

Giant supraclavicular schwannoma involving the cervical nerve root: surgical management and perioperative neurological monitoring—a case report

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Case Report

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Additional Declarations: No competing interests reported.

Abstract

Objective

To describe the clinical features, surgical management, and postoperative neurological outcomes of a giant right supraclavicular schwannoma extending toward the cervical intervertebral foramen. Particular attention was paid to the tumor's close relationship with the surrounding neurovascular structures.

Methods

We retrospectively reviewed the clinical data, imaging findings, surgical procedures, pathological findings, postoperative course, and follow-up of a patient with a giant right supraclavicular schwannoma. The surgical and perioperative management was evaluated with regard to the tumor's relationship to adjacent neurovascular structures, intraoperative blood loss, postoperative neurological function, wound and drainage status, and recovery. The case was reported in accordance with the CARE guidelines[1].

Results

A 47-year-old woman was admitted after an incidentally detected neck mass had persisted for more than 1 month. Imaging revealed a mixed-density mass with abnormal signal in the right supraclavicular region, measuring approximately 58 mm at its largest diameter. The lesion extended toward the right intervertebral foramen, with prominent vessels surrounding the mass. Preoperative biopsy showed a spindle cell tumor consistent with schwannoma. Immunohistochemistry was positive for S-100 and SOX10, with a Ki-67 index of approximately 3%[11]. The patient underwent right cervical soft-tissue tumor resection, vascular and nerve exploration and neurolysis, and random-pattern fascial flap reconstruction. Intraoperative blood loss was approximately 400 ml, and 1.5 U of packed red blood cells and 220 ml of plasma were transfused. A wound drain was placed after surgery. Postoperative management included cervical compression with a salt bag, monitoring of the wound and drainage, and serial neurological assessments. No postoperative wound bleeding or cervical hematoma developed. Numbness in the distal phalanges of the right hand gradually improved, muscle strength remained grade V, and distal limb perfusion was preserved. The patient was discharged on postoperative day 5 with satisfactory wound healing. At 1 month after surgery, cervical MRI showed slight enlargement of the right C6/7 nerve root. The patient had no cervical scar tenderness or other significant symptoms.

Conclusion

Giant supraclavicular schwannomas can be difficult to remove because of their deep location and close proximity to major vessels, peripheral nerves, and cervical nerve roots. Preoperative imaging, careful dissection, and postoperative neurological assessment are important for reducing complications and

preserving neurological function. Perioperative management should be tailored to the tumor anatomy and intraoperative findings rather than based solely on routine risk scores[5][6][7][8][9][10].

1 Introduction

Schwannoma is a benign tumor originating from Schwann cells of the peripheral nerve sheath and may arise from cranial nerves, sympathetic nerves, or peripheral nerves[2]. Head and neck schwannomas are relatively uncommon clinically and often present as slowly growing, painless, unilateral neck masses. Because early symptoms are nonspecific, they may be confused with lymphadenopathy, thyroid-origin tumors, carotid body tumors, neurofibromas, or metastatic tumors[2][3][4]. Imaging examinations help clarify tumor location, size, margin, vascularity, and relationships with surrounding vessels and nerves, while pathology and immunohistochemistry provide important evidence for diagnosis[2][11].

The anatomy of the right supraclavicular region is complex because it is adjacent to major cervical vessels, the brachial plexus, paravertebral structures, and the thoracic inlet. When schwannomas in this region are large or extend toward the intervertebral foramen, surgical resection may involve risks such as bleeding, postoperative hematoma compression, neurological dysfunction, pain, and sensory or motor abnormalities of the upper limb[5][6][7]. Although postoperative cervical hematoma is uncommon, it may cause airway compression once it occurs and can be life-threatening in severe cases [8–10]. In such cases, postoperative assessment should include not only routine monitoring of vital signs and the surgical wound but also evaluation of drainage, cervical swelling, and neurological function in relation to the tumor characteristics and intraoperative findings [8][9][10].

We report a case of a giant schwannoma in the right supraclavicular region extending toward the cervical intervertebral foramen. The clinical presentation, imaging findings, surgical management, postoperative neurological changes, and perioperative course are described. Particular attention is given to the tumor's anatomical relationships, the surgical challenges encountered during resection, and the patient's postoperative neurological recovery..

2 Case Information

2.1 General Information

A 47-year-old Chinese woman was admitted with a right-sided neck mass that had been noticed for more than 1 month. The mass had developed without an identifiable precipitating factor. She reported no significant pain, dysphagia, dyspnea, hoarseness, limitation of upper-limb movement, or other discomfort. Her past medical history was unremarkable. Her father had died of gastric cancer.

On physical examination, the patient was alert and in stable condition. The trachea was midline, with no obvious thyroid enlargement or palpable nodules. A mass measuring approximately 5 × 4 cm was palpable in the right neck. It was hard, irregular in shape, poorly mobile, and non-tender. No palpable mass was found on the left side of the neck.

2.2 Auxiliary Examinations

Preoperative thyroid ultrasonography showed a normal-sized thyroid gland with a smooth surface, intact capsule, and homogeneous echogenicity. No definite thyroid nodules were identified, and color Doppler flow imaging showed no abnormal thyroid vascularity. A mixed-echo mass measuring approximately 56 × 49 × 26 mm was detected in the superficial right supraclavicular region. The lesion had a relatively well-defined margin and contained an irregular anechoic area centrally. Prominent blood-flow signals were present within the solid component.

Chest CT revealed several small solid nodules in both lungs, the largest measuring approximately 6 × 4 mm in the lateral basal segment of the left lower lobe. The nodules had well-defined margins. No obvious mediastinal lymphadenopathy or pleural effusion was observed. A soft-tissue-density mass measuring approximately 45 × 37 mm was also identified in the right supraclavicular region.

Contrast-enhanced cervical CT showed a mixed-density mass measuring approximately 36 × 28 × 54 mm in the right supraclavicular region. The lesion demonstrated marked peripheral enhancement with an irregular central non-enhancing area. Prominent vessels were seen coursing around the mass (Fig. 1).

Preoperative cervical MRI revealed a round-to-oval lesion with abnormal signal intensity in the right neck. The lesion had a well-defined margin and measured approximately 58 × 55 mm. It was hypointense on T1-weighted images and hyperintense on T2-weighted images. After contrast administration, marked peripheral enhancement was observed, with an irregular non-enhancing area centrally. The lesion extended toward the right intervertebral foramen (Fig. 2).

The diagnosis of head and neck schwannoma is generally based on the clinical presentation and imaging findings, with postoperative histopathological examination providing definitive confirmation[2][3][4].

Preoperative puncture biopsy suggested a spindle cell tumor consistent with schwannoma. Immunohistochemistry showed positivity for S-100 and SOX10, negativity for CD117, DOG1, CD34, and SMA, and a Ki-67 positivity rate of approximately 3% [11].

Based on the clinical findings, imaging studies, and biopsy results, a right supraclavicular schwannoma was suspected preoperatively. The differential diagnoses included cervical lymph node lesions, thyroid-origin masses, carotid body tumor, neurofibroma, soft-tissue sarcoma, and metastatic tumor[2][3][4].

Before surgery, the patient had an NRS pain score of 0, grade V muscle strength, and no apparent sensory or motor deficits in the right upper limb. However, the tumor characteristics and intraoperative findings indicated a risk of postoperative bleeding, hematoma formation, and neurological dysfunction [12]. The tumor was large, located in the right supraclavicular region, surrounded by prominent vessels on imaging, and extended toward the right intervertebral foramen. These features warranted close

postoperative monitoring for bleeding, cervical hematoma, and changes in neurological function[5][6][7][8][9][10]

3 Treatment Course

Under general anesthesia, the patient underwent resection of the right cervical soft-tissue tumor with vascular and nerve exploration and neurolysis, followed by reconstruction with a random-pattern fascial flap. After induction of anesthesia, she was placed in the supine position with the right cervicobrachial region elevated. The surgical field was routinely disinfected and draped. A curved incision approximately 10 cm in length was made over the right cervical mass, and the skin, subcutaneous tissue, and deep fascia were dissected sequentially.

A firm, oval mass measuring approximately $7 \times 5 \times 4$ cm was identified within the right cervical musculature. The mass was closely associated with the surrounding vessels and nerves and extended deep into the paravertebral region. It was highly vascular and caused mild compression of adjacent neurovascular structures. The tumor appeared to arise from a relatively thick nerve bundle, supporting a neurogenic origin. Careful dissection was performed along the tumor capsule, allowing complete intracapsular removal. The nerve bundle from which the tumor arose was subsequently excised (Fig. 3).

The wound was thoroughly irrigated with normal saline, followed by meticulous hemostasis. The surrounding vessels and nerves were explored and released, and a drainage tube was placed in the incision. Because a large residual cavity remained after tumor removal, a random-pattern fascial flap from the surrounding tissue was used for reconstruction. The wound was then closed layer by layer and covered with a sterile dressing.

On gross examination, the cut surface of the mass showed grayish-yellow-white, firm, fish-flesh-like tissue. The operation lasted 1 h 50 min. Intraoperative blood loss was approximately 400 mL, and 1.5 units of packed red blood cells and 220 mL of plasma were transfused. No obvious adverse events occurred during or immediately after surgery, and the patient was transferred to the ward in stable condition.

Postoperative analgesia was provided with flurbiprofen axetil. Oral mecobalamin was administered, and dexamethasone sodium phosphate was given to reduce local inflammatory edema according to the treatment plan.

4 Perioperative Nursing

4.1 Preoperative Assessment

Given the size and vascularity of the tumor, its close relationship with the surrounding vessels and nerves, and its extension toward the intervertebral foramen, potential risks of intraoperative bleeding and postoperative neurological dysfunction were considered before surgery.

A baseline neurological examination was performed, including assessment of upper-limb sensation, muscle strength, range of motion, and distal perfusion. Muscle strength was grade V, with no apparent sensory deficit in the right upper limb.

Routine laboratory tests, coagulation studies, electrocardiography, and other preoperative evaluations were completed. Blood products were prepared because of the anticipated risk of intraoperative bleeding.

4.2 Postoperative Monitoring

After surgery, the patient's vital signs, level of consciousness, cervical wound, drainage, airway status, and neurological function were monitored regularly.

Given the cervical surgical site and the potential for postoperative hematoma, the team monitored for increasing cervical swelling, wound bleeding, changes in drainage, worsening neck tightness or pain, voice changes, dysphagia, and respiratory discomfort.

A negative-pressure drainage bulb was placed in the wound, and cervical compression was applied. The drain was kept in place to monitor the volume and characteristics of the drainage.

Drainage was 25 mL on postoperative day 1, 24 mL on day 2, 15 mL on day 3, and 5 mL on day 4. The fluid remained lightly blood-stained throughout this period, with no sudden increase in output or evidence of active bleeding. The drain was removed once the drainage volume met the clinical criteria for removal.

No postoperative cervical hematoma, respiratory distress, dysphagia, or clinically evident wound infection was observed.

4.3 Neurological Monitoring

Because the tumor arose from a relatively thick nerve bundle and was closely associated with adjacent neural structures, neurological function of the right upper limb was assessed serially after surgery.

On postoperative day 1, the patient reported mild numbness in the distal phalanges of the right hand. Finger movement was intact, distal perfusion was preserved, and muscle strength remained grade V. The sensory symptoms gradually improved during the hospital stay. Compared with the first postoperative day, the numbness was reduced on day 2. Mild residual numbness was still present on day 3 but continued to improve. By postoperative day 5, only mild numbness remained, with preserved upper-limb movement and grade V muscle strength.

The patient was discharged on postoperative day 5 with satisfactory wound healing.

At the 1-month follow-up, cervical MRI (Fig. 4) showed postoperative changes in the right supraclavicular region and slight enlargement of the right C6/7 nerve root. Clinically, the patient had no significant cervical scar tenderness or other neurological complaints.

Postoperative pathology indicated schwannoma of the right neck. Immunohistochemistry showed Ki-67 positivity (6%), SOX-10 positivity, and S-100 positivity. The pathological findings were consistent with the preoperative diagnosis.

5 Discussion

5.1 Clinical and Anatomical Characteristics

Head and neck schwannomas are generally benign, slow-growing tumors that often present as painless, unilateral neck masses with nonspecific clinical manifestations[2][3][4]. In the present case, the patient had no significant pain or neurological symptoms despite the relatively large size of the tumor. The absence of specific symptoms may have contributed to delayed recognition.

The anatomical location of the tumor was an important consideration in this case. Contrast-enhanced CT showed prominent vessels surrounding the mass, while MRI demonstrated extension toward the right intervertebral foramen. During surgery, the tumor was found deep within the cervical muscles and was closely associated with surrounding vessels and nerves. These findings suggest that tumor size alone does not fully reflect the complexity of surgical resection. The anatomical relationship between the tumor and adjacent neurovascular structures also needs to be considered during preoperative assessment.

5.2 Surgical Management and Neurovascular Considerations

Complete resection or intracapsular enucleation is commonly used for schwannomas; however, postoperative sensory or motor dysfunction may occur when the tumor is closely associated with the nerve of origin or adjacent neural structures [5][6][7]. The surgical approach therefore needs to balance adequate tumor removal with preservation of neurological function.

In this case, the tumor arose from a relatively thick nerve bundle, and the involved nerve bundle was excised during tumor removal. The lesion was also closely associated with surrounding vessels and nerves, which made surgical dissection more demanding. Identification and careful release of these structures were performed during the procedure.

The tumor was highly vascular, and intraoperative blood loss was approximately 400 mL, requiring transfusion of packed red blood cells and plasma. The prominent vessels seen on preoperative imaging were consistent with the rich vascularity encountered during surgery. This finding supports the value of contrast-enhanced imaging in assessing the vascular characteristics of large supraclavicular schwannomas and in anticipating potential intraoperative bleeding.

5.3 Postoperative Neurological Outcome

Postoperative neurological dysfunction is an important concern after resection of schwannomas involving peripheral nerves or the brachial plexus [5][6][7]. In the present case, the patient developed mild numbness in the distal phalanges of the right hand after surgery. Muscle strength remained grade V, distal limb perfusion was preserved, and the sensory symptoms gradually improved during the postoperative period.

The postoperative neurological findings in this patient were therefore monitored over time rather than interpreted from a single assessment. Evaluation of sensory symptoms, their distribution, motor function, and distal perfusion provided a simple clinical basis for follow-up during the early postoperative period. The improvement in sensory symptoms without motor impairment was consistent with a favorable short-term neurological outcome.

5.4 Postoperative Bleeding and Wound Management

Large cervical tumors may require particular attention to postoperative bleeding because a cervical hematoma can compress adjacent structures and, in severe cases, compromise the airway[8][9][10]. In this patient, the routine bleeding-risk assessment score was 0; however, several factors warranted closer observation, including the rich tumor vascularity, approximately 400 mL of intraoperative blood loss, transfusion of blood products, and the relatively large residual cavity after tumor removal.

Postoperative assessment therefore took into account the operative findings in addition to the routine risk assessment. The surgical wound, cervical swelling, drainage, vital signs, respiratory status, and neurological function were monitored during the early postoperative period. No active bleeding or cervical hematoma developed, and drainage decreased progressively from postoperative day 1 to day 4.

These findings suggest that routine risk scores may not fully capture the clinical considerations associated with individual cervical tumors. In patients with large and highly vascular lesions, postoperative surveillance should also take into account the tumor characteristics, extent of surgery, intraoperative blood loss, and local wound conditions.

5.5 Role of Perioperative Management

Perioperative management in this case involved both surgical treatment and postoperative clinical monitoring. Before surgery, assessment of neurological function provided a baseline for postoperative comparison, while imaging findings and the operative plan helped identify the potential risks associated with tumor location and vascularity. After surgery, wound and drainage assessment, cervical compression, vital-sign monitoring, and serial neurological examinations were incorporated into routine care.

Rather than relying on a standardized risk score alone, postoperative observation was adjusted according to the clinical findings of this patient, including tumor anatomy, intraoperative blood loss, transfusion status, the residual cavity, and postoperative neurological changes. This approach may be

particularly relevant to patients with large supraclavicular schwannomas in whom the tumor is located near major neurovascular structures.

The present case also illustrates the need to consider both local surgical complications and neurological outcomes during the early postoperative period. Close observation of bleeding, cervical swelling, drainage, and neurological function allowed early recognition of postoperative changes while avoiding unnecessary intervention in the absence of progressive deterioration. Further cases are needed to determine whether this approach can be generalized to other patients with large cervical schwannomas.

6 Conclusion

Giant supraclavicular schwannomas can be challenging to resect because of their deep location, rich vascularity, and close relationship with adjacent nerves and vessels. Preoperative imaging and careful intraoperative dissection are important for planning and performing safe tumor removal.

Postoperative monitoring should include assessment of bleeding, wound and drainage status, airway-related symptoms, and neurological function. In this patient, mild postoperative sensory disturbance gradually improved without motor deficit, and no major bleeding or neurological complications occurred.

The management of large supraclavicular schwannomas requires consideration of the tumor anatomy and intraoperative findings together with serial postoperative neurological assessment. This approach may help identify early postoperative complications and support functional recovery.

Declarations

Ethics and consent to participate

Ethics approval was not required for this case report in accordance with the relevant institutional requirements. Written informed consent was obtained from the patient for participation in this case report.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The author declares no conflict of interest.

Informed Consent

The patient's name, hospitalization number, and other personal identifiers have been removed from this case report. Written informed consent should be obtained from the patient or her authorized family member before publication [1].

Authors' information

Not applicable.

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Author Contribution

Hao Du: Writing – Original Draft, Writing – Review & Editing. Linghui Wang: Investigation, Data Curation. Shuting Xu: Investigation, Data Curation. Hongchen Wang: Investigation, Data Curation. Zhouting Li: Imaging Data Curation, Image Processing and Visualization. Xi Zhu: Conceptualization, Methodology, Writing – Review & Editing. Lei Zhu: Conceptualization, Methodology, Surgical Management, Project Administration, Writing – Review & Editing. Lili Chen: Supervision, Conceptualization, Writing – Review & Editing, Project Administration, and Final Approval of the Manuscript.

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Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article. Further information is available from the corresponding author upon reasonable request.

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Figures

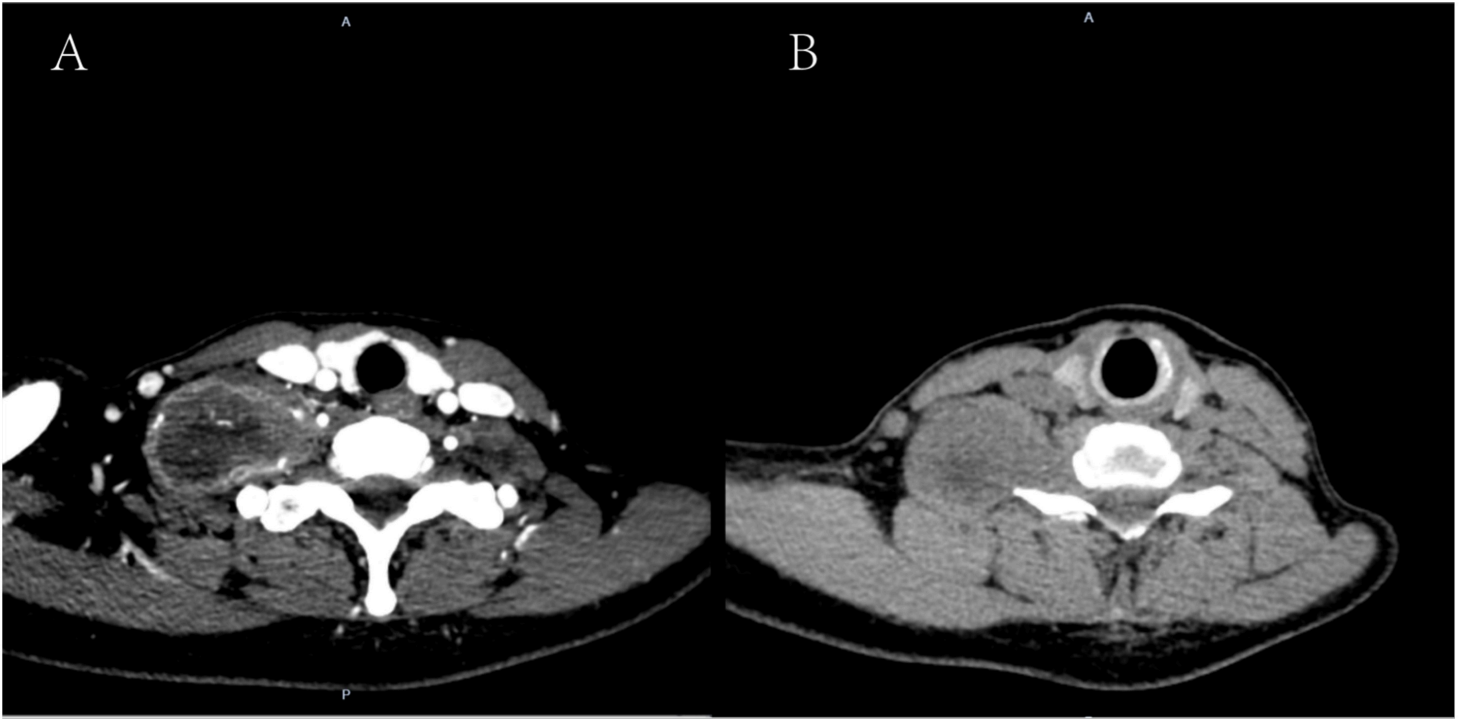


Figure 1

Preoperative cervical computed tomography findings. Representative axial CT images showing a mixed-density mass in the right supraclavicular region. The lesion demonstrates marked peripheral enhancement, an irregular central non-enhancing area, and prominent vessels coursing around the mass.

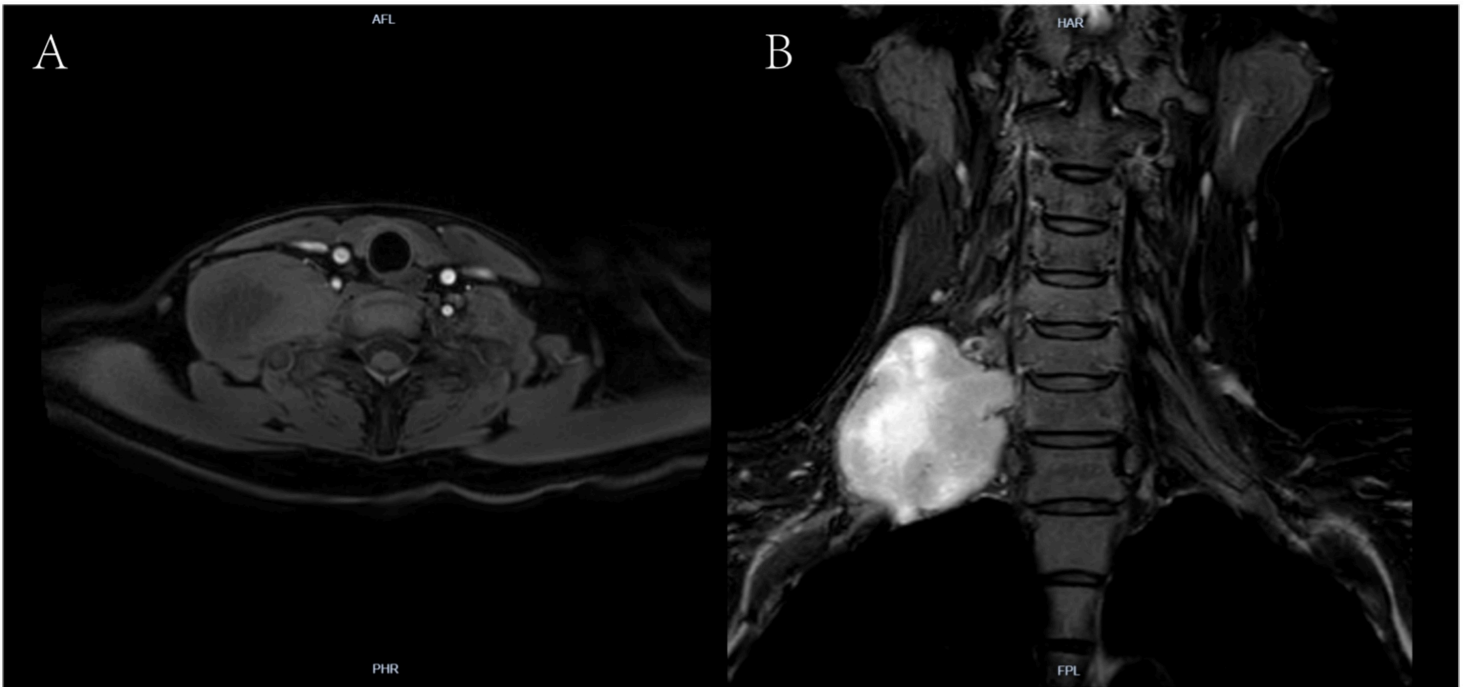


Figure 2

Preoperative cervical magnetic resonance imaging findings. (A) Axial and (B) coronal MR images showing a well-defined mass in the right supraclavicular region, measuring approximately 58 × 55 mm. The lesion demonstrates heterogeneous signal intensity and extends toward the right intervertebral foramen.



Figure 3

Gross appearance of the resected right supraclavicular schwannoma. The resected mass was irregular and lobulated and measured approximately 7 × 5 × 4 cm. A metric ruler is included for scale.

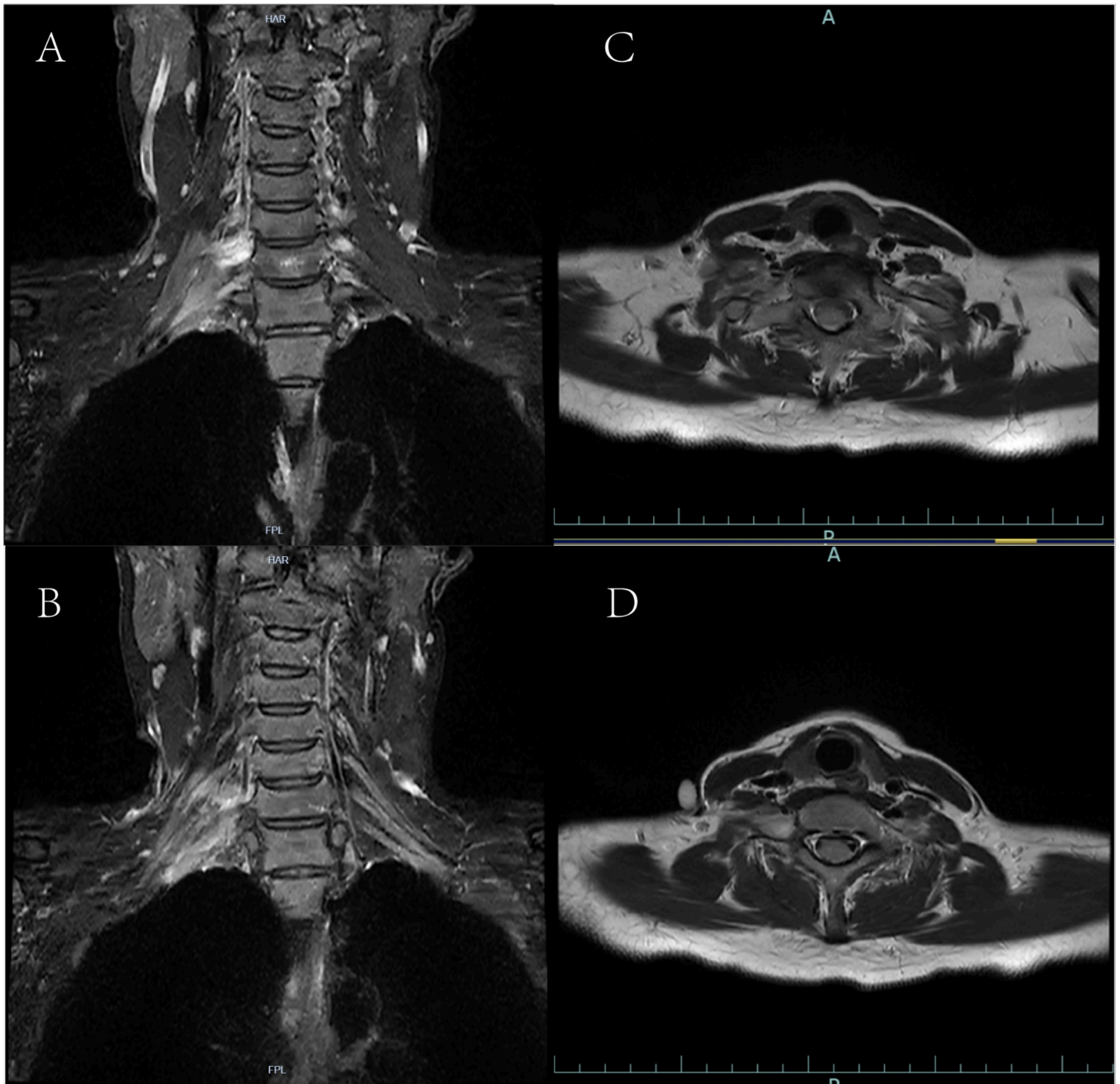


Figure 4

Cervical magnetic resonance imaging at 1 month after surgery. Coronal (A, B) and axial (C, D) MR images showing postoperative changes in the right supraclavicular region and slight enlargement of the right C6/7 nerve root.

Supplementary Files

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