

Case Report

The cervical-thoracic approach for the resection of a giant cervico-mediastinal neurogenic tumor: a case report

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Abstract: Many approaches for mediastinal tumor resection have been reported. Superior mediastinal tumors that involve the thoracic inlet and adjacent structures pose problems to thoracic surgeons. The cervicothoracic junction is difficult to access because of the crowded anatomy of this region. No single approach provides the best access to all of the tumors in this region. We introduce the cervical-thoracic approach for complete resection of huge cervico-mediastinal neurogenic tumors. With cutting off of the right clavicular, and first, second, and third anterior ribs, both the thoracic and cervical components of the tumor were well exposed. The clavicular and anterior ribs were cut off at the middle segment, avoiding injury to the sternoclavicular joint and muscle attachments. The right clavicular and third ribs were repaired with plates and screws to reconstruct the chest wall. The use of plates and screws expanded our incision options, and we could pay more attention to the protection of body function while excising the tumor.

Keywords: Neurogenic tumor, superior mediastinum, thoracic inlet, cervical-thoracic approach, chest wall reconstruction, plates and screws

Introduction

Many approaches for mediastinal tumor resection have been reported. Incision selection depends on the location of the tumor. We introduce the cervical-thoracic approach for the resection of huge cervico-mediastinal neurogenic tumors.

Case report

A 41-year-old man presented with a right supraclavicular mass. The mass had grown over 30 years. An operation was performed 27 years previously, which left a movement disorder in his right arm. He was admitted to our hospital because the mass had become very large (**Figure 1A**). Chest computed tomography and magnetic resonance imaging revealed a right superior mediastinal mass extending to the supraclavicular fossa through the gap between the clavicular and first rib, measuring 20 × 13 × 10 cm (**Figure 2A**). Angiography showed axillary artery occlusion and collateral circulation. Based on the location and size of the tumor, we

selected a cervical-thoracic approach (**Figure 1B**). General anesthesia was administered with the patient in the supine position, with his head turned to the left. Hand and vascular surgeons performed the procedures for the brachial plexus and great vessels. First, a thoracotomy was performed through a right fourth intercostal anterior lateral incision. Thoracoscopy-assisted operation exploration revealed that the tumor, which was 15 cm in diameter, was fixed on top of the thoracic cavity and adhered to the right upper lobe, but not to the great vessels. After cutting off part of the lung tissue by using Endo GIA, the thoracic component of the tumor was isolated. After extending the incision to the right neck, the right clavicular, and first, second, and third anterior ribs were cut off. The cervical component of the tumor was approximately 20 × 10 cm in size. The tumor originated from the inferior trunk of the brachial plexus, compressing the superior and middle trunk of the brachial plexus. After isolating the nerves, cutting off the inferior trunk of the brachial plexus, and excising part of the first rib, blocking resection was performed to remove the tumor because it

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Figure 1. A. Before the surgery, the patient presented a huge right supraclavicular mass. B. Appearance of the incision using the cervical-thoracic approach at 10 days after the surgery.

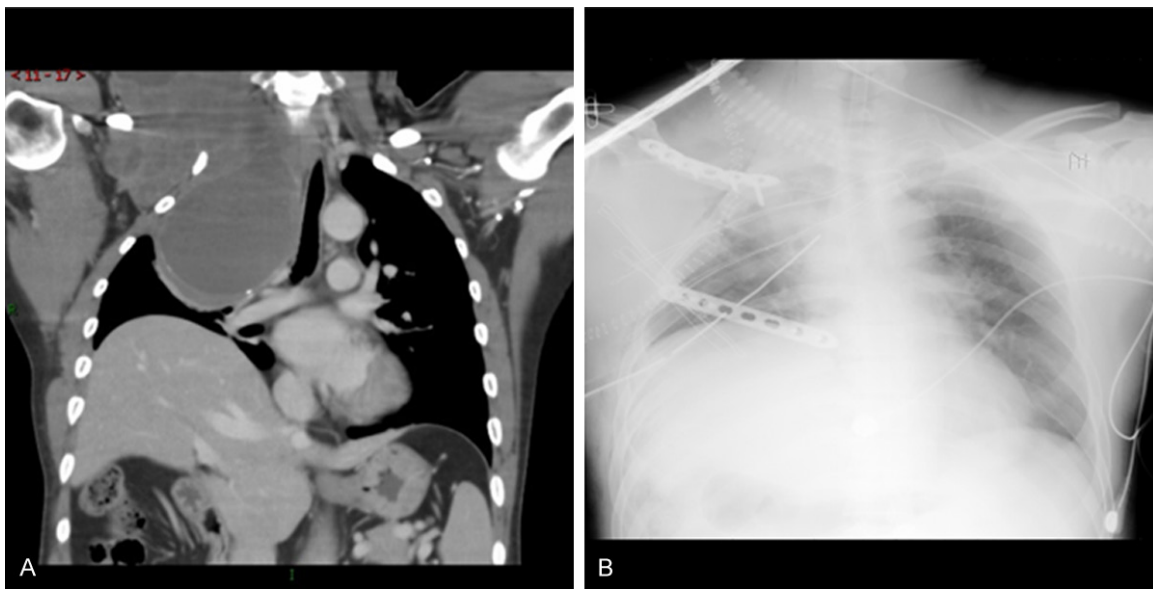


Figure 2. A. The tumor extended from the right superior mediastinal to the supraclavicular fossa through the gap between the clavicular and first ribs. B. Internal fixation was performed on the right clavicular and third rib by using a locking plate.

was too huge for en bloc resection. The right subclavian artery ruptured during the operation, and we noticed that the artery was thinner than usual. The proximal artery had incomplete occlusion, and the distal artery had no blood flow. The proximal artery was ligated after confirming that the right upper limb had enough blood supply. Internal fixation was performed on the right clavicular and third rib with a locking plate (**Figure 2B**). A chest tube was placed at the fifth intercostal space on the right midax-

illary line. According to pathological findings, the tumor was diagnosed as a schwannoma. The patient was discharged on the 12th day after the operation (**Figure 1B**). At 1-year follow-up, no symptoms or recurrence were observed, as well as paradoxical respiration.

Discussion

Superior mediastinal tumors that involve the thoracic inlet and adjacent structures pose

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problems to thoracic surgeons. The cervicothoracic junction is difficult to access because of the crowded anatomy of this region. The tumors in this area often involve important adjacent structures such as the great vascular, brachial plexus, and skeletal structures [1]. Many approaches for the resection of tumors in this region have been reported, including the transcervical approach [2], the cervical-transsternal approach [1], thoracoscopic surgery (VATS), the supraclavicular approach, VATS combined with the supraclavicular approach [3], thoracotomy approach, thoracotomy combined with laminectomy [4], and the mini-trapdoor incision [5]. No single approach provides the best access to all of the tumors in this region [1]. Thoracic surgeons should choose the appropriate incision for each patient based on the tumor location. Motoki et al. recommend a cervical anterior approach if the tumor is located superior to the Th3 level [2]. Tônu et al. suggested that the anterior cervical-transsternal approach provides adequate exposure for resection of neurogenic tumors originating in the brachial plexus and sympathetic chain in the root of the neck or the superior mediastinum [1]. Akashi et al. applied the original thoracoscopic procedure and additional finger manipulation through a supraclavicular incision for easy dissection and removal of tumors [3]. Sumiko et al. suggested that thoracotomy combined with laminectomy is the preferred surgical approach for dumbbell-shaped posterior mediastinal tumors [4]. Ge et al. proposed that the mini-trapdoor technique provides excellent exposures of the brachiocephalic and subclavian vessels [5]. Thoracoscopic resection of mediastinal neurogenic tumors is widely accepted. However, bulky tumors of the superior sulcus require the thoracoscopic approach in combination with the supraclavicular approach [3]. Meanwhile, dumbbell tumors require a combined neurosurgical approach [4].

In the present case, we applied the cervical-thoracic approach to remove the giant neurogenic tumor. With cutting off of the right clavicular, and first, second, and third anterior ribs, both the thoracic and cervical components of the tumor were well exposed, thereby protecting the brachial plexus and subclavian vessels. The clavicular and anterior ribs were cut off at the middle segment, avoiding injury to the sternoclavicular joint and muscle attachments. The

right clavicular and third ribs were repaired with plates and screws to reconstruct the chest wall. Clavicular reconstruction is believed to cause disturbance in the shoulder girdle function due to sternoclavicular arthrodesis [1]. By not disturbing the sternoclavicular joint and muscle attachments, we avoided cosmetic and functional defects to the pectoral girdle. The use of plates and screws expanded our incision options, and we could pay more attention to the protection of body function while excising the tumor.

Disclosure of conflict of interest

None.

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