otorhinolaryngologist [7].

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - H.E.C.; Design - J.H.J.; Supervision - S.T.K.; Materials - J.Y.P.; Data Collection and/or Processing - J.H.J.; Analysis and/or Interpretation - J.Y.P.; Literature Review - H.E.C.; Writing - J.H.J.; Critical Review - H.E.C.; Other - S.T.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: This study was supported by a grant from Gachon University, Gil Medical Center.

REFERENCES

- Lee KS. Hearing aids. In: Na KS, editors. Otorhinolaryngology head and neck surgery. Seoul: Ilchokak press; 2009. p.819-44.
- Chang So, Kim CS, Oh SH, Kang BS. Two cases of middle ear foreign body; earmold for hearing aid. Korean J Audio 1997; 1: 203-6.
- Kiskaddon RM, Sasaki CT. Middle ear foreign body. A hearing aid complication. Arch Otolaryngol 1983; 109: 778-9. [CrossRef]
- Hof JR, Kremer B, Manni JJ. Mould constituents in the middle ear, a hearing-aid complication. J Laryngol Otol 2000; 114: 50-2. [CrossRef]
- Hajioannou JK, Bathala S, Marnane CN. Case of perilymphatic fistula caused by medially displaced tympanostomy tube. J Laryngol Otol 2009; 123: 928-30. [CrossRef]
- Ribeiro Fde A Foreign body in the Eustachian tube - case presentation and technique used for removal. Braz J Otorhinolaryngol 2008; 74: 137-42.
- Kohan D, Sorin A, Marra S, Gottlieb M, Hoffman R Surgical Management of Complications after Hearing Aid Fitting. Laryngoscope 2004; 14: 317-22. [CrossRef]