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Case reports

Application of Burow's solution for cement foreign body in the external auditory canal



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ABSTRACT

Introduction: Only two reports in English literature have described cement foreign bodies in the external auditory canal.

Case summary: We present the case of a 37 year-old man with cement foreign body in the right external auditory canal. Removal of the foreign body was difficult because of severe adhesion to the external auditory canal and tympanic membrane. We therefore used acidic Burow's solution to dissolve the alkaline cement deposition. Application of Burow's solution immediately caused the deposition to take on a paste-like consistency that was easily removed.

Discussion: Burow's solution seems useful for removing cement foreign bodies in the external auditory canal.

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1. Introduction

Foreign body in the external auditory canal (EAC) is a common problem seen by otolaryngologists. However, to the best of our knowledge, no previous reports have described cement foreign body treated using Burow's solution. Burow's solution, which contains 13% aluminum acetate, was developed in the 19th Century and has been widely used for the treatment of refractory otorrhea due to otitis externa or chronic otitis media [1,2]. We report a case of cement foreign body in the EAC treated with Burow's solution.

2. Case report

While a 37 year-old man was working outside, his right ear was accidentally exposed to cement powder. He was initially asymptomatic, but complained of a foreign body sensation in the right ear immediately after taking a bath. An otolaryngologist diagnosed foreign body in the EAC, but removal of the cement deposition proved impossible. The patient was therefore referred to our hospital for further evaluation.

Clinical examination revealed the cement deposit covering the anterior part of the right tympanic membrane (TM) (Fig. 1).

Audiometry demonstrated normal hearing on both sides. Computed tomography (CT) targeting the ear revealed a mass with calcification in the EAC in contact with the TM (Fig. 2a,b). No inflammatory findings were found in the right middle ear.

Removal of this foreign body using suction or a Rosen needle proved difficult, because of severe adhesion to the EAC and TM. Although we initially considered surgical procedures to remove the deposit, we decided to use acidic Burow's solution, based on the patient's professional opinion that alkaline cement might be dissolved by acidic solution.

We applied cotton immersed in Burow's solution to the foreign body near the TM for 5 min (Fig. 3a). On contact with Burow's solution, the surface of the cement deposit showed a paste-like consistency and was easily removed by suction and a Rosen needle (Fig. 3b). We repeated this procedure a number of times, finally achieving complete removal of the cement deposit. Burow's solution did not cause otalgia or inflammatory changes in the EAC.

Although perforation of the TM and otitis media was observed following removal of the foreign body (Fig. 3c), these conditions were temporary and healed spontaneously within 1 month. At 6 months after removal, no obvious abnormality was observed in the TM (Fig. 3d).

3. Discussion

Although foreign body in the EAC is a common disease for otolaryngologists, cement foreign body is extremely rare [3,4]. In the present case, because of severe adhesion of the cement to the EAC

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Fig. 1. Otoscopic finding of the tympanic membrane. Cement deposition covers the anterior part of the right tympanic membrane.

and TM, we could not remove the body using general instruments such as foreign body hooks, forceps for ossicles or suction.

Only two cases of cement foreign body in the EAC have previously been described in English literature [3,4]. In one case, deposits of cement on the TM spontaneously moved outwards onto the EAC by epithelial migration of EAC wall over a period of 4 weeks [3]. The main components of cement are tricalcium silicate, dicalcium silicate, calcium aluminate, and calcium aluminoferrite. Cement is alkaline (pH usually > 12) and is corrosive to tissue, producing significant burn injuries [4]. In conservative therapy, special attention should be paid to avoid alkaline complications such as burn injuries.

In the other case [4], dextrose-containing solution was used to remove the cement foreign body in the EAC. Glucose solutions can retard the setting and hardening process of concrete or cement. In the present case, this procedure was not applicable, because the

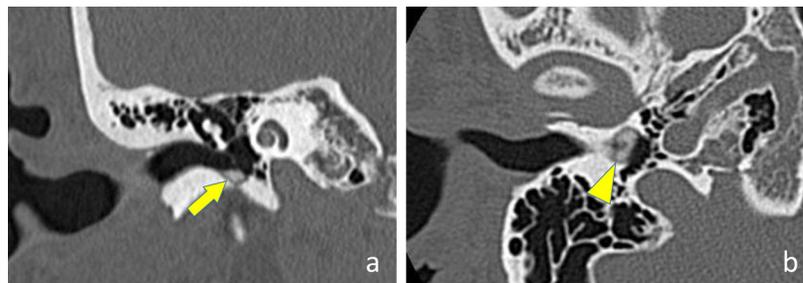


Fig. 2. Computed tomography of the right temporal bone. a,b: CT reveals a mass with calcification at the external auditory canal in contact with the tympanic membrane.

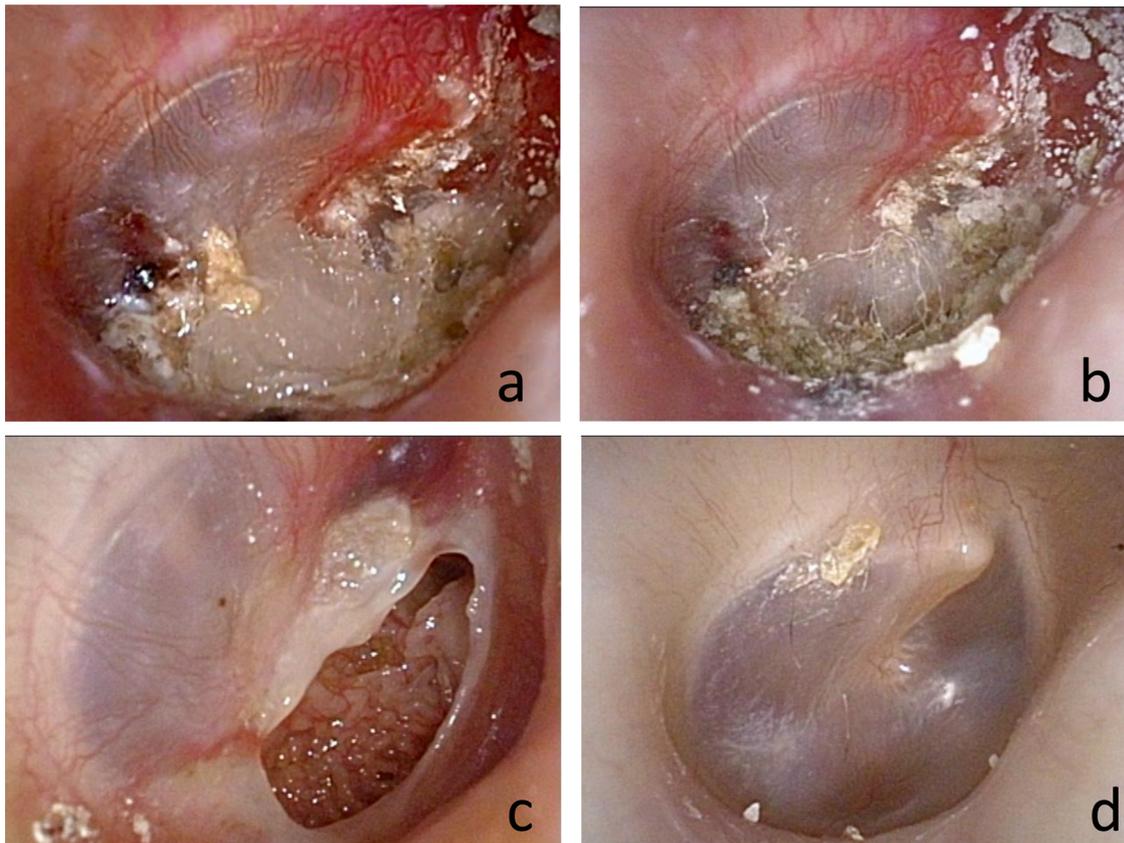


Fig. 3. Otoscopic findings of the tympanic membrane. a: Cotton dipped in Burow's solution is applied to the cement deposit; b: The cement deposit has taken on a paste-like consistency and is easily removed by suction and a Rosen needle; c: Perforation of the tympanic membrane and otitis media are evident following removal of the foreign body; d: At 6 months after cement removal, no obvious abnormality is apparent in the tympanic membrane.

Table 1
Composition of Burow's solution (in 100 ml).

Ingredient	Amount
Aluminium sulfate	22.5 g
Calcium carbonate	10 g
Acetic acid	25 ml
Tartaric acid	4.5 g
H ₂ O	75 ml

cement had completed setting and hardening in the EAC. In addition, the reaction of cement with normal saline may cause stiffening and enhanced strength [4]. We speculate that water entering the ear while bathing may have caused cement powder in the EAC to harden and set.

We applied Burow's solution for the treatment of alkaline cement foreign body, allowing successful removal. Burow's solution has been reported as effective against chronic suppurative otitis media and otitis externa [1,2]. Acidic Burow's solution (pH 3) includes aluminum sulfate, calcium carbonate, acetic acid, and H₂O (Table 1). The cement deposit was considered to have dissolved through the reaction of these acidic components with the alkaline cement. Burow's solution was effective even for a cement deposit for which hardening had completed.

In the present case, perforation of the TM was observed after removal of the cement foreign body. This perforation occurred only at the part in contact with the cement deposit and was not identified at the time of removal of the foreign body. In addition, TM showed no bleeding during the procedure. Burns and tissue failure on exposure to the alkaline cement seem likely to have injured the TM. Although these complications were temporary in the present case, alkaline electrolyte solution could potentially lead to ossicular erosion, facial nerve injury and necrosis of the medial wall of the middle ear [5].

4. Conclusion

In the management of foreign bodies, minimally invasive treatment methods should be selected individually according to the characteristics of the foreign substance. Application of Burow's solution for cement foreign body in the EAC has not been reported previously. Burow's solution seemed useful not only for the treatment of otitis externa or chronic otitis media, but also for the removal of a cement foreign body in the EAC.

Disclosure of interest

The authors declare that they have no competing interest.

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