

Living-donor lung transplantation for end-stage lung disease

1 Guidance

- 1.1 Current evidence on the efficacy of living-donor lung transplantation for end-stage lung disease and its safety profile for suitable recipients appears adequate to support the use of this procedure.
- 1.2 The procedure should only be used in selected patients who would otherwise die.
- 1.3 However, limited evidence suggests that living-donor lung transplantation for end-stage lung disease carries a significant risk of morbidity for donors. Therefore clinicians wishing to undertake this procedure should take the following actions.
- Inform the clinical governance leads in their Trusts.
 - Ensure that donors receive thorough physical and psychological screening, and counselling about the morbidity associated with this procedure. They should also be provided with clear written information. In addition, use of the Institute's *Information for the public* is recommended (available from www.nice.org.uk/IPG170publicinfo).
 - Audit and review clinical outcomes of all people donating lungs for transplantation.
- 1.4 Living-donor lung transplantation for end-stage lung disease should only be performed in specialist centres in the context of a multidisciplinary team. Donor lungs should be harvested by specialist thoracic surgeons.
- 1.5 Clinicians should enter all donors and recipients into the UK National Audit of Intrathoracic Transplantation (www.rcseng.ac.uk/research/ceu/projects/proj_intrathoracic.html).

2 The procedure

2.1 Indications

- 2.1.1 Lung transplants are performed in patients with non-malignant pulmonary disease that is unresponsive or minimally responsive to treatment and who have a life expectancy of less than a year. The underlying causes include cystic fibrosis, severe pulmonary fibrosis, pulmonary hypertension and obliterative bronchiolitis.
- 2.1.2 The majority of live-donor lung recipients are patients with cystic fibrosis. The majority of lung donors are first-degree relatives who are compatible in terms of size and ABO blood group.
- 2.1.3 Living donation is an alternative to cadaveric organ donation. Living donation is an option for patients for whom cadaveric transplantation is unavailable, or who are deteriorating clinically to the point of transplant ineligibility while waiting for a cadaveric donor. Living donation may also be an option for critically ill children, as there is a particular shortage of suitable cadaveric donors for this age group.

2.2 Outline of the procedure

- 2.2.1 Living-donor lung transplantation requires three operations: two donor lobectomies (one donor providing the right lower lobe and another, the left), and the recipient bilateral pneumonectomy and lung implant.
- 2.2.2 The recipient operation is performed through a chest incision. Procedures are performed on cardiopulmonary bypass. Once the pneumonectomies have been completed the harvested lobes are implanted sequentially.

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This guidance is written in the following context

This guidance represents the view of the Institute which was arrived at after careful consideration of the available evidence. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of healthcare professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Interventional procedures guidance is for healthcare professionals and people using the NHS in England, Wales and Scotland.

This guidance is endorsed by NHS QIS for implementation by NHSScotland.

2.3 Efficacy

- 2.3.1 In a study of 123 adult and paediatric patients who had undergone living lung transplantation, 1-, 3- and 5-year survival was 70%, 54% and 45%, respectively. Infection was the main cause of death (33/63; 52%), followed by obliterative bronchiolitis (8/63; 13%).
- 2.3.2 In a non-randomised study from the same centre outcomes were compared between living (n = 59) and cadaveric (n = 43) lung recipients who had survived more than 3 months after transplant. The study found no significant differences between the groups with respect to survival; 1-, 3- and 5-year survival was 83%, 64% and 62%, respectively, in the living lung group compared with 83%, 81% and 75% in the cadaveric lung group. A true comparative analysis is difficult, however, because those receiving living lung transplants often have poorer outcomes by nature of eligibility criteria (for example, underlying lung disease and preoperative severity of illness).
- 2.3.3 Where pulmonary function was measured in the studies it was reported that patients who had undergone living lung transplantation had improved function compared with preoperative values. For more details, refer to the 'Sources of evidence' section.
- 2.3.4 Some Specialist Advisors expressed uncertainties about the long-term outcomes of recipients following living lung transplantation and the incidence of obliterative bronchiolitis compared with those undergoing cadaveric lung transplantation.

2.4 Safety

- 2.4.1 There was limited information reported on the complications in recipients following living lung transplantation. In the studies that included both adult and paediatric patients, the incidence of acute rejection ranged from 0.8 to 1.5 episodes per patient. In a small study of 30 patients, complications following living lung transplantation included pulmonary oedema in 20% (6/30), haemorrhage necessitating rethoracotomy in 7% (2/30) and cardiac tamponade in 7% (2/30). Tracheostomy was required in 15 patients (50%), and reintubation in seven patients (23%).

- 2.4.2 There were no reports of donor mortality following lobectomy. In one study it was reported that 20% (50/253) of donors had one or more perioperative complications following lobectomy. The most common complication was the need for a thoracostomy tube in 30% (15/50), either for persistent drainage or for air leaks. The most significant complication was pulmonary artery thrombosis, which occurred in two patients (1%). Eight patients (3%) also required reoperation because of bleeding (1.2%), bronchopulmonary fistula (0.4%), unresponsive pericarditis (0.4%), loculated pleural effusion (0.4%), a sterile empyema (0.4%) and a retained sponge (0.4%). In a study following 253 donor lobectomies it was reported that donors who could be contacted at 1 and 2 years had reduced pulmonary function compared with preoperative values. For more details, refer to the 'Sources of evidence' section.

- 2.4.3 The Specialist Advisors considered the main complications in recipients to be rejection and hyperexpansion of the transplants leading to significant lung injury and subsequent failure. With respect to donors, the Specialist Advisors listed potential complications following donor lobectomy as prolonged air leak, bleeding, pleural sepsis and pulmonary embolism. The Specialist Advisors also stated that donors were likely to experience loss of lung function following lobectomy.

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Chief Executive
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Information for the public

NICE has produced information describing its guidance on this procedure for patients, carers and those with a wider interest in healthcare. It explains the nature of the procedure and the decision made, and has been written with patient consent in mind. This information is available from www.nice.org.uk/IPG170publicinfo

Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

'Interventional procedure overview of living donor lung transplant for end-stage lung disease', April 2005.

Available from: www.nice.org.uk/ip292overview

Ordering information

Copies of this guidance can be obtained from the NHS Response Line by telephoning 0870 1555 455 and quoting reference number N1031. *Information for the public* can be obtained by quoting reference number N1032.

The distribution list for this guidance is available at www.nice.org.uk/IPG170distributionlist

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