Single Lung Transplantation in India: An Initial Experience

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ABSTRACT

The science of lung transplantation has evolved from an experimental procedure, to be accepted as a legitimate mainstream therapy for patients with end-stage pulmonary disease. Now lung transplantation offers patients with end-stage lung disease acceptable quality of life and matches a 5-year survival rate of other solid organ transplants. In the present report, we present our initial experience in performing two single lung transplantations done in our centre. **[Indian J Chest Dis Allied Sci 2013;55:101-103]**

Key words: Lung transplant, Cardiothoracic surgery, Pulmonology.

INTRODUCTION

Lung transplantation has undergone significant evolution since the first such surgery was performed by James Hardy at the University of Mississippi in 1963. It has proven to be a life-saving therapeutic option for patients suffering from end-stage pulmonary disease. Single lung transplantation and bilateral sequential lung transplantation are being performed more often in patients with isolated endstage lung disorders to maximise the use of donor organs. We present our experience with two single lung transplantations performed at our centre.

CASE REPORT

Case 1

A 33-year-old male with interstitial lung disease on continuous home oxygen therapy was evaluated and waitlisted for lung transplantation. He underwent a right lung transplantation. The in-house donor was a 21-year-old male who had sustained intra-cerebral haemorrhage and was declared brain dead. The cold ischaemic time was 90 minutes. The recipient was extubated on the first post-operative day and had an uneventful post-operative period. He had adequate



Figure 1. Computed tomography of thorax of the first recipient (A) pre-operative and (B) post-operative.

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respiratory effort and maintained blood gases. Transbronchial biopsy showed no signs of rejection. At three months follow-up, he had no signs of rejection and was enjoying an improved quality of life.

Case 2

A 41-year-old female on continuous home oxygen therapy for severe interstitial lung disease was evaluated for lung transplantation and waitlisted. She underwent right lung transplantation, receiving the lung from a 33-year-old male who was pronounced brain dead after a road-traffic accident. The cold ischaemic time was 190 minutes. She was ventilated for a period of 24 hours and was extubated successfully. However, she developed respiratory failure, requiring intubation. It was suspected that the deterioration was probably occurred due to infection or pulmonary re-implantation responsive syndrome. She was supported by mechanical ventilation for another 48 hours and successfully weaned off and extubated. Oxygenation index was used as a guide. Her transbronchial biopsy showed no signs of rejection. She is presently recuperating postoperatively.

115mM, Sodium 10mM). After cardiac extraction, the right main bronchus is stapled with the lungs at functional residual capacity.

The recipients had a pulmonary sheath with quadruple lumen venous line in the right internal jugular vein along with intra-arterial catheters in both radial and femoral artery. In both the recipients, the right lung had poor function as judged by quantitative ventilation-perfusion scans. The surgical approach was through a right-sided, postero-lateral thoracotomy with right lung isolation using a left, double-lumen endobronchial tube. During implantation the lung was kept cold by topical application of saline with ice slush. We did not require cardiopulmonary assistance for both the recipients.

Both the patients received antibacterial prophylaxis comprising of meropenem and teicoplanin. These empirical antibiotics were adjusted or changed as per the culture sensitivity reports of both the donor and the recipient. In addition, the patients also received acyclovir and amphotericin. Methylprednisolone at a dose of 500mg was given intravenously intra-operatively followed by 125mg, every 8 hours, in the immediate post-operative period. The recipients received tacrolimus, mycophenolate



Figure 2. Computed tomography of thorax of second recipient (A) pre-operative and (B) post-operative.

Surgical Technique

The selection of both the recipients was based on the guidelines outlined by the International Society for Heart and Lung Transplantation.¹ Both the donors had a clear chest radiograph, optimal gas exchange, without any smoking history and normal bronchoscopic examination. Both the donor lungs were harvested as part of a multi-organ procurement. Our technique of donor organ harvesting includes systemic heparinisation with 4mg/kg followed by bolus does of PGE1 (1µg/kg) administered directly into pulmonary artery immediately before donor inflow occlusion and antegrade pulmonary artery flush with 30mL/kg of Euro Collins solution (Chloride 15mM, Phosphate 50mM, Potassium

mophetil and prednisolone for immunosuppression. The immediate and short-term outcomes were good.

DISCUSSION

The classical indications for lung transplantation include chronic obstructive lung disease, alpha-1antitrypsin deficiency, idiopathic pulmonary fibrosis, cystic fibrosis, primary pulmonary hypertension among many others.¹ Both the cases presented here were suffering from idiopathic pulmonary fibrosis and fulfilled the recipient selection criteria. We utilised blood type and body size as the major prerequisite for matching the recipients to the donors.^{1,2}

The limiting factor in lung transplantation is not only the availability of donor organs but also rapid deterioration of lungs after brain death. Retrieval of the organs requires close cooperation and judicious management in terms of fluid administration, use of inotropic support and overall donor management.² The current preservation technique provides protection for an ischaemic interval of nearly six hours.³ Both our patients had an ischaemic interval of less than three hours.

Oxygenation index [(mean airway pressure × percent of inspired oxygen)/partial pressure of arterial oxygen] helps in rapid assessment of pulmonary function to guide management.⁴ The signs of rejection in the early post-operative period are based on clinical findings, such as persistent low arterial oxygen tension (PaO₂), development of pulmonary infiltrates, changes in the quantitative lung perfusion scans. However, confirmation of rejection requires a transbronchial lung biopsy.³

Single or bilateral lung transplantation offers viable therapy for patients with end-stage disease.³ There are reports supporting single lung over bilateral lung transplantations based on functional outcomes.^{5,6} Though a few reports claim bilateral lung transplantation to be associated with superior lung function, exercise tolerance and a trend towards enhanced survival, the limited availability of donor lungs makes the single lung transplantation the preferred alternative.^{7,8} The added advantage of a single lung transplantation is the likelihood of providing the donor lungs for two separate recipients.

With significant improvements in the techniques, the indications for carrying out lung transplantation have expanded with success rates comparable to other solid organ transplants. But as with other organ transplants, there is an increased need to focus on the availability of suitable donor organs, improved immunosuppressant therapy and to promptly diagnose and treat the rejection.

In conclusion, although our follow-up period is short, the result of the first lung transplantation surgery carried out in India are encouraging.

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