Case report - Thoracic non-oncologic

Video-assisted thoracoscopic lobectomy in the treatment of intralobar pulmonary sequestration

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Abstract

Pulmonary sequestration is a congenital malformation characterised by cystic, non-functioning embryonic lung tissue with vascularisation of an abnormal systemic artery. They are classified as intralobar (75%) and extralobar (25%) and are more common in the left lung and lower lobes (60–90%). We report two cases of intralobar pulmonary sequestration located in the lower lobe of the left lung which were subjected to video-assisted thoracoscopic surgery (VATS). Both patients had recurrent infections for which, after performing imaging tests, they were diagnosed with intralobar pulmonary sequestration in the left lower lobe, with an afferent arterial branch to the malformation from the aorta. A lower lobectomy was performed by video-assisted surgery, dividing the aberrant aortic artery with an endostapler. A single thoracic chest tube was placed and removed on postoperative day 2 and the patients were discharged on the same day. In both cases, the pathology examination revealed intralobar pulmonary sequestration. Pulmonary sequestrations are uncommon malformations that can be operated on using minimally invasive techniques, thereby permitting early discharge and a low rate of complications.

Keywords: Thoracotomy/video-assisted thoracoscopic surgery; Lobectomy; Pulmonary sequestration

1. Introduction

Pulmonary sequestration is an uncommon lung malformation in which part of the lung is excluded from the rest and which has a systemic blood supply, that encourages the development of recurrent infections.

2. Case report

We report two clinical cases who underwent video-assisted thoracoscopic surgery (VATS).

The first was a 30-year-old female patient, formerly a smoker, and with no relevant clinical history, who visited the emergency room due to fever, greenish phlegm and dyspnoea. A chest X-ray showed a consolidation in the left lower lobe (LLL). A thoracic computed tomography (CT)-scan was performed, which confirmed the presence of a multiloculate lesion, with a diameter of about $8.8 \times 6.6$ cm (Fig. 1a). A spiral CT-scan with contrast confirmed the presence of an aberrant arterial branch of the distal thoracic aorta connected to the LLL, suggesting intralobar pulmonary sequestration of the LLL. After antibiotic treatment the patient’s condition improved and the fever and expectoration subsided. A control chest X-ray evidenced a radiological improvement, with persistent opacity of the LLL. During the following months she was admitted to hospital on several occasions due to recurrent infection, and surgery was recommended.

Under general anaesthesia and double lumen intubation a left VATS approach using two ports was performed. Incision for a 10-mm camera and $30^\circ$ in seventh intercostal space (ICS) in the mid-axillary line and utility incision of about 4 cm in the fifth ICS at the anterior level with no rib spreading. The LLL was seen to be partly hepatised with adherences. After detachment using a harmonic scalpel, an aortic aberrant trunk of approximately 1 cm in diameter and dividing an endostapler (Video 1). Subsequently, a VATS left lower lobectomy was performed and a single chest tube was placed at the end of the procedure. The patient was discharged on the postoperative day (POD) 2, with no complications in the chest X-ray. The pathology examination confirmed the presence of an intralobar pulmonary sequestration with infection by aspergillus, for which postoperative outpatient treatment was started with antifungal aerosols.

The second case was that of a 41-year-old female patient with no relevant clinical history, except for a diagnosis of biv able aorta. She had suffered recurrent infections, and consequently, following imaging studies, a multicystic lesion was detected in the LLL, with an afferent artery at the level of the distal descending aorta (Fig. 1b). Surgery was proposed and a VATS left lower lobectomy was performed via three ports (same approach as in the first case adding a subscapular incision due to strong adhesions). The anomalous arterial branch was divided again with an
Fig. 1. CT-scan showing the intralobar sequestration in the left lower lobe with an anomalous aortic branch in case 1 (a) and case (b). CT, computed tomography.

endostapler. A single chest tube was placed at the end of the procedure (Fig. 2b), and the patient was discharged on the POD 2 with no complications in the X-chest ray and excellent functional recovery.

The pathology examination revealed the presence of intralobar pulmonary sequestration with bronchiectasis, fibrosis and chronic inflammatory infiltration.

3. Discussion

Pulmonary sequestration is a malformation consisting of abnormal lung tissue which is not connected to the tracheobronchial tree and is irrigated by an abnormal systemic artery. There are two types: intralobar (75%) and extralobar (25%).

Intralobar sequestrations are irrigated by a large systemic artery. Venous drainage is towards the left atrium, through the pulmonary veins. It usually occurs mainly in childhood, and its origin is not clear (congenital or acquired) [1].

It is more commonly observed in the left lung, mainly in the lower lobes. Most patients have recurrent infections and inflammatory conditions in the affected lobe. The blood flow of the affected lobe may come from one or several systemic arteries that usually arise in the thoracic aorta. A spiral CT with contrast angiography and magnetic resonance imaging (MRI) are the diagnostic techniques of choice [2].

Video 1. Dissection of an aberrant aortic branch.
Few clinical cases have been published that relate pulmonary sequestration to colonisation or infection by aspergillus [3]. Fungal overinfection is very rare and usually detected during the pathology examination. Although reports of spontaneous involution of pulmonary sequestration [4] and conservative treatment with arterial embolisation have been published, the treatment of this condition is always surgical, even in asymptomatic patients. Preparative preparation must be focused on controlling the infection through antibiotic therapy and respiratory physiotherapy. Currently, VATS has been shown to be a safe and feasible surgical procedure in experienced hands. When performed with no rib spreading has been shown to involve a shorter hospital stay and less acute postoperative pain [5].

The treatment consists of identifying and division of the aberrant feeding vessel and usually the lobectomy of the affected lobe. However, some authors describe VATS sublobar and wedge resections when possible [6, 7]. The aberrant systemic artery can be freed and dissected safely with VATS approach despite the frequently occurring inflammatory changes.

After division of the anomalous artery, the lower pulmonary vein must to be dissected but care should be made to ensure that a superior pulmonary vein exists, and there is not a common pulmonary vein. Most of the authors describe a VATS approach via three to four incisions. The operation may be successfully carried out using only two incisions. In our department, we use the double port technique described by Damico for most of the lobectomies [8].

There are few reports of VATS approach for pulmonary sequestration. Kestenholz et al. reported on an analysis of 14 thoracoscopically treated pulmonary sequestrations in a single institution with good postoperative results [9].

Lagausie et al. recommend embolization of the feeding artery prior to surgery to reduce some of the danger of thoracoscopic dissection. They reported eight paediatric cases attempted thoracoscopically with conversion rate of 25% [10].

We consider a limitation of this approach the lack of experience in VATS major pulmonary resections. Bleeding during thoracoscopic dissection of the feeding artery could be dramatic specially if arterial retraction below the diaphragm is produced. In the same way, we recommend converting to an open thoracotomy in the case of severe adherences in centres with reduced experience in VATS.

References