

Dehiscence of the Tympanic Bone with Temporomandibular Joint Herniation

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Abstract

Dehiscence of the tympanic bone is due to the persistence of the foramen tympanicum from the embryonic period [1]. The presence of this variant is common and has been well described in previous studies [2-7]. However, its association with tissue herniation from the temporomandibular joint (TMJ) is rare. We present the case of a 57-year-old female with three months of left sided otorrhea and EAC mass with protrusion through the anteroinferior wall of the bony portion of the EAC associated with breathing and buccal opening.

Keywords: Temporomandibular joint, Dehiscence, External auditory canal, Foramen tympanicum, Huschke, Tympanic bone

Introduction

The foramen tympanicum (FT), also known as Huschke's foramen, is a dehiscence of the anteroinferior wall of the bony portion of the external auditory canal (EAC), due to a lack of ossification of the tympanic ring during development [8]. First described by the German anatomist Emil Huschke [9,10], the FT is a normal anatomical variant through which no vascular or nervous structures traverse [2,9]. Therefore, the term "foramen" is a misnomer. A more accurate term for this variant would be tympanic bone dehiscence (TBD) [2].

The TBD variant is common and has been well described previous studies [2-7]. However, its association with tissue herniation from the temporomandibular joint (TMJ) is rare despite its anatomical proximity and embryological relationship. We therefore present such a case in this paper, as well as its clinical implications.

Case Description

A 57-year-old Dominican female without significant past medical history and a surgical history significant for bilateral tubal ligation at age 21 and excision of a benign skin tumor in her right leg at age 53. She presented to our otorhinolaryngology clinic with three months of left sided otorrhea, which she described as an intermittent, odorless and colorless discharge of scarce quantity, worsened by talking or mastication. She also complained of ipsilateral headache, facial and eye pain, and mild paresthesia of the scalp. Her symptoms were not accompanied by hearing loss or otalgia. She had been treated two months prior to presentation in an outside clinic for presumed left sided acute otitis media and acute otitis externa. She was treated with oral and topical antibiotics for one month without improvement and therefore presented to our clinic for further evaluation. The patient brought with her a selective agar plate culture result that showed no growth of microorganisms from the ear secretions taken at the outside clinic.

The physical exam was overall unremarkable, with the exception of the otoscopic exam. Visualization of the left EAC revealed a clear secretion and a bulging mass protruding through the anteroinferior wall of the bony portion of the EAC. Protrusion of the mass into the EAC worsened with breathing and especially during mouth opening (Figures 1 and 2). The tympanic membrane was intact with mild hyperemia at the insertion site of the malleus. Computerized tomography (CT) scan confirmed the diagnosis, showing a dehiscence of the anterior wall of the middle third of the bony portion of the left EAC with herniation of tissue corresponding to the left TMJ (Figure 3).

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Figure 1: Herniation not visible.

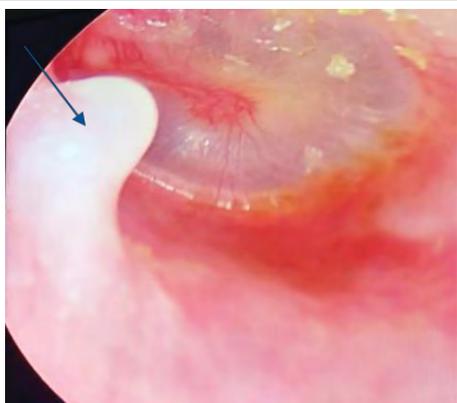


Figure 2: Herniation of periarticular tissue in EAC.



Figure 3: Bone defect (blue arrow) on axial CT scan.

Discussion

Epidemiologically, there is a wide variation in the prevalence of TBD, ranging between 0% and 65%, depending on the

population studied [3]. One study looking at 994 Japanese dry skulls showed that there is a greater incidence among females (20%) than males (12%) [4]. The study also found that there is a decrease in prevalence with age, demonstrating that the defect can close over time [4]. This is important when making a decision regarding medical or surgical treatment when there are associated symptoms or, as in this case, herniation of adjacent structures.

The TMJ and the EAC are intimately related starting from the embryonic period. There exists a direct communication between the two structures up until several years after birth when bone development of the EAC is ultimately completed [11]. During the ninth week of fetal development, four ossification centers appear around the tympanic membrane within the tympanic portion of the temporal bone. By the 10th week of gestation, these ossification centers expand and unite to form the tympanic ring [12-14]. At birth, this structure has a U-shaped form and remains incomplete. The open portion of this structure is known as the notch of Rivinus, which is flanked by the anterior and posterior processes [15]. These processes grow and fuse by the first year of life, forming superiorly the EAC and inferiorly the FT. In the majority of individuals, the FT closes completely by five years of age. Failure of such closure results in a persistent FT in a small percentage of adults [5]. In such cases of dehiscence of the tympanic bone, the persistent FT allows communication between the retrodiscal portion of the TMJ and the medial bony portion of the EAC [16].

Tympanic bone dehiscence and subsequent herniation may occur spontaneously or may be secondary to neoplasia, trauma, inflammation or even iatrogenic causes [17]. While the majority of cases are asymptomatic, infections of the EAC can progress through the defect into the preauricular tissue, the TMJ or the parotid gland, and give rise to specific signs and symptoms [1]. Patients may present with articular click sounds with mandibular movement, saliva or synovial fluid within EAC (transient otorrhea), and/or an oscillating herniating mass, as well as the infections already mentioned [17].

Furthermore, patients with TBD are at risk for otologic complications and salivary fistulas following procedures such as arthroscopy of the TMJ. Conversely, there is risk of dissemination of pathologies to the TMJ following manipulation of the EAC by otoscopy or during surgery. It is also important to consider that the persistent FT can act as a conduit for metastasis into the infratemporal fossa [7].

In addition to the characteristic clinical presentation mentioned in this case, CT scan is an indispensable instrument for making the definitive diagnosis of TBD. High-resolution multi-slice helical CT or cone beam CT are especially useful due to their precision and fine millimetric slices [2]. In cases where there is herniation of preauricular tissue of unclear origin, magnetic resonance imaging (MRI) or CT with contrast or can be used to identify specific structures.

First line management of TBD, with or without herniation of periarticular tissue, is expectant; especially in asymptomatic cases and those without severe complications. Nevertheless, follow up is crucial in order to control the symptoms and prevent or treat any complications that may arise. In symptomatic patients with associated infection, worsening herniation of

adjacent structures and/or active fistulas, a surgical closure of the defect and reduction of the herniation should be considered and weighed against the risk of iatrogenic fistula formation or damage to the TMJ [18]. In the case of our patient, we opted for conservative management after an extensive discussion with the patient regarding her condition and all treatment options. While she had some mild symptoms, including otorrhea, headache and paresthesia, we were reassured that her symptoms were stable and she had reliable follow up care. She was advised to keep the affected ear as dry as possible and follow up in our clinic regularly for monitoring of symptoms.

Conclusion

Dehiscence of the anterior wall of the EAC rarely occurs with associated pathology. In this particular case, our patient presented with an evident herniation of tissue from the TMJ with mild symptoms including intermittent otorrhea, headaches and paresthesia, in the absence of severe complications. It is important to associate such findings with clinical imaging, such as CT or MRI, to rule out cholesteatomas or otitis in the setting of a normal variant. Confirmed cases with severe complications such as infections, worsening herniation and/or active fistula, may warrant surgical intervention. Conservative medical management is often appropriate first line treatment for cases like our patient, where symptoms are mild and stable, and reliable follow up is ensured.

Abbreviations

External auditory canal (EAC)

Foramen tympanicum (FT)

Temporomandibular joint (TMJ)

Computerized tomography (CT)

Magnetic resonance imaging (MRI)

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Conflict Of Interest

None.

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