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Surgical Management of Glomus Jugulare Tumors in a Nigerian Hospital: Technical Considerations, Challenges, and Outcomes

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Abstract

Glomus jugulare tumors are rare, highly vascular paragangliomas of the skull base that pose significant surgical challenges due to their proximity to critical neurovascular structures and their propensity for extensive local invasion. In low- and middle-income countries such as Nigeria, limitations in access to advanced imaging, preoperative embolization, intraoperative neuromonitoring, and blood products further complicate management. The objective is to describe the surgical technique, perioperative management, and outcomes of patients with glomus jugulare tumors managed in a Nigerian hospital. This was a prospective case series of patients with radiologically confirmed glomus jugulare tumors managed surgically from January 2024 to December 2025. Preoperative evaluation included cranial nerve assessment and cross-sectional imaging. Surgical approaches, extent of resection, estimated blood loss, perioperative complications, and functional outcomes were analyzed. Seven patients were included, with a mean age of 45.7 years. Hearing loss and lower cranial nerve dysfunction were the most frequent presenting symptoms. Gross total resection was achieved in 5 patients (71.4%). The mean estimated blood loss was 253 ml. One patient (14.3%) developed new or worsened postoperative lower cranial nerve deficits, which improved during follow-up. No perioperative mortality occurred. Adjuvant radiotherapy was recommended for subtotal resections but could not be administered due to limited availability. Despite significant resource constraints, surgical management of glomus jugulare tumors in Nigeria is feasible with acceptable oncological and functional outcomes. Early diagnosis, meticulous microsurgical technique, and a multidisciplinary collaboration remain critical for optimizing patient outcomes in resource-limited settings.

Keywords: Glomus jugulare, paraganglioma, skull base surgery, cranial nerve outcomes, Nigeria, resource-limited settings.

INTRODUCTION

Glomus jugulare tumors are rare, slow growing but locally aggressive neoplasms arising from paraganglionic cells located in and around the jugular foramen at the skull base. These tumors are characterized by their high vascularity, extensive bone erosion, and close association with the lower cranial nerves and major vascular structures, making surgical resection technically demanding and potentially morbid. [1,2]

In high-income settings, advances in preoperative embolization, intraoperative neuromonitoring, and refined skull base surgical approaches have improved rates of tumor control and functional preservation.[3] However, in low- and middle-income countries such as Nigeria, neurosurgical practice is often constrained by late patient presentation, limited availability of endovascular services, inconsistent access to blood products, and lack of specialized operative equipment.[4] These factors may influence both surgical strategy and clinical outcomes.

Despite these challenges, surgery remains the primary curative modality for large, symptomatic, or progressively enlarging glomus jugulare tumors, particularly in patients with brainstem compression, lower cranial nerve dysfunction, or in whom radiotherapy is not readily accessible. This study presents our institutional experience with the surgical management of glomus jugulare tumors, highlighting technical considerations, perioperative challenges, and outcomes within the Nigerian healthcare context.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective descriptive case series conducted at a Nigerian tertiary referral hospital between January 2024 and December 2025. Ethical approval was obtained from the institutional review board, and informed consent was obtained from all patients or their guardians.

Patient Selection

Patients included in this study had radiologically confirmed glomus jugulare tumors and underwent surgical intervention during the study period.

Inclusion Criteria:

- Clinical and radiological diagnosis of glomus jugulare tumor.
- Patients who underwent definitive surgical treatment.

Exclusion Criteria:

- Patients managed exclusively with radiotherapy.
- Medical unfitness for surgery.

Preoperative Evaluation

All patients underwent detailed neurological examination with emphasis on cranial nerves VII–XII. Audiological assessment was performed at National Ear Care Centre located in Kaduna. Imaging included contrast-enhanced computed tomography (CT) of the temporal bone to assess bony erosion and magnetic resonance imaging (MRI) to evaluate tumor extent, intracranial extension, and brainstem compression.
Tumors were classified using the Fisch or Glasscock–Jackson classification systems based on radiological findings.

Preoperative Optimization

Patients were optimized for surgery with particular attention to hematologic parameters. Blood was grouped and cross-matched, and blood products were made available preoperatively. Preoperative embolization was not performed in patients due to non-availability of interventional radiology services. Anesthetic planning focused on airway protection, blood loss control, and hemodynamic stability and blood loss control.

Surgical Technique

Patients were positioned supine or in the park-bench position with Mayfield head fixation. The choice of surgical approach was guided by tumor extent and included the infratemporal fossa approach type A, retrosigmoid approach, or a combined approach. Early devascularization was achieved by cervical exposure and proximal control of the internal carotid artery using vessel loops, followed by progressive intratumoral debulking. Circumferential dissection was performed under magnification with meticulous preservation of the facial and lower cranial nerves. Hemostasis was secured using bipolar cautery, topical hemostatic agents, and packing as required

After skin incision and mastoid exposure, careful identification and preservation of the facial nerve were performed. Tumor devascularization was achieved through early control at the internal carotid artery via dissection of the neck and application of a sling around the vessel. Early control of feeding vessels was also followed by internal debulking. Dissection proceeded circumferentially with attention to preservation of the lower cranial nerves and major vascular structures. Hemostasis was achieved using bipolar cautery, hemostatic agents, and packing where necessary.

Reconstruction included watertight dural closure, obliteration of dead space using fat grafts or muscle flaps, and measures to prevent cerebrospinal fluid (CSF) leak risk.

Outcome Measures

Primary outcomes included extent of resection, estimated blood loss, and postoperative cranial nerve function. Secondary outcomes were postoperative complications, length of hospital stay, and radiological tumour control during follow-up.

RESULTS

Seven patients were managed during the study period: four males and three females, with a mean age of 45.7± 3.6 years. Presenting symptoms were hearing loss, pulsatile tinnitus, dysphagia, and hoarseness. Two of the tumors were classified as Fisch Class C or D, indicating advanced local extension.

Gross total resection was achieved in 5 patients (71.4%), while two patients underwent subtotal resection was due to extensive vascular and cranial nerve involvement. The mean estimated blood loss was 253 mL.

One patient (14.3%) developed new or worsened postoperative lower cranial nerve deficits, which showed gradual improvement during follow-up. No CSF leaks or perioperative mortality were recorded. Adjuvant radiotherapy was recommended for patients with residual disease but could not be administered because of limited availability.

The mean follow-up period was eight months, during which all patients demonstrated radiological and clinical stability; none showed evidence of tumor progression.

DISCUSSION

Glomus jugulare tumors represent one of the most technically demanding pathologies encountered in

skull base surgery due to their hypervascularity, infiltrative growth pattern, and close anatomical relationship with the lower cranial nerves, internal carotid artery, jugular bulb, and brainstem. The present series provides insight into the surgical management of these tumors within a resource-limited Nigerian tertiary hospital.

Surgical management of glomus jugulare tumors represents a formidable challenge, particularly in resource-limited environments. The advanced stage tumors in this series, with two patients classified as Fisch class C or D at presentation reflect low disease awareness, systemic barriers to early diagnosis, delays in referral and limited access to specialized care. Similar series from low-resource settings report a higher proportion of advanced jugular paragangliomas compared with high-income countries, where incidental detection at earlier stages is more common. [4,6]

Preoperative embolization is widely regarded as a key adjunct in reducing intraoperative blood loss and facilitating safer resection of glomus jugulare tumors [7]. Early proximal vascular control via cervical exposure and looping of the internal carotid artery, combined with staged internal debulking and meticulous bipolar coagulation, proved effective in limiting blood loss in these cases in the absence of embolization. While embolization remains desirable, acceptable surgical outcomes can still be achieved in its absence through disciplined microsurgical technique and hemodynamic vigilance.

Gross total resection was achieved in 71.4% of patients, a rate comparable to those reported by specialized skull base centers. [3,9] The decision to perform subtotal resection in two cases was guided by extensive vascular encasement and adherence to lower cranial nerves. Current guidelines support subtotal resection followed by adjuvant radiotherapy for residual disease, [6,8] in this cohort, although radiotherapy was recommended, it was unavailable. This highlights a critical gap in comprehensive skull base oncology care in Nigeria.

Cranial nerve morbidity remains one of the most important considerations in the management of patients with glomus jugulare tumors, often outweighing concerns related to residual disease. [3] Cranial nerve dysfunction occurred in one patient (14.3%) and showed partial recovery over time. The relatively low incidence observed may be attributed to cautious surgical dissection.

Multidisciplinary collaboration between neurosurgeons, otolaryngologists, anesthetists, and radiologists were essential in the successful management of these cases. This outcome demonstrates that glomus jugulare tumor surgery can be safely undertaken in low-resource environments when guided by sound surgical principles, careful patient selection, and realistic treatment goals.

Limitations

This study is limited by its single-center design, small sample size, and relatively short follow-up period, which may underestimate long-term recurrence rates.

CONCLUSION

Surgical treatment of glomus jugulare tumors in Nigeria is feasible and can achieve acceptable oncological and functional outcomes despite significant resource constraints. Early referral, careful patient selection, meticulous microsurgical technique, and multidisciplinary care are essential to improving outcomes and disease control in this challenging patient population.

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