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Clinical Challenge | RADIOLOGY

Sudden Onset and Unremitting Vertigo in a Middle-aged Woman

Anthony DiPonio, DO; Eric Sargent, MD; Katie McClain, DO

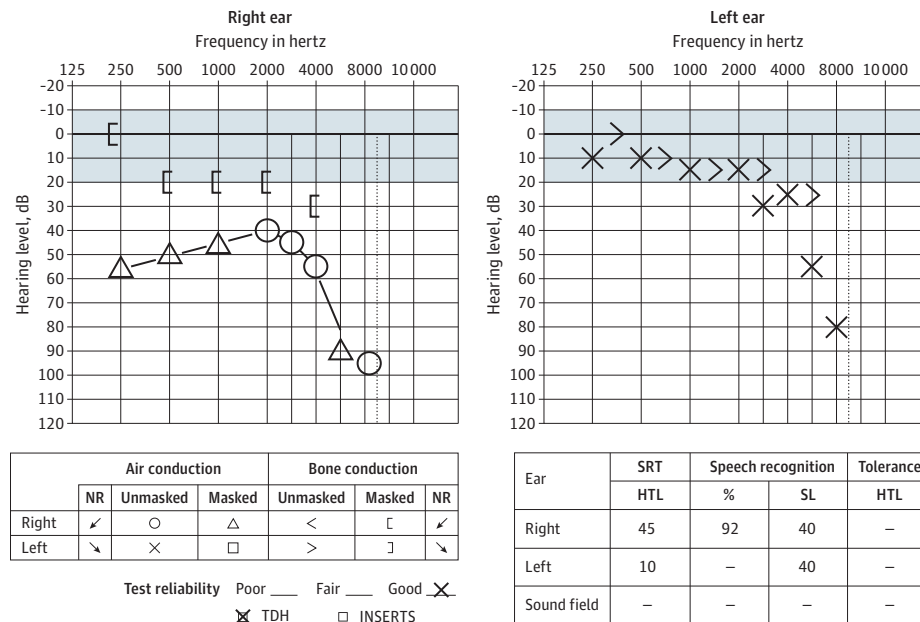


Figure 1. Preoperative audiogram reveals a right-sided low- to mid-frequency moderate conductive hearing loss and a bilateral high-frequency sensorineural hearing loss. dB denotes decibels; HTL, hearing threshold level; SL, sensation level; SRT, speech reception threshold; and TDH, telephonic dynamic headphones.

A 51-year-old woman presented with a 24-hour history of severe dizziness that she described as “room spinning,” right aural fullness, and a subjective right-sided hearing loss. She denied any medical history of vertigo, recent upper respiratory infection, head trauma, or prior otologic surgery.

A physical examination revealed no abnormalities on otoscopic evaluation; however, a strongly positive right-sided Dix–Hallpike test was elicited with rotary nystagmus; a subsequent Epley maneuver was performed. The patient’s symptoms subjectively worsened during the following several days. Therefore, an audiogram test (Figure 1) and computed tomography (CT) of the temporal bone were performed.

WHAT IS YOUR DIAGNOSIS?

- A. Superior semicircular canal dehiscence syndrome
- B. Pneumolabyrinth
- C. Labyrinthitis
- D. Meniere disease

[Quiz at jamamelookup.com](https://quiz.at.jamamelookup.com)

Diagnosis

B. Pneumolabyrinth

Discussion

The patient’s audiogram findings revealed a right-sided low- to mid-frequency moderate conductive hearing loss, as well as a bilateral high-frequency sensorineural hearing loss (Figure 1). Findings of the CT of the temporal bone were important for air within the vesti-

bule and the semicircular canals, as well as in the basal turn of the cochlea, consistent with a pneumolabyrinth (Figure 2). All 4 of the possible diagnoses may be responsible for causing symptomatic dizziness. However, the presence of air in the bony labyrinth is specific for a pneumolabyrinth, and therefore, the remaining options would be incorrect.

Pneumolabyrinth was first described in 1984 by Mafee and colleagues¹ who observed air in the vestibule and cochlea on post-

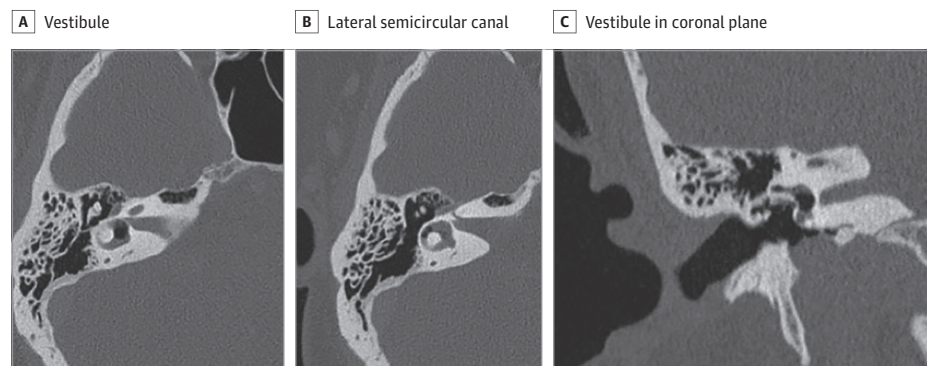


Figure 2. Axial computed tomography image of the temporal bone showing air in the right inner ear, specifically, the vestibule (A) and lateral semicircular canal (B). Air also visualized in the vestibule in the coronal plane (C).

operative imaging of a patient who had undergone a mastoidectomy for cholesteatoma for an iatrogenic stapes footplate fracture. Since then, multiple cases of pneumolabyrinth have been reported in the literature and most were associated with trauma with or without temporal bone fracture^{2,3} or with a prior otologic surgery.^{4,5} A systematic review published in 2021 by Botti and colleagues⁶ reviewed 78 articles involving pneumolabyrinth, most cases of which were associated with temporal bone fracture (31.8%), stapes surgery (18.2%), head trauma without temporal bone fracture (14.4%), penetrating trauma (15.9%), and barotrauma (11.4%).

This patient presented with a spontaneous idiopathic cause of pneumolabyrinth; she had no history of traumatic head injury nor any prior otologic surgery. Given the focus of the air bubbles around the oval window in the labyrinth, it was presumed that either a spontaneous tear or disruption of the annular ligament of the stapes was involved. We began a right middle ear exploration with tissue graft repair of the presumed spontaneous oval window fistula; however, the middle ear appeared normal, and palpation of the ossicular chain revealed normal mobility of all the ossicles. Mucosal flaps were elevated around the oval window, and a fat graft harvested from the postauricular subcutaneous tissue was placed medial to this in an attempt to repair the presumed oval window fistula.

Given the rarity of the condition, most of the current data on pneumolabyrinth is from case reports and small case series, and

there is no definitive treatment algorithm. Most cases are managed by either conservative approaches (eg, bed rest, steroids) or surgical repair of the presumed structural defect via an exploratory tympanotomy. Schied and colleagues recommend that patients with progressive hearing loss or vertigo be treated with middle ear exploration.⁷ Conservative management failed in this patient, and after 1 week of persistently severe symptoms with audiogram evidence of substantial hearing loss, it was decided to perform surgical treatment via an exploratory tympanotomy. Tissue graft repair of the presumed oval window fistula proved to be effective. At a postoperative follow-up visit, the patient noted a subjective improvement of all preoperative symptoms. Two months postoperatively, results of a repeat audiogram test indicated complete improvement of the conductive component of the hearing loss, and a CT of the temporal bone showed resolution of air in the labyrinth.

This patient initially presented with sudden-onset routine otologic complaints—eg, vertigo and aural fullness—as well as positionally triggered vertigo with nystagmus and mixed hearing loss. After symptoms worsened, further testing revealed a spontaneous pneumolabyrinth. This case report illustrates the importance of considering a wide range of differential diagnoses when evaluating patients with routine otologic concerns whose symptoms fail to improve after conservative management.

ARTICLE INFORMATION

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