Case report - Thoracic general

Contralateral spontaneous pneumothorax after pneumonectomy: thoracoscopic management with cardiopulmonary bypass

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Received 22 June 2004; accepted 6 September 2004

Abstract

Spontaneous contralateral pneumothorax after pneumonectomy is a rare condition. Management can be quite challenging, as surgical intervention other than tube thoracostomy poses significant risks. We report a case of spontaneous pneumothorax that did not resolve with conventional management, necessitating thoracoscopic bleb resection with the use of cardiopulmonary bypass.

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Keywords: Minimally invasive surgery; Pleura; Lung-other

1. Introduction

Spontaneous contralateral pneumothorax after pneumonectomy is a rare condition. Management can be quite challenging, as surgical intervention, other than tube thoracostomy, can be quite complicated and poses significant risks. We report a case of spontaneous pneumothorax that did not resolve with conventional management, necessitating thoracoscopic bleb resection with the use of cardiopulmonary bypass.

A 63-year-old African American male underwent a right pneumonectomy in January of 2003 for a hilar stage II (T2N1) adenocarcinoma of the lung. He received adjuvant chemoradiation therapy and recovered well. Seven months postoperatively, he presented to the emergency department with new-onset dyspnea and was diagnosed with a left pneumothorax (PTX) (Fig. 1). A thoracostomy tube was inserted but failed to completely resolve the pneumothorax and he remained with a persistent air leak. A second chest tube was inserted, following a chest CT scan that showed residual PTX and significant apical bullous disease. Both tubes were maintained on -20 cm water suction, as attempts to decrease the suction resulted in significant worsening of symptoms.

An operative intervention was considered. Due to the presence of significant emphysematous changes, it was felt that a simple surgical approach (thoracotomy with intermittent apnea) might not be adequate, as prolonged periods of apnea would be required to deflate the lung. Additionally, a minimally invasive approach would be desirable, so as to minimize postoperative pain and facilitate recovery. We therefore opted for a thoracoscopic approach (VATS) with the use of cardiopulmonary bypass.

The patient was placed under general endotracheal anesthesia with a single lumen endotracheal tube. The left common femoral artery and vein were exposed through a groin incision and cannulated in the standard fashion. The patient was placed in the lateral decubitus position and standard 3-port thoracoscopy was performed. Femoro-femoral cardiopulmonary bypass was then instituted and ventilation was arrested. A wedge excision of an upper lobe bleb was performed with the use of endoscopic linear staplers. Mechanical pleural abrasion completed the procedure. Meticulous hemostasis was obtained. Three chest tubes were used through the operative ports.
The patient was then awakened and extubated in the operating room. His chest tubes were placed on water seal within the first 4 days and were subsequently removed without development of new PTX. His postoperative course was characterized by development of pneumonia, requiring reintubation on the 5th postoperative day; he underwent a tracheostomy on the 18th postoperative day. He was eventually weaned from the ventilator and discharged from the hospital.

2. Discussion

Contralateral pneumothorax after pneumonectomy is a rare but potentially fatal complication [1]. Few isolated case reports exist in the literature [2,3] with most events occurring in the early postoperative period, so experience with management of this condition is limited. Traditional thinking would dictate that definitive treatment should be attempted, since recurrence may have grave consequences for the patient. However, surgery for pleurodesis and/or bleb resection in a patient with pneumonectomy is quite complicated and dangerous. In the reported cases, the most common management option was insertion of a thoracostomy tube, followed by surgery in two cases, secondary to persistent air leak.

The indications and techniques of surgical management of spontaneous pneumothorax continue to evolve. Thoracoscopic procedures, with wedge resections and or pleurodesis, are now most frequently used for surgical treatment of this entity [4]. In addition, several authors have reported on the operative techniques for lung resections following pneumonectomy [5–10]. Most of these operations were performed for lung cancer. Different approaches were used in this challenging group of patients, including standard posterolateral thoracotomy, median sternotomy and VATS; these were combined with intermittent apnea [5], selective lobar isolation [6], high-frequency jet ventilation [10] and extracorporeal oxygenation [7,9]. Patients with spontaneous pneumothorax may not be suitable candidates for some of these approaches. Intermittent apnea, for instance, may not work well with severely emphysematous lungs, such as in our patient. This is particularly important when thoracoscopic approaches are contemplated. Indeed, in one of the reported cases, conversion to thoracotomy was necessary, as inadequate lung deflation during the brief periods of apnea limited visualization.

In our patient, the limited respiratory reserve, the persistent air leak and the inability to tolerate water seal and potentially a Heimlich valve, necessitated surgical intervention, even though the previous pneumonectomy significantly increased the operative risk. Due to the presence of substantial bullous disease, we anticipated that the traditional approach (use of intermittent apnea) would not allow for adequate lung deflation and completion of the procedure. We elected, therefore, to proceed with the use of cardiopulmonary bypass. The operation was completed successfully; no bleeding or access complication occurred. The postoperative course was marked by the development of pneumonia and respiratory failure, reflecting one of the major risks of further pulmonary resection—with any approach—in pneumonectomy patients.

In summary, contralateral spontaneous pneumothorax after pneumonectomy is, fortunately, a rare condition. No specific management guidelines exist, as reported experience is very limited. Conservative management with tube thoracostomy is a sensible initial approach, but persistent air leak may necessitate surgical intervention. Thoracoscopic surgery with bleb resection and/or pleurodesis can be performed with the use of cardiopulmonary bypass. Careful patient selection and consideration of all available approaches are essential prior to operating in this challenging group of patients.

References


Appendix A. ICVTS on-line discussion

Author: Mohamed F. Ismail (Mansoura University, Egypt)

eComment: I read with interest the article and I am astonished by your effort with this poor patient. However, I do have some comments.

The article title, "Contralateral spontaneous pneumothorax after pneumonectomy: thoracoscopic management with cardiopulmonary bypass" is a point of discussion.

I do not agree with the fact that "contralateral" should be added in the title. If pneumothorax occurs after a pneumonectomy it is absolutely clear that it could only be contralateral [1]. In fact these words were taken from the authors but I want to reach for a unique definition of that case. I also would like to discuss some other points about the indications of inserting another tube and why you didn’t proceed to surgical intervention directly after delayed expansion of the lung.

My last comment is about the large number of three postoperative tubes.

Reference

Author: Sameh Sersar (Mansoura University, Egypt)

eComment: The authors supported my opinion published in ICVTS [1] as a comment on the paper cited in their article by A. Caesario 2003 [2]. My opinion was that the title (Persistent late post-pneumonectomy spontaneous pneumothorax: a challenging case) is not indicative enough: it would be more indicative if contralateral was added before spontaneous pneumothorax making “Contralateral persistent late post-pneumonectomy spontaneous pneumothorax: a challenging case”. Cesario A. et al. replied that they do not agree with the fact that “contralateral” should be added in the title. If pneumothorax occurs after a pneumonectomy it is absolutely clear that it could only be contralateral. The title of Birdas et al. [3] is “Contralateral spontaneous pneumothorax after pneumonectomy: thoracoscopic management with cardiopulmonary bypass and VATS.”

References


Author: Biruta Witte (Katholische Klinikum, Germany)

eComment: I’d like to ask the authors whether it is possible to clearly outline the indications for extracorporal circulation. Our institutional experience with post pneumonectomy thoracic surgery is very limited, but a VATS debridement for empyema and an open segmentectomy for a second bronchial carcinoma have been carried out with “single lung ventilation”. That was not too comfortable for the surgeon and the anesthesiologist, but safe for the patients.