THE LUNG-TRANSPLANT PATIENT

Advances in donor and recipient selection, improved surgical techniques as well as new immunosuppressive drugs and better management of infections has improved survival.

Table 295-11.1 General Indications for Single-Lung, Double-Lung, and Heart-Lung Transplantation
Conditions requiring single-lung transplantation (primarily parenchymal conditions)
Emphysema or COPD (most common)
IPF
α_1-Antitrypsin deficiency
Primary pulmonary hypertension
Eisenmenger syndrome
Others (sarcoidosis, eosinophilia, lymphangioleiomyomatosis, bronchiolitis obliterans, retransplantation)
Conditions requiring double-lung transplantation (primarily infectious conditions)
Cystic fibrosis (most common)
Selective patients with COPD (second most common)
IPF
α_1-Antitrypsin deficiency
Primary pulmonary hypertension
Bronchiectasis
Eisenmenger syndrome
Conditions requiring heart-lung transplantation (primarily vascular conditions)
End-stage lung disease with nonrepairable congenital cardiac defects
Eisenmenger syndrome secondary to advanced valvular or ischemic cardiomyopathy

CLINICAL FEATURES:

- Important features to note include RR, pulse oximetery, cyanosis, diaphoresis, use of respiratory muscles, signs of congestive heart failure & adequacy of peripheral perfusion.
- CXR to identify new infiltrates or pneumothorax
- Pulmonary function tests are important (but this cannot distinguish between acute rejection, infection & non-immunologic causes of respiratory dysfunction such as airway stenosis)
    - A drop in FEV1 of >10% is considered a significant change that warrants clinical investigation
    - Patients should measure their FEV1, BP and temperature daily

DIFFERENTIATING INFECTION FROM REJECTION:

- BRONCHOSCOPY IS NEEDED TO DISTINGUISH THESE 2 CLINICAL ENTITIES.
    - The two OFTEN OVERLAP in terms of their symptoms and signs
    - Management is obviously quite different
    - Urgent bronchoscopy with BAL and transbronchial biopsy is required to discern the specific aetiologies
- COVER BOTH INFECTION AND REJECTION TO BEGIN WITH !!

EARLY COMPLICATIONS OF LUNG TRANSPLANT:

Table 295-12 Time Course of Lung Transplant Complications	
Days Post-Transplant	**Complications Most Commonly Seen in Each Time Period**
0–3 d	Hemorrhage from technical/mechanical problems
	Reperfusion injury
	Dysrhythmia
3 d–1 mo	Infection: bacterial, mycoplasma, community respiratory viruses
	Rejection
	Anastomotic failure
	Pulmonary embolism
	Muscle weakness
	Dysrhythmia
Starting at 1 mo	Rejection
	Obliterative bronchiolitis
	Infection
	Bacterial, fungal, community respiratory viral (can occur at any later time)
	Mycoplasma 0–4 mo
	Mycobacteria after 4 mo
Other	Cytomegalovirus infection and *Pneumocystis jiroveci* pneumonia may occur any time, but are more common when prophylaxis is not being given, especially when such treatment has been recently discontinued.

ACUTE REJECTION:

TREATMENT SHOULD BE DISCUSSED WITH THE PATIENT'S TRANSPLANT TEAM

- If maintenance immunosuppressant regimen has been tapered, return to pretaper dosages.
- High-dose corticosteroids (15mg/kg IV methyprednisolone daily for three days) then 1mg/kg prednisone for 10days
- Acute rejection is common and may occur 3-6 times in the first postoperative year.
    - After the first year, the frequency of acute rejection decreases
- *SIGNS OF REJECTION.*
    - Cough, chest tightness, ↑ or ↓ in temperature from baseline >0.28*C
    - Hypoxaemia, decline of FEV1 >10%, development of infiltrates on CXR (may be radiographically silent after six weeks)
- Clinical response to treatment is gauged by improvement in oxygenation, spirometry & radiographic appearance.
    - Typically occurs within 24-48 hours after treatment is initiated

INFECTION:

- One of the most common causes of morbidity and mortality in lung transplant patients (see below for others)
- Infection of donor lungs is frequently found on cultures taken before transplantation (staph aureus may be more prevalent in donor lungs given high rates among ventilated brain injury patients)

Table 295-14 Causes of Death in Adult Lung Transplant Recipients				
Cause of Death	**Percentage at <1 mo***	**Percentage at 1–12 mo***	**Percentage at 1–3 y***	**Overall Percentage†**
Graft failure	28	19	18	5.3
Infection, non-cytomegalovirus	20	36	24	63.1
Cardiovascular	11	4	3	—
Bronchiolitis obliterans	0.4	5	28	—
Malignancy	0.2	5.4	7.8	—
Acute rejection	4.7	2	1.9	—
Technical	8	3	1	
Pulmonary embolism	—	—	—	5.3
Acute myocardial infarction	—	—	—	5.3
Other	27	22	15	—

- Bacterial pneumonia is the most common complication in the 1st 3 months after transplant.
    - Poor mucociliary clearance, diminished cough, poor lymphatics & reperfusion injury, as well as immunosuppression.
- Late/recurrent infections are associated w/ increased risk of bronchiolitis obliterans.
    - Can be avoided with targeted post-operative ABx therapy.
- Infection w/ pan-resistant *Pseudomonas* is associated w/ increased morbidity & mortality.
- Other infectious agents include;
    - Gram -ve & +ve bacteria, Mycobacterium sp., aspergillus, CMV/HSV/EBV.

INDICATIONS FOR HOSPITAL ADMISSION

Table 295-13 Indications for Hospital Admission for Lung Transplant Patients
Pretransplant patients
Respiratory failure
Infiltrate
Systemic infection
Decompensated congestive heart failure or pulmonary edema
Pneumothorax
Post-transplant patients
Respiratory failure
Acute rejection
Rapidly progressive airflow limitation (forced expiratory volume in 1 second falls >10% over 48 h)
Infiltrate
Systemic infection
Febrile neutropenia
Pneumothorax

BRONCHIOLITIS OBLITERANS.

- The most frequent cause of death after 2nd post-transplant year.
- Large airways become *bronchiectatic* whilst smaller airways are destroyed.
- Chronic allograft dysfunction & airflow limitation.
    - Chronic rejection likely plays a role.
        - Other factors include CMV, toxic inhalation etc.
- Diagnosis is made on clinical criteria.
    - >20% fall in FEV1 [without any other identifiable cause].
    - CXR is usu. clear of infiltrates
- Treatment involves;
    - Augmentation of immunosuppression
        - High-dose steroids included.

ABDOMINAL COMPLICATIONS.

- ~10% of transplant recipients develop abdominal complications.
- Include;
    - Acute acalculous or calculus cholecystitis
    - Peptic ulcer disease
    - Obstructive jaundice
    - SBO
    - Pancreatitis
    - Diverticulitis
    - Perforations.