Protruding Jugular Bulb Presenting as a Middle Ear Mass: Case Report and Brief Review

FRANK W. FARRELL, JR.,[1] AND OSCAR HANTZ[2]

Dehiscence of the floor of the middle ear with protrusion of the jugular bulb into the cavity is an uncommon but important cause of bluish masses behind the tympanic membrane which bleed dramatically when incised. Tomography demonstrates the bone defect, and jugular venography demonstrates the characteristic knuckle of the jugular bulb extending into the middle ear cavity. This topic has received scant attention in the radiologic literature [1, 2].

This entity was described as early as 1914 [3], and 10 cases were alluded to by Uffenorde in 1942 [4]. Plain film radiologic findings were described in 1946 [2] and Gejrot and Lauren [5] described venographic findings in high bulb position with protrusion in 1964. Several clinical case descriptions have also appeared [6–10].

Overton and Ritter [11] added another case and described a histologic study of 257 temporal bones, 13 of which had the apex of the jugular bulb extending above the inferior margin of the bony drum annulus into the middle ear cavity. Of these 13 specimens, 12 had at least some bone between the bulb and the middle ear cavity; only one had a truly dehiscent middle ear cavity floor.

Case Report

A 51-year-old female had a 6 month history of dull pain and "popping" in her left ear. She denied previous hearing loss, ear infections, discharges, pulsating sensations, or head trauma. A nonpulsatile bluish discoloration was visible through the lower portion of the left tympanic membrane, and an audiogram revealed a mild conductive hearing loss in the left ear. A plain film mastoid examination demonstrated a large left jugular fossa and normal mastoid development and aeration.

An extensive otoradiologic evaluation was performed 2 days after a left myringotomy produced copious bleeding which was controlled by external canal packing. Temporal bone tomography demonstrated a small right and a large left jugular fossa (fig. 1). The apex of the left jugular fossa lay above the inferior rim of the bony drum annulus. Dehiscence of the floor of the middle ear cavity was clearly demonstrated, located on the anterolateral wall of the jugular fossa, not at the apex. The bony spur between the jugular fossa and the carotid canal was intact and sharply marginated. There was no demonstrable destruction in the area of the cochlear promontory or attic scutum. The left middle ear cavity was opaque.

Left selective external carotid and vertebral angiograms were normal. A left selective internal carotid study demonstrated the large jugular bulb but failed to demonstrate the protrusion. A percutaneous left internal jugular venogram revealed a large left jugular bulb with contrast reflux into the inferior petrosal and sigmoid sinuses. There was a protrusion of the bulb forward and laterally through the previously demonstrated dehiscent floor of the middle ear cavity (figs. 2 and 3).

The patient's postoperative course was uneventful. The mild left ear conductive hearing loss is stable, and the "popping," while still present, is diminished in intensity. Cartilaginous rein-

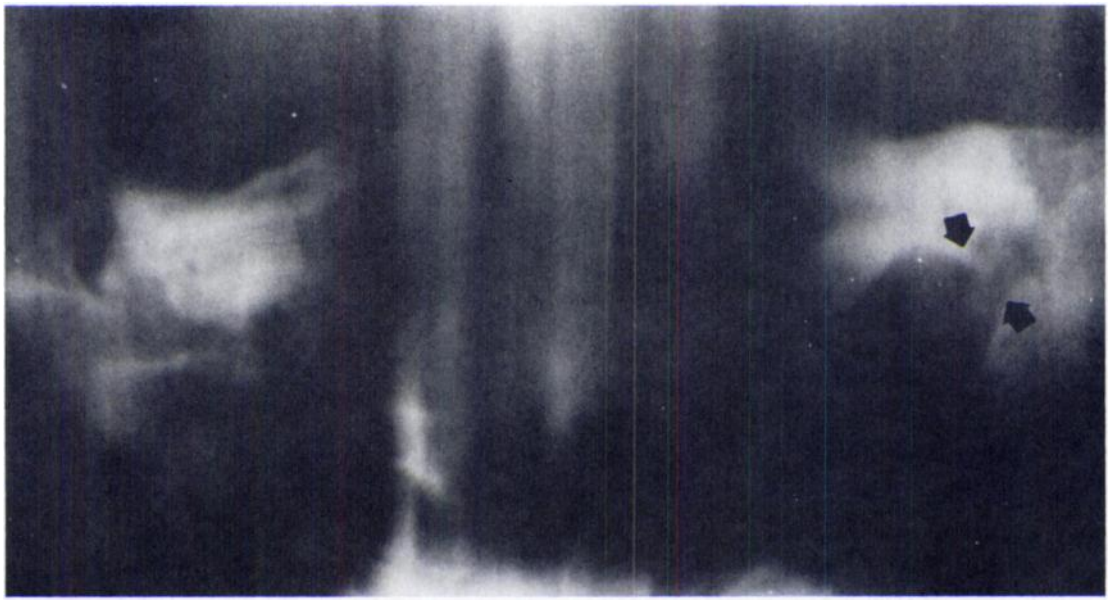

Fig. 1. — Anteroposterior tomogram showing high left jugular bulb and dehiscence of floor of middle ear cavity (*arrows*).

Received July 14, 1976; accepted after revision December 16, 1976.
Presented at the annual meeting of the American Society of Neuroradiology, Vancouver, B C., May 1975.

[1] Department of Radiology, Christian Hospital Northeast, St. Louis, Missouri 63136. Present address: Department of Radiology, Forsyth Memorial Hospital, 3333 Silas Creek Parkway, Winston-Salem, North Carolina 27103. Address reprint requests to F. W. Farrell, Jr.
[2] Department of Otolaryngology, Christian Hospital Northeast, St. Louis, Missouri 63136

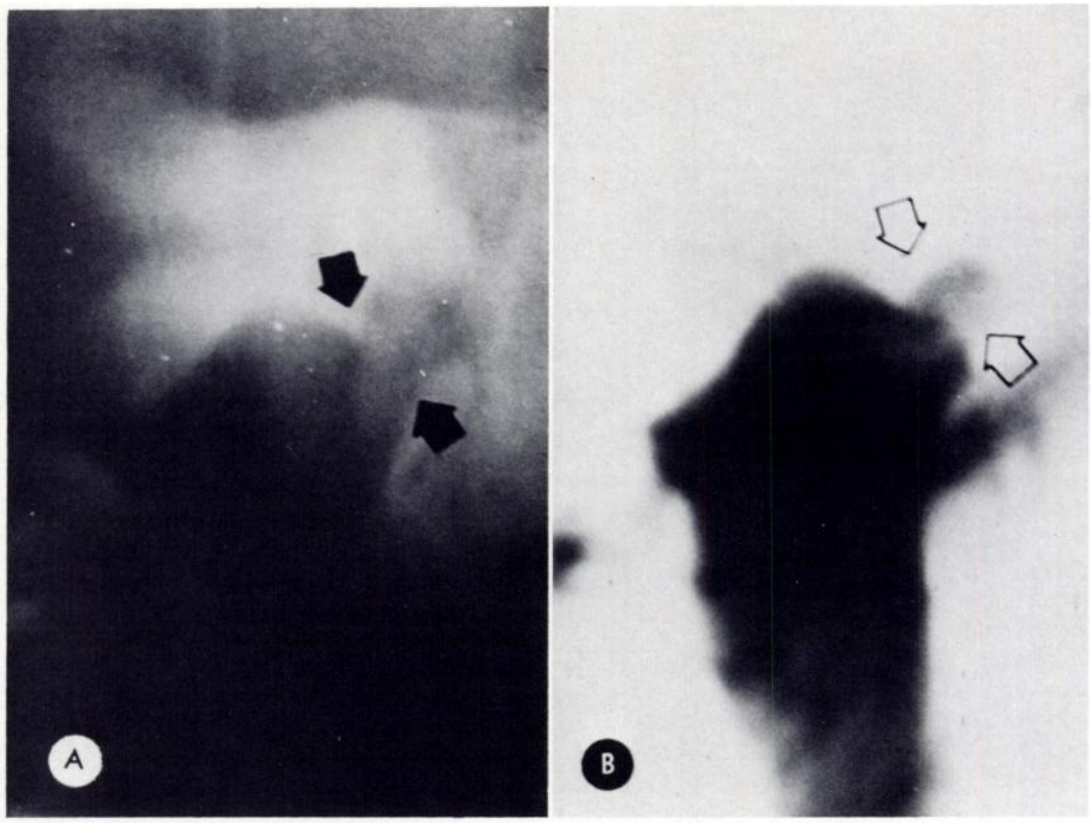

Fig. 2.—*A,* Anteroposterior tomogram of left petrous pyramid showing jugular fossa and dehiscent middle ear floor (*arrows*). *B,* Anteroposterior subtraction jugular venogram showing jugular bulb protruding into middle ear cavity (*open arrows*).

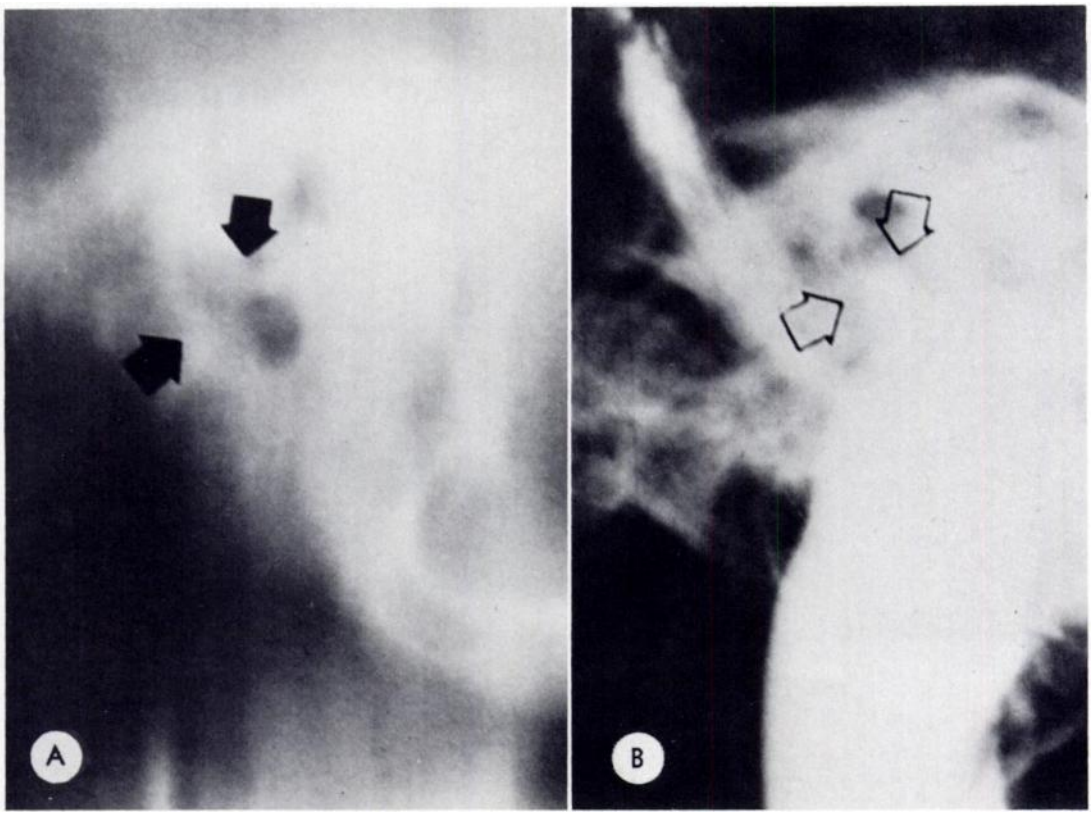

Fig. 3.—*A,* Lateral tomograms of left petrous pyramid showing defect in middle ear floor (*arrows*). *B,* Lateral projection of jugular venogram showing bulb protrusion into middle ear (*open arrows*).

forcement of the middle ear floor has been reported as a treatment for this condition [9], but in this case the symptoms were not considered severe enough to warrant intervention of this magnitude. No surgical treatment is planned.

Discussion

This entity has two components, a dehiscence of the floor of the middle ear and a protrusion of a portion of the jugular bulb through the dehiscence. A high position of the jugular bulb is a congenital variant associated with a large jugular fossa and usually is not associated with a dehiscent floor [11]. A dehiscent floor can occur with a normal jugular bulb size and position. The condition is usually acquired secondary to infection, trauma, aneurysm, or tumor erosion. Although the term protruding jugular bulb implies an accompanying dehiscence, a dehiscence usually is not accompanied by a bulb protrusion.

The more common entities presenting as a bluish middle ear mass are petrous internal carotid aneurysms and malpositions, glomus hypotympanum or jugulare tumors, cholesteatomas, or hemotympanum from a variety of causes [10]. Tomography followed by selective internal and external carotid and vertebral angiography will differentiate these lesions but may not identify the protruding jugular bulb. Jugular venography is required to prevent catastrophic surprises at tympanotomy.

REFERENCES

1. Heinz ER: Pathology involving the supratentorial veins and dural sinuses, in *Radiology of the Skull and Brain,* vol 2, edited by Newton TH, Potts DG, St. Louis, Mosby, 1974, p 1896
2. Khoo FY: Giant jugular fossa. *Am J Roentgenol* 55: 333–336, 1946
3. Page JR: A case of probable injury to the jugular bulb following myringotomy in an infant 10 months old. *Ann Otolaryngol* 23:161–163, 1914
4. Uffenorde W: *Anzeige und Ausfuhrung der Eingriffe an Ohr, Nase, und Hals,* Leipzig, Johann Ambrosius Barth, 1942
5. Gejrot T, Lauren T: Retrograde jugulariography in the diagnosis of abnormalities of the superior bulb of the internal jugular vein. *Acta Otolaryngol* (Stockh) 57:177–180, 1964
6. Hough JVD: Congenital malformations of the middle ear. *Arch Otolaryngol* 78:335–343, 1963
7. Ovchinnikov IUM: Penetration of the bulb of the jugular vein into the tympanic cavity. *Vestn Otorinolarlngol* 28:108–110, 1964
8. Smyth GDL, Black JHA: A case of protruding jugular bulb. *Laryngoscope* 75:669–672, 1965
9. Robin PE: A case of upwardly situated jugular bulb in the left middle ear. *J Laryngol Otol* 86:1241–1246, 1972
10. West JM, Bibhas CB, Jafek BW: Aberrant jugular bulb in the middle ear cavity. *Arch Otolarygol* 100:370–372, 1974
11. Overton SB, Ritter FN: A high-placed jugular bulb in the middle ear. A clinical and temporal bone study. *Laryngoscope* 83:1986–1991, 1973