in diagnosing AE fistula, CT may reveal pneumomediastinum or air bubbles in the left atrium. Results of both studies were negative in our patient, and this was the first report that magnetic resonance imaging was required to discover an intracardiac mass in the left atrium or air bubbles in the left atrium. Results of both studies were negative in our patient, and this was the first report that magnetic resonance imaging was required to discover an intracardiac mass in the left atrium.

Esophagogastroduodenoscopy is rarely used to diagnose AE fistula given the risk of iatrogenic esophageal perforation with endoscope manipulation but was performed in this patient because of the clinical suspicion of the fistula, despite negative findings on echocardiography and CT. This unusual presentation of AE fistula was likely responsible for the initial transient ischemic attack and persistent symptoms of infection in our patient. Indeed, resection of the mass exposed the underlying atrial wall abscess, but the fistula had actually healed before the operation. The healed fistula communication between the left atrium and esophagus likely explains the delayed clinical presentation of AE fistula in this patient. Extracardiac and intracardiac repairs of AE fistula have both been reported, with mortality exceeding 50% [2–4]. The intermittent antibiotic use and continuous anticoagulation likely protected the patient and allowed the fistula to heal, with a satisfactory surgical outcome.

References

Aortic Valve Replacement for Critical Aortic Stenosis After Bilateral Lung Transplantation
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Four years after bilateral lung transplantation, a 62-year-old man with critical aortic stenosis required aortic valve replacement. This is the first report of aortic valve replacement after bilateral lung transplantation. Anesthetic and surgical management are described.


Since Cooper’s first report in 1983, 38,119 lung transplantations have been recorded [1]. Some of these patients require cardiac surgical interventions. Yet, minimal experience has been reported in the literature on open-heart procedures after lung transplantation [2–4].

A 62-year-old man had undergone bilateral lung transplantation elsewhere in 2008 for end-stage idiopathic pulmonary fibrosis, performed with cardiopulmonary bypass through a clamshell incision. Postoperative complications included loculated pleural effusions and hemothorax. Decortication was ultimately required. Two weeks later, the patient sustained a pulmonary embolism, treated medically. Long-term immunosuppression included tacrolimus, mycophenolate, and prednisone. Thirteen weeks after transplantation, during bronchoscopy, the patient experienced hypoxic respiratory failure, requiring transient intubation. The patient was later found to have a paralyzed right vocal cord. After medialization of the cord, the patient was discharged home using biphasic positive airway pressure. One year later, the patient sustained a rejection episode and multiorgan failure, requiring tracheostomy and long-term mechanical ventilation. He recovered from these events.

Four years later, the patient experienced progressive exertional dyspnea and decreased exercise tolerance. Comorbidities included chronic renal failure (creatinine 2.1 mg/dL), gastroesophageal reflux, hypertension,
hyperlipidemia, obstructive sleep apnea, supraventricular tachycardia, and unilateral iatrogenic diaphragm paralysis. Serial echocardiograms showed progressive calcific severe aortic stenosis with peak gradient 86 mm Hg (mean, 51 mm Hg) (Fig 1). Coronary angiography revealed no coronary artery disease. The patient declined transcatheter valve replacement.

Anesthetic Management
A Medline search showed no reports of aortic valve replacement (AVR) after lung transplantation to guide perioperative management. In the operating room, the patient’s baseline vital signs were blood pressure 161/113 beats/min, heart rate sinus at 75/min, and oxygen saturation (room air) 95%. After 5-minute preoxygenation, intravenous lidocaine (80 mg) was administered, and a rapid sequence induction was performed (etomidate 16 mg, succinylcholine 100 mg). By use of videolaryngoscopy, tracheal intubation was accomplished with an 8.0-mm tube. A pulmonary artery catheter showed pulmonary artery pressure 32/14 mm Hg and cardiac output 4.9 L/min.

Vancomycin 1 g, hydrocortisone 100 mg, and epsilon-aminocaproic acid 5 g were administered. The baseline arterial blood gas value was satisfactory (7.4/38/491/24/100%). Ventilation used the pressure control mode (peak pressure 30 cm H2O, tidal volume 6 to 7 mL/kg, positive end-expiratory pressure 5 cm H2O). Anesthesia was maintained with sevoflurane, oxygen, sufentanil, and cisatracurium. Transesophageal echocardiography showed the aortic valve to be heavily calcified and trileaflet, with peak gradient 80 mm Hg and aortic valve area 0.74 cm². Ejection fraction was 60%.

Operative Technique
Redo sternotomy was performed without incident. The tissues were extremely weak, reflecting the long-term immunosuppression. We anticipated, upon safe reentry, cannulating the ascending aorta; however, the pursestring sutures produced severe bleeding from even shallow needle bites. Accordingly, the femoral artery was used. Right atrial and right pulmonary venous cannulation were performed. The aorta was opened transversely near the root. The aortic valve was trileaflet, with heavy calcification extending into the annulus. The valve was excised, and a 21-mm bioprosthesis (Edwards Lifesciences, Irvine, CA) was seated with interrupted pledgeted sutures. The aorta was closed with reinforcing Teflon strips. The patient was weaned from bypass without difficulty (cross-clamp time 70 minutes, bypass time 91 minutes). At skin closure, the anesthesia team noticed on transesophageal echocardiogram a dissection flap confined to the descending aorta (Fig 2). A collaborative decision was made to treat the iatrogenic type B dissection expectantly, in the hope that reestablishing prograde flow and having a normal-sized descending aorta would discourage progression. We confirmed excellent femoral pulses. The patient’s condition was completely stable.

Postoperative Course
The patient’s postoperative recovery was uneventful, with extubation at 7 hours and good oxygenation. Computed tomography imaging and echocardiography performed before discharge showed absolutely no change in the dissection. On postoperative day 6 the patient was discharged home in good condition, receiving all his medications, including immunosuppressive therapy. Three weeks after AVR, magnetic resonance imaging of the chest to follow up on the type B dissection showed no change and no dilatation (Fig 3). The patient continues to be well 14 months postoperatively.

Comment
There is minimal reported experience (three cases) with open-heart operations in patients with single or bilateral lung transplantation (Table 1): a coronary artery bypass...
operation after single-lung transplantation and two mitral valve replacements for infective endocarditis after bilateral lung transplantation [2–4]. We found no reports of AVR after lung transplantation.

This case presented a daunting history, with extensive prior manipulation in the pericardial space at the time of the transplantation procedure and both infection and respiratory failure after lung transplantation, along with diaphragm paralysis from prior phrenic nerve injury. Additionally, there was concern, later confirmed surgically, that prolonged immunosuppressant therapy, including steroids, would significantly weaken the cardiac tissues. However, the degree of aortic stenosis was likely to be lethal if left untreated, so it was decided to proceed with the high-risk surgical intervention. Despite these multiple serious concerns, the patient did well, with a routine postoperative recovery.

The occurrence of intraoperative iatrogenic retrograde aortic dissection resulting from extreme aortic fragility deserves discussion. Femoral cannulation has been our method of choice for aneurysms and dissections [5]. In this case our patient experienced a type B dissection intraoperatively, which was most likely related to retrograde perfusion of the extremely fragile aorta. We chose to treat the type B dissection with our preferred “complication-specific approach,” according to which uncomplicated cases of descending aortic dissection can be treated medically by “antiimpulse therapy” (β blockade and afterload reduction) [6]. This approach proved successful, with no adverse aortic remodeling noted on follow-up imaging.

Anesthetic considerations included adrenal suppression, hypertension, renal insufficiency, and potential for infection [7]. Stress-dose steroids and strict aseptic technique were used. The chronic renal insufficiency indicated use of the neuromuscular blocker cisatracurium. Fluid administration was limited because of increased susceptibility to pulmonary edema from lymphatic disruption after lung transplantation [8]. Owing to reduced lung compliance after double lung transplantation, we avoided excessive lung volumes, which can cause barotraumas. As many as one third of posttransplantation patients experience gastric atony, increasing the risk of aspiration on induction [9]. Accordingly, endotracheal intubation was accomplished with a rapid sequence induction, for which etomidate was used because it minimizes cardiovascular depression, histamine release, and increase in pulmonary vascular resistance.

**Conclusion**

We present the first report (to our knowledge) of AVR after bilateral lung transplantation. The case illustrates perioperative surgical and anesthesia concerns and their management.

**Addendum**

During the publication process of this manuscript, we became aware of a manuscript published by Morsolini M, et al. (Aortic valve replacement performed twice through ministernotomy 15 years after lung transplantation. Ann Thorac Surg. 2013;95:328-30), which describes a similar procedure.

**References**

A giant left atrial appendage is a rare congenital anomaly that has been reported on only a few occasions. We report two symptomatic patients with atrial fibrillation combined with a cerebellar infarct in one and dyspnea in the other. Both patients were treated surgically with resection of the giant left atrial appendage and radiofrequency pulmonary vein isolation. Recognition of this uncommon pathology can lead to timely surgical intervention.


A giant left atrial appendage is a rare entity described only in case reports. Patients can be asymptomatic or exhibit supraventricular arrhythmias, systemic thromboembolism, cardiac dysfunction, or aspecific chest pain. Because of the risk of life-threatening complications, recognition of this pathology in an early stage is important and can lead to timely intervention.

Case Reports

Patient 1
A 39-year-old man with an unremarkable medical history was admitted to the hospital with an acute, extensive cerebellar infarction and palpitations owing to atrial fibrillation. The cerebellar infarction was treated immediately with thrombolysis. Hemorrhagic complications required two craniotomies, but only mild residual ataxia on the left side and atrial fibrillation persisted.

A chest radiograph showed a convex left upper cardiac figure. Both transthoracic (TTE) and transesophageal echocardiography (TEE) demonstrated a giant left atrial appendage (LAA), with spontaneous echo contrast and a slightly enlarged left atrium. No thrombi were seen. No other structural or functional abnormalities were observed. On computed tomographic (CT) and magnetic resonance imaging (MRI) the presence of a giant LAA was confirmed.

The patient was referred to our hospital for surgical treatment. He underwent a median sternotomy and bipolar radiofrequency bilateral pulmonary vein isolation. On extracorporeal circulation with cardioplegic arrest and normothermia, the giant LAA was excluded primarily by closure of the appendix with a Blalock suture (Fig 1). Macroscopically, a mass measuring 7 × 7; 2.5 cm was resected. Histologic analysis revealed left atrial appendage tissue with minor fibrosis. The postoperative course was uneventful, and the patient was discharged to his referring hospital 4 d after surgery. Four weeks later, he was still in sinus rhythm and showed good recovery.

Patient 2
A 69-year-old man with a history of a pericardial cyst was admitted to the hospital because of dyspnea, stage New York Heart Association Class II, and permanent atrial fibrillation. He was scheduled for percutaneous pulmonary vein isolation. By routine CT imaging and echocardiography a giant LAA was visualized (Fig 2A, 2B). Therefore, the plan for a percutaneous approach was abandoned, and a surgical resection performed.

The patient underwent surgical resection of the LAA and pulmonary vein isolation. A mass measuring 7 × 7; 5.5 × 7; 2.5 cm was removed, and the histologic analysis showed normal left atrial appendage tissue (Fig 3). The patient was discharged to the referring hospital 5 d after surgery. Despite numerous attempts to restore sinus rhythm by electrical cardioversion and amiodarone (Cordarone), the patient is still in atrial fibrillation.

Fig 1. Intraoperative view on the giant left atrial appendage of case 1. (LAA = left atrial appendage.)