






# Cervical C5–C6 Schwannoma With Vertebral Artery Compression and Bone Destruction: Surgical Resection and Stabilization Strategy

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## Abstract

*Schwannomas are the most common benign nerve sheath tumors, accounting for approximately one-third of all primary spinal neoplasms. Although more frequent in the lumbar region, they may also involve the thoracic and cervical spine. Cervical schwannomas can pose significant surgical challenges, especially in cases of neurovascular compression and bone destruction. We report the case of a 41-year-old female patient with no prior comorbidities, presenting a right-sided C5–C6 schwannoma associated with facet joint destruction and vertebral artery compression. Surgical treatment included tumor resection and posterior arthrodesis to prevent long-term spinal instability.*

## Background

Schwannomas are the most common benign nerve sheath tumors, representing approximately one-third of all primary spinal neoplasms. They are more prevalent in the lumbar region, followed by the thoracic and cervical spine [1,2]. These lesions may cause radicular or myelopathic symptoms, depending on their location, size, and the degree of neural compression. Laminectomy is traditionally employed, although minimally invasive techniques have become increasingly common [3,4]. While offering better visualization in the short term, more aggressive approaches may lead to long-term disadvantages such as spinal instability [5].

In this article, we describe a case of a large schwannoma at the C5–C6 level with foraminal extension and compression of the right vertebral artery, as well as carotid artery involvement. Imaging studies revealed vascular compression and significant bone destruction—key findings that guided the decision for a single-stage surgery including tumor resection and spinal stabilization.

## Case report

A 41-year-old female with no comorbidities presented with paresthesia in the C5–C6 dermatome. Cervical CT and CTA demonstrated a lesion occupying the right intervertebral foramen with significant bone destruction and compression of the vertebral artery (Figures 1 and 2).

During surgery, lateral mass screws were placed from C4 to C7 on the left side. On the right, screws were inserted at C4 and C7, preserving space for laminectomy and tumor resection. The left rod was fixed first to maintain alignment during resection (Figure 3).

Tumor removal was performed cautiously using bipolar cautery to avoid thermal injury to the vertebral artery. Dissection was carried out under continuous neuromonitoring, with no changes in motor evoked potentials. A follow-up CT scan confirmed complete decompression of the spinal canal and foramen (Figure 4). The patient had an uneventful recovery and was discharged two days later with mild residual paresthesia.

At two-year follow-up, the patient remains asymptomatic, with stable instrumentation and no evidence of tumor recurrence on imaging. Histopathological analysis confirmed a benign schwannoma.

## Discussion

Cervical schwannomas are benign nerve sheath tumors that can present with radiculopathy or myelopathy depending on their size, location, and degree of compression [1,2]. Although more frequently found in the lumbar and thoracic regions, cervical tumors present specific surgical challenges, particularly in cases with foraminal extension, bone destruction, or neurovascular compression [6,7].

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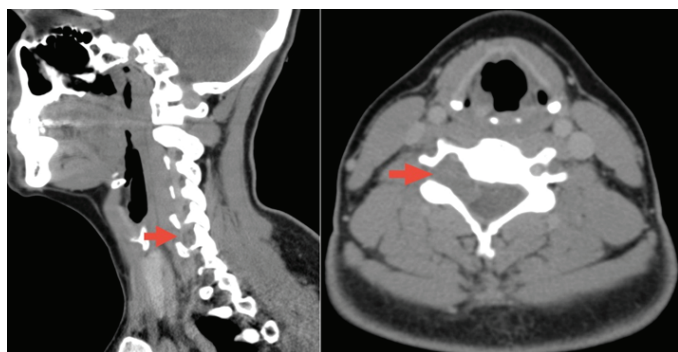
## Keywords

Cervical schwannoma; Vertebral artery; Bone destruction; Spinal instability; Arthrodesis.

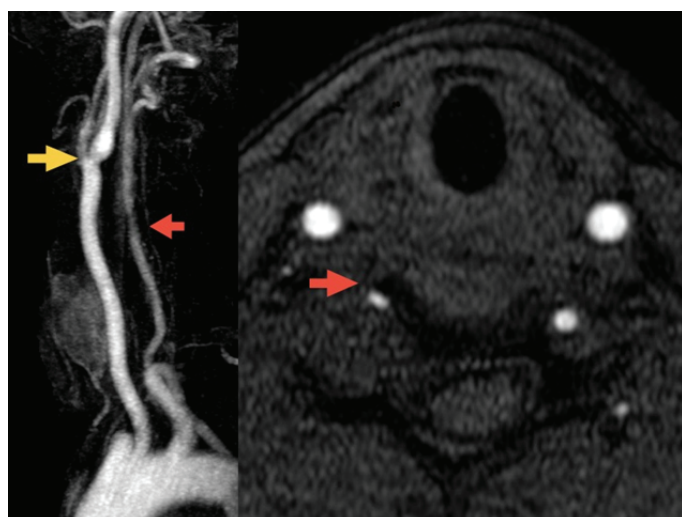
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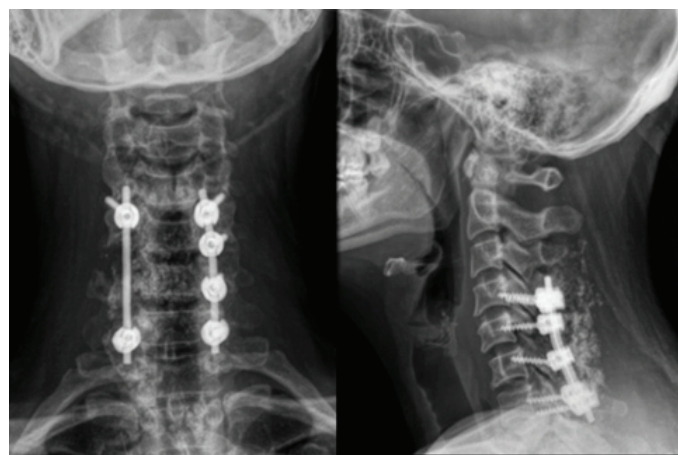
**Figure 1.** Cervical spine CT scans in sagittal (left) and axial (right) views using bone window settings. The red arrow on the sagittal image indicates a hypodense expansile lesion in the right C5–C6 foramen, showing clear destruction of the pedicle and facet joint, along with erosion of the foraminal bone wall. The axial view shows the same lesion extending beyond the foramen and causing remodeling and compression of adjacent structures, consistent with a cervical schwannoma with a “dumbbell” growth pattern and significant bone erosion.



**Figure 2.** Cervical CTA with sagittal (left) and axial (right) reconstructions. In the sagittal view, the red arrow indicates extrinsic compression of the right vertebral artery at the C5–C6 level, caused by a space-occupying lesion (schwannoma). The yellow arrow highlights severe stenosis of the right carotid bulb with reduced luminal caliber. In the axial view, the red arrow shows compression of the right vertebral artery within the transverse foramen, confirming asymmetric narrowing. These findings emphasize the neurovascular impact of the lesion and the need for a careful surgical approach due to the risk of ischemia and proximity to critical structures.

Surgical resection remains the treatment of choice for symptom control and prevention of neurological deterioration. Their benign behavior and favorable outcomes after gross total resection support early intervention. Intraosseous schwannomas are rare, comprising only 0.2% of all bone tumors. The first vertebral case was described by Dickson [3]. These tumors are typically well-defined and encapsulated but may slowly erode surrounding bone structures.

Sridhar et al. classified spinal schwannomas, and the current case corresponds to Type III — characterized by both intra- and extraforaminal extension [2].



**Figure 3.** Postoperative cervical spine X-rays in anteroposterior (left) and lateral (right) projections following schwannoma resection and segmental arthrodesis. Posterior instrumentation with bilateral rods and lateral mass screws is noted. Right-side fixation was limited to C4 and C7, while left-side screws were placed at C4, C5, C6, and C7. The asymmetry in screw placement reflects individualized surgical planning aimed at preserving tumor access and maintaining cervical alignment.



**Figure 4.** Postoperative cervical spine CT in coronal (left) and sagittal (right) planes. The coronal image shows enlargement and remodeling of the right intervertebral foramen at C5–C6 (red arrow), with no residual mass, confirming full foraminal decompression. The sagittal view demonstrates adequate decompression of the spinal canal, with no residual compression of the spinal cord. Posterior instrumentation from C4 to C7 is well positioned, with preserved cervical alignment. These findings confirm successful surgical decompression and mechanical stabilization.

During lateral dissection, meticulous care was taken to preserve the vertebral artery (VA), which was compressed but not invaded. Microsurgical dissection combined with anatomical knowledge allowed for safe mobilization. The VA (V2 segment) typically enters the transverse foramen at C6, anterior to the nerve roots. Entry variations may occur at C5 (5%) or C4 (1%) and must be identified preoperatively [8]. Foraminal tortuosity is observed in up to 13% of cases, reinforcing the importance of individualized surgical planning [9].

The literature strongly supports spinal stabilization in these cases. Nakamura et al. reported high rates of postoperative deformity in cervical dumbbell schwannomas and advocated for prophylactic fusion when structural integrity is compromised [6]. Preoperative embolization, which can reduce intraoperative bleeding and improve visualization, was not available in our setting [10].

This case underscores the importance of tailored surgical strategies. In the presence of bone destruction and vascular involvement, both stabilization and microsurgical technique are critical. Posterior approaches with arthrodesis are reliable and safe in tumors with foraminal and extraforaminal extension, ensuring gross total resection and long-term spinal integrity.

## Conclusion

Minimally invasive techniques are effective for most cervical schwannomas. However, large tumors with associated bone destruction and vascular compression require extended approaches. Arthrodesis is often necessary to prevent future spinal instability.

Each case should be evaluated individually, considering surgical anatomy and potential complications. Vascular structures, especially the vertebral artery, must be handled with precision. Adjunct techniques such as preoperative embolization (when available), intraoperative neuromonitoring, and VA mobilization are essential for successful outcomes in complex cases.

## Conflict of interest

The authors have no conflict of interests to declare.

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