Case Report

Precise Reconstruction of Auditory Canal Defect in External Auditory Canal Cholesteatoma with Bonewax Template

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Abstract Precise reconstruction of external auditory canal (EAC) defect is important for the prevention of retraction pocket and recurrent cholesteatoma. This report describes a new technique for the reconstruction of EAC defect by using bonewax template and the cortical bone. Canal defect reconstruction was performed successfully after the removal of EAC cholesteatoma. There has been no recurrence, and the outcome was excellent. This method avoids a sharp edge in EAC, which deters good epithelialization and promotes granulation tissue and enables the avoidance of subsequent retraction and formation of recurrent cholesteatoma. We recommend the use of bonewax template for the reconstruction of canal defects as a simple and precise method.

Keywords cholesteatoma; ear canal; reconstruction

1. Introduction

External auditory canal (EAC) cholesteatoma is characterized by focal invasion and erosion into the bony ear canal. The occurrence of posterior canal wall-mastoid cavity fistula in EAC cholesteatoma is rare. If the cholesteatoma is more localized, a canal-wall-up mastoidectomy with the repair of the canal defect may be preferable [6]. Various procedures have been used to close the canal defect [6,4,3]. However, these procedures may not be sufficient for precise reconstruction. The stabilization of wall repairs is difficult because repair materials tend to either fall into the mastoid cavity or protrude into the EAC. When using preserving techniques, precise reconstruction of the canal defect seems to be important for the prevention of retraction pocket and recurrent cholesteatoma. Bonewax is commonly used for sealing bony edges during neurotologic surgery. This report describes a new technique for reconstructing the canal defects by using bonewax template and cortical bone in the mastoid.

2. Case and surgical technique

A 52-year-old woman had a 2-year history of foul-smelling otorrhea. She denied hearing loss, otalgia, vertigo, tinnitus, and disequilibrium. She had no history of prior ear surgery

or other medical problems. Physical examination revealed keratin debris within the left canal that had fistulized through the posterior canal wall into the mastoid. The tympanic membrane was normal. Facial nerve function and neurologic examination findings were normal. A CT scan demonstrated a fistula between the posterior EAC and the mastoid cavity (Figure 1). The right ear was normal. The patient underwent a surgical procedure. A postauricular incision was carried down to the temporal fascia, a fascia graft was harvested, a Palva flap was then raised, and the cortical bone was harvested using a chisel in the mastoid. The posterior canal wall skin was elevated and then transected. Cholesteatoma debris and matrix were excised using the canal-wall-up technique, during which the

Figure 1: Axial CT scan of the left temporal bone showing a large fistula between the external auditory canal and the mastoid cavity. The middle ear is well aerated, and the mastoid is filled with a soft-tissue density.

Figure 2: (a) Operative photograph showing the canal defect (arrow) after the removal of external auditory canal cholesteatoma. (b) Bonewax template is tailored through the defect. (c) The cortical bone is cut in the bonewax shape. (d) The bone is put into the defect.

fistula site was cleared of disease and squamous epithelium. After the removal of cholesteatoma sac and bony sequestra, the bony surface was drilled with a diamond burr and smoothed until viable bone was found. Canal defect was managed with the cortical bone of the mastoid. To achieve a close fit, a bonewax template was used to assess the exact shape in situ. The harvested cortical bone was then sculpted to the exact dimension of the bonewax template. The graft was placed into the defect (Figure 2). The repair site was covered with canal skin flaps and a temporalis fascia. The canal is packed with Gelfoam and left in situ for 3 weeks. Complete healing was achieved after 6 weeks. During follow-up of 12 months, no recurrence was found. There was no retraction pocket in the EAC.

3. Discussion

EAC cholesteatoma is likely to be located in the inferior portion of the ear canal. However, it tends to progress to the posterior portion because the inferior portion of the bony canal is thick [9]. When the cholesteatoma invades the mastoid air cells, the patient needs to be managed with surgery [8,5]. Canal-wall-up mastoidectomy is performed when middle ear function is normal, and the lesion is more localized [2]. After the removal of diseases, the defect of EAC wall can be noted. Defects of EAC may also arise from trauma or neoplastic disease [1]. Defects of the canal wall can result in retraction pockets and sequential cholesteatoma. To restore normal anatomic condition, the canal wall needs to be reconstructed. A graft is frequently required to produce a satisfactory obliteration of the EAC defect. Sometimes cortical bone or cartilage is used for canal-wall reconstruction [10]. However, canal defects usually are difficult to repair precisely. To achieve a close fit

of grafts, we used bonewax templates. Bonewax is manufactured from sterilized, white-bleached honeybee wax (*cera alba*) and is widely used in neurotologic surgery. It has been shown to be easily handled and relatively simple to shape and bend to fit because of its texture, and puttylike plastic properties [7]. The bone graft is then sculpted to the exact dimensions of the bonewax template. The template offered a simple and adaptable technique that seemed to deliver an excellent outcome. In this study, we explained the method of precise canal-wall reconstruction. This avoids a sharp edge, which deters good epithelialization and promotes granulation tissue. Precise reconstruction also enables the avoidance of subsequent retraction and formation of recurrent cholesteatoma. A half-moon-shaped template of bonewax can be used for reconstructing the scutal defect associated with cholesteatoma, and the technique can also be extended to several skull base procedures in which bony defects need to be reconstructed. Most operating rooms have access to bonewax, and the method we described in this report is both very simple and easy to put into practice. In conclusion, we recommend the use of bonewax templates for the reconstruction of canal defects as a simple and precise method.

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