Case report

Surgery for posterior mediastinal dumbbell tumors: A case report

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ABSTRACT

Introduction: Mediastinal dumbbell tumors are rare, and special cases provide valuable knowledge to the existing literature.

Presentation of case: A 57-year-old woman was diagnosed with a recurrent dumbbell-shaped nerve sheath tumor with intrathoracic and intraspinal components. We attempted to resect the tumor via combined biportal thoracoscopy and laminectomy with the patient in a prone position. However, copious bleeding prevented complete removal of the intraspinal component of the tumor. Pathological examination of the operative specimens showed a mixed hemangioma.

Discussion: The first report on the use of triportal thoracoscopy for treatment of a posterior mediastinal dumbbell tumor with the patient in the prone position was published in 1995. However, this technique is not widely used. The technique used in our case is unique only in that biportal rather than triportal thoracoscopy was used to resect the intrathoracic component of the tumor. The differential diagnoses of posterior mediastinal dumbbell-shaped tumors include neurogenic tumors, meningiomas, and hemangiomas. Very rarely, cavernous and capillary hemangiomas also present as dumbbell-shaped lesions. To our knowledge, a mixed hemangioma presenting as a dumbbell-shaped lesion has not been previously reported.

Conclusion: The intrathoracic component of a posterior mediastinal dumbbell tumor can be resected by biportal thoracoscopy with the patient in a prone position, reducing the operative time. If the diagnosis of a dumbbell tumor is inconclusive, an endoscopic biopsy should be performed before removing the tumor.

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1. Introduction

Mediastinal dumbbell tumors are rare, and reports of cases add valuable information to the existing literature. We herein report a case involving a patient with a posterior mediastinal dumbbell tumor and describe a surgical technique for removal of such tumors.

2. Presentation of case

A 57-year-old woman was referred to our hospital because of progressive leg weakness. She had undergone spinal surgery 12 years previously for what was believed to be a dumbbell nerve sheath tumor; however, pathologic material could not be obtained from the tumor. Therefore, a diagnosis of recurrent nerve sheath...
tumor was made. Magnetic resonance imaging showed a mass in the upper field of the right chest and intraspinal canal at T4 and T5, and the lesion was determined to be an intrathoracic and intraspinal dumbbell-shaped tumor (Fig. 1).

2.1. Surgical technique

The patient was intubated with a double-lumen endotracheal tube under general anesthesia and placed in the prone position (Fig. 2).

2.1.1. First phase: removal of intraspinal tumor

After induction of anesthesia, a laminectomy was performed at the level of the tumor with the patient in the prone position. Enough bone was removed to expose the intraspinal tumor and widen the laminectomy on the side of the tumor; this allowed the performance of an intervertebral foraminotomy where the tumor narrowed to pass into the chest cavity. Unfortunately, the intraspinal tumor was not completely removed because of copious bleeding during the laminectomy, necessitating transfusion of 5000 mL of blood.

2.1.2. Second phase: removal of the intrathoracic tumor

After the intraspinal tumor had been removed to the greatest extent possible, a biportal thoracoscopy setup was prepared. One port was placed in the seventh intercostal space on the mid-axillary line for a camera, and another was placed in the fourth intercostal space on the posterior axillary line. During the procedure, the lung on the operative side was found to be suboptimally deflated. Accordingly, a Veress needle was inserted into the pleural cavity and CO₂ insufflated to 8 cmH₂O to provide adequate exposure of the operative field. The pleura was incised around the tumor using an ultrasonic scalpel (Fig. 2). As dissection proceeded deeper into the extrapleural tissue, all vessels feeding the tumor were cauterized. After the tumor had been removed through the working port, a chest tube was inserted and the ports closed.

2.1.3. Outcome

Although the intrathoracic component of the tumor was completely removed (Fig. 3), the intraspinal tumor was incompletely removed because of copious bleeding. Pathological examination of the operative specimens showed a mixed hemangioma (Fig. 4). The patient did not recover her lower limb function.

3. Discussion

Most posterior mediastinal dumbbell tumors are benign. Safe removal of these tumors requires a one-stage combined neurosurgical and thoracic operation. Various types of incisions and different patient positions have been described. Minimally invasive approaches using video-assisted thoracic surgical techniques have recently become routinely used for treatment of intrathoracic disease. For most video-assisted thoracic surgery, patients are placed in the lateral decubitus position. Safe resection of posterior mediastinal dumbbell tumors using video-assisted thoracoscopy with the patient in the lateral decubitus position has been described [1]. However, the need to reposition the patient from the prone to lateral decubitus position after the spinal component of the tumor has been removed is very inconvenient.

Although the prone position is very popular for spinal surgery, it is seldom used in video-assisted thoracic operations. In 1995, McKenna et al. [2] published the first report on the use of thoracoscopy to treat a posterior mediastinal dumbbell tumor with the patient in the prone position to avoid repositioning and reduce the
procedure time. However, this technique is not widely used. Our case differs from that of McKenna et al. [2] in that biportal rather than triportal thoracoscopy was used to resect the intrathoracic component of the tumor. Another difference between our case and that of McKenna et al. [2] is that our patient had a mixed hemangioma.

With the patient in the prone position, the heart and lungs are displaced by gravity and artificial pneumothorax. Removal of intrathoracic tumors using thoracoscopy with the patient in the prone position not only negates the need to reposition the patient but also provides an optimal view of the posterior mediastinum. However, surgery with thoracoscopy and the patient in the prone position also has disadvantages, including providing limited exposure of the rest of the chest cavity and a greater risk of injury to critical nerves and vital organs. Another disadvantage of the prone position is that the patient’s position must be changed if conversion to open surgery is necessary. Additionally, the prone position is associated with a variety of complications, some of which may be prevented with care on the part of the anesthetist [3].

The differential diagnoses of posterior mediastinal dumbbell-shaped tumors include neurogenic tumors (schwannomas, neurofibromas), meningiomas, and hemangiomas. Very rarely, cavernous [4] and capillary hemangiomas [5] also present as dumbbell-shaped lesions. To our knowledge, a mixed hemangioma presenting as a dumbbell-shaped lesion has not been previously reported. Current treatments for symptomatic posterior mediastinal or vertebral hemangiomas include surgery, radiotherapy [6], and transarterial embolization. Surgical treatment is often associated with profuse hemorrhage, incomplete resection, and lengthy convalescence [7,8], as was true of our case. Thus, misdiagnosis can lead to inappropriate surgical planning and serious complications, especially life-threatening hemorrhage. Preoperative embolization [9] and sclerotherapy [10] were recently recommended to control intraoperative bleeding.

There are some lessons to learn from our case. First, care must be taken to ensure an accurate preoperative differential diagnosis; in retrospect, there was some evidence on computed tomography images that the correct diagnosis was hemangioma, as shown in Fig. 5. Second, if the diagnosis of a dumbbell tumor is inconclusive, endoscopic biopsy should be performed before removing the tumor.
4. Conclusion

The intrathoracic component of a posterior mediastinal dumbbell tumor can be resected by biportal thoracoscopy with the patient in a prone position, reducing the operative time. If the diagnosis of a dumbbell tumor is inconclusive, an endoscopic biopsy should be performed before removing the tumor.

Conflict of interest

None.

Funding

None.

Ethical approval

Written consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of Annals of Medicine and Surgery. Ethics committee approval was obtained for publication of this report.
Authors' contributions

Ansheng Mo participated in the patient care, contributed to data collection and analysis, and helped to design and draft the manuscript. Jiali Zhang participated in the patient care.

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