

Rare Presentation and Treatment of an Invasive Giant Cell Tumor of the Middle Ear and Skull Base: A Case Report



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Abstract

Introduction: Giant cell tumors (GCTs) are a common benign bone tumor found in young adults, most frequently occurring in the long bones but rarely in the skull. Although they are considered benign, GCTs have the potential to be aggressive and destroy surrounding bone and tissue. GCTs in the skull are not commonly described, and as such, understanding its presentation and management is critical.

Objectives: We present the unusual case and management of a patient with a GCT of the middle ear and skull base and review the recent relative literature.

Results: In the present case, a 19-year-old male with an extensive giant cell tumor underwent surgical resection by a multidisciplinary team consisting of otolaryngology, neurosurgery, and plastic and reconstructive surgery. The mass was grossly resected, and a cervicofacial flap allowed for reconstruction with optimal cosmesis, a procedure not described for GCTs. This approach allowed for excellent wound healing without tumor recurrence. Gross total resection remains the most effective treatment for GCTs, minimizing radiation exposure and recurrence risk. However, an optimal surgical approach for skull GCTs has yet to be described and cosmetic defects resulting from extensive skin resection are scarcely discussed.

Conclusions: Skull-base GCTs present a challenge due to their complex anatomy and neurovascular elements. Further, the high rates of local recurrence make gross resection the goal of treatment, though this is difficult to achieve. The present case was successfully managed by extensive multidisciplinary surgical resection, highlighting the necessity of collaborative effects to achieve gross total resection and cosmetic outcomes.

Case Presentation

- A 19-year-old male presented with left-sided facial paralysis, otorrhea, and a mass visible protruding near the left ear (Figure 1).
- Imaging with MRI and CT revealed a large soft tissue mass (5x4x3cm) with central necrosis and hemorrhage centered around the left mastoid, compressing the sigmoid sinus and displacing the parotid gland.
 - The mass was further seen abutting the course of the facial nerve and cerebellum adjacent to the sigmoid sinus (Figure 2).
- A multidisciplinary approach involving otolaryngology, neurosurgery, and plastic and reconstructive surgery was utilized.



Figure 1. Pre-operative image demonstrating the mass protruding anteriorly and posteriorly to the left outer ear.



Figure 2. Sagittal MRI demonstrating the large invasive Giant Cell Tumor (GCT). The mass is noted to be extending through the middle ear, into the skull base, and displaces the parotid gland.

Surgical Management

- Otolaryngology
 - The procedure began with an extensive neck dissection to remove the anterior portion of the tumor (Figure 3).
 - A total parotidectomy was performed, but all branches of the facial nerve had to be sacrificed due to tumor invasion.
- Neurosurgery
 - The neurosurgery team resected the tumor from the skull base by drilling the occipital bone and removing portions adherent to the transverse sinus.
- Plastic and Reconstructive Surgery
 - Reconstruction involved elevating a large cervicofacial flap supplied by the transverse cervical artery and second intercostal artery perforator.
 - Using a local fasciocutaneous flap yielded an excellent skin color and quality match.
- Outcomes
 - There were no acute postoperative complications. The patient experienced excellent wound healing with no pain or infection.
 - Moderate left-sided hearing loss persisted, attributed to middle ear invasion. CN VII palsy resulted in lagophthalmos, which was addressed with interventions at 2- and 34-months post-op to correct residual facial asymmetry.
 - Follow-up imaging over three years showed no recurrence of the tumor, and the incisions healed with excellent aesthetic results (Figure 4).

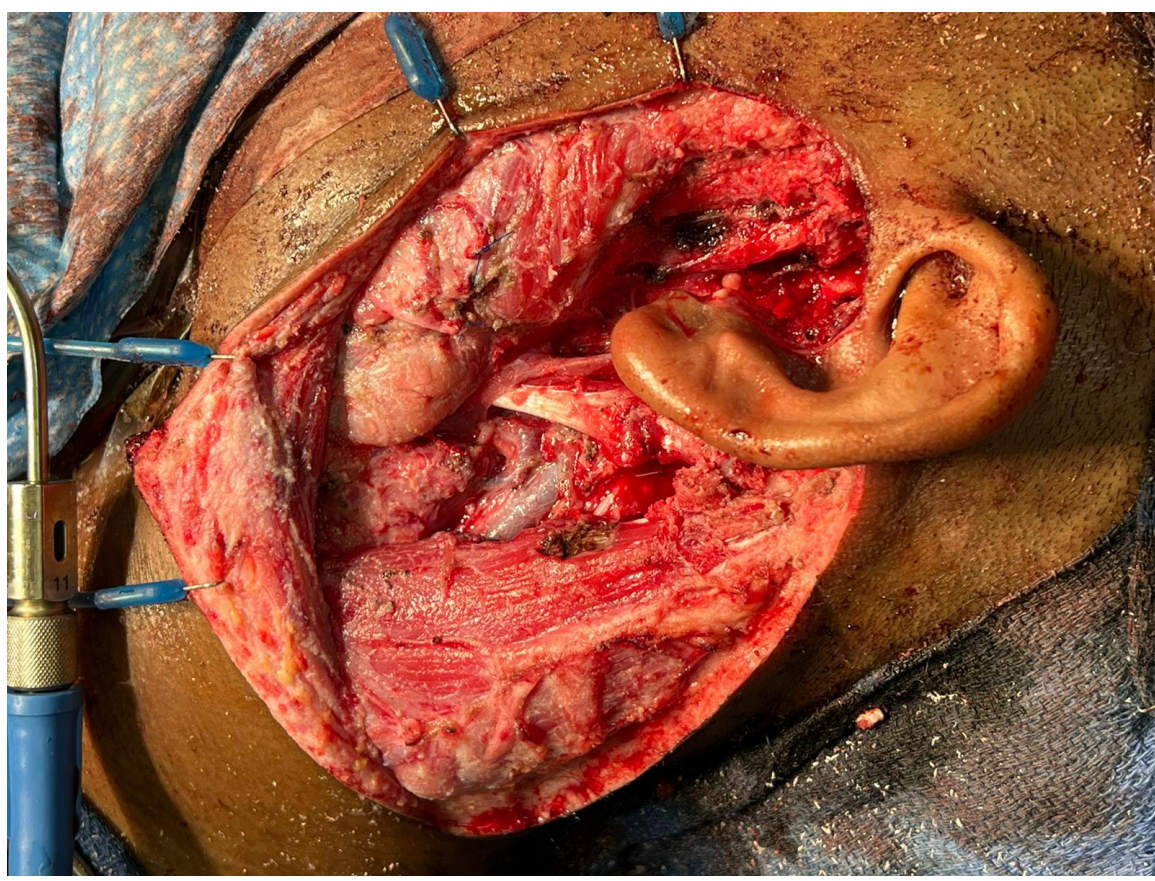


Figure 3. Intraoperative image demonstrating the depth of tumor invasion and adhesion to the facial nerve, parotid gland, and temporal bone.



Figure 4. Post-operative image demonstrating the cervicofacial flap with aesthetic deformity correction.

Discussion

- The present case describes a novel three-discipline technique to repair a massive extensive tumor with excellent resection and optimal cosmesis.
- Surgical resection remains the primary treatment for GCTs due to their aggressive nature and high risk of recurrence. Non-surgical option such as embolization, radiation, and denosumab have shown limited efficacy.^{1,2,3}
- While skull base GCT resection poses risks, including hemorrhage, cranial nerve deficits, and cosmetic concerns, a tailored approach can maximize resection while minimize complications, including recurrence.^{4,5}
- In this case, extensive tumor invasion necessitated a collaborative effort to enhance both safety and efficacy. Similarly expansive GCTs require operative strategies guided by an integrated, multidisciplinary perspective.

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