Case 21: Transotic Approach to Left-Sided Jugular Paraganglioma/ Glomus Tumor for Partial Debulking

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Summary

This case illustrates a 64-year-old woman presenting with hearing loss and headaches, with a left jugular glomus tumor, which was resected using a transotic approach.

Case Presentation

A 64-year-old female presented with progressive left hearing loss and headaches and complaints of pounding headache, imbalance, progressive hearing loss, ear pain, and intermittent facial spasms and weakness that resolve spontaneously. She denied dysphagia and hoarseness. MRI showed a large 2.5 × 2.7 × 2.5 cm left petrous apex mass medial to jugular bulb, with paraganglioma rather than schwannoma (Figs. 42.1 and 42.2). A small extracranial extension was noted.

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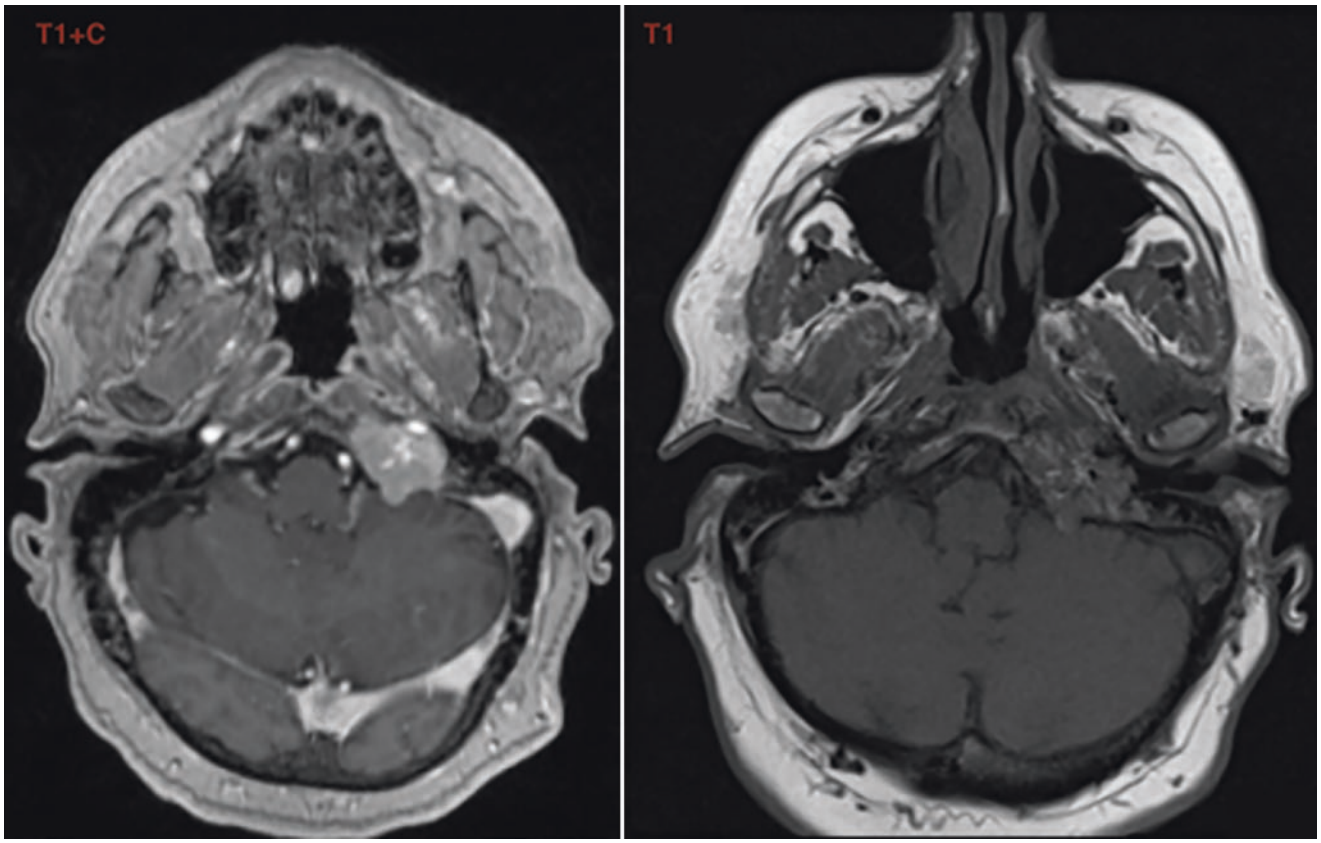

Fig. 42.1 Preoperative MRI, axial

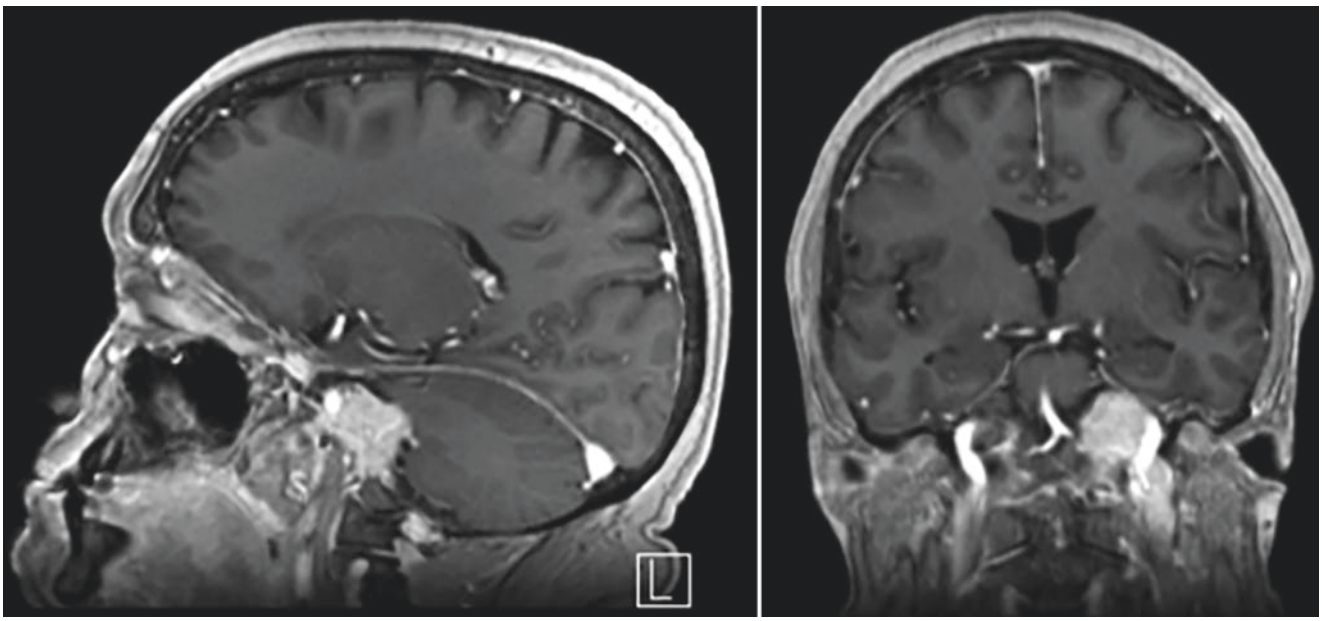

Fig. 42.2 Preoperative MRI, (Left) coronal and (Right) sagittal

Approach

A partial resection of the tumor utilizing a transotic approach, with adjuvant radiosurgery, was planned, given the anterior and inferior location of the tumor surrounding the jugular bulb and because the patient already had significant hearing loss on this side. This approach would create the biggest possible window to the tumor with the right angle.

Alternatives

This tumor would not be reached properly by a retrosigmoid approach because of its anterior and inferior localization. A translabyrinthine approach would create a window to the tumor possibly too small for proper debulking. A transcochlear approach, almost identical to the transotic approach, requires a full mobilization of the facial nerve and posterior translocation. Facial nerve function is usually compromised in the transcochlear approach due to loss of blood supply of the geniculate when the nerve is transposed.

Positioning

The patient was positioned supine, with her head turned to the right.

Incision

A left-sided horizontal cervical neck incision for vascular exploration was planned (Fig. 42.3). The postauricular incision was situated approximately two finger breadths behind the postauricular sulcus.

Fig. 42.3 Incision

Operation

A left-sided horizontal cervical neck incision was made. With dissection, the common carotid artery was identified medial to the sternocleidomastoid muscle. The artery was then isolated with vessel loops for proximal vascular control of the patient's skull-base tumor. The common carotid artery was isolated with vessel loops for proximal vascular control of the patient's skull-base tumor. The external auditory canal was transected at the bony cartilaginous junction circumferentially at 360°. Then the skin was elevated off the underlying cartilage, passed through the external auditory canal, and closed using 4–0 silk stitches to achieve a watertight closure in the event there would be a cerebrospinal fluid (CSF) leak.

Next, a wide mastoidectomy was performed using a combination of cutting and diamond burs. The mastoid was contracted, the tegmen was low, and the sigmoid was quite forward. Skeletonization and decompression of the tegmen and sigmoid were then performed, followed by identification of the descending segment of the facial nerve, which was traced down to the stylomastoid foramen. The facial recess was opened, and an extended facial recess approach was performed. The incudostapedial joint was separated, the incus was removed, and the tensor tympani tendon was sectioned. The ear canal skin including the tympanic annulus and the malleus were removed and discarded.

The canal wall was taken down, and bone along the hypotympanic ring was removed to expose the jugular bulb. There was obvious tumor extending through the promontory right below the round window niche involving the hypotympanic part to the middle ear.

A labyrinthectomy was then performed, and bone was removed down to the level of the internal auditory canal (IAC). Bone was also dissected in the retrofacial air cell tract all the way to the jugular bulb and sigmoid sinus. Once the bone was removed, the tumor was seen extending in that area beneath the IAC.

Surgical attention then turned back to performing the transcochlear approach by drilling off the cochlea. The ultrasound probe was used to identify the location of the internal carotid artery and the petrous bone. Stapes were removed, and the oval window that connected it to the round window niche was drilled. The cochlea was then removed by turning the basal turn followed by the middle turn and the apex. The tensor tympani muscle and its canal were maintained given our decision to use the transotic approach and avoid posterior routing of the facial nerve, which would have left the patient with complete facial paralysis. Furthermore, limited resection was the goal rather than complete resection. The bone was then skeletonized.

The bone around the facial canal was thinned all the way from the first genu to the stylomastoid foramen, and the bone lateral to the nerve along the lateral epitympanic recess was removed to better expose the entire temporal bone. After good exposure was acquired, bone medial to the nerve along the vestibule was removed to further improve the exposure around the nerve and facilitate tumor removal. Tumor was removed from around the nerve, posterior to the internal carotid artery and medial to it, and medial to the location of the cochlea and the jugular bulb as well.

Limited resection was performed, and hemostasis was achieved. The eustachian tube mucosa was everted, and free muscle grafting was placed to obliterate the eustachian tube. Bone wax was also placed. Abdominal fat was harvested for grafting, trimmed into strips, and placed into the mastoid defect to fill it. Titanium mesh was placed outside the filled defect for support and to recreate the contour of the mastoid (see Video 42.1).

Post-op

The postoperative course was uncomplicated, with no new deficits (Figs. 42.4, and 42.5).

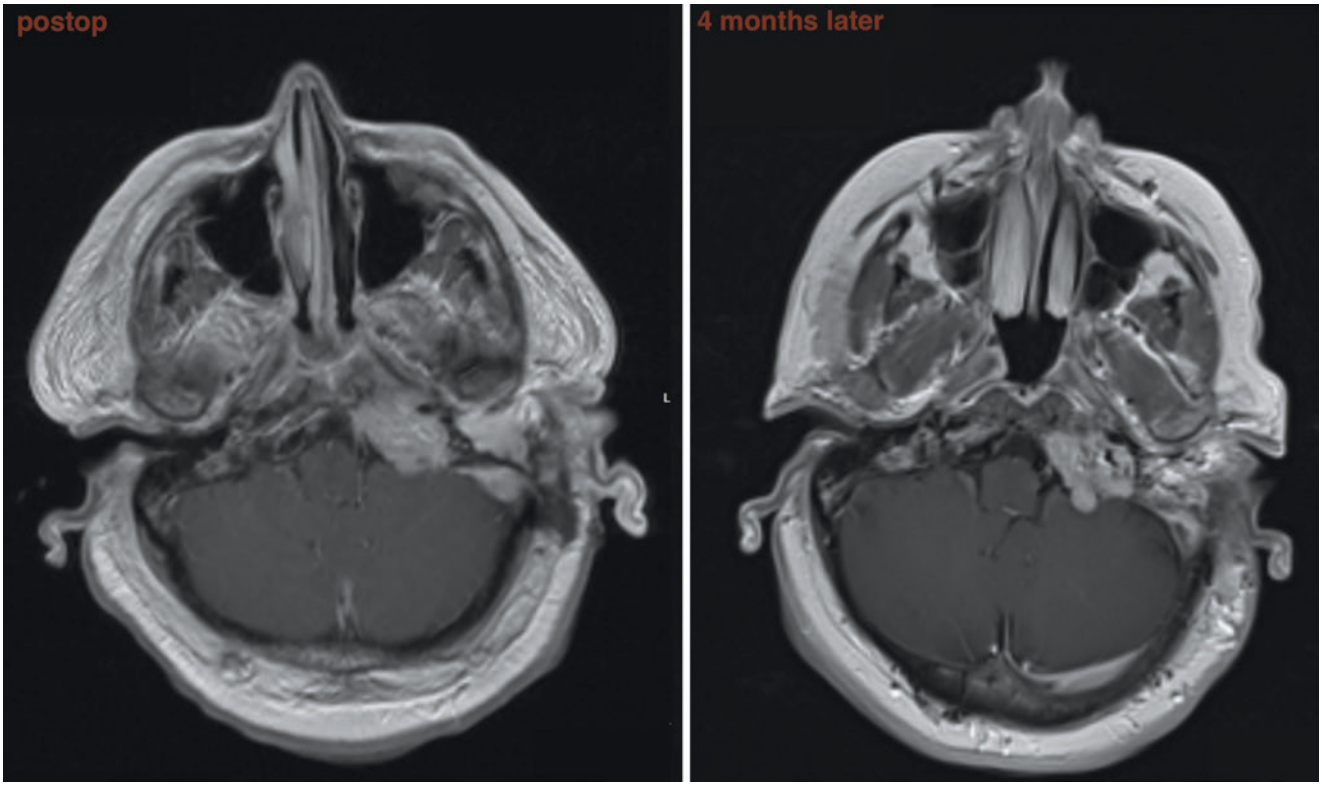

Fig. 42.4 Postoperative MRI, axial

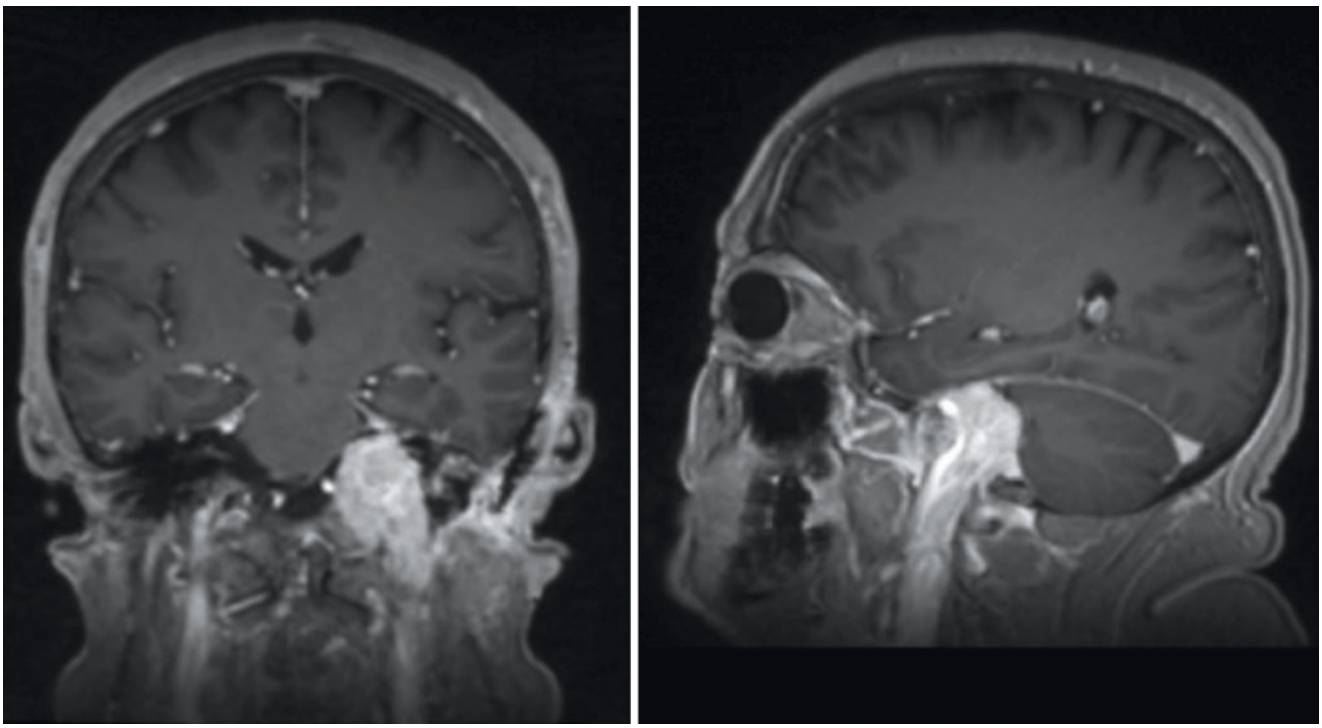

Fig. 42.5 Postoperative MRI, (Left) coronal and (Right) sagittal

Outcome

Pathology confirmed the diagnosis of a glomus tumor. The patient was scheduled to receive adjuvant gamma knife radiosurgery for the treatment of residual glomus jugular tumor. She was neurologically intact, besides the pre-existent loss of hearing in her left ear.

Pearls and Pitfalls

- Special care should be taken to preserve the facial nerve during multiple steps in this procedure.
- For example, when the cochlea is ready to be drilled out, the labyrinth segment of the facial nerve is located very close to the upper turn of the cochlea.
- When the facial nerve is skeletonized, care should be taken to protect the nerve from bone dust as the cochlea is drilled out; covering the nerve with Gelfoam is one option.
- Prevent CSF leaks by packing the middle ear and eustachian tube with fascia and by using a fat graft to obliterate the mastoid.

Discussion

We recommend a multidisciplinary approach for difficult cases like these. In this approach, a neuro-otolaryngologist who is qualified for such an extensive procedure is essential. The transotic approach provides a bigger window into the cerebellopontine angle but requires sacrifice of the labyrinth and the cochlea; its aim is to preserve facial function. Despite excellent exposure, glomus tumors can be very difficult to resect due to their hypervascular nature. Subtotal resection followed by radiation therapy is a reasonable treatment strategy.