Resection of a posterior mediastinal mass: Lessons learned from a failed exploration for presumed schwannoma

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Surgeons frequently proceed with surgical resection of a paraspinal tumor without biopsy for presumptive diagnosis of schwannoma^{1,2}; however, misdiagnosis and improper operative planning can have dire consequences for the patients. Here, we discuss our experience with perioperative management and resection of a large thoracic chordoma that was initially misdiagnosed as schwannoma.

CLINICAL PRESENTATION

A 60-year-old man underwent an attempted resection of a left-sided paraspinal mass spanning the level T7-T9 for a presumed diagnosis of schwannoma. A left posterolateral thoracotomy was performed, and a large paraspinal mass was found, invading the spine, abutting the descending aorta. An attempt was made to dissect the tumor off the spine, but “bleeding from intercostal arteries prevented further dissection.” The operation was aborted. An intraoperative incisional biopsy demonstrated chordoma. Magnetic resonance imaging (MRI) and positron emission tomography scan ruled out spinal cord involvement and distant metastasis, and a 2-staged en bloc surgical resection was recommended.

INTERVENTION AND TECHNIQUE

Stage I involved a posterior midline approach to stabilize the thoracic spine by placing pedicle screws above (T6) and below the levels of the lesion (T10). The sagittal cuts were created along the lateral aspect of the lamina/pedicles and deep into the vertebral bodies (T7-T9). This in effect dissociated the vertebral segment with tumor from the remainder of the vertebral column.³

Stage II began with a left posterolateral thoracotomy at the sixth intercostal space. The 6th to 10th ribs were resected at a distance 4 cm lateral to the edge of the tumor to create a posterior and lateral margin. The descending aorta above and below the tumor was encircled to allow rapid vascular control in the event of bleeding. Medially,

Side-by-side comparison of thoracic chordoma versus extradural schwannoma.

Central Message

Misdiagnosis and pitfalls in the operation for posterior mediastinal mass can be avoided with a multidisciplinary team approach.

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several intercostal arteries were ligated and the tumor was freed from the aorta (Figure 1). The dissection was carried dorsal to the ribs until the sagittal cut made from stage I was identified and remaining vertebral body attachments were cut. The lesion along with the lateral vertebral column was fractured out with delivery of the tumor en bloc. The chest wall was reconstructed using Gore-Tex mesh.

CLINICAL OUTCOME

The patient was neurologically intact and discharged after 12 days. Initial pathology showed possible microscopic tumor at medical margin; however, reexamination of specimen by a senior pathologist confirmed negative final margin. The patient did not receive adjuvant radiation treatment. A follow-up MRI after 1 year demonstrated no evidence of recurrent disease.

DISCUSSION

Paraspinal primary bone tumors, such as chordoma, are rare. Several procedures have been described for resection of thoracic paraspinal tumors, including a single-staged midline approach or multiple stages.⁴⁻⁶ The technical operative details of the current case were published previously as well³; however, most of these earlier reports focused on the neurosurgical techniques of operation. Yet, paraspinal primary bone tumors can be confused with more common schwannoma, and thoracic surgeons are often the first specialists the patients encounter. This case demonstrates the diagnostic and management dilemmas

FIGURE 1. Intraoperative photograph of the resected tumor and the operative field after the resection. The arrows indicate ligated intercostal arteries.

often confronted by thoracic surgeons and offers guidance in avoiding pitfalls.

This case highlights 2 crucial errors that were made during our patient's preoperative diagnosis and management: a wrong diagnosis made solely based on computed tomography (CT) imaging and incomplete surgical planning. Both errors could have been prevented with a multidisciplinary team approach. The initial CT scan demonstrated an obliteration of the plane between the spine and the tumor (Figure 2, B), which would be unusual for a benign schwannoma. Review of CT images and discussion among the oncologist, surgeon, and radiologist could have led to a correct diagnosis. CT-guided biopsy and further evaluation using MRI would have been invaluable in narrowing down the differential diagnosis and defining the anatomy for the surgical approach.

A large chordoma involving the thoracic spine is challenging because of its proximity to the descending aorta

and requires careful planning by both thoracic surgery and neurosurgery. Major hemorrhage from intercostal arteries can be difficult to control, especially if the tumor is large and near the aorta. Preparation for proximal and distal control of the aorta should be planned accordingly. We chose a 2-stage approach, because dissecting the tumor free from the aorta while controlling the intercostal artery branches was a key portion of the operation. The single-stage posterior midline approach would have been difficult if not impossible in our patient.

CONCLUSIONS

A presumed schwannoma with locally invasive features should be carefully worked up by a multidisciplinary team to avoid misdiagnosis and pitfalls during the operation. A 2-staged approach allows the surgeon to confirm the stability of the spine before the tumor resection and gives best exposure with minimal risk.

FIGURE 2. Side-by-side comparison of thoracic chordoma (A) versus extradural schwannoma (B). Schwannoma is usually lobulated, encapsulated, and well demarcated, as shown in (B). There is a loss of plane between the spine and tumor in chordoma, as shown in (A).

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EDITORIAL COMMENTARY

A posterior mediastinal mass is not always what it seems

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Central Message

A posterior mediastinal chordoma is a malignant tumor, which may be mistaken for a schwannoma. This tumor usually requires a combined anterior and posterior approach for complete resection.

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When referred an adult patient with a posterior mediastinal mass, a thoracic surgeon will usually envision a rather simple operation for its removal. Indeed, this is commonly the case as most tumors in this location are benign schwannomas, which are relatively avascular and usually quite easy to separate from the spine. The primary approach for these tumors is often a minimally invasive one, and both video- and robotic-assisted thoracoscopic approaches have been described.¹⁻³

However, not all posterior mediastinal tumors in adults are benign neurogenic ones. One such example is a chordoma, which is a slow-growing, locally invasive malignant tumor that usually extends into surrounding structures such as the spinal cord and mediastinum. The key to preoperative diagnosis of chordoma is the absence of a plane between the spine and tumor on computed tomography and magnetic resonance imaging (MRI) scans. When suspected, a preoperative biopsy is indicated, as is the ruling out of distant metastasis. Surgery is the principal treatment for these radioresistant tumors, and en bloc resection of chordomas has been shown to be associated with increased patient

survival.⁴ It is of utmost importance to ensure complete removal whenever possible, as up to 40% of chordomas tend to recur locally.⁵

However, this resection is frequently quite challenging but is possible thanks to modern spinal instrumentation, which allows complete resection and reconstruction for tumors at all levels of the spine. Although descriptions of anterior or posterior resections alone have been described, a combined anterior and posterior approach is usually necessary for these large vascular tumors that often affect multilevel vertebral bodies and may also involve mediastinal structures such as the aorta.⁶ These combined