



Management of Bilateral Auditory Canal Stenosis: A Case Report and Literature Review

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Abstract

External Auditory Canal (EAC) stenosis can be congenital or acquired, often resulting from chronic otitis externa, trauma and malignancy or radiation therapy. This condition can cause symptoms such as hearing loss and complicate ear management, usually requiring surgical intervention. A 43-year-old woman presented with bilateral hearing loss, progressively worsening over 5 years. Otoscopic examination revealed fibrous stenosis of the EAC. Audiometry showed a mixed hearing loss of 70 dB in the right ear and a conductive loss of 45 dB in the left ear. Computed tomography confirmed EAC stenosis with tympanosclerosis. Surgical management involved fibrosis removal and stenting. Acquired inflammatory atresia of the EAC is classified into membranous and solid types, with surgery aimed at improving hearing and preventing restenosis. Radiological evaluation is crucial preoperatively. Techniques such as cartilage grafting and long-term stenting are recommended to prevent recurrence. This case highlights the complexity of managing EAC stenosis and the importance of personalized surgical approaches.

Keywords: External auditory canal stenosis; Hearing loss; Fibrous stenosis; Inflammatory atresia; Stenting

Introduction

Canal stenosis is a narrowing of the length of the external auditory canal that is either caused by a congenital malformation of the external auditory canal or is acquired, secondary to persistent otitis externa, trauma, malignancy or irradiation [1-4]. These conditions produce stenosis by inducing thickening of the subcutaneous tissue and hence narrowing of the external auditory canal.

Indeed, inflammatory causes of EAC stenosis are chronic and relapsing otitis externa, perichondritis and periostitis. EAC tumours can cause EAC stenosis and their excision can lead to postoperative restenosis (traumatic cause).

Radiation Therapy (RT) for the treatment of head and neck cancers including those affecting the temporal bone area can induce pathological changes in the EAC [5]. Previous surgery (canaloplasty or meatoplasty) and radiotherapy, especially if associated with a history of parotid surgery extended to the external auditory canal, have been implicated as possible causes [6]. Acquired atresia of the external auditory canal is a rare condition

that has also been known as post-inflammatory medial meatal fibrosis, post-inflammatory medial canal fibrosis, post-inflammatory acquired atresia [7-10]. An acquired atresia consists of a soft tissue plug in the proximal portion of the external auditory canal, attached to the lateral surface of the tympanic membrane [11]. These changes may appear clinically as a persistent otitis externa, with otorrhoea and otalgia, resulting in EAC stenosis that prevents adequate examination and cleaning of the ear and is associated with hearing loss [12].

Acquired stenosis of the external auditory canal is known to be a surgical problem. The aim of surgery is to produce a dry, patent ear canal by enlarging the bony canal and cartilaginous meatus and by excising the thickened subcutaneous tissue [11]. In view of the fact that so many possible causes exist, numerous techniques have been used to treat this problem surgically and this illustrates that the repair may be difficult [13]. Considerable pessimism appears in the literature. A simple but effective technique is needed. In this report, we present the case of bilateral fibrous stenosis of the external auditory canal, managed in our



department, with a review of the literature.

Case Report

In April 2024, a 43 years old woman was referred to our ENT Department due a bilateral hearing loss. Her history of illness started 5 years ago by a bilateral hypoacusis, with gradual installation and more pronounced in the right ear. However, the patient didn't report the presence of otorrhea, a tinnitus, facial paralysis or any symptoms of meningitis. It is important to note that the patient's history includes, recurrent otitis in her childhood, without any otologic surgery in the past.

The otoscopic examination reveals bilateral fibrous stenosis of the external auditory canal. The rest of the physical examination was normal. The tonal audiometry showed a mixed hearing loss of 70 decibel and an audiometric rhinne of 20 for the right ear. For the left ear, we have objectified a conductive hearing loss of 45 decibel and an audiometric rhinne of 20.

The CT scan of petrous bone showed a tissue filling of the 2 external auditory canals with tympanosclerosis, with no abnormalities in the inner ear. Tissue filling of the 2 external auditory canals with tympanosclerosis, with no abnormalities in the inner ear (**Figure 1**).



Figure 1: CT scan of temporal bone, axial section: Tissue filling the external auditory canals with tympanosclerosis.

In terms of therapeutic options, we proposed to the patient surgical management. The surgical procedure was based on removal of the fibrosis with reconstruction using skin grafts.

Discussion

Bonding and Thoracic Outlet Syndrome (TOS) classified the underlying pathology of inflammatory acquired atresia into two types: Membranous and solid [10]. In membranous atresia, a circumferential insult to the canal skin leads to the formation of granulation tissue; epithelization occurs from all sides of the canal and a membrane forms. As a result, keratin accumulates behind the atretic membrane.

The more common solid atresia starts with a granular myringitis that extends laterally onto the

external auditory canal wall; the granulation tissue fills the deep part of the canal and its lateral surface epithelializes. The resulting soft tissue plug is converted into dense fibrous tissue. This atretic segment can extend as far as the bony cartilaginous junction and causes a conductive hearing loss. The primary aim of surgery in these cases is improvement of hearing [11].

Acquired atresia of the external auditory canal is an unusual cause of conductive hearing loss. It has been classified by TOS into 4 categories: Post-traumatic, post-operative, neoplastic and post-inflammatory [14]. A radiological assessment is recommended before any surgery, particularly in the case of medial external auditory canal stenosis, in order to eliminate the presence of associated pathology of the external auditory canal and/or of the middle ear (iatrogenic cholesteatoma bone lysis or osteoneogenesis, rare tumoral processes) and to assess the condition of the tympanic fundus [15,16].

Different stenting materials have been successfully used to prevent early, but not delayed, EAC stenosis, including absorbable gelatine sponge (Gelfoam®), backing strips and expandable wicks. After removal of the packing material about 1 week postoperatively, if the canal is oedematous, it may be necessary to place a Pope wick; in addition, ototopical antibiotic/steroid drops may help to prevent early restenosis [17].

Our approach started with the identification of the limit of fibrosis under the microscope. Then, we made a retro-auricular incision and removed the fibrosis from the auditory canal. 4 silastic flaps were put and Gelfoam and also pope wick.

According to the literature, in the case of medial external auditory canal stenosis, treatment involves removal of all fibrous tissue and skin obstructing the EAC, bone reaming of the EAC and repair of the tympanic membrane after resection of its fibrous layer where this has been damaged by the pathological process [18].

The skin of the EAC is then reconstructed using perichondral or aponeurotic grafts, covered with thin skin grafts. A meatoplasty is necessary to promote the healing process and aeration of the duct and in some cases to improve the approach [9,16].

The use of cartilage as a graft, combined with aponeurosis or perichondrium, is of interest, as this stable, non-deformable material promotes stabilization of the neo-tympanum. Cartilage has been shown to offer greater chances of surgical success than perichondrium alone, without compromising postoperative hearing results [19]. The use of hyaluronic acid films to promote cicatrization and prevent recurrence of the pathological process deserves to be pursued and studied, in order to



ascertain its real value in these therapeutically difficult cases. In addition to the administration of local antibiotic-corticoid treatments for several weeks, some authors recommend, as we do, leaving silicone plates in place in the EAC for a sufficiently long period (around 2 months), so as to prevent the recurrence of the pathological process [20-21].

Paparella and Kurkjian introduced the basic surgical principles of excising the fibrous plug, enlarging the cartilaginous and bony canal and then re-covering it. Since then, modifications of this technique have been introduced primarily to address the most common postoperative complication, restenosis [22].

However, the Jerusalem Hospital group described meatal stenosis after mastoidectomy in 3 patients; to prevent it, they inserted an Optosil® template after surgery, which was left in place for the first postoperative week and then replaced with an acrylic stent worn during most of the day for a period of 6 months, until epithelization occurred around it [22].

Conclusion

The stenosis of the External Auditory Canal (EAC) can be congenital, due to abnormalities of the first gill cleft or acquired as a result of inflammation, trauma and the effects of radiotherapy, all sharing a common pathogenesis, namely a cascade of inflammatory changes leading to medial canal fibrosis. The surgical aim is to produce a dry and patent ear canal and also to improve hearing. Management of acquired atresia requires a skin graft to cover the deficient ear canal, in addition to plug excision. However, the ear canal remains unstable and recurrence can occur.

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