

Bilateral Lung Transplant for Bronchiectasis in Asymmetric Thorax: A Case Report

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Abstract

Patients with suppurative lung diseases such as bronchiectasis and cystic fibrosis can be treated surgically, which leads to an asymmetric thorax, making lung transplant difficult in a volume-reduced hemithorax. We report a 52-year-old man with bronchiectasis and ventilation, dependent on a severe asymmetric thorax, who underwent bilateral lung transplant without cardiopulmonary bypass or extracorporeal membrane oxygenation support. This report suggests that bilateral lung transplant might be an efficient therapeutic option for such patients.

Lung transplant is generally accepted as an effective way to deal with end-stage pulmonary diseases. Particularly, in patients with bronchiectasis or cystic fibrosis, single lung transplant may lead to infectious complications more easily. Thus, bilateral lung transplant is a better choice for such patients. However, some patients with bronchiectasis may have a history of surgical resection of target areas, which leads to an asymmetric thorax and makes lung transplant more difficult. We described 1 case of bilateral lung transplant for bronchiectasis in asymmetric thorax.

Key words: Lung transplant, Chest wall, Lung volume reduction, Bronchiectasis, Cystic Fibrosis

Case Report

A 52-year-old man was diagnosed with left lung diffuse bronchiectasis and right lung bronchiectasis

and emphysema. He had a history of sulphuric acid aspiration 32 years prior, and from then on, his pulmonary function deteriorated gradually. He was known to be colonized with multidrug-resistant *Pseudomonas aeruginosa*, which was routinely cultured from sputum. With progressive loss of pulmonary function and eventual need for noninvasive ventilation dependent for 14 months, this patient finally underwent a tracheotomy for mechanical support for 5 months preoperatively. Thoracic chest radiograph and computed tomography showed diffuse bronchiectasis prevailing in the left chest and severe bullous emphysema in the right chest. A severe asymmetric thorax with the mediastinum greatly shifted to the left also was shown (Figure 1). We obtained permission from the local ethics committee and the consent of the patient for double-lung transplant. All protocols conformed to the ethical guidelines of the 1975 Helsinki Declaration.

The patient underwent bilateral lung transplant 1 month after being included on the waiting list. The organ obtained by distal procurement from a 23-year-old man (172 cm height, 60 kg weight) was perfused with raffinose-low potassium dextran, and transported on ice. Access to the patient was gained via a bilateral anterolateral thoracotomy in the fifth intercostal space without transsternal incision (Figure 2-A). For the purpose of a satisfactory field of vision for this incision, we made the operating table a 30-degree obliquity along the long axis. There were firm pleuropulmonary adhesions to the left, which were difficult to dissect.

Despite technical difficulties, total pneumonectomy was completed, and the ischemia time for the first organ was 4.5 hours. Then, we made it remaining partially outside the pleural cavity during implantation of the second organ owing to the disproportion of the left cavity and the implanted

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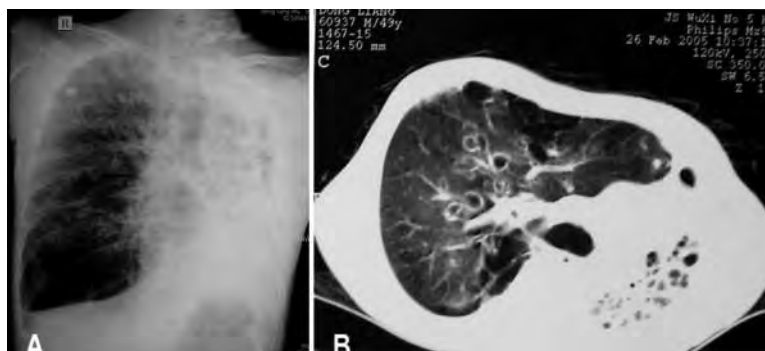


Figure 1. Chest radiograph (A) and CT (B) show left lung diffuse bronchiectasis and right lung bronchiectasis and emphysema with asymmetric thorax.

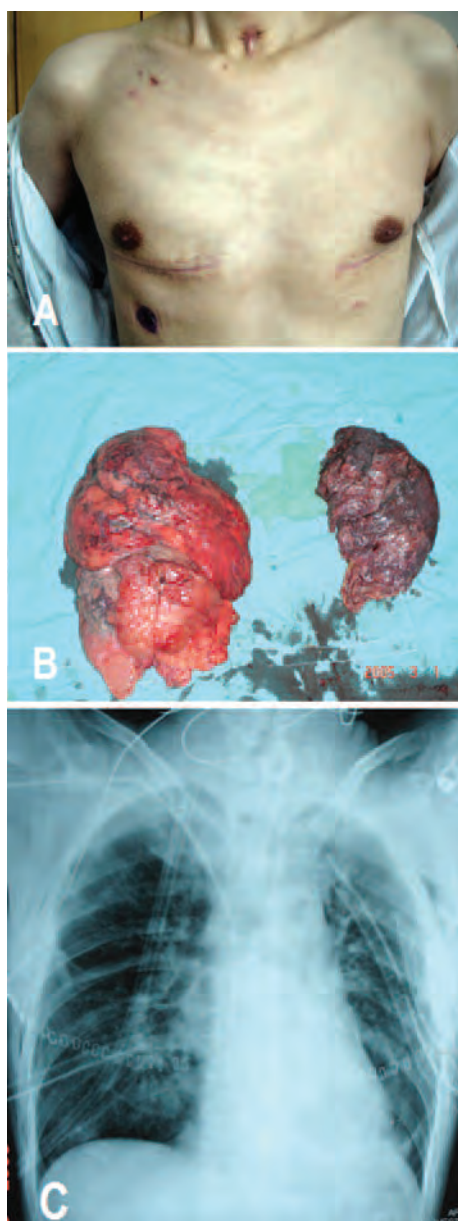


Figure 2. (A) Our access of procedure: bilateral anterolateral thoracotomy in the fifth intercostal space without transsternal incision. (B) Bilateral lungs exsected ex vivo. Left lung is obviously smaller than right one. (C) Chest radiograph after bilateral lung transplant shows no I/R injury.

lung. Smoothly, we performed the second one with an ischemia time of 6.5 hours. At the end of the procedure, a left lower lobectomy was performed to adjust the rest of the lobe to the smaller pleural cavity (Figure 2-B). Because of hemodynamic stability, cardiopulmonary bypass or extracorporeal membrane oxygenation was not required. Chest radiograph after bilateral lung transplant showed satisfactory without I/R injury (Figure 2-C). Mechanical ventilation time was 6 days, and the patient was discharged from the hospital on the 44th postoperative day. After transplant, he returned to normal life for 5 years.

Comment

According to the data of the International Society for Heart and Lung Transplantation (ISHLT), bronchiectasis is the sixth indication for lung transplant and during the period from January 1995 to June 2008, six hundred thirty-six lung transplants (2.7% of total, involving 40 single lung transplants and 596 bilateral lung transplants) were performed worldwide.¹ In our center, from September 2002 to September 2009, 81 lung transplants were performed, and 5 patients with bronchiectasis underwent bilateral lung transplant. As bronchiectasis could be treated by lung resection, some candidates might have undergone thoracic surgeries and pleurodesis, which made the native lung more difficult to explant and increased the risk of bleeding, particularly when extracorporeal circulatory assistance is required.²

Although both single lung transplant and bilateral lung transplant may be chosen for suppurative lung diseases (such as cystic fibrosis or bronchiectasis), single lung transplant would more easily lead to infectious complications or to development of contralateral empyema after

simultaneous pneumonectomy; therefore, single lung transplant for patients with cystic fibrosis or bronchiectasis remains controversial.³ Owing to the technical difficulty in lung extraction and implantation associated with the increased risk of bleeding, single lung transplant and contralateral pneumonectomy have been the choices in some cases. In 1994, Forty and associates⁴ reported a single lung transplant with simultaneous contralateral pneumonectomy for a 24-year-old man with cystic fibrosis. This patient had skeletal asymmetry, and volume of the left hemithorax was significantly reduced. Despite preoperative pulmonary infection, he had a satisfactory long-term survival for 5 years. Experience of synchronous single lung transplant and contralateral pneumonectomy in cases of asymmetric thorax also were reported by other lung transplant groups.⁵⁻⁶ Samano and associates⁷ reported 2 cases of bilateral lung transplant for bronchiectasis in asymmetric thorax, and they applied lobectomy to adjust the graft to the volume-reduced hemithorax instead of pneumonectomy, and both lived well. The access was a bilateral anterolateral transsternal thoracotomy (clamshell type) in the fourth intercostal space, and 1 required extracorporeal circulatory assistance but the other did not.

We performed similar procedures but made the access a bilateral anterolateral thoracotomy in the fifth intercostal space without transsternal incision. Because of hemodynamic stability, extracorporeal circulatory assistance (such as cardiopulmonary bypass or extracorporeal membrane oxygenation) was not required, which may decrease the incidence of complications of extracorporeal circulatory assistance. Only when there is significant

hemodynamic instability, extracorporeal circulatory assistance is needed, usually in cases with associated pulmonary hypertension. Our experience in the use of extracorporeal circulatory assistance is similar to Samano's.⁷

The disproportion between the implanted lungs and the pleural cavities is usually corrected with lung resection by using linear-cutting mechanical stapling devices. However, in these situations, reduction of lung volume in the smaller cavity can be safely performed through lobectomy. Besides, sternal injury associated complications can be avoided through a bilateral anterolateral thoracotomy without transsternal incision. In conclusion, this case illustrates that this is an efficient therapeutic option for such patients.

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