Simple Stapled Division of Aberrant Artery During Thoracoscopic Resection of Pulmonary Sequestration

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Pulmonary sequestration is a rare developmental abnormality where pulmonary tissue lacks normal connections to the tracheobronchial tree, in addition to its having an anomalous systemic blood supply. Lobectomy via open thoracotomy has long been the procedure of choice for the resection of pulmonary sequestration. We present three cases of thoracoscopic lobectomies performed using video-assisted thoracic surgery (VATS). Transection of the associated aberrant artery was performed using only a single staple.

Keywords: pulmonary sequestration, VATS, aberrant artery

Introduction

Intralobar pulmonary sequestration is a rare congenital abnormality in which normal pulmonary parenchyma develops without its own pleural covering and a blood supply originating from a systemic artery.1) Traditional management has been surgical resection through open thoracotomy.1) This report illustrates three cases in which thoracoscopic lobectomies were performed to successfully treat intralobar pulmonary sequestration.

Case Report

Case 1

A 34-year-old man was referred to our department with a left lower lobar mass found on chest X-ray and chest computed tomography (CT) obtained during a medical screening. He had no respiratory symptoms. A tortuous aberrant artery (15 mm in diameter) arose from the descending thoracic aorta and flowed into the mass-like lesion (Fig. 1A).

Case 2

A 37-year-old woman presented with coughing and chest discomfort. Her chest X-ray revealed a consolidation in the left lower lung field. Chest CT showed consolidation of the lower lobe of the left lung. An aberrant artery (8 mm in diameter) arising from the descending thoracic aorta was identified (Fig. 1B).

Case 3

A 20-year-old man was admitted to our department with a 6-month history of hemoptysis. Chest CT revealed a mass with an aberrant artery (10 mm in diameter) arising from the descending thoracic aorta was identified (Fig. 1C).

Operative Procedure

We started the procedure for video-assisted thoracic surgery (VATS) lobectomy by first placing patients in the decubitus position. A 10-mm 30-degree thoracoscope was then inserted into the left pleural cavity through the 12-mm trocar in the fifth intercostal space along the posterior axillary line. Two additional 5-mm and 12-mm trocars were located in the fifth intercostal space along
the anterior axillary line and in the seventh intercostal space along the midaxillary line, respectively. We found no pleural adhesions in Case 1, and severe adhesions between the sequestrated lung tissue and surrounding structures, such as the left upper lobe, chest wall, diaphragm, and pericardium in Cases 2 and 3. In each case, the aberrant artery was identified and then transected using a 2.5-mm stapling device (Endo GIA™ Universal Loading Unit 30–2.5 mm; Covidien llc, Mansfield, Massachusetts, USA) (Fig. 2). Afterwards, we performed a standard VATS lobectomy. At the conclusion of the procedure, the port incision in the midaxillary line was enlarged to 3–4.5 cm to facilitate removal of the excised lobe. All patients made an uneventful recovery.

Discussion and Conclusion

Pulmonary sequestration is a relatively uncommon abnormality of the lung, characterized by lung tissue that lacks the normal communication with the bronchial tree and receives its blood supply through a feeding artery from the systemic circulation, most commonly the descending aorta. There are 2 types: intralobar and extralobar. In intralobar disease, the feeding artery is usually of large caliber. In contrast, extralobar disease is frequently associated with an artery of small diameter. In our cases, the diameter of the feeding artery was 15 mm, 8 mm, and 10 mm, respectively.

It is generally accepted that resection is the treatment of choice for pulmonary sequestration. Preoperative aortography and open resection are the recommended approaches for diagnosis. Recently, aortography has become unnecessary in most cases. The aberrant arteries of a sequestration can now be clearly identified on coronal and 3-dimensional reconstructed images performed using modern multi-detector CT (MDCT). In our cases, MDCT allowed us to diagnose pulmonary sequestration and accurately identify aberrant arteries.

The conventional surgical approach for resection has been through a posterolateral thoracotomy. Reasons thoracic surgeons may prefer open thoracotomy to VATS are adequate exposure to visualize adhesions resulting from recurrent infection and concern over the safety of using a stapling device to transect a large systemic feeding artery. However, we recommend the VATS approach...
rather than open thoracotomy because the procedure allows for an optimal approach to the aberrant artery which is usually located just above the diaphragm. In addition, VATS offers a better surgical visual field for undergoing dissection in cases of severe adhesion. Preparations should always be made in advance to convert to open thoracotomy if required.

With growing VATS experience, thoracoscopy now seems to have an established role in the surgical treatment of pulmonary sequestration.\(^1\)\(^-\)\(^5\) Despite using VATS, some surgeons still choose not to divide the feeding artery using a single stapling device during the procedure.\(^2\)\(^-\)\(^4\) In addition, Kestenholz, et al. describe occluding the artery centrally with a stapling device after removal of the endoscopic scalpel. They then cut the artery peripherally with a second stapling device. With experience, however, they recognized that this method was unnecessary and began using a single stapling device even with very large vessels.\(^2\) We also have experience transecting a large feeding artery arising from the descending thoracic aorta using only one 2.5-mm stapling device safely. We think it is important to confirm the vascular condition, such as atherosclerosis, which can lead to stapling failure before the operation by using preoperative CT. In addition, we also think it is important to divide the aberrant artery as close to the descending thoracic aorta as possible.

In conclusion, these cases illustrate that VATS treatment of pulmonary sequestration is feasible and can be performed safely using a single 2.5-mm vascular stapling device to divide the large aberrant artery under a better surgical visual field.

**Disclosure Statement**

No conflict of interest.

**References**