



# Right Thoracoscopic, Robot-Assisted Resection of an Apical Mediastinal C7 Schwannoma

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## Abstract

Spinal schwannomas are benign, slow-growing tumors originating from Schwann cells, constituting 25 to 30% of primary spinal neoplasms and most frequently arise from sensory nerve roots in the cervical or thoracic spine.<sup>1–3</sup> Although generally nonaggressive, their growth can result in significant neurological deficits due to compression of surrounding structures such as the spinal cord or nerve roots.<sup>4,5</sup> Patients commonly present with localized pain, muscle weakness, and sensory disturbances.<sup>5,6</sup> Imaging techniques such as MRI or CT assist in identifying these tumors, and surgical resection is recommended when they cause progressive symptoms or neurological decline.<sup>7,8</sup> Recent advances in surgical techniques have improved the precision of schwannoma resections, reducing intraoperative complications, facilitating patient recovery, and improving overall patient outcomes.<sup>9</sup>

## Keywords

- ▶ neurosurgery
- ▶ da Vinci robot
- ▶ spine
- ▶ thoracic surgery
- ▶ schwannoma
- ▶ spinal tumor

## Background

In this operative video report, we present the surgical resection of a C7 schwannoma in a 64-year-old male with right arm weakness and shortness of breath. Clinical history, physical exam, and imaging revealed a large paraspinal mass at the C7–T1 level, extending into the mediastinal apex. Given the extent of the mass, a two-staged resection was planned. The first stage involved a posterior spinal fusion, laminectomy, and partial corpectomy by the Neurosurgery Department. The second stage was performed thoracoscopically by the Thoracic Surgery Department using the da Vinci robot. The tumor was successfully removed. Postoperatively, the patient had no new neurological deficits, was discharged

on postoperative day 3, and showed no residual tumor at follow-up (▶**Video 1**).

## Video 1

This Operative Video Report outlines the presentation, clinical course, and stages of surgical resection of a 64-year-old male with a large C7–T1 schwannoma extending from the vertebral foramina to the mediastinal apex. Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/a-2482-9271>.

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## Transcript (mm:ss)

### 00:09–00:42

We present a 64-year-old healthy male who presented with mild, right-handed arm weakness with several months of shortness of breath. Neurologic exam revealed left upper extremity strength of 5 out of 5, right upper extremity with triceps and grip strength of 4 out of 5, and right lower extremity strength of 5 out of 5. Sensory testing revealed pain and numbness over the right triceps and hand. Reflexes were diminished in the right triceps but otherwise brisk throughout. The exam was consistent with a C7–C8 nerve compression.

### 00:43–01:21

After initial investigation, imaging was obtained. A coronal CT of the C-spine showed bony erosions on the right at the C7–T1 level by the mass. Both sagittal and axial MRI of the C-spine demonstrated a hyperintense large right paraspinous C7–T1 mass extending from the foramina to the right mediastinal spinal apex. Here we can see the location of the mass as it extends down in the soft tissues relative to the cervical spine and apex of the lung. Interventional radiology biopsy sent to pathology was suggestive of nerve sheath tumor.

### 01:34–02:18

Given the patient's progressively worsening hand function, a team decision was made to pursue a two-stage surgical resection. Stage 1, completed by neurosurgery, would encompass a C5–T2 posterior spinal fusion with C7 laminectomy, right C6–C7 and C7–T1 facetectomies, partial C7 corpectomy, and a C7 complete transpedicular approach for resection of the mass. Risks discussed with the patient include possible hand weakness, adjacent segment disease, incomplete resection, regrowth of the tumor, paralysis, quadriparesis, stroke, and death, among other possible complications associated with surgery.

### 02:19–02:28

Here we present the second stage of the resection as performed by the thoracic surgery team via the da Vinci robot just 1 day after stage 1 performed by neurosurgery.

### 02:29–03:06

For stage 2, the patient was brought to the operating room under general anesthesia and induced with a left-sided double-lumen endotracheal tube. The patient was positioned in a left lateral decubitus position with the right side up. An 8-mm incision at approximately the 5th intercostal posterior axillary line was made, and an 8-mm robotic trocar was inserted with camera to inspect the pleural cavity. Auxiliary 8-mm ports were also placed in the 6th intercostal space posteriorly, another in the 5th intercostal space posterior to the scapula, and one on the anterior wall of the 4th intercostal space.

### 03:07–03:50

As seen in the operative video, the right pleural cavity is inspected. Visually, an apical mass was adhering to the lung apex. Pneumolysis and partial decortication were used to separate the lung adhesion from the mass. Once completely separated from the lung, a mixture of blunt and bipolar dissection was utilized circumferentially to re-enframe the mass from its adjacent structures. A posterior approach following the tumor capsule to the anterior aspect of the vertebral column was utilized to access the prior dissection plane from stage 1. This approach allowed for freedom of the tumor and inferior reflection of the mass toward the chest cavity.

### 4:06–05:11

Through continued blunt and bipolar dissection, the tumor was freed from the apical structures. The tumor cavity can be visualized, and adequate hemostasis was achieved. The mass was removed through the assistant port. Secondary confirmation of adequate hemostasis was confirmed. A small 24-French straight chest tube was placed in the assistant port, going posteriorly to the mid-level of the chest, and the lung was inflated, and instruments were removed.

### 05:22–05:58

The patient did well postoperatively without any new neurologic deficits or pulmonary complications. The chest tube was removed on postoperative day 1. The patient was discharged home in good condition on postoperative day 3. Postoperative MRI of C-spine at 6 weeks showed no residual tumor. At 1-year follow-up, the patient continued to show improved strength in the right arm and near-complete strength return in right hand. MRI of C-spine at 1 year was stable.

### Authors' Contributions

The primary surgeons involved in the procedure were Dr. Zachary Smith, Dr. J. Matthew Reinersman, and Dr. Lance Villanueva, who holds both an MD and PhD. The video and abstract were edited and drafted by Spencer J. Oslin, BS, Dr. Helen H. Shi, and Dr. Fauzziya Y. Muhammad, who holds both an MD and PhD. The critical review and final approval of the work were provided by Spencer J. Oslin, BS, and Dr. Zachary A. Smith.

### Supplemental Information

We obtained the necessary patient informed consent for this study.

### Funding

None.

### Conflict of Interest

None declared.

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