

Case Report

Persistent Conductive Hearing Loss After Tympanostomy Tube Placement Due to High-Riding Jugular Bulb

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High-riding jugular bulb (HRJB) is a rare condition not often observed in the clinical setting that occurs in 1% to 3% of cases. The jugular bulb is not present at birth, and the precise size and location likely depends on a myriad of postnatal events. This report describes the case of a male adolescent who experienced persistent conductive hearing loss (CHL) unilaterally following bilateral tympanostomy tube placement. Subsequent workup included computed tomography, which identified a very high jugular bulb eroding the posterior semicircular canal and occluding the round window niche. The patient had no hearing or vestibular symptoms aside from CHL and continues to be observed on a regular basis. HRJB is a rare disorder that has been known to erode the posterior semicircular canal, resulting in possible tinnitus, vertigo, dizziness, and/or sensorineural hearing loss. CHL has been reported in HRJB cases, although it is uncommon. HRJB may result in CHL through a third-window defect shunting hydromechanical energy away from the round window or due to middle ear blockage. Imaging is useful in ascertaining rare causes of CHL, such as HRJB. Because HRJB is not easily fixable, it is important to recognize it as a rare cause of CHL for appropriate patient counseling. Possible interventions should be tailored to the patient after careful consideration of contralateral anatomy and likely benefits.

Key Words: jugular bulb, jugular bulb abnormalities, conductive hearing loss, hearing loss.

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INTRODUCTION

High-riding jugular bulb (HRJB) is a rare condition not often observed in the clinical setting. The jugular bulb typically lies underneath the floor or the hypotympanum, anterior, inferior, and medial to the descending segment of the facial nerve. There is wide variability in its location, size, shape, and extent of bony covering. Because the jugular bulb is not present at birth, the precise size and location likely depends on a myriad of postnatal events, such as blood flow and pneumatization of the mastoid.^{1,2} Jugular bulb abnormalities (JBA) are estimated to occur in 10% to 15% of the U.S. population, whereas HRJB eroding into the inner ear is less common, occurring in 1% to 3% of JBA cases.¹ In this report, we discuss the case of an adolescent patient who, after

bilateral placement of tympanostomy tubes, experienced unilateral persistent conductive hearing loss (CHL). As a result, temporal bone imaging was performed, which identified a rare case of HRJB eroding the posterior semicircular canal.

CASE REPORT

A 13-year-old male presented with bilateral hearing loss over a 2-month period with concomitant sleep-disordered breathing. An audiogram demonstrated type B tympanograms bilaterally with moderate CHL on the right (pure-tone average [PTA] = 33 dB, air-bone gap [ABG] = 25 dB) and moderately severe CHL on the left (PTA = 47 dB, ABG = 40 dB) (Fig. 1A). Bilateral myringotomy with ear tube placement and adenotonsillectomy were performed 2 weeks after presentation for persistent bilateral middle ear effusion. At 3-month follow-up, the patient reported resolution of congestion and sleep symptoms as well as improved hearing. The ear tubes were patent, and the patient had no otorrhea. Audiogram at the 6-month follow-up demonstrated persistent CHL on the left (PTA = 28 dB, ABG = 20 dB) with normal hearing on the right, prompting temporal bone imaging and neurotology referral (Figs. 1B and 2). At this point, the differential diagnosis included juvenile otosclerosis—although likely not congenital stapes footplate fixation given the lack of lifelong symptoms—ossicular discontinuity, enlarged vestibular aqueduct, middle ear mass lesions,

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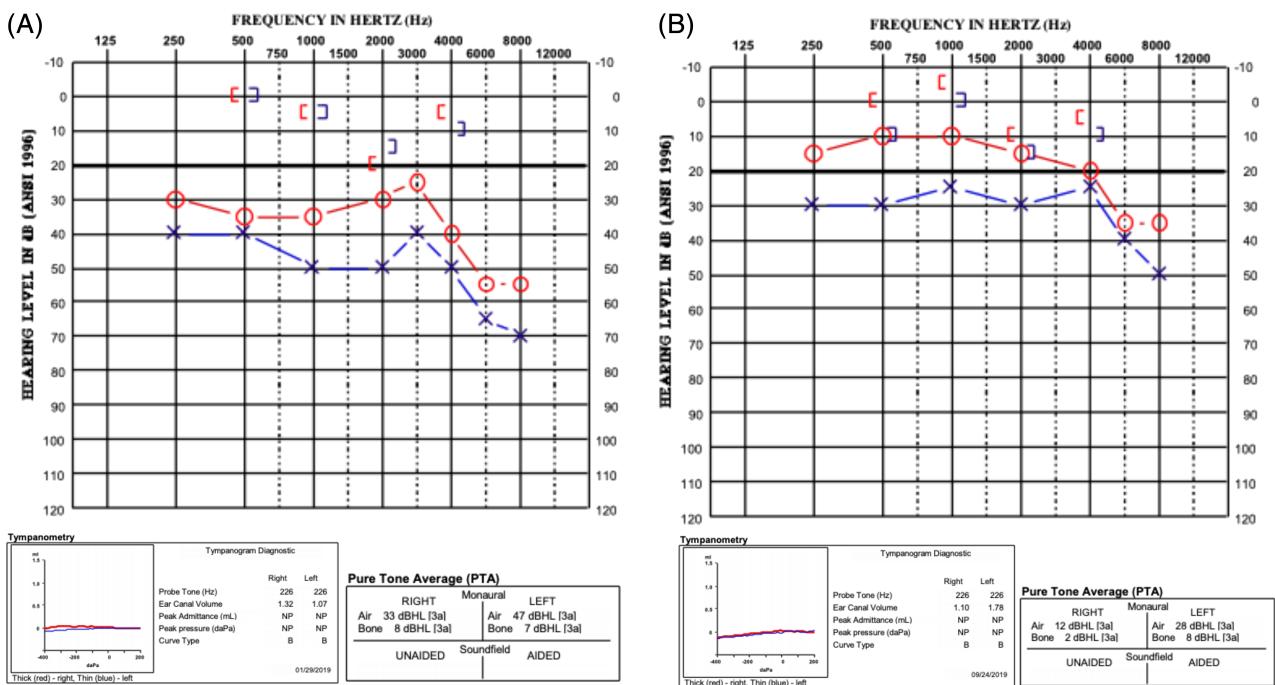


Fig. 1. Audiometric data prior to operation (A) and 6 months after tympanostomy tube placement (B) with persistent left conductive hearing loss.

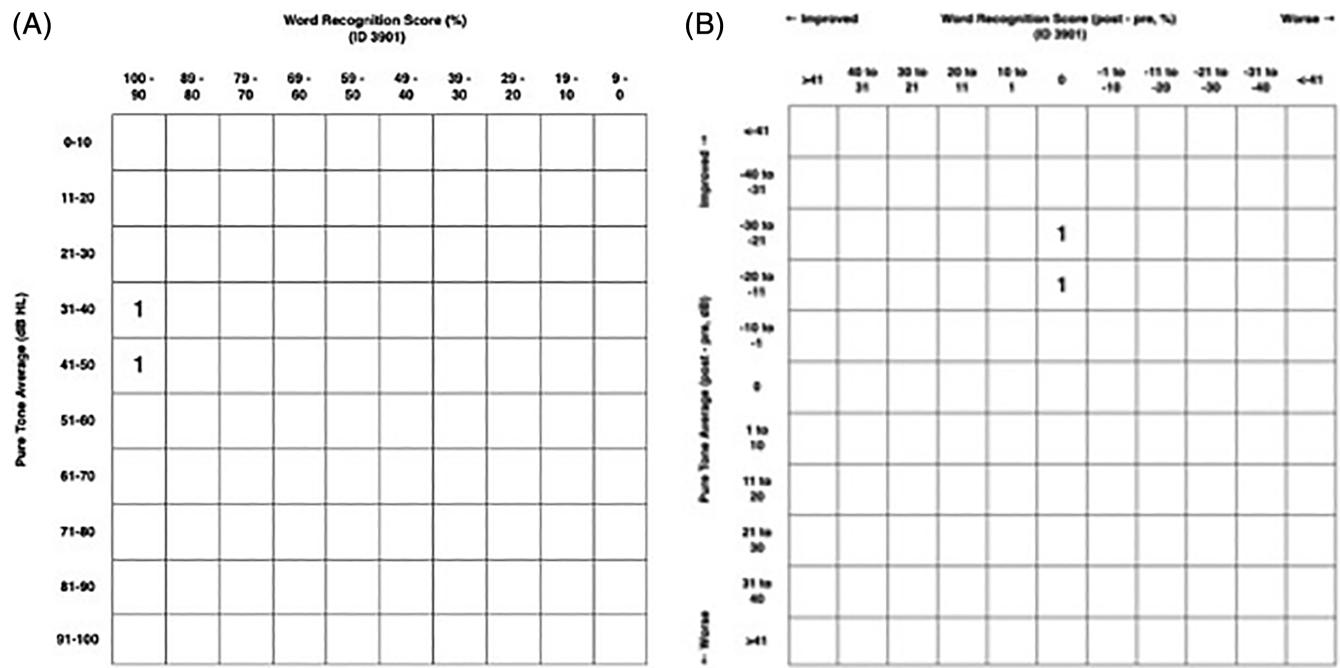


Fig. 2. Scattergram of hearing levels for left and right ears pre- and posttympanostomy tube placement.

third-window defect, or other rare etiologies of middle ear dysfunction.

A temporal bone computed tomography scan identified a very high jugular bulb eroding the posterior semicircular canal and occluding the round window niche (Fig. 3A, 3B). The patient denied any other

symptoms, including pulsatile tinnitus, autophony, or sound- and/or pressure-induced dizziness. The patient and family were counseled on the pathophysiology of posterior semicircular canal dehiscence (PSCD) and the likely persistence of CHL. The patient continues to be observed on a regular basis.

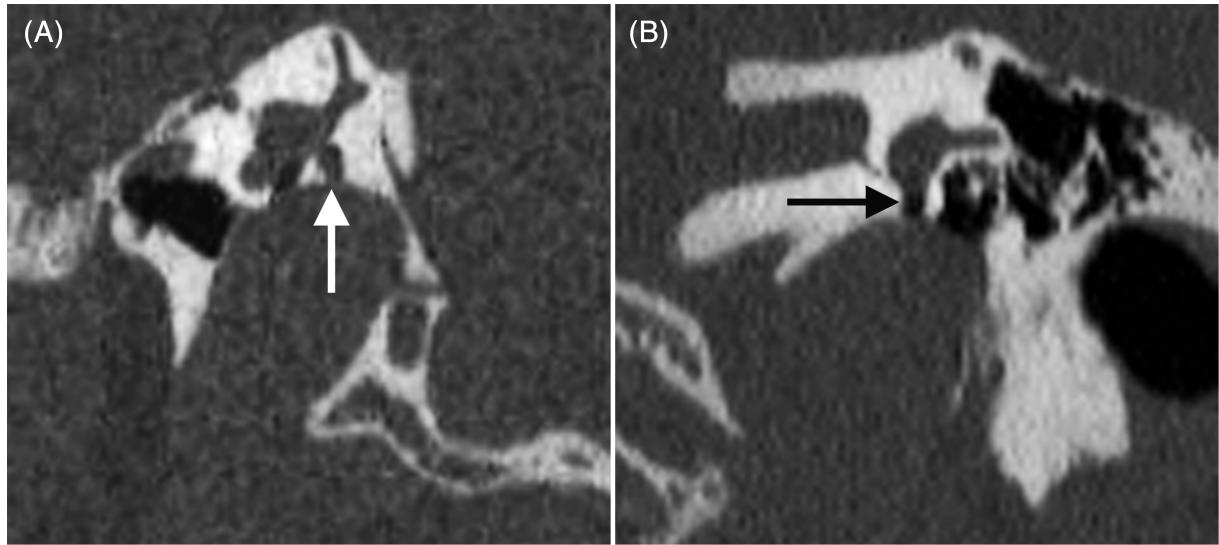


Fig. 3. High-riding jugular bulb causing dehiscence of posterior semicircular canal (white arrow) shown in (A) and covers the round window niche (black arrow) (B).

DISCUSSION

Although there is extensive variability in the size and location of the jugular bulb, anomalies of the jugular bulb are uncommon, with HRJB occurring in a very low percentage of cases. As occurred in the patient described, HRJB may result in PSCD.³ This can result in symptoms such as pulsatile tinnitus, vertigo, or dizziness. HRJB has typically been noted to cause sensorineural hearing loss, although CHL has also been reported, likely a result of a third-window effect due to posterior semicircular canal erosion.² CHL in PSCD from a third-window effect has been reported in approximately 19% of PSCD cases and can occur as an isolated finding.³ HRJB may also result in CHL through middle ear dysfunction and occlusion of the round window niche or other middle ear pathologies, although PSCD appears most likely in this case.^{4,5}

Third-window defects typically result in hearing loss because hydromechanical energy is shunted away from the round window, resulting in reduced energy availability to hair cells. Additionally, third-window defects often result in sound- and/or pressure-induced vertigo or pulsatile tinnitus. Interestingly, our patient did not experience any symptoms aside from conductive hearing loss. Although absolute conclusions are unable to be made from available data, it may be possible that HRJB occlusion of round window niche is responsible for the lack of additional third-window symptoms. As a result of this uncommon scenario, no intervention has yet been planned. CHL is likely due to a combination of PSCD as well as round window occlusion effect. Because HRJB is

not easily fixable, it is important to recognize it as a rare cause of otherwise asymptomatic CHL for appropriate patient counseling.

CONCLUSION

Dehiscent HRJB are usually observed in absence of significant vestibular dysfunction or bothersome pulsatile tinnitus. Interventions should be tailored to the patient and only used after careful consideration of contralateral anatomy and likely benefit. This patient was counseled about HRJB and elected to observe in the absence of significant symptomatology. This case highlights utility of imaging to ascertain rare causes of persistent CHL.

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