

Successful Lung Transplantation from a Donor with Persistent Lobar Atelectasis

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ABSTRACT

Background: Over the past 15 years, the number of recipients waiting for a lung transplant has increased and now far exceeds the number of available donors. Liberalization of donor criteria to include the use of extended donors remains an attractive option for expanding the donor pool. Numerous centers, including the authors' own, have begun exploring this relatively unknown territory of lung transplantation.

Case Report: Successful bilateral lung transplantation was performed for a patient with emphysema utilizing lungs from a donor with persistent lobar atelectasis.

Conclusion: This report demonstrates that an acceptable outcome is possible from a donor with persistent lobar atelectasis if other parameters are acceptable. Larger studies would help further our understanding of the impact of donor radiographic abnormalities on outcomes following lung transplantation.

INTRODUCTION

Over the past 15 years, the number of recipients waiting for a lung transplant has increased and now far exceeds the number of available donors. The result is a doubling of the median wait time with an associated 20%-30% waitlist mortality.¹ Numerous strategies to expand the donor pool have recently

been advocated, including living-related lung donation, donation after cardiac death, and liberalization of donor criteria. Living-related lung donation and donation after cardiac death have been slow to develop because of technical and ethical issues. Liberalization of donor criteria to include the use of extended donors remains an attractive option for expanding the donor pool. Numerous centers, including the authors' own, have begun exploring this relatively unknown territory of lung transplantation.

CASE REPORT

A 56-year-old female patient with emphysema was listed for bilateral lung transplantation with a forced expiratory volume in 1 second of 0.42 L. An appropriately sized 39-year-old male donor became available after he suffered a blunt head injury from a 10-foot fall, necessitating a left craniotomy. Because of cerebral edema, the craniotomy was not closed, and the donor was maintained in a right lateral decubitus position for 72 hours prior to donation. The lung function was excellent; the peripheral arterial blood gas demonstrated a partial pressure of oxygen (P_{aO_2}) of 396 mmHg on an inspired oxygen fraction (F_iO_2) of 100%. Bronchoscopy demonstrated normal anatomy with minimal secretions. Serial chest radiographs demonstrated progressive development of a right lower lobe infiltrate suspicious for atelectasis (Figure 1). Physical inspection of the lung at the time of procurement showed severe right lower lobe atelectasis resistant to full expansion despite a 35-cm H₂O Valsalva maneuver.

Upon arrival at the hospital, the recipient developed respiratory distress requiring intubation. Because of the patient's deteriorating respiratory condition, we elected to proceed with lung transplantation. Bilateral sequential lung transplantation was performed via anteroaxillary thoracotomy without cardiopulmonary bypass. Our techniques for lung transplantation, donor procurement, and recipient immunosuppression have been described previously.² The ischemic times were 336 and 446 minutes for the right and left lungs, respectively. Postoperatively, the

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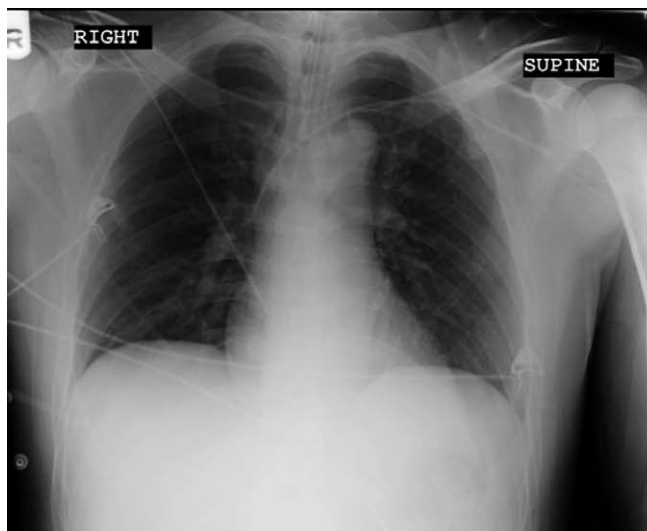
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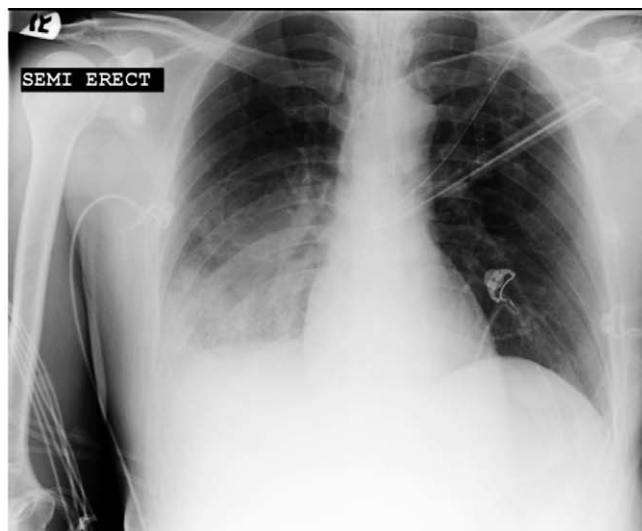
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A.



B.

Figure 1. Chest radiograph of the donor (A) at admission and (B) on the day of donation.

lung function was excellent with an oxygen saturation of 100% on an F_iO_2 of 30% and 10 cm H_2O of positive end-expiratory pressure.

The recipient's chest radiograph on postoperative day 1 is shown in Figure 2A. She was extubated on postoperative day 3 and transferred out of the intensive care unit the following day. Cultures from the donor's right mainstem bronchus grew methicillin-resistant *Staphylococcus aureus*, and the recipient was treated with intravenous vancomycin. On postoperative day 12, the recipient was discharged home

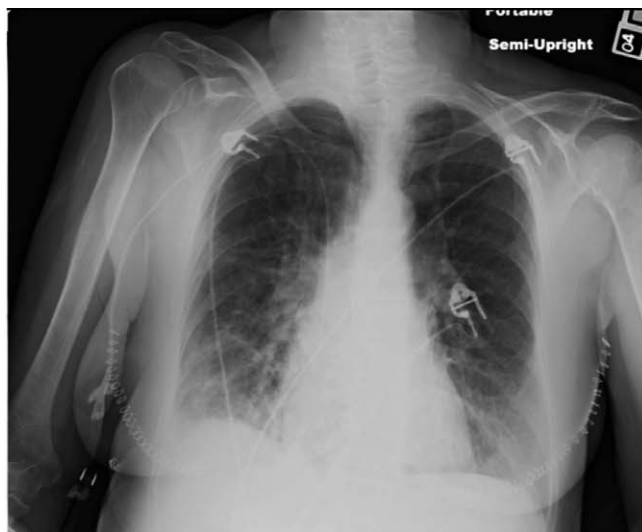
with an oxygen saturation of 98% on room air. Her chest radiograph at the time of discharge demonstrated nearly complete resolution of the right lower lobe atelectasis (Figure 2B). She required readmission on postoperative day 15 for moderate-sized bilateral pleural effusions, for which she underwent uneventful pigtail catheter drainage.

DISCUSSION

We report a successful case of double lung transplantation from an extended donor, one with



A.



B.

Figure 2. Chest radiograph of the recipient (A) on postoperative day 1 and (B) at time of discharge from the hospital.

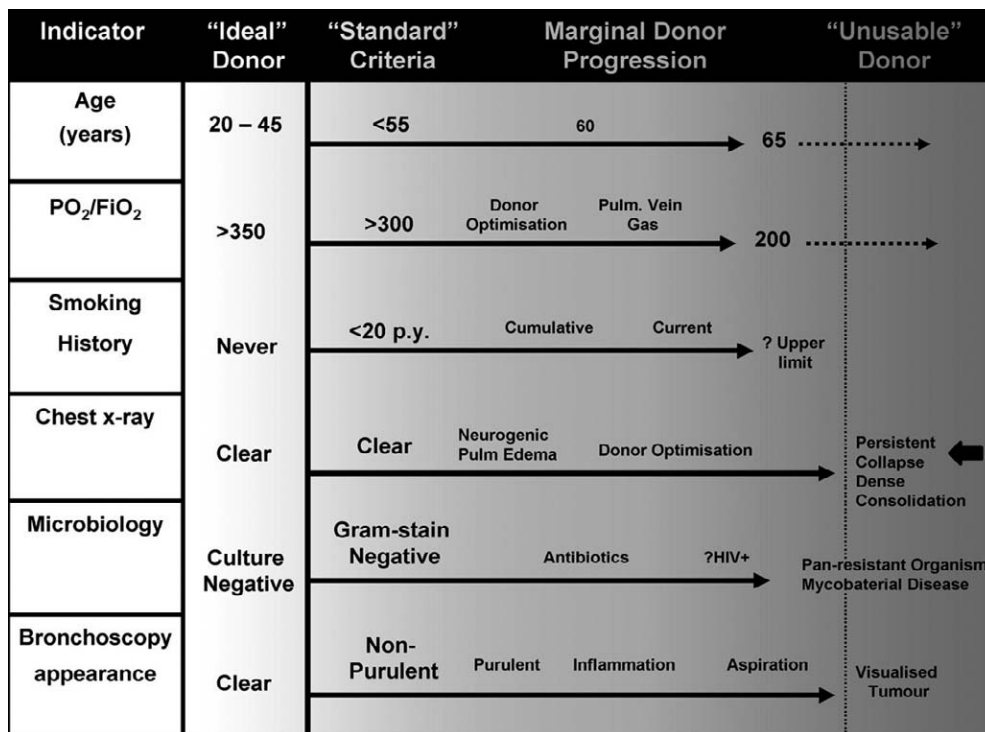


Figure 3. Chart summarizing the progressive relaxation of donor acceptability criteria. (Reprinted with permission from Botha P, Fisher AJ, Dark JH.³ Promotional and commercial use of the material in print, digital, or mobile device format is prohibited without the permission from the publisher Lippincott Williams & Wilkins. Please contact journalpermissions@lww.com for further information.)

persistent lobar atelectasis. Characteristics typical of the extended donor include high-risk social history, advanced age, prior chest surgery, suboptimal lung function, radiographic abnormalities, and coexisting infection or injury. Confusion still exists regarding the utilization of donors with radiographic abnormalities. Most centers typically demand that the radiograph be completely free of abnormalities. A significant emphasis has been placed upon using the radiograph to optimize donor management. We typically request frequent radiographic examinations in addition to arterial blood gas analysis to assess the impact of corrective measures. Inability to correct an abnormal chest radiograph is generally considered a contraindication to lung donation. Our case challenges this common contraindication.

Botha et al recently reviewed the use of extended criteria lung donors.³ In their chart summarizing the progressive relaxation of donor acceptability criteria (Figure 3), a donor with persistent collapse on chest radiograph would be considered unusable. Bhorade et al, on the other hand, described successful outcomes in 5 patients who underwent lung transplantation from donors with infiltrates on their chest radiograph.⁴ Unfortunately, the degree of these

infiltrates was not described. In a cohort of 84 patients, Bolton et al found that chest radiography played little role in decisionmaking regarding donor acceptance and demonstrated that significant inter-observer variability existed in assessing the quality of the lungs for donation.⁵

CONCLUSION

The literature is sparse in studies that evaluate the utility of chest radiography in determining the suitability of lungs for donation. The ability to utilize lungs that current criteria would deem unusable may help alleviate the current shortage of donor lungs. This report demonstrates that an acceptable outcome is possible from a donor with persistent lobar atelectasis if other parameters are acceptable. Larger studies would help further our understanding of the impact of donor radiographic abnormalities on outcomes following lung transplantation.

ACKNOWLEDGMENT

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