Traumatic false aneurysms of the left ventricle after an attempt at video-thoracoscopic surgery†

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Abstract

OBJECTIVES: Video-thoracoscopic surgery (VTS) has been accepted as a safe and credible technique since 1990. Lung injury is one of the main perioperative complications. Few data are available about cardiac trauma and VTS-related false aneurysm of the left ventricular (LV) wall has not yet been reported.

METHODS: A 62-year old woman presented with a left thoracic empyema. Video-thoracoscopy was attempted for bacterial sampling and surgical drain of the pleura. A rapid conversion to open thoracotomy was necessary to control massive bleeding after the first thoracic port intrusion. An apical systolic murmur was found 2 weeks later during a systematic clinical examination. The patient was asymptomatic and had no personal history of cardiac disease.

RESULTS: Colour Doppler imaging showed two spurious aneurysms on the LV wall without any haemopericardium. Pericardial enhancement around the left ventricle was observed on the chest computerized tomography scan with the injection of contrast. After the careful excision of the two false aneurysms, a surgical repair was strengthened with a suture under a cardiopulmonary bypass. The postoperative course was uneventful and the patient was safe at 3 years.

CONCLUSIONS: This is the first report of LV traumatic false aneurysms secondary to an attempt of a video-thoracoscopic procedure. This is a rare but life-threatening complication because of the risk of spontaneous rupture. Left persistent thoracic empyemas associated with the ipsilateral mediastinum deviation carry a high risk of myocardial damage related to the trocar port intrusion.

Keywords: Thoracic empyema • Minimally invasive thoracic surgery • Complication

INTRODUCTION

Major technological improvements associated with surgeons’ growing experience has led to the worldwide use of video-thoracoscopic surgery (VTS) since 1990. It has been accepted as a safe and credible technique for diagnosis and treatment of thoracic diseases. VTS is associated with reduced postoperative pain and short hospital stay mean duration with early return to full activities [1]. Three different stages of thoracic empyema (TE) are described from the early exsudative state to the fibrinopurulent stage and finally the chronic organizational phase. There is no consensus regarding the surgical treatment of TE. Maladjusted antibiotic therapy associated with immunodeficient conditions puts patients at risk for the development of therapy-resistant TE. Chronic empyema is associated with significant morbidity if managed through VTS [2]. Herein, we report a remarkable case of traumatic left ventricular (LV) false aneurysms secondary to an attempt of VTS for TE management.

A 62-year old woman presented with a recurrence of left suppurative pleurisy. It was the third episode despite adapted antibiotic treatment. Bacterial analysis of the liquid revealed a penicillin-sensitive Streptococcus pneumoniae empyema. A chest computerized tomography (CCT) scan showed a left pleural residual collection with a lower lobe atelectasis (Fig. 1). Medical treatment failed despite 15 days of intravenous penicillin therapy associated with chest tube drain. A VTS procedure was decided upon to perform new bacterial sampling and surgical drain. The first VTS port was difficult to create using a plastic trocar because of thickening of the pleura. Three attempts were necessary to finally introduce the VTS port device through the fifth left anterior intercostal space. A massive bleeding from the lung occurred after the VTS port intrusion into the left thoracic cavity. A left open thoracotomy was performed to control bleeding. A deep injury of the left upper lobe was found on opening up the pleural cavity. It sat just under the anterior VTS port. There were tight adhesions between the lung and a thickened parietal pleura. A collected empyema was located in the left posterior pleural space. The VTS procedure was definitively

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stopped. No other cause of bleeding was found within the left thoracic cavity, mainly from the mediastinal great arteries. A wedge resection of the left upper lobe resulted in efficient lung haemostasis after a total bleeding of 800 ml. No cardiac injury was observed and the pericardium was closely preserved. It was not opened to investigate the heart because there was no evidence of recent damage within the anterior mediastinum. Haemodynamic conditions were stable after surgical haemostasis of the left upper lobe, suggesting the absence of other intrathoracic bleeding. The end of the intervention was exclusively performed via the open thoracotomy approach to obtain bacterial samples. A chest tube drain was also safely introduced under open-chest control. The postoperative course was initially uneventful and the patient was discharged 1 week later with a long-lasting antibiotic therapy.

RESULTS

A systolic heart murmur was found 2 weeks later while the patient was asymptomatic. Electrocardiography showed normal sinus rhythm without ST-segment elevation. Two-dimensional echocardiography showed two echo-free spaces within the pericardium, one above the LV apex and the other on the LV free wall. LV ejection fraction was up to 55%. Colour Doppler imaging revealed persistent flow into these juxta-myocardial lesions, without associated pericardial effusion (Fig. 2). Haemodynamic parameters were favourable and the patient was referred to a cardiac surgery centre. A multi-slice CCT scan found a protrusion of contrast solution within the two LV false aneurysms. An organized empyema was found persistent in the left pleural cavity (Fig. 3).

The surgical correction of cardiac injuries was performed under the cardiopulmonary bypass. After midline sternotomy, we found a very adherent pericardium to the heart without any haemopericardium. Following aortic cross-clamping, cardiac arrest was induced by cold cardioplegia infusion. Massive adhesions developed between the LV, anterior chest wall and left lung. Surgical repair was strengthened with a suture after the careful excision of the false aneurysms. There was no need for ventricular remodelling because the proper LV shape was preserved after those direct Teflon-armed sutures. The aorta was clamped for 72 min and the patient was completely weaned of the cardiopulmonary bypass after a total extra-corporeal support time of 123 min. Microbial definitive analysis of both myocardial and pericardial samples was negative.

The postoperative course was uneventful. The Doppler echocardiographic control showed moderate hypokinesia of the LV wall without any pericardial effusion. The patient was healthy without any recurrence after 3 years of follow-up.

DISCUSSION

Since 1990 VTS has been accepted as a safe technique. Inderbitzi and Grillet [3] reported 3.6% of complications and 0.3% of mortality associated with the worldwide initial experience, no matter the underlying treated disease. The traumatic false aneurysm of the LV wall is an unusual complication after thoracic surgery and to our knowledge, this has never been reported after a VTS procedure. TE remains associated with significant morbidity and mortality despite optimal management
According to current guidelines [4]. Among VTS-related complications during TE management, conversion to open decortication is more frequent at advanced stages of the disease [2]. Massive bleeding related to lung injury occurred in our case at the beginning of the VTS procedure. The first thoracoport intrusion was traumatic because of adhesions between the visceral pleura and the chest wall.

Aneurysms of the LV wall are commonly related to extensive myocardial infarction. No evidence of coronary artery disease was found in our patient’s clinical history. The probability that a post-myocardial infarction scarring resulted in the development of LV wall pseudoaneurysms is minimal. An infectious origin of the LV pseudoaneurysm is unusual and has been reported by Chen et al. [5] secondary to purulent pericarditis. All surgical samples of the myocardial lesions were culture negative in our case. An infective aetiology for LV false aneurysms was then excluded. A traumatic origin was found to be the most likely explanation. Left collected pleural effusion resulted in a left deviation of the mediastinum. The heart was abnormally located in the left thoracic cavity as shown on the pre-VTS CCT scan (Fig. 1). The bleeding injury, found only on opening up the thoracotomy, was a deep wound of the left upper lobe. As it was difficult to cross the thickened pleura with the plastic trocar port, we supposed that a blunt cardiac trauma happened at that time. This resulted in occurrence of delayed LV false aneurysms. Recently, Kaplan et al. [6] reported a true LV aneurysm after blunt chest trauma. Penetrating injury of the heart was observed on opening up the thoracotomy in our case. A LV myocardial contusion after the anterior VTS port intrusion was initially asymptomatic but probably responsible for the development of the false aneurysms [7]. This cardiac contusion cannot be directly related to the VTS procedure but rather results from the traumatic port intrusion. The LV was actually very close to the chest wall as previously described on the preoperative CCT scan (Fig. 1).

Empyema of the pleura is one of the earliest thoracic diseases. This case highlights evidence for the involvement of thoracic surgeons in the early management of suppurative TE, before the organized state of the disease. In case of persistent TE, patients have to be carefully selected to benefit from the VTS because of a higher risk of induced morbidity. Even though optimal timing for surgical treatment has still to be defined for TE, there is evidence that most clinically relevant incidents may be avoidable if surgeons consider the preoperative mediastinum location and pleural thickness [3]. Pleural symphysis is well recognized as an absolute contraindication for the VTS procedure, but not TE. However, surgeons should take into account the usual adhesions between the pleura and the chest wall related to TE. The first VTS port device can be introduced through a short open thoracotomy in order to prevent lung injury if important pleural adhesions are expected.

In conclusion, in this case we report for the first time ever the occurrence of traumatic LV false aneurysms after minimally invasive thoracic surgery. Left persistent primary empyema and the thickening of the pleura associated with left deviation of the heart resulted in a complicated VTS port creation with massive haemorrhage and myocardial contusion. This life-threatening complication should be avoided, taking carefully into account the practical guidelines for VTS and preoperative location of the mediastinum.

Conflict of interest: none declared.

REFERENCES