Step-By-Step to Lung Transplantation

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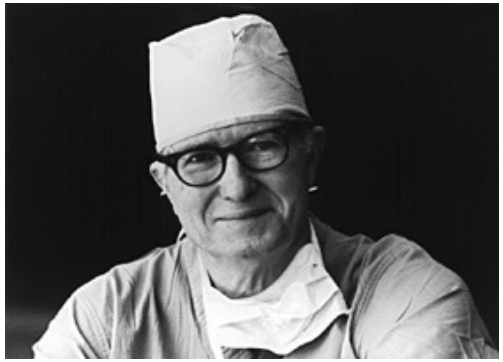
Conflict of Interest Disclosures

- Abiomed, Atricure, Abbott

Lung Transplantation



A transplant team led by Dr. Hardy performed the world's first heart transplant in man at the University of Mississippi Medical Center on January 23, 1964.

- First human lung transplant was performed in 1963 at the University of Mississippi by JD Hardy
  - 58 y.o. male with emphysema, CRI and a left mainstem bronchogenic carcinoma
  - Donor died of a MI with shock and pulmonary edema
  - Recipient survived 18 days with death resulting from renal failure and infection

Hardy, JD, Webb, WR, Dalton, ML Jr, Walker, GR Jr. Lung homotransplantation in man. JAMA 1963; 186:1065.

Single Lung Transplantation

- **First successful single lung transplant was performed in 1983 at the Toronto University by Joel Cooper, M.D. for idiopathic pulmonary fibrosis**

  - **Improved vascularization of the ischemic donor bronchus using an omental wrap**
  - **Use of cyclosporine and avoidance of large doses of steroids**

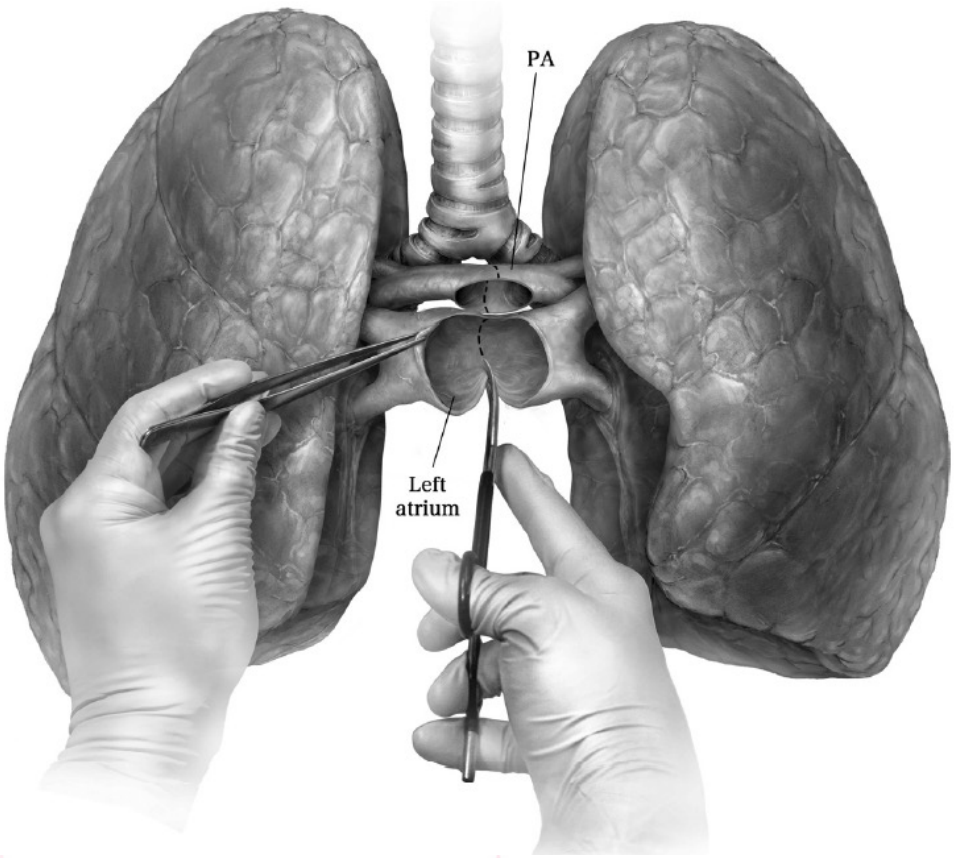
Unilateral lung transplantation for pulmonary fibrosis. Toronto Lung Transplant Group. N Engl J Med 1986 May 1;314(18):1140-5

Double Lung Transplantation

- **First successful double lung transplant was performed in 1986 by Toronto Lung Transplant Group for COPD**

Double-lung transplant for advanced chronic obstructive lung disease. Cooper JD; Patterson GA; Grossman R; Maurer J. Am Rev Respir Dis 1989;139:303-7.

Donor Lung Procurement



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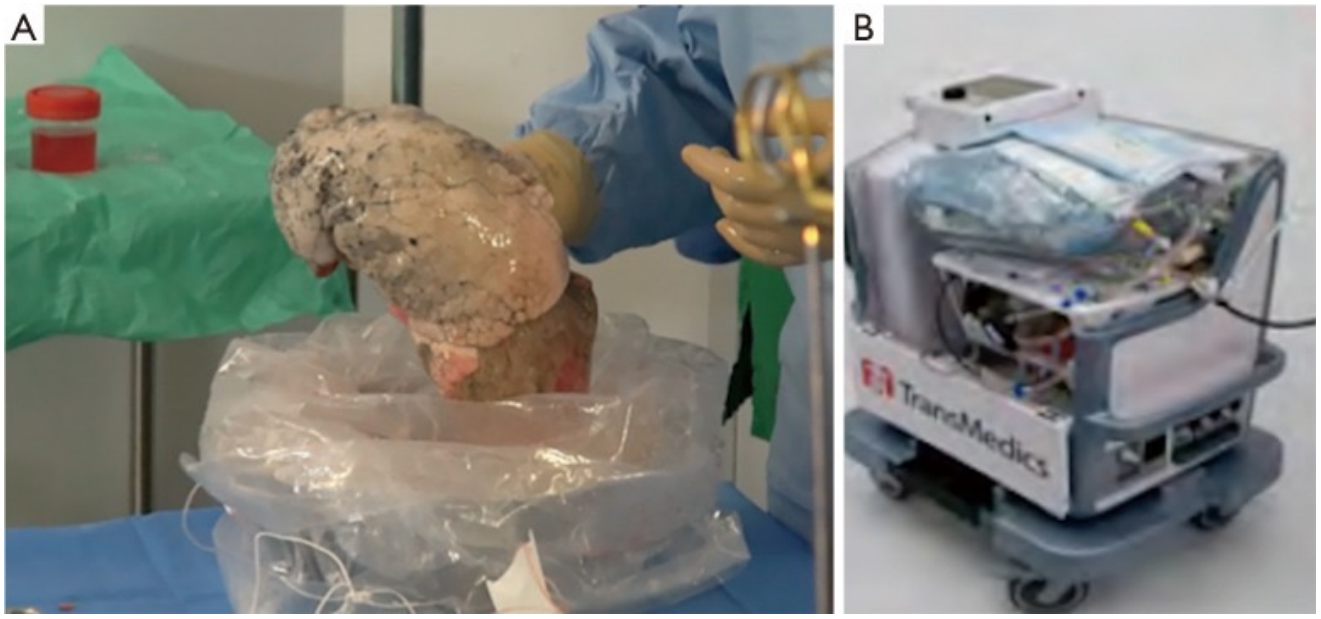
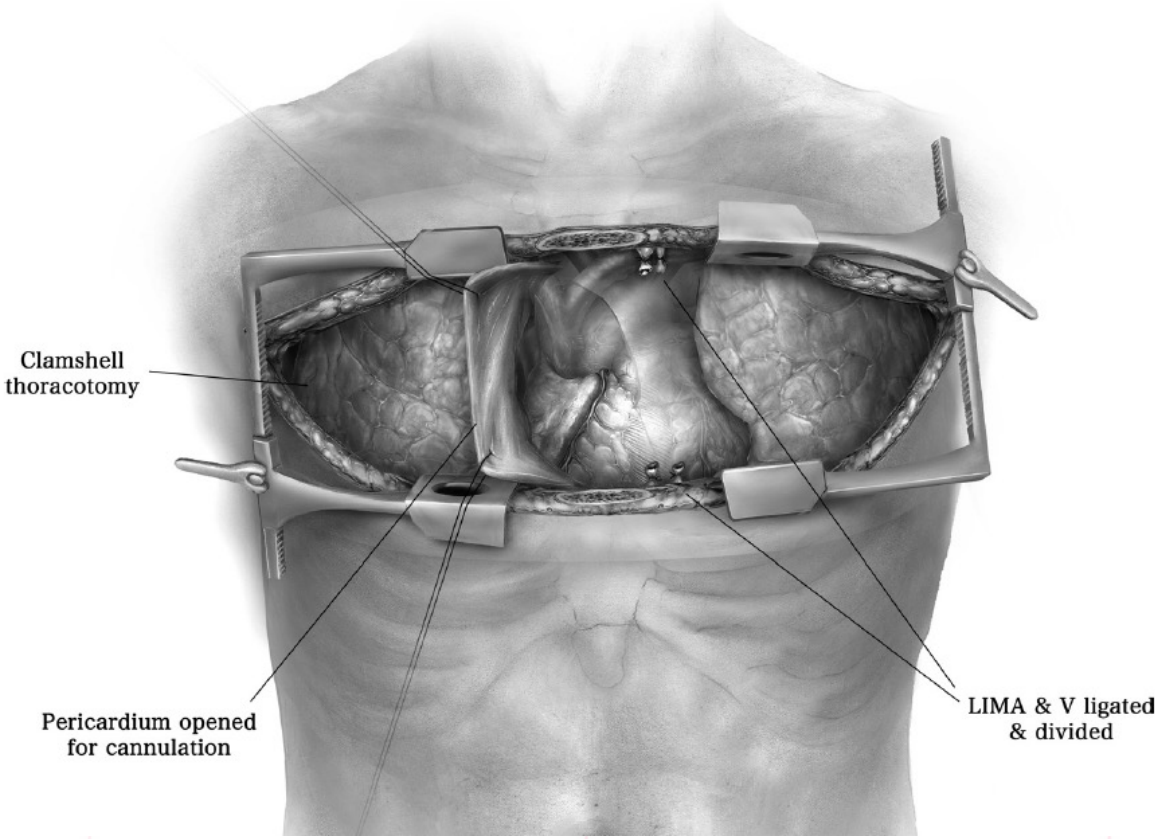
Donor Storage

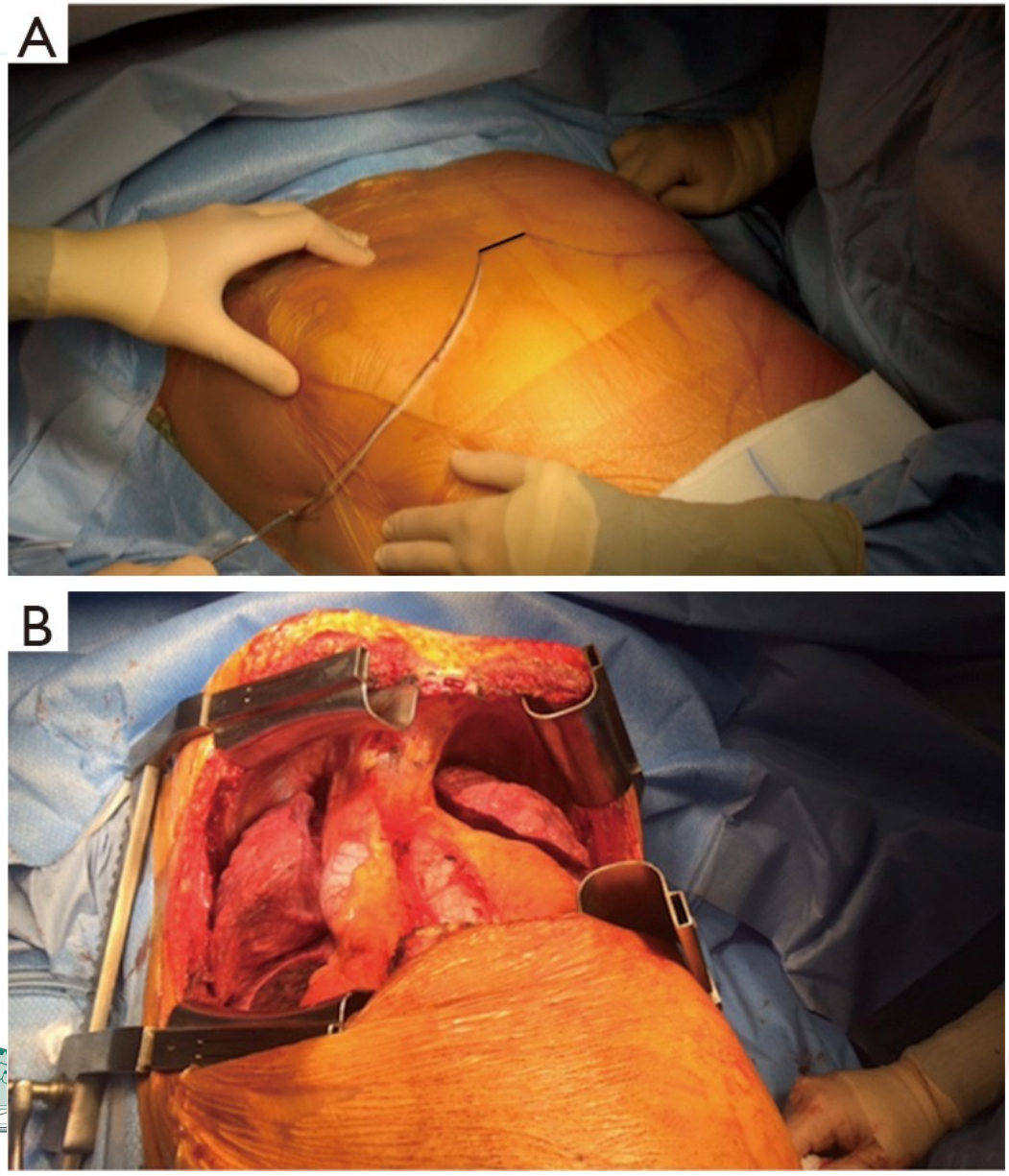


The Recipient Operation

- **Lines**
- **Double-lumen ET tube**
- **NO**
- **TEE**
- **Off pump / on pump / ECMO**

The Standard Incision

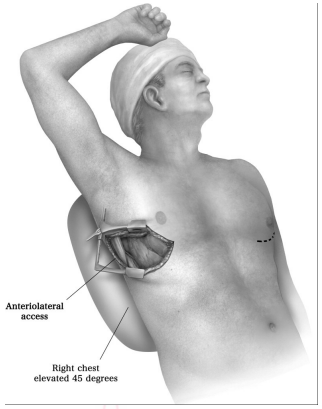


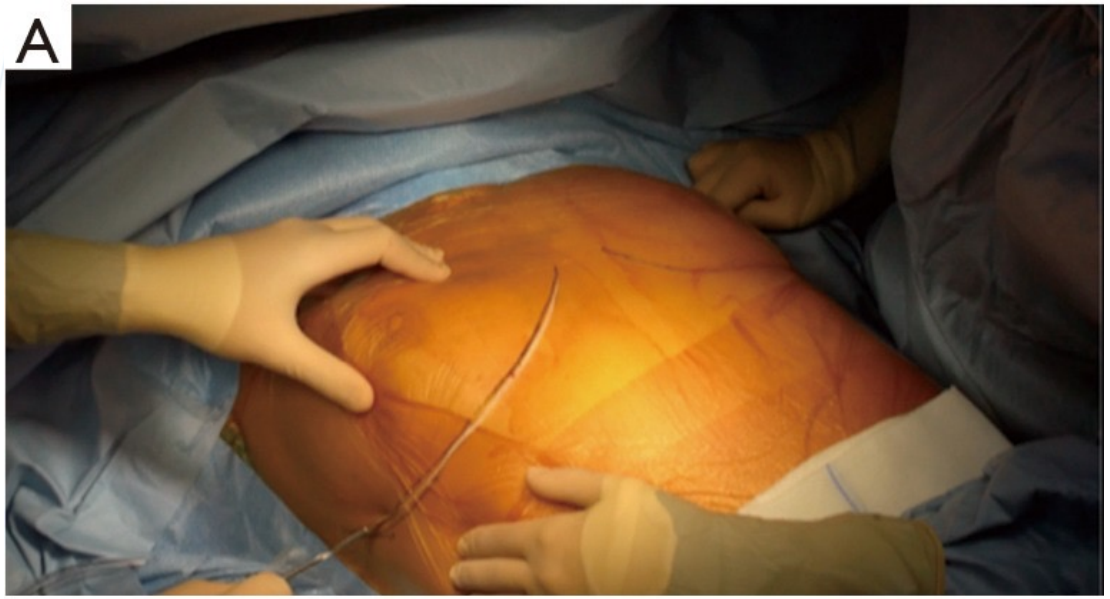

A
B

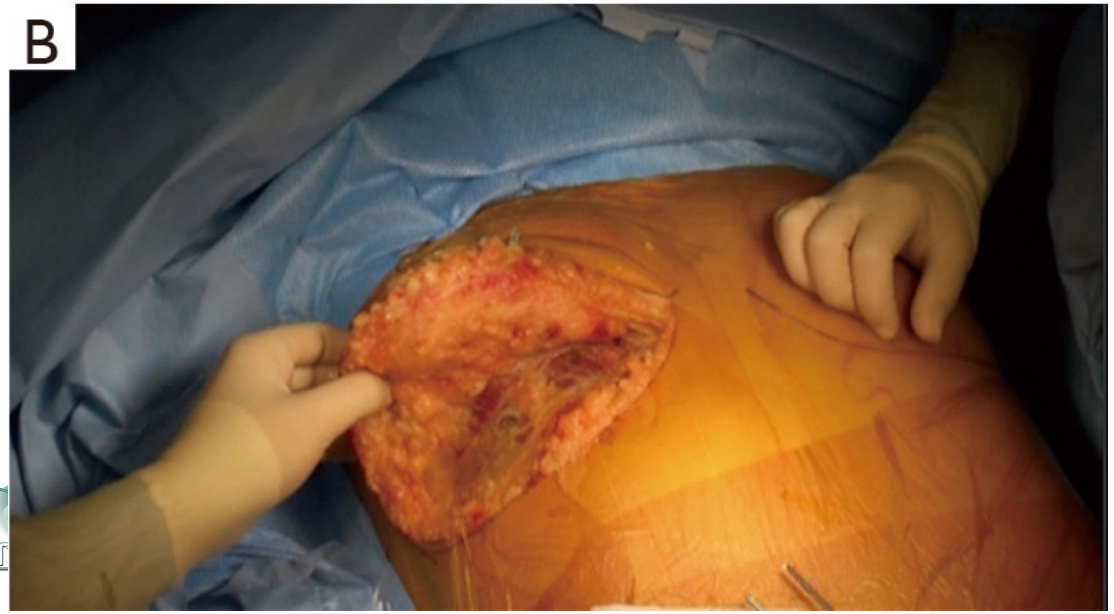
Thoracotomy

- **Single Lung Transplantation**

- **Bilateral Lung Transplantation**

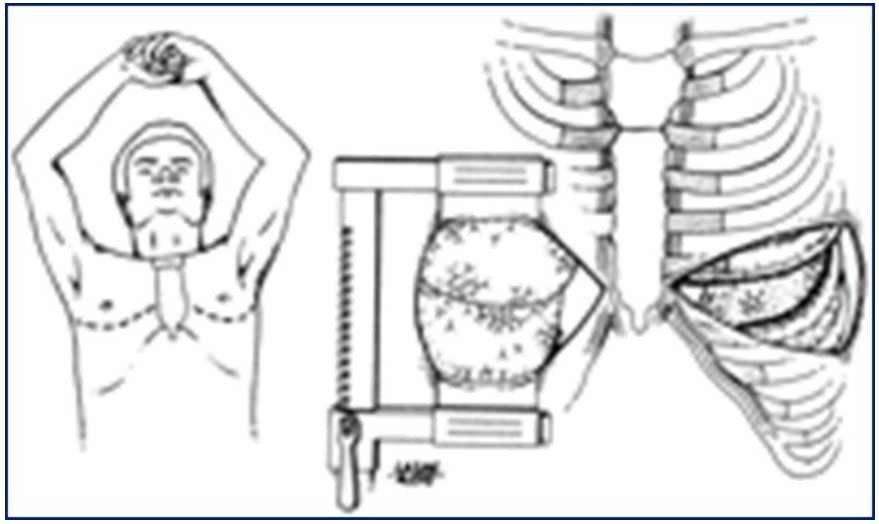



A


B

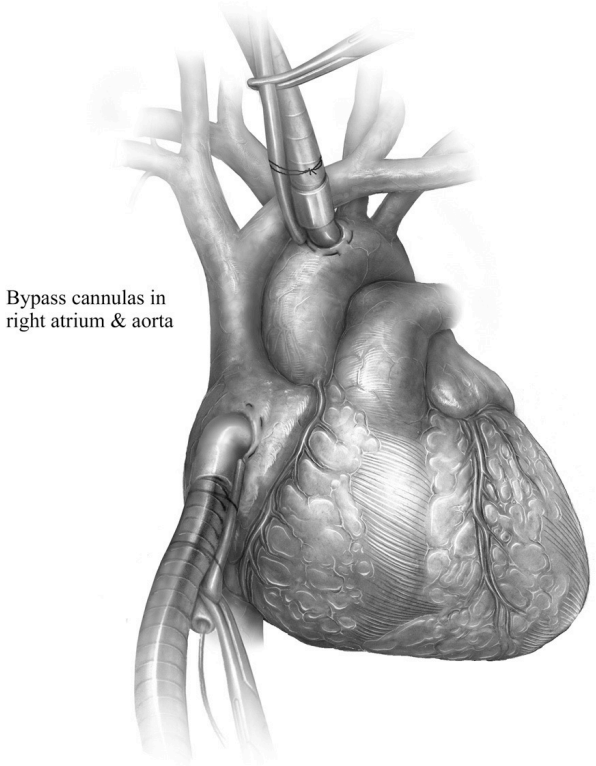
Thoracotomy

Minimally Invasive

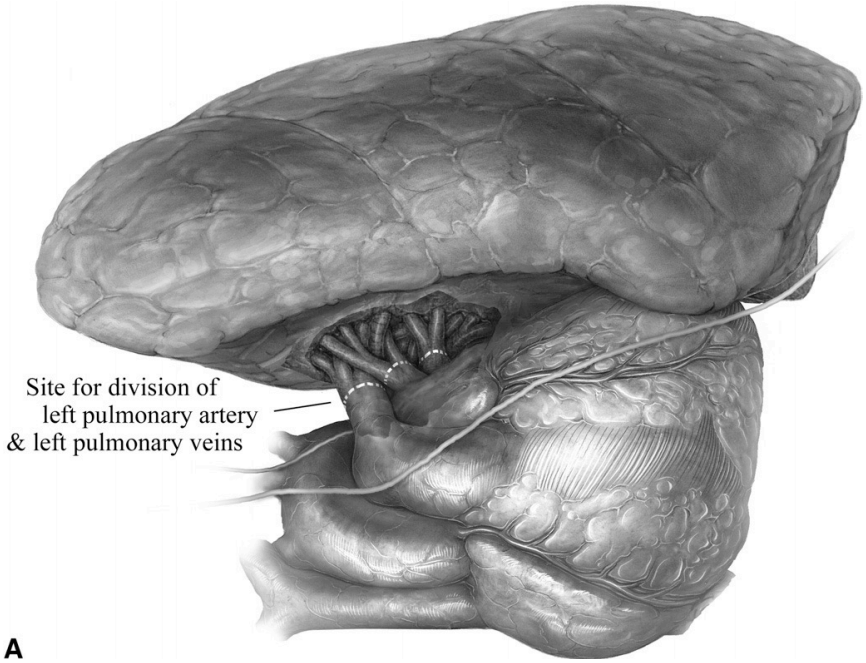


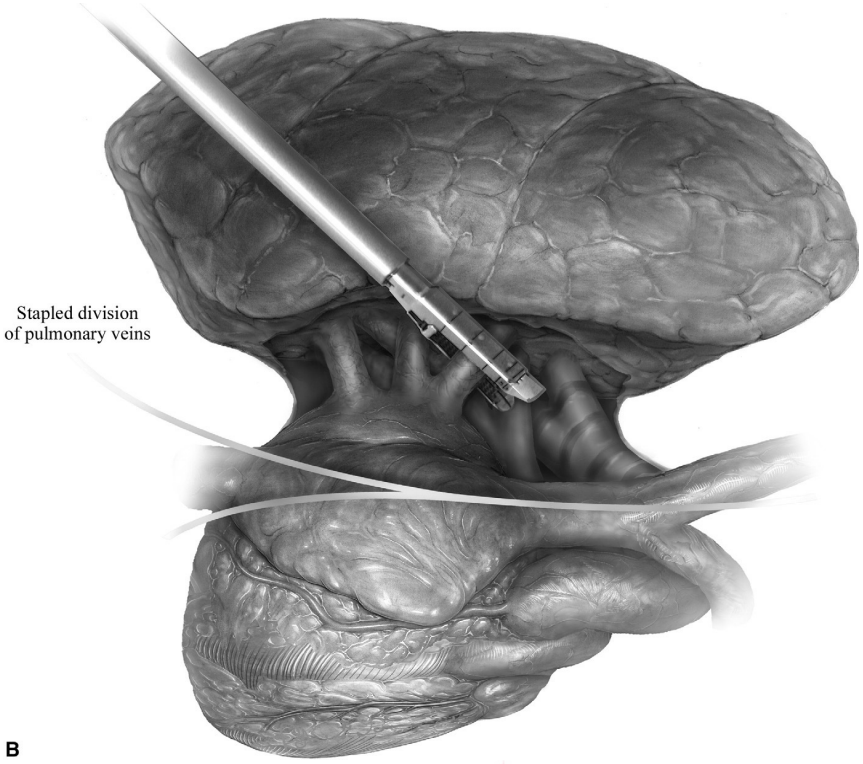
The same operation through smaller incisions.

On Pump, on ECMO or Off pump

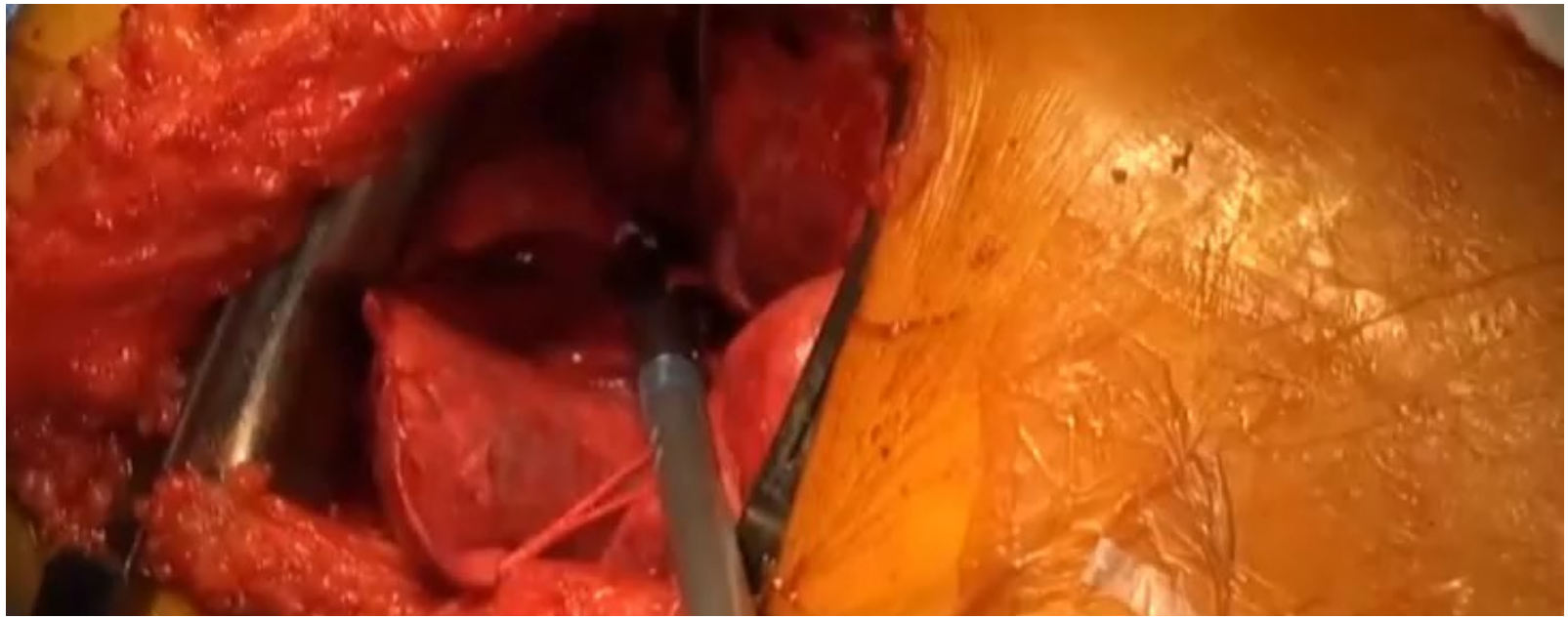


Native lung explant

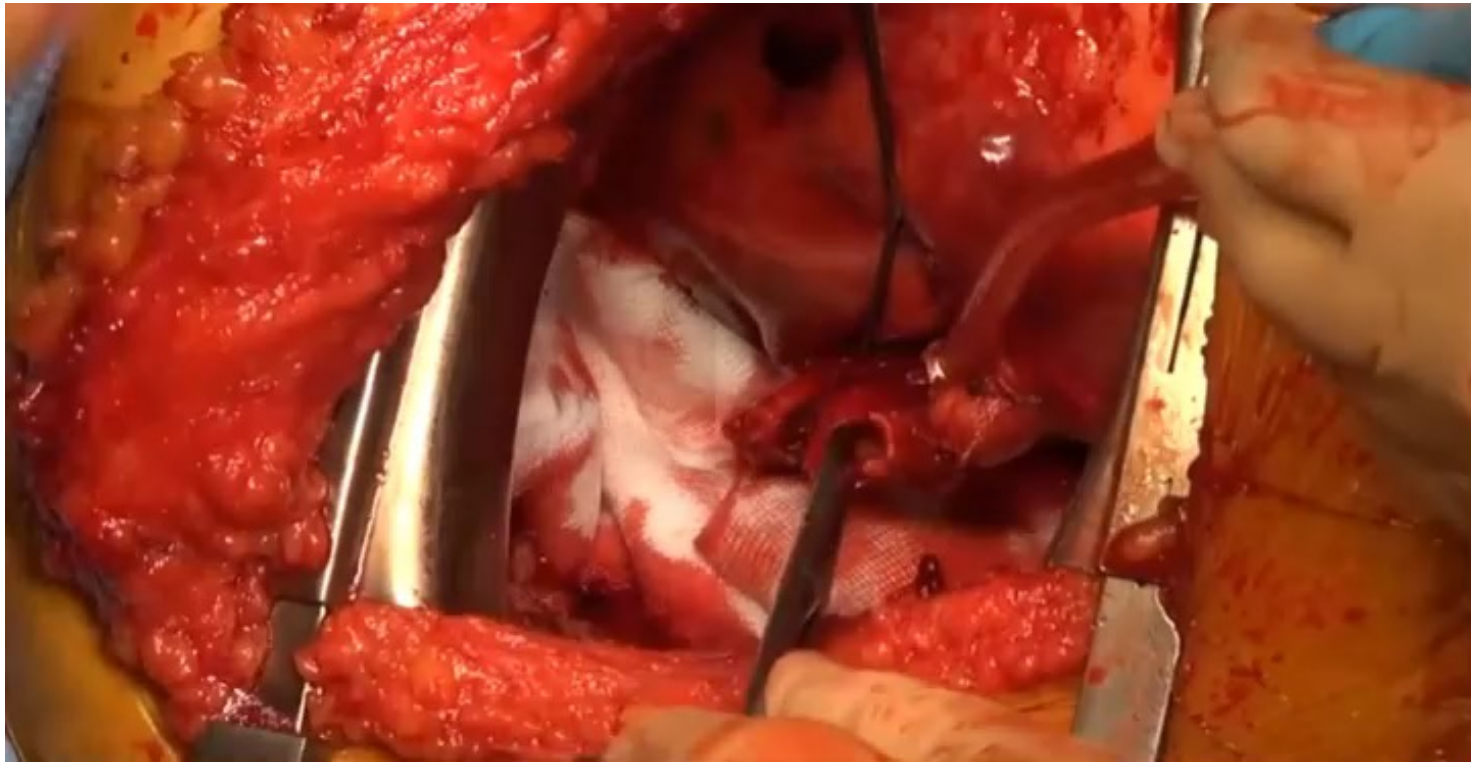




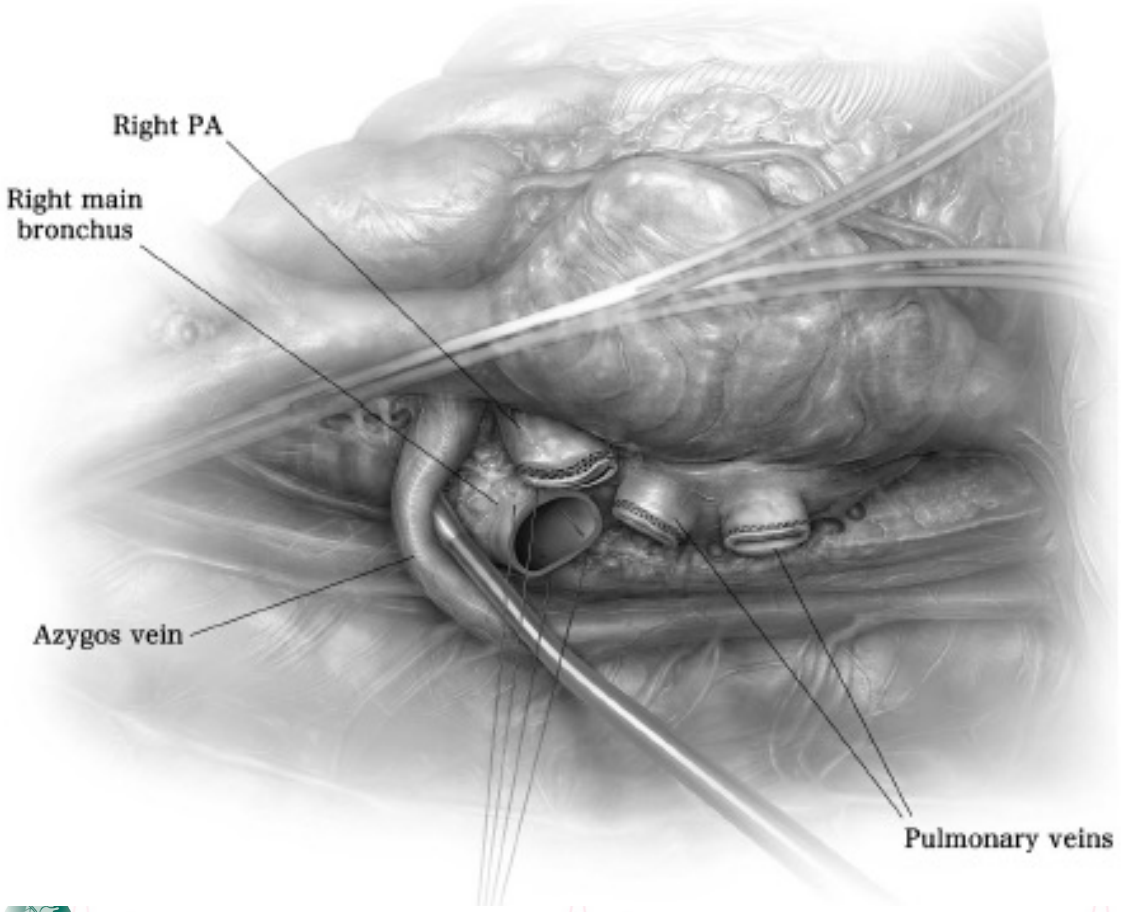
Native lung explant



Preparing the hilum



Operative Steps



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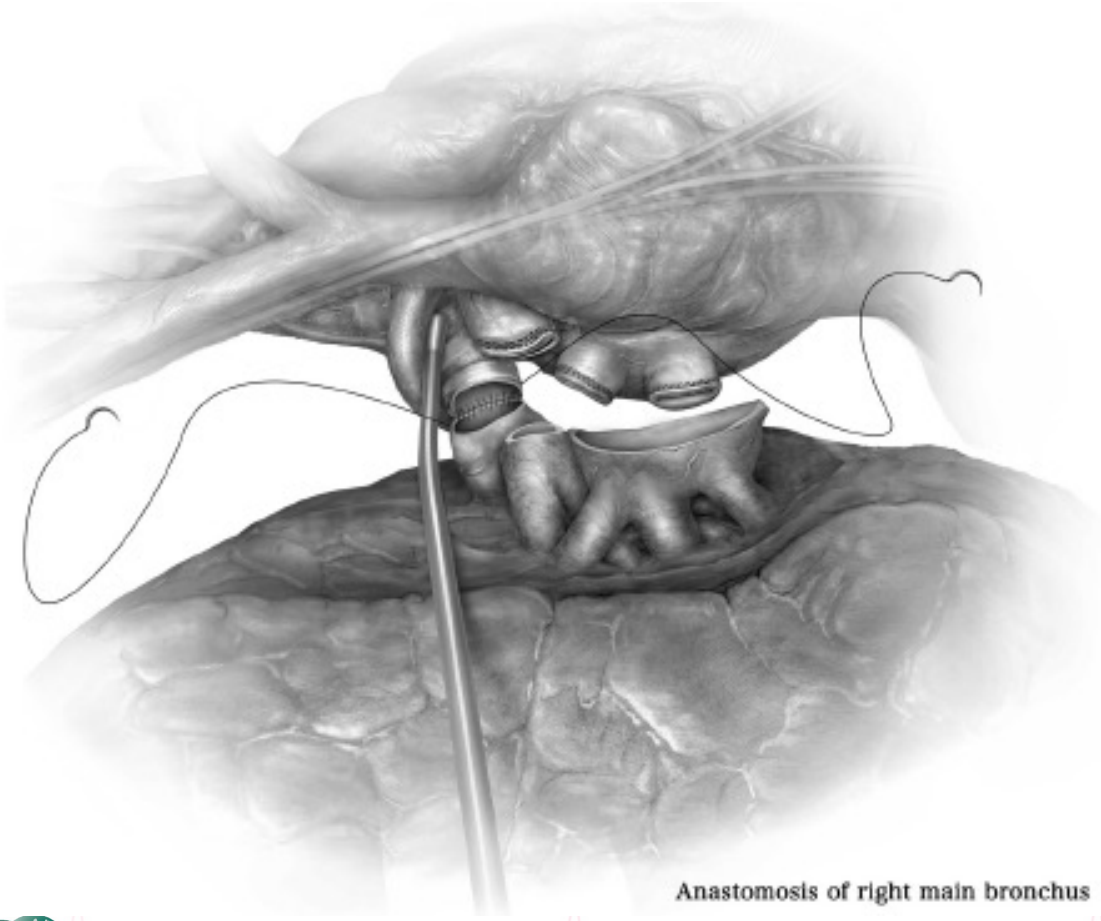
Preparing the graft

Bronchial Anastomosis



Anastomosis of right main bronchus

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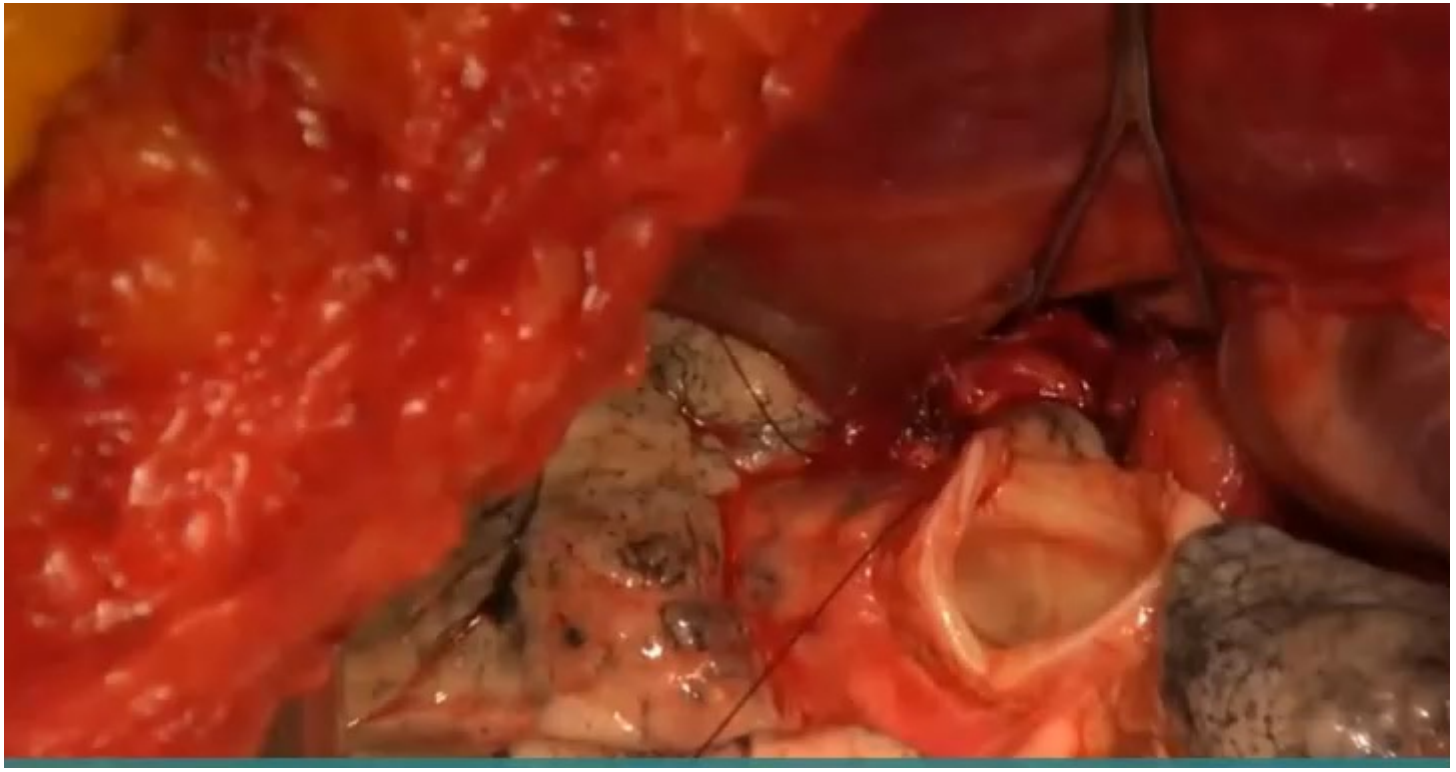
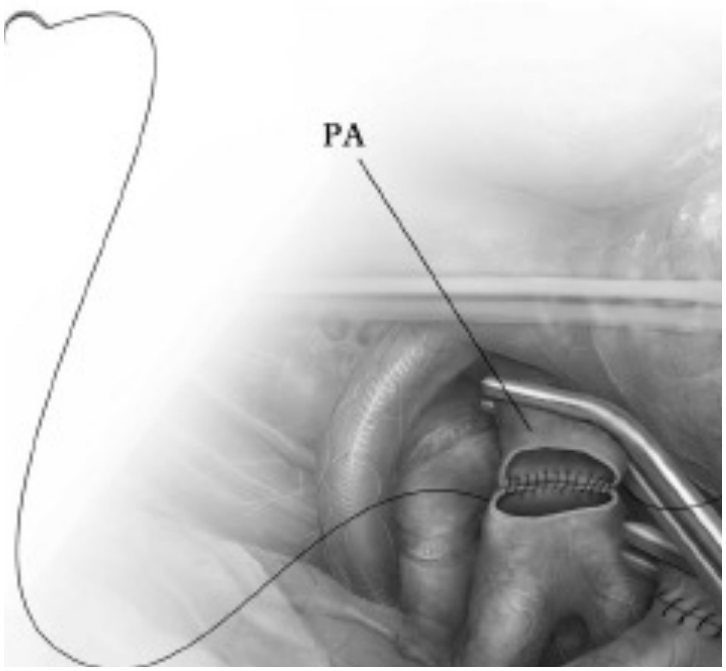
Bronchial anastomosis (4-0 PDS and 4-0 Prolene)



PA Anastomosis



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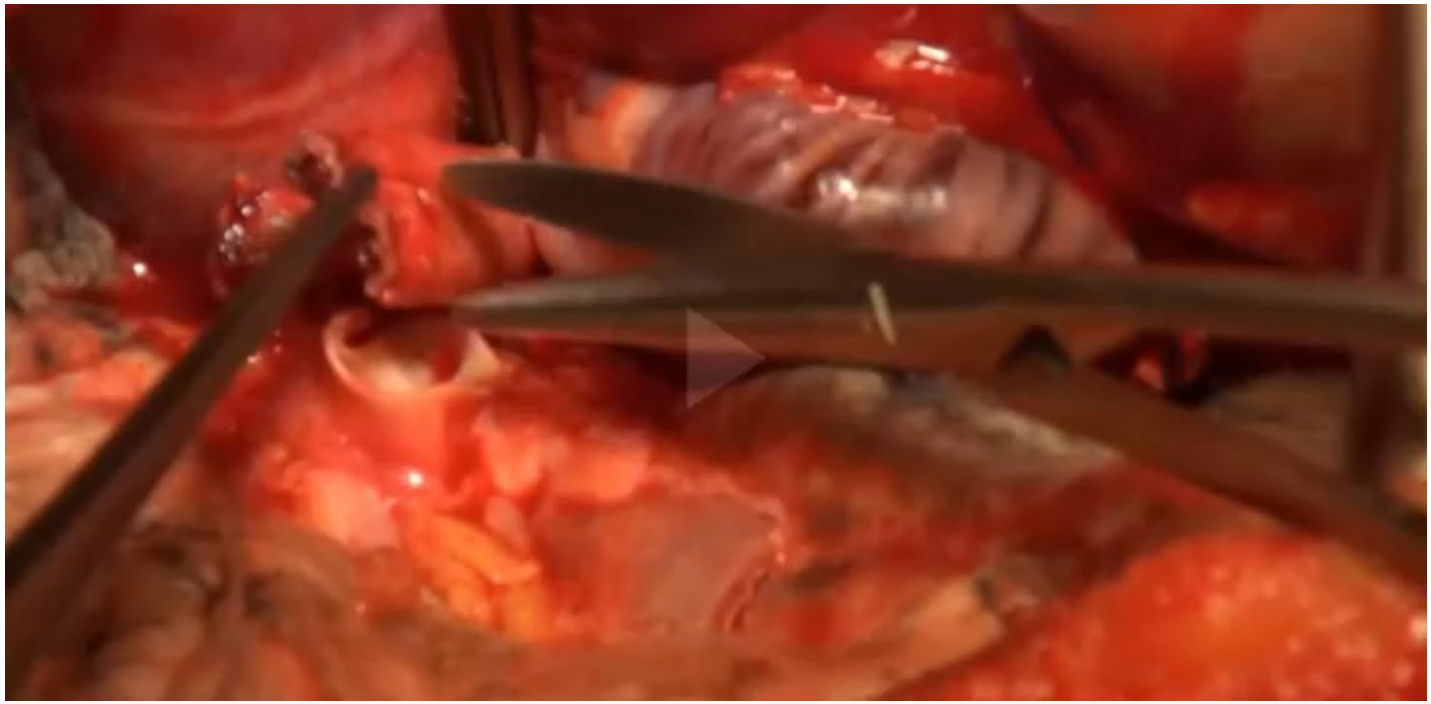
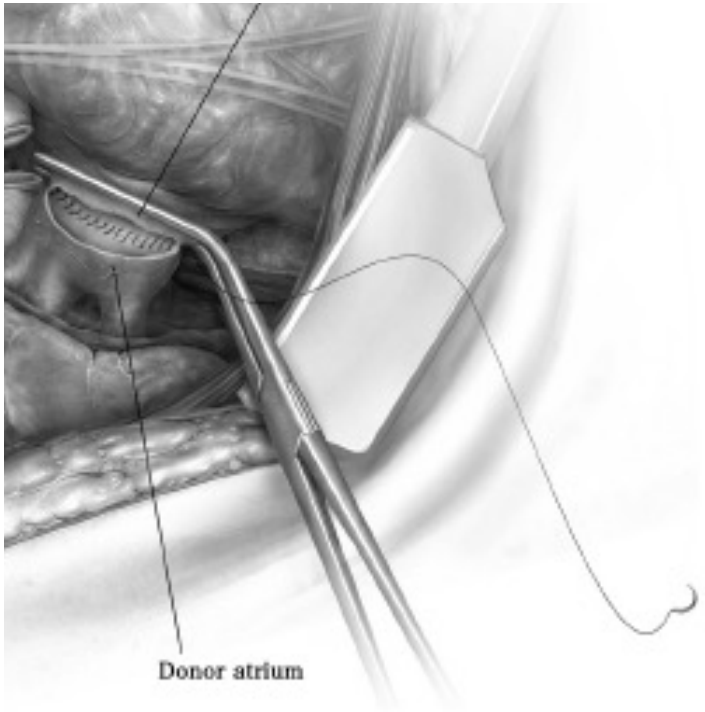
PA Anastomosis (5-0 Prolene)



PV Anastomosis



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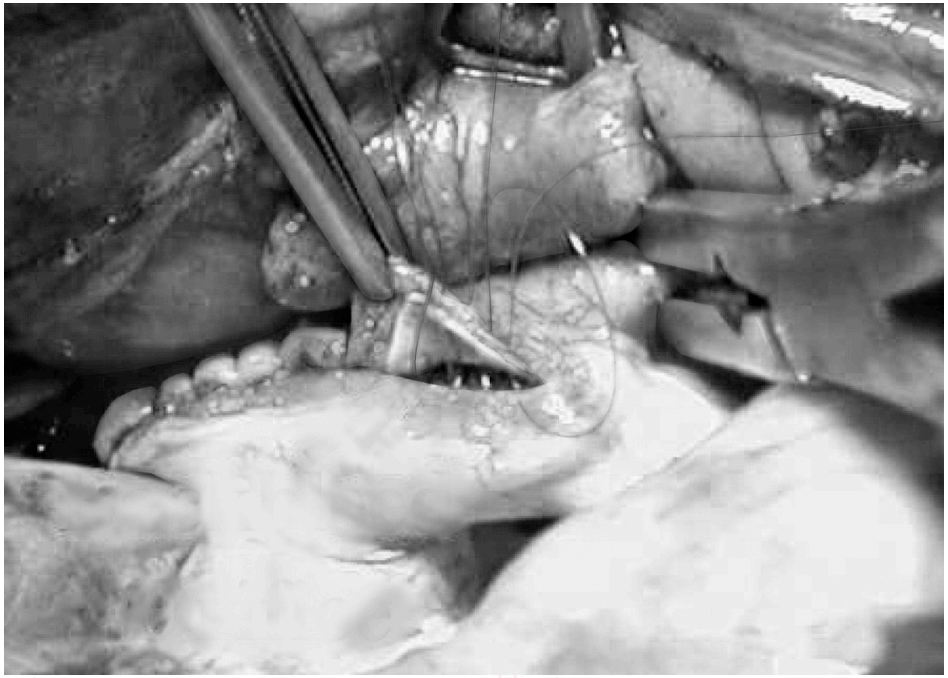
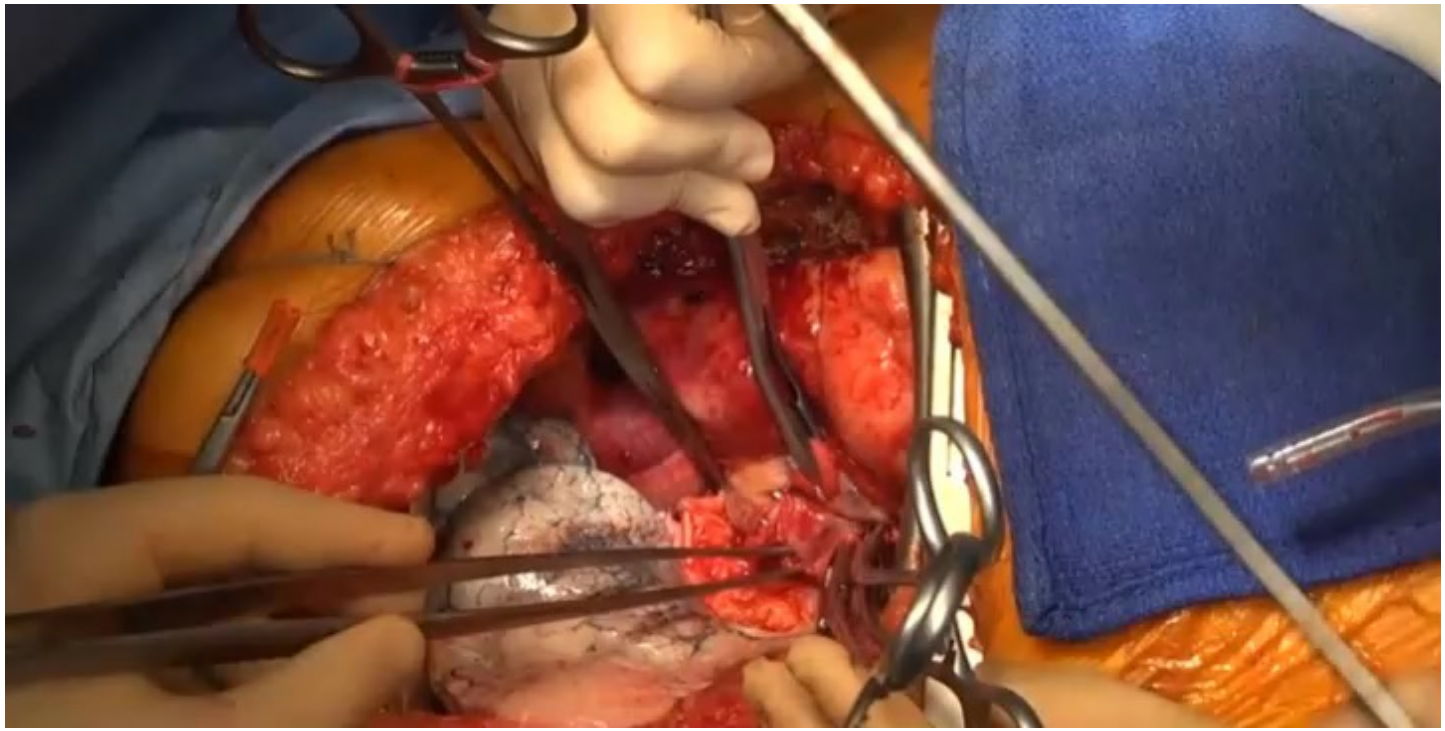
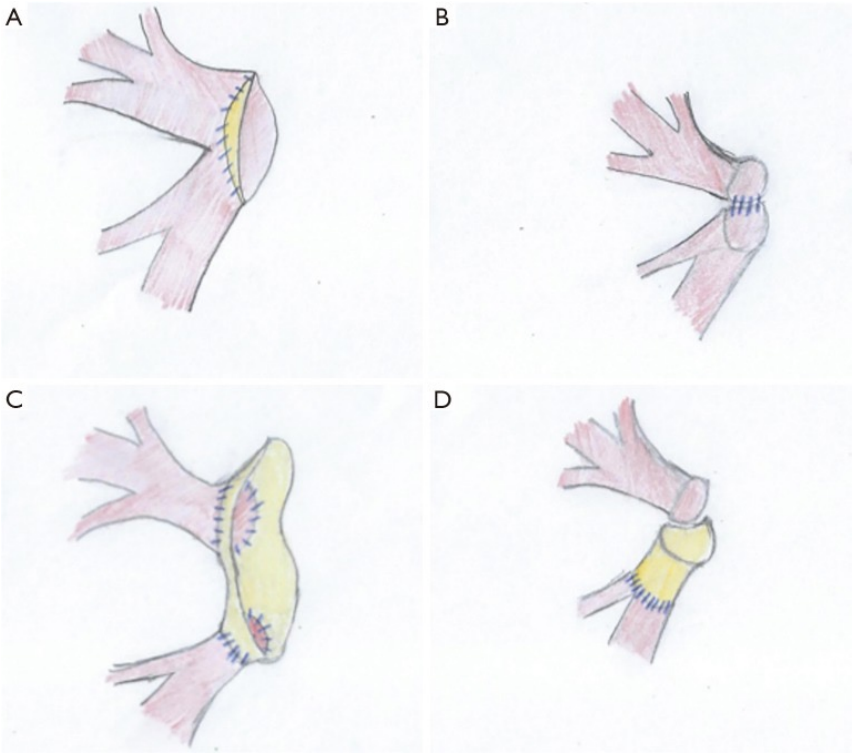
Recipient atrial cuff

Donor atrial cuff

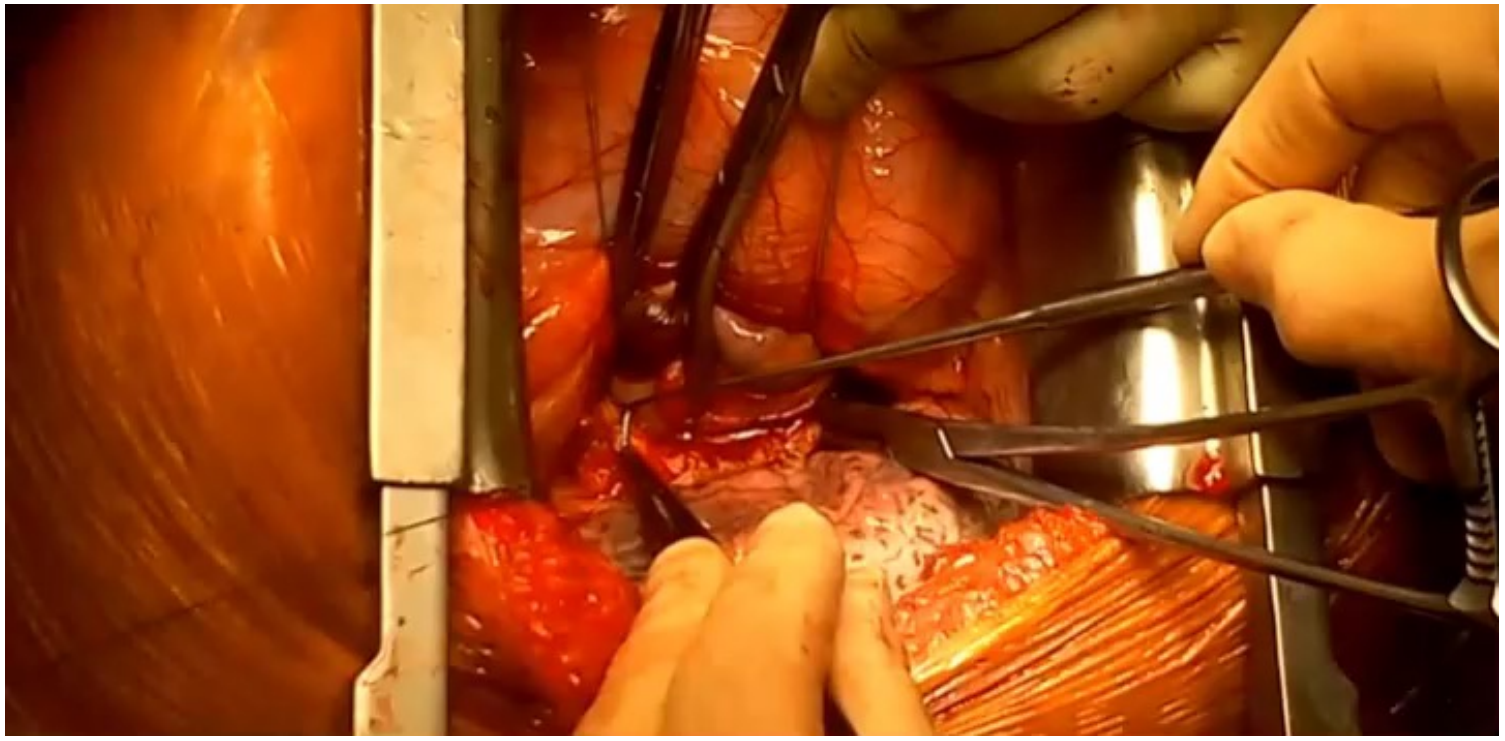


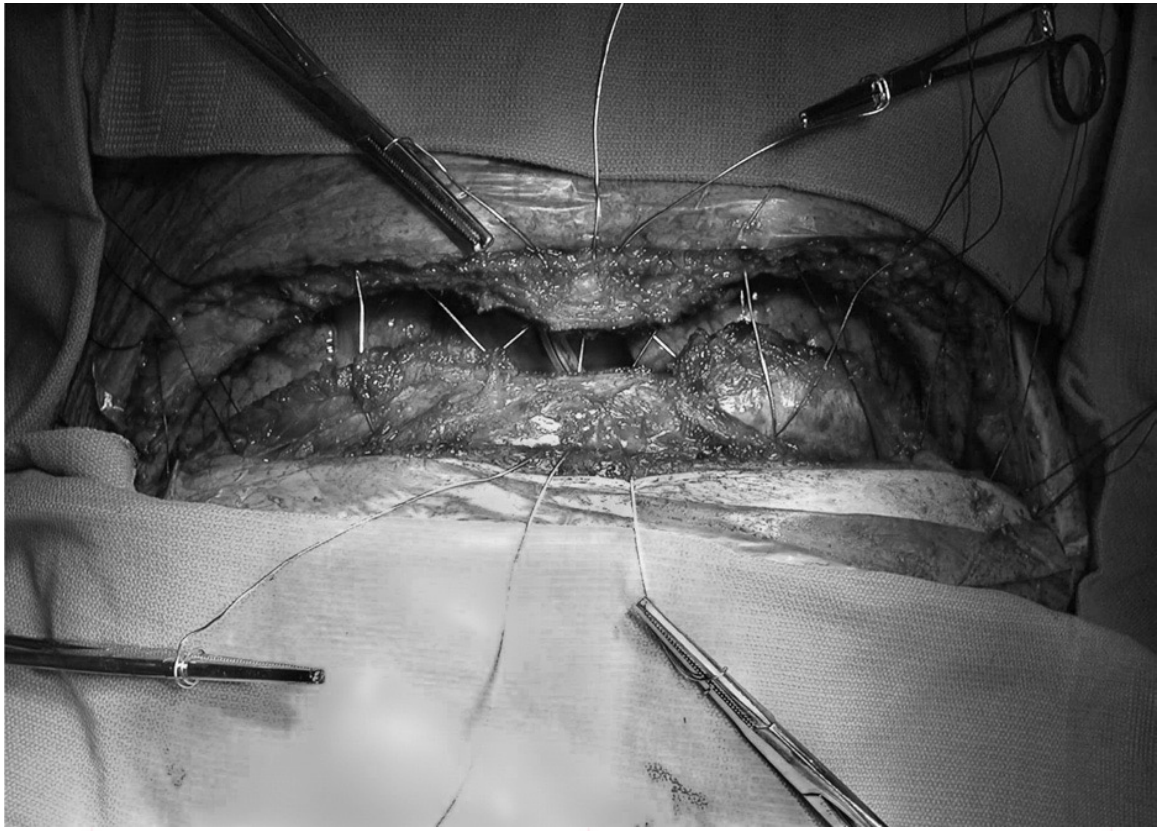
Pulmonary Vein anastomosis (4-0 Prolene)




A
B
C
D

Retrograde flush





Intraoperative Considerations

- **Which lung to work on first?**
- **Cardiopulmonary support**
  - **ECMO vs CPB**
  - **Cannulation site**
- **Ischemic times**
- **Graft function**

Post Op Pathway

Data:	Pre-op	POD 0	POD 1	POD 2	POD 3	POD 4-14, post discharge
Criteria to call transplant service	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain • Chest tube output >150 per hour • Neurologic changes	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain • Chest tube output >150 per hour • Neurologic changes	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain • Chest tube output >150 per hour • Neurologic changes	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain • Chest tube output >150 per hour • Neurologic changes	• Temp >38.5 • Heart rate <60, >120 • Systolic BP <90, >180 • Urine output <30mL/Hr • Unrelieved pain • Chest tube output >150 per hour • Neurologic changes
Transplant Team Care/Nursing Care	• Type and cross minimum of 4 units pRBCs, 2 FFP, and 1 platelets (specify stat for PRBCs and platelets; choose CMV safe and leuko-reduced)	• Titrate pressors and inotropes (to ensure end organ perfusion) • Follow serial lactate and ABG • Wean FiO_2 to 40% • PEEP 10 • Bronch for toilet prn • Monitor chest tube output • Examine cannula sites for bleeding in post-op ECMO patients • Consider wean of nitric oxide or Flolan	• Wean FiO_2 to 30% • Wean PEEP to 5 • Wean nitric oxide or Flolan • Initiate CPAP trial with view to extubation • Flexible bronchoscopy for toilet prior to extubation • Wean pressors and inotropes • Assess neuro status • DC posterior chest tube when output <250cc/day • Remove hemodynamic monitoring lines • Ensure adequate narcotic pain control • Start bowel regimen • Pulmonary toilet	• Ensure satisfactory VS and UO • Check chest tube output • Begin diuresis • DC anterior chest tube when output <150 cc/day • Send DSA in event of unacceptable antigenic profile • Transfer orders to 9D • Ensure alert and oriented x3, balanced intake and output	• Ensure satisfactory VS and UO • Ensure >92% on 4L/min NC and down to 2L/min by POD 6 • Check last chest tube output (follow output until <150cc/day, then DC) • Ensure alert and oriented x3 • Begin diuresis and monitor renal function • Pulmonary toilet	• Ensure satisfactory VS and UO • Ensure >92% on 4L/min NC and down to 2L/min by POD 6, RA from POD 7 • Check chest drain output (follow output until <150cc, then DC) • Ensure alert and oriented x3 • Begin diuresis and monitor renal function • Pulmonary toilet
Immunosuppression	• Coordinator notifies whether Campath or Simulect • On Simulect order set, choose only pre-op Simulect order and uncheck all other boxes • No premeds (Tylenol, Benadryl) necessary with Simulect • For infectious serologies (CMV, toxoplasma, etc), order only those that are negative on previous draw	• Check orders for tacrolimus, MMF, and steroids	• Start tacrolimus • Check MMF and steroid dose	• Check tacrolimus levels (goal 10-15) with AM labs, adjust as necessary	• Check tacrolimus levels (goal 10-15) with AM labs, adjust as necessary	• Check tacrolimus levels (goal 10-15) with AM labs, adjust as necessary

ATCSA2023 Ho Chi Minh city, Vietnam

Immunosuppression

- **FK506**
- **MMF**
- **Steroids**

Thank You