Video-assisted thoracoscopic resection for intralobar pulmonary sequestration

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Abstract

Video-assisted thoracoscopic treatment of intralobar pulmonary sequestration in an obese (120 kg, body mass index 42) young man is described. Two aberrant arteries originating from the descending thoracic aorta were transected with a vascular stapler, and a left lower lobectomy was successfully performed thoracoscopically. A 3-dimensional chest computed tomography was used to identify the aberrant vessels. Video-assisted thoracoscopic lobectomy is useful and minimally invasive for treating pulmonary sequestration, especially in obese patients.

Introduction

Intralobar pulmonary sequestration is a rare congenital malformation; it is an abnormal region within the normal pulmonary parenchyma without its own pleural covering. In symptomatic patients with pulmonary sequestration, resection is the generally accepted treatment. Although open thoracotomy has been the most frequently performed procedure for resecting pulmonary sequestration, video-assisted thoracoscopic surgery (VATS) lobectomy has recently been advocated(1,2). However, the value of VATS has not yet been established. We report the successful use of VATS to treat intralobar pulmonary sequestration in an obese young man weighing 120 kg.

Case

An obese 16-year-old male (height 169 cm, weight 120 kg) was referred to our institution because of a history of recurrent left lower lobe pneumonia. The chest X-ray film revealed persistent left lower lobe infiltration despite antibiotic treatment. The 3-dimensional chest CT scan revealed two afferent vessels from the descending thoracic aorta (Figure 1) and venous drainage into the inferior pulmonary vein. Bronchoscopic examination showed no remarkable abnormalities. The patient was diagnosed as having intralobar pulmonary sequestration. Due to recurrent pulmonary infection, VATS was planned to treat the intralobar pulmonary sequestration.

The patient was placed in the right lateral position. A double-lumen endotracheal tube was used for selective one-lung ventilation. The first port was inserted via a 12-mm skin incision in the midaxillary line in the eighth intercostal space. A 40-mm minithoracotomy was made in the sixth intercostal space in the midaxillary line as an access port. Three additional port sites were used to optimize access: in the fifth intercostal space in the anterior axillary line, and in the sixth and eighth intercostal spaces in the posterior axillary line. The entire operation was carried out with a monitor, with no rib retractor. Under thoracoscopy, the pleural surface corresponding to the sequestrated lung appeared congested and telangiectatic, but it could not be clearly differentiated from the normal lower lobe parenchyma. A wide area of the left lower lobe adhered to both the chest wall and the diaphragm, possibly resulting

from a chronic inflammatory process accompanying the pulmonary sequestration(Figure 2). The adherent area was meticulously dissected. The two aberrant arteries, about 8 mm in diameter at their origin, were identified in the lower pulmonary ligament and isolated, closed, and cut with a stapling device (Multifire Endo GIA 30, 2.5 mm; Auto Suture, Tyco Healthcare, Norwalk, CT, USA) without difficulty (Figure 3). A left lower lobectomy was then performed. Operation time was 371 min and volume of intraoperative blood loss was 410 ml. The patient's postoperative course was uneventful; his chest tube was removed on postoperative day 3, and he was discharged on postoperative day 10. Microscopically, the final diagnosis was intralobar pulmonary sequestration.

Discussion

Pulmonary sequestration, a rare congenital malformation of the foregut, is of two types: intralobar, an abnormal region within the normal pulmonary parenchyma without its own pleural covering, and extralobar, which has its own pleural covering. Pulmonary resection is the generally accepted treatment of choice for pulmonary sequestration(3). The difficulty in resecting pulmonary sequestration is identifying the aberrant artery. Kestenholz et al. reported that it was sometimes easy to identify the artery within the pulmonary ligament; however, there were usually inflammatory changes in the area of the sequestration due to recurrent infections, and the artery was hidden in scar tissue(4). In the present case, a wide area of the lower lobe adhered to both the chest wall and the diaphragm, which required careful dissection and prolonged the operation.

Thoracoscopic surgery allowed us to safely perform a lobectomy. Detailed preoperative information on aberrant arteries is important for safe thoracoscopic surgery. A previous study demonstrated that the thoracoscopic approach for pulmonary sequestration is feasible, and it appears to have some advantages over the conventional method in that it may reduce the duration of postoperative drainage, postoperative narcotic use, and hospital stay in children(5).

Obese patients are generally regarded as requiring a larger operative incision for sufficient surgical visualization in open thoracotomy. However, a larger incision is not needed for VATS as compared to

the open thoracotomy in obese patients. VATS allows better identification of the diaphragm, apex and chest wall compared to open thoracotomy. Obtaining good visualization for dissecting these areas is difficult in open thoracotomy. In cases showing adhesion, VATS is also very useful to identify certain layers between the lung and chest wall. Since we can secure a view on a monitor when the area of adhesion is limited around one lobe, we believe that completion of VATS lobectomy without conversion to open thoracotomy is feasible. The main disadvantage of VATS is the relative difficulty in obtaining a wide field of view. Therefore, careful operation is required to avoid injuring the lung parenchyma and vessels in the outside of thoracoscopic vision.

In most cases, angiography is unnecessary because the feeding arteries can be easily identified on 3-dimensional CT(4). In the present case, 3-dimensional CT was extremely useful for identifying the aberrant arteries and venous drainage. A stapling device was used in the present case for the pulmonary artery and pulmonary vein. Kaseda et al. reported that they had a frightening experience while using an endoscopic staple cutter to transect a pulmonary artery, when the staples failed to close completely(6). However, stapling device failure has not occurred in any of our VATS lobectomies. Therefore, we used the stapling device to transect the aberrant arteries. Lobectomy is the most common procedure, and segmentectomy is an option only if the sequestrated lung is localized within a segment(7). Kestenholz et al. have done four segmentectomies by thoracoscopic surgery for intralobar sequestrations(4). However, there were only small inflammatory changes in the lobe. If severe inflammatory changes are present, as this present case, lobectomy should be selected.

Conclusion

In this report, thoracoscopic treatment of intralobar pulmonary sequestration in an obese patient was described; VATS was very useful to identify the aberrant arteries and perform a minimally invasive lobectomy.

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Figure Legends

Figure 1

Three-dimensional chest CT shows the two afferent vessels arising from the descending thoracic aorta to the area of the right lower lobe(arrow)

Figure 2

Intraoperative photograph shows wide adhesion of the left lower lobe to both the chest wall and the diaphragm, possibly resulting from a chronic inflammatory process accompanying the pulmonary sequestration.

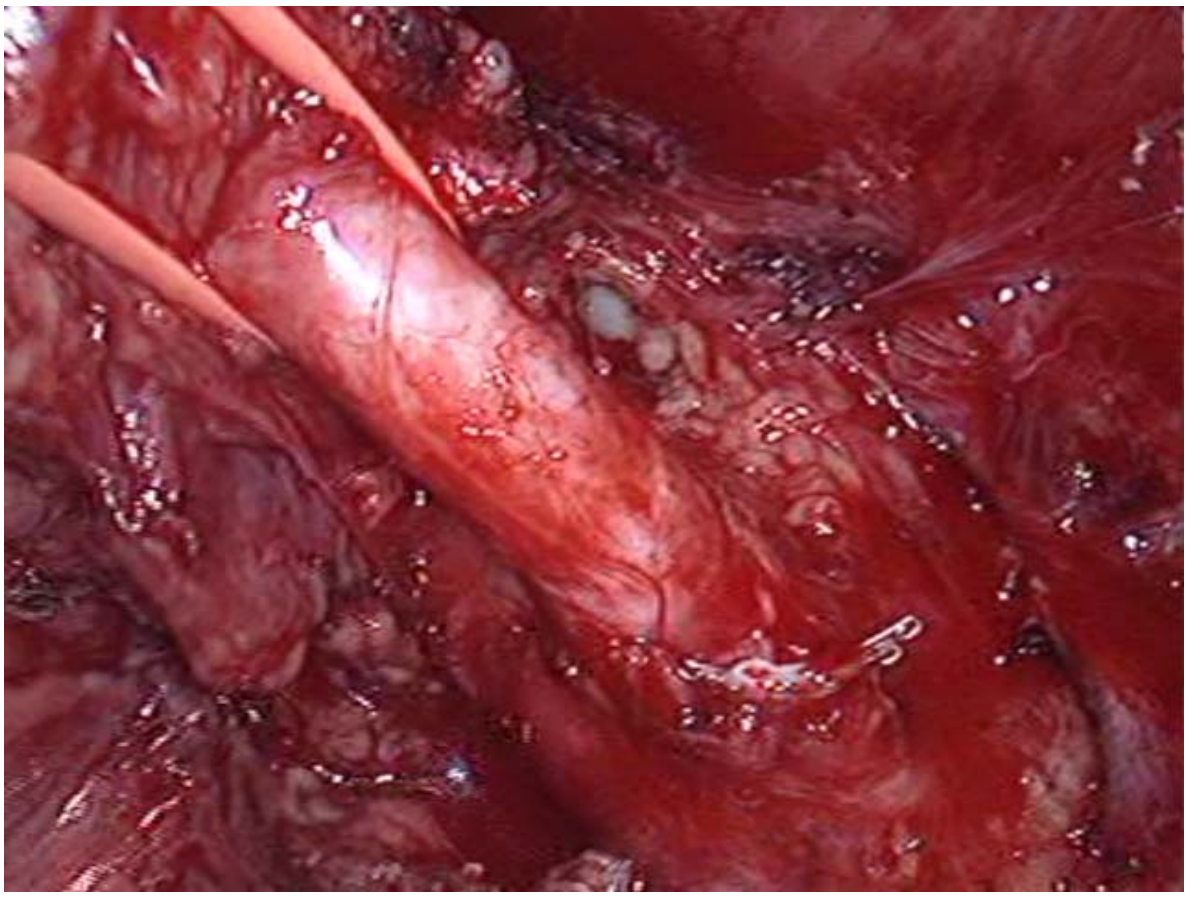

Figure 3

Intraoperative photograph after first aberrant artery was cut with stapling device(short arrow). The second aberrant artery arising from the descending thoracic aorta to the right lower lobe sequestration(long arrow).