

# Lung retrieval

## Lung retrieval

Flexible bronchoscopy is first performed to clear mucopurulent secretions or aspiration. After median sternotomy and exposure of the lungs in each pleural space, detailed inspection is carried out for masses, consolidation or contusion. Uniform atelectasis. Lung compliance is also assessed by observing lung deflation when disconnected from the ventilator. Heparin is administered and the main pulmonary artery cannulated. Prostaglandin E (500 µg) is then injected to induce pulmonary vasodilatation and 3 litres of a cold pulmoplegia preservative infusion is initiated. The left atrial appendage is incised to vent the effluent while the lungs are also topically cooled with saline. Lung ventilation continues during flushing to improve fluid distribution and prevent atelectasis. The pulmonary artery is then divided proximal to the bifurcation and the left atrium is incised to create a cuff of left atrium on each side, into which the two pulmonary veins drain. Division of the pulmonary ligament on each side allows the lungs to be removed after inflating them to 25 mmHg and stapling the trachea, the lungs remaining inflated for transportation. A 500-mL retrograde pulmoplegia infusion is carried out into each pulmonary vein to augment preservation and flush out clots from the vasculature. The lungs are then placed into a bag containing pulmoplegia and double-bagged for transport within an ice-packed cooler. Lungs are more resistant to warm and cold ischaemic times and safe transplantation can be undertaken with preservation times of 6–12 hours. As in heart transplantation the use of DCD donors has expanded the donor pool. After the declaration of death the lungs are rapidly retrieved. Lungs are resistant to the effects of warm ischaemia much more so than the heart and outcomes are equal to those obtained with DBD donors. The avoidance of the catecholamine storm and associated inflammation associated with brain death may be particularly advantageous in these cases. The technique for DCD lung retrieval is somewhat different. Five minutes after the declaration of death, bronchoscopy is performed and the lungs inflated. After rapid chest entry the pulmonary artery is quickly cannulated, the left atrium quickly inspected for abnormalities and topical hypothermia is accomplished with ice slush to limit the warm ischaemic time. Most donors involve controlled withdrawal of treatment (Maastricht 3) but uncontrolled DCD (Maastricht 2) donation where failed resuscitation from unexpected cardiac arrest with a declaration of death is followed by heparinisation, the in situ cooling of the lungs and insertion of chest drains with consent for donation and organ retrieval has been shown to be efficacious in Spain. The use of ex vivo lung perfusion (EVLP) is recommended to allow for assessment. Ex vivo lung perfusion This technique involves placing donor lungs into a machine at the recipient centre; the lungs are ventilated and perfused with an electrolyte and protein solution for 2–4 hours, sometimes longer. This permits the reconditioning and evaluation of lungs that may not appear to be useable for transplantation in the first instance. Treatments may be administered that can optimise graft function, such as antibiotics, steroids and immunomodulatory drugs, and biomarkers for poor outcomes can be detected. EVLP may be used for logistic reasons to reduce ischaemic time and in the future it may permit ex vivo therapeutic interventions such as gene therapy. By using perfusates with an

optimised colloid osmotic pressure, pulmonary oedema can be reduced, thereby improving gas exchange. The lungs can be monitored on the device for the development of changes in compliance, airway pressure, pulmonary vascular resistance and perfusate oxygenation. Bronchoscopy can be performed to resolve areas of atelectasis ( Figures 92.6 and 92.7 ). - -

Figure 92.6 Ex vivo lung perfusion. The lungs have been explanted from the donor but may be borderline for acceptance for transplantation. Perfusion, bronchoscopy and ventilation in the system can recondition lungs to a useable state to permit the transplant to proceed. Ventilator Temperature probe in the open left atrium Pressure measurement PA LA Reservoir Leukocyte /f\_ i lter Haemoconcentrator O , N , CO 2 2 2 Pump Oxygenator Temperature

# probe HCU

Figure 92.7 Schematic of a typical ex vivo lung perfusion circuit. HCU, heater-cooler unit; LA, left atrium; PA, pulmonary artery.

With this technique, lungs can be evaluated for function and quality between donation and transplantation with 35–97% of initially unacceptable lungs being used successfully with 5-year mortality rates equivalent to those of conventional transplantation, although some studies have suggested an increase in postoperative ECMO requirements and longer intensive care unit stays. A different EVLP system that involves a portable organ preservation system taken to the donor hospital rather than the recipient hospital has also been shown to have favourable safety and efficacy. Trials have been completed in which EVLP was used in standard criteria donors to assess whether this would lead to improved outcomes but no benefit was demonstrated.

Figure 92.8 The clamshell thoracotomy commonly used for bilateral lung transplantation. Bilateral anterior thoracotomies through the fourth or fifth intercostal space are connected by division of the sternum. This facilitates excellent visualisation of the thorax

---

Revision #1

Created 2025-12-31 15:32:34 UTC by Omar Ayman

Updated 2025-12-31 15:32:34 UTC by Omar Ayman