Negative results - Thoracic non-oncologic

Pulmonary hernia secondary to limited access for mitral valve surgery and repaired by video thoracoscopic surgery

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Abstract

Iatrogenic pulmonary hernia is a rare condition. Repair is performed due to persistent symptoms and it is usually carried out by open surgery. We report a case of a 59-year-old woman who developed a lung hernia after small anterior thoracotomy that was performed for mitral valve surgery. The herniated lung is reduced with success by video thoracoscopic surgery and the chest wall defect is repaired by a polypropylene mesh fitted to the thoracic wall. At six-month follow-up, she was asymptomatic and without recurrence of hernia. Our experience suggests that video thoracoscopic surgery is a feasible surgical technique even for lung hernia secondary to mini-thoracotomy. However, before performing video thoracoscopic surgery, several factors preclusive to using this strategy must be considered, including the extensiveness of pleural adhesions due to the time interval between the previous operation and lung hernia, the site and the size of the hernia, and the insufficient experience in video thoracoscopic surgery.

Keywords: Lung; Hernia; Cardiac surgery

1. Introduction

Maxwell Chamberlain wrote about pulmonary hernia in the 1960s when he first reported the Chamberlain Procedure [1]. He initially made a vertical incision excising both the second and third cartilages and reported a lung hernia in about 15%. He then went to a transverse incision, recommended the excision of only one cartilage and emphasized the meticulous closure with interrupted non-absorbable sutures. Herein, we report a case of a patient that suffered a lung hernia following minimal invasive mitral valve surgery, and who subsequently went on to receive a thoracoscopic hernia repair with mesh implantation.

2. Summary case

In January 2008, a 59-year-old woman was admitted to our institution with a complaint of chest pain, dyspnea and a swelling appearing on coughing. Seven-months before, she underwent minimally invasive mitral valve surgery. A 6-cm skin incision was made in the right submammarian groove with the excision of the fourth costal cartilage to create a small antero-lateral ‘working port’ for mitral valve surgery; peripheral cannulation was used for cardiopulmonary bypass. Five weeks later, she noted the bulge at the third intercostal space. On physical examination, an ill-defined, smooth, soft mass was individuated anteriorly in the fourth intercostal space of right hemithorax, which had a positive cough impulse and spontaneous reduction (Video 1). On auscultation, breath sounds clearly could be heard on the mass. Laboratory exams were normal. On chest X-ray, the lung tissue was seen protruding through the rib cage on coughing. Chest tomography (CT) confirmed lung hernia and defined the extension (Fig. 1). Operative repair of the hernia was performed by video thoracoscopic surgery (VTS) (Video 2). The patient was intubated using the Carlen orotracheal tube for selective ventilation and placed in the left lateral position. After release of the adhesions, the identification of the ‘hernial sac’ and chest wall defect, measuring 5.5×7 cm, were confirmed (Fig. 2a). The herniated lung was freed from adhesions and reduced into the thoracic cavity. Finally, to prevent a possible recurrence of the lung herniation, we completely covered the defect with a polypropylene (Marlex [Davol, Cranston, RI]) mesh fitted to the thoracic wall (Fig. 2b). The postoperative course was uneventful. The patient was discharged on the fifth postoperative day. At six-month follow-up, she was asymptomatic and without recurrence of hernia.

3. Discussion

Lung hernia is an uncommon condition, and iatrogenic pulmonary hernia secondary to mini-thoracotomy is even rarer [2]. In theory, minimally access surgical techniques should decrease the likelihood of herniation, in comparison with open thoracotomy. However, postoperative intercostal...
Video 1. On physical examination, an ill-defined, smooth, soft mass was indi-
viduated anteriorly in the third intercostal space of right hemithorax, which
had a positive cough impulse and spontaneous reduction.

Fig. 1. Chest tomography shows a right-sided intercostal lung hernia and
defined the extension.

Video 2. Shows operative repair of hernia performed by video thoracoscopic
surgery.

Fig. 2. During dissection of the ‘hernial sac’, the chest wall defect is con-
firmed (part a). After the reduction of the herniated lung into thoracic cav-
ity, the intercostal defect is completely covered by a patch of Marlex mesh
fitted to the thoracic wall (part b).

hernias are reported more commonly after less extensive surgical procedures than after major thoracic interventions. This is may be due to a less meticulous closure of the ‘mini’ incisions as opposed to routine thoracotomy closure [3]. As minimal invasive cardiothoracic procedure evolves, different complications such as lung hernia may be more evident. Symptoms of lung hernia are infrequent, and clinical examination shows a compressible and well demar-
cated mass; diagnosis is confirmed by radiologic evaluation. Surgical treatment is generally proposed for symptomatic hernias [1]. Although thoracoscopic repair of a traumatic

[4] and spontaneous hernia [5] are mentioned in the liter-
ature, to our knowledge VTS repair of lung hernia after minimally cardiac surgery has not yet been reported. We
describe a case report of a patient that suffers a lung hernia following minimal invasive mitral valve surgery, and who subsequently goes on to receive a thoracoscopic hernia repair with mesh implantation. The causes of herniation in
our patient appear to have been the result of the excision of the fourth costal cartilage, and the non-satisfactory
closure of the mini-thoracotomy. The hernia is symptomatic and the patient is afraid of the risk of complications associated with lung incarcerration. Consequently, surgical repair of hernia is selective. However, contrary to Athan-
asiaidi et al. [6] who find no indication of VTS repair in cases of reoperation, we prefer VTS to thoracotomy approach for several reasons. First, the short time interval between the cartilage-rib excision and lung hernia avoids
tenacious pleural adhesion formation which may preclude the use of VTS. Second, the anatomical site and the size of the hernia, as confirmed by CT-scan, suggest the feasibility of VTS procedure. Third, VTS affords better cosmetic results than thoracotomy and respects the less invasive
spirit which has inspired the initial valvular procedure. In our patient, this is of considerable concern. During VTS operation, identification of the ‘hernial sac’ and defect is essential so that the lung can be freed from adhesions and reduced into the thoracic cavity [7]. For attempting this procedure, we utilize an electrothermal bipolar tissue sealing system (LigaSure, Valleylab Inc, USA) that easily permits the release of the adhesions without bleeding [8]. Consequently, the herniated lung is reduced with a bimanual push pull technique as proposed by Reardon et al. [4].

While the assistant applied gentle external pressure over the bulging area, traction is applied on the herniated lung tissue with an atraumatic grasper. However, in contrast to Reardon et al. [4] who close the intercostal defect with approximating sutures, we cover the defect by a patch of Marlex mesh that is tacked to the thoracic wall using ProTack® 5-millimeters (Autosuture™) designed for laparoscopic inguinal hernia repair. Consistent with McCormack [9], we believe that any defect >5 cm and localised anteriorly should be reconstructed to prevent future lung herniation. Our experience suggests that VTS is a feasible surgical technique even for lung hernia secondary to mini-thoracotomy. However, several factors must be considered before performing VTS, including the extensiveness of pleural adhesions resulting from the time interval between the previous operation and lung hernia, the site and the size of the hernia, and sufficiency of one’s knowledge of and experience with VTS procedure. In conclusion, although appropriate surgical intervention of lung hernia is usually curative, prevention is still the best method in order to avoid a lung hernia. If the removal of costal cartilage becomes necessary for better exposure in minimally invasive cardiac procedure, as in our case, lung herniation may be a real problem, especially in a patient with chronic obstructive pulmonary disease [10]. In such cases it would be prudent to perform primary reconstruction to prevent future lung herniation. The authors suggest that the anterior thoracotomy wound closure should include separate layer closures for the muscles and additionally deep dermal and subcuticular layers with running absorbable sutures with respect to every tissue. In addition, it is important to limit the patient’s activity during the period of chest wall healing, regardless of the length of the skin incision.

References