



Case report

Spontaneous temporomandibular joint herniation into the external auditory canal through a patent foramen of Huschke: A case report

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H I G H L I G H T S

- FH is an anatomical separator between the EAC and TMJ.
- PHF develops through an imperfect serial ossification and fusion of the tympanic bone.
- PHF can result in the TMJ herniation due to persistent dehiscence of the bony wall of the EAC.
- Awareness of TMJ herniation through PHF can be helpful for the diagnosis of a protruding EAC mass.

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A B S T R A C T

Temporomandibular joint herniation (TMJ) can be caused by inflammation, trauma, tumor, or otologic procedures. However, spontaneous TMJ herniation can also occur as a result of a congenital bony defect in the external auditory canal (EAC), known as the patent foramen of Huschke (PFH), and occurs in 0.4% of the population. Herein, the authors present a case of spontaneous TMJ herniation through the PFH with clicking tinnitus. The patient underwent the surgical repair of bony defect in the EAC with placement of titanium mesh, and the symptom disappeared after surgery. They also review the relevant literature regarding this disease and discuss its embryologic development and clinical significance.

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1. Introduction

The foramen of Huschke (FH) is a route of communication between the external auditory canal (EAC) and the infra temporal fossa. It is also an anatomical separator between the EAC and temporomandibular joint (TMJ). Normally, closure of the EAC occurs at five years of age, although the FH is occasionally observed after this age. The EAC and TMJ are separated by a bony anterior wall of variable thickness. Several factors, such as trauma, tumor, and injury and inflammation, may cause protrusion of TMJ tissue into the EAC [1–3]. However, spontaneous TMJ herniation due to congenital bony defects, such as patent foramen of Huschke (PFH), is an extremely rare condition, affecting only 0.4% of the population [2]. PHF develops through an imperfect serial ossification and

fusion of the tympanic bone. These abnormal conditions cause various otologic symptoms, such as clicking tinnitus, conductive hearing loss or otalgia, and TMJ pathologies [4]. In this article, we present a case of spontaneous TMJ herniation and provide a brief review of the relevant literature. This work has been reported in line with the SCARE guidelines [5].

2. Presentation of case

A 46-year-old man presented to the otorhinolaryngology department as an outpatient with the chief complaint of mastication-induced clicking tinnitus on the right side, a symptom he experienced for 20 years. He reported no other otologic symptoms such as ear fullness, otorrhea, or otalgia, and had no medical or trauma history. The otoscopic examination revealed a normal tympanic membrane; however, there was a focal protrusion of the soft tissue, originating from the anterior wall of the right EAC

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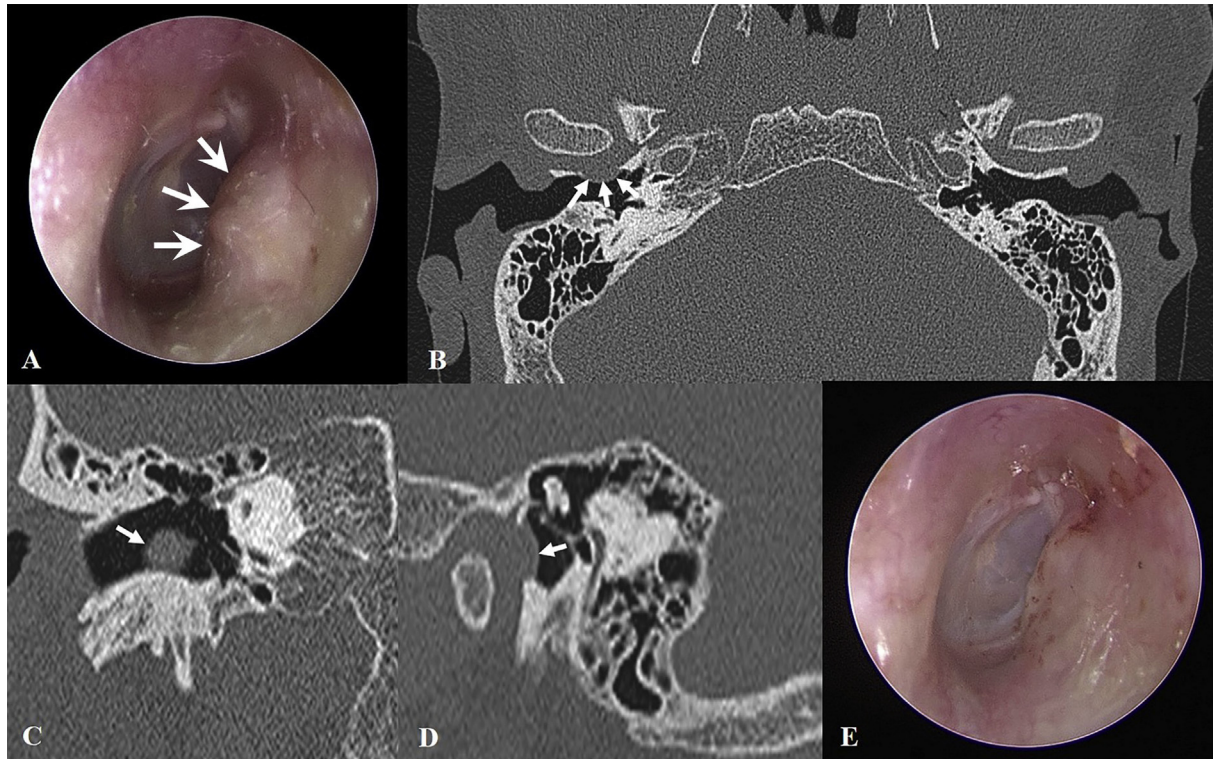


Fig. 1. A 46-year-old man presented with clicking tinnitus during mastication, a symptom he experienced for 20 years. **A** Otoloscopic examination revealing a protruding lesion (arrow) in the anteroinferior wall of the right external auditory canal (EAC). **B–D** High-resolution computed tomography of the temporal bone revealing a well-defined bony defect in the anterior wall of the right EAC (arrows), with focal herniation of posterior temporomandibular joint soft tissue (**B**: axial view; **C**: coronal view; **D**: sagittal view). **E** Postoperative otoscopic examination 2 months later. Although a mildly bulging lesion is still apparent, symptoms have completely resolved.

(**Fig. 1A**). The mass moved with jaw movement and bulged significantly when the patient tightened his jaw. High-resolution computed tomography (HRCT) was performed on a dual-layer detector CT unit (IQon Spectral CT, Philips Healthcare, Best, The Netherlands). The following acquisition parameters were applied: 140 kVp; 270 mAs; collimation, 16×0.625 mm; pitch factor, 0.188; rotation time, 0.4 s; field-of-view (FOV), 95.2 mm; slice thickness, 0.67 mm; slice increment, 0.67 mm; and scan time, 11.2 s. HRCT images revealed a 9-mm bony defect in the anterior wall of the right EAC, and posterior TMJ tissue protruded through this bony defect (**Fig. 1B–D**). The patient desired surgical repair, and surgery involved placement of titanium mesh via the preauricular incision. Two months later, mild residual bulging was still observed on the postoperative follow-up otoscopic examination (**Fig. 1E**). However, the mastication-induced clicking tinnitus disappeared.

3. Discussion

Spontaneous TMJ herniation through the PFH is extremely rare. The EAC develops from the first branchial cleft at eight weeks' gestation. In the ninth week of intrauterine life, four ossification centers appear around the tympanic membrane, which fuse to form the tympanic ring. At birth, anterior and posterior bony prominences form on the tympanic ring, which grow toward one another until they ultimately fuse, thereby separating the tympanic ring into the ear canal superiorly and the FH inferiorly. This fusion is not completed during the first years of life and forms the FH, which is normally open at birth. As a consequence of tympanic bone development at approximately five years of age, the FH becomes increasingly short until its complete closure [6]. Failure of involution results in persistent dehiscence of the bony wall of the EAC. The ear canal rotates with growth, due to the ongoing downward

and forward displacement of the mastoid bone; thus, a PFH results in a defect of the anterior canal wall. In adults, it is positioned slightly posteromedial to the TMJ [1,4,6]. The incidence of PFH in the normal adult population has been reported to be 4.6% and 7.2% in high-resolution CT and autopsy, respectively [3,6,7]. A previous study by Park et al. [2] reported that TMJ herniation was noted in 26% of PFH cases and was closely related to the size of the defect.

The diagnosis can be based on otoscopic or radiological findings [8,9]. Evaluation of the EAC during mouth movement can be helpful for diagnosing PFH because PFH-related TMJ herniation is more prominent when the mouth is closed and retracts when the mouth opens. In addition, high-resolution CT is useful for detection of the bony defect, while magnetic resonance imaging is useful for detection of TMJ soft tissue herniation. Treatment of PFH is based on symptom severity and patient willingness to undergo the necessary procedures. When patients experience trivial or no symptoms, surgery is not considered. In patients who experience significant symptoms, surgical closure of the defect can be performed [10].

4. Conclusion

We reported a rare case of TMJ herniation through the PFH presenting as mastication-induced tinnitus. The details of this case remind practicing clinicians that awareness of the embryological and anatomical background of PFH can be helpful for the diagnosis of a protruding EAC mass in the anterior wall.

Ethical approval

This was purely an observational case study. The patient's management and outcome were unaltered. Therefore, no ethical

approval was required for this case report.

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Authors' contributions

1. Concept and design: HJB, KHR
2. Acquisition of data: KHR, DGH
3. Literature review: All authors
4. Analysis and interpretation of data: HJB, DGH
5. Writing the paper: KHR, HJB
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Conflict of interest

All authors, including Kyeong Hwa Ryu, Hye Jin Baek, Dong Gu Hur, declare that they have no conflict of interest.

Guarantor

Hye Jin Baek.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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