EMPYEMA & LUNG ABSCESS

EMPYEMA:

- *Empyema = PUS IN THE PLEURAL SPACE*
  - Includes pleural space infections with +VE gram stain/culture or parapneumonic effusion without culture/sampling
  - Underlying bacterial pneumonia is the most common cause
- Additional causes: complications of chest/abdominal trauma, oesophageal perforation, extension from a lung abscess, osteomyelitis, haemothorax/ chylothorax/hydrothorax w/ secondary infection.
- PREDISPOSING FACTORS:
  - Aspiration pneumonia and its predisposing factors
  - Respiratory disease impairing ciliary function
  - Immunocompromise
  - Alcoholism

Table 69-1 Common Organisms in Empyema and Associated Pathology

Pathology	Organisms
Pneumonia	*Streptococcus pneumonia*
	Staphylococcus aureus
Pneumonia (unimmunized with *Haemophilus influenza* type B vaccine)	*Haemophilus influenza*
Lung abscess	Mixed oropharyngeal anaerobes
or	*or*
Aspiration pneumonia	*S. aureus*
or	*or*
Recent thoracotomy	Gram-negative bacilli
Pneumonia in the setting of human immunodeficiency virus	Tuberculosis
	Fungal infections
Chest trauma	*S. aureus*
	or
	Gram-negative bacilli
Contiguous abdominal infection	Gram-negative bacilli
	Anaerobes
Esophageal rupture	Mixed oropharyngeal organisms

CLINICAL FEATURES:

- Empyema usually preceded by pneumonia --> suspect if symptoms of pneumonia (fever, cough and SOB) do not resolve with treatment.
- Patients appear chronically ill --> weight loss, anaemia, night sweats
- Physical exam: ↓d breath sound, dullness to percussion

DIAGNOSIS:

- Diagnostic criteria include aspiration of grossly purulent material on thoracocentesis plus at least one of:
  - Positive gram stain or culture of pleural fluid
  - Pleural fluid glucose <40mg/dL
  - pH < 7.1
  - LDH > 1000
- Empyema has THREE STAGES THAT AFFECT TREATMENT OPTIONS
  - Exudative phase: may be brief, characterised by free-flowing fluid amenable to chest tube drainage
  - Fibrinopurulent: fibrin causes loculation, meaning resolution with ICC drainage alone is unlikely
  - Organisational: over weeks, more extensive fibrosis, "pleural peel" makes lung expansion difficult

TREATMENT:

- Treatment of underlying conditions should begin in ED
  - Antibiotics
  - Pain relief
  - THORACOCENTESIS MAY BE NEEDED TO STABILISE A PATIENT WITH RESPIRATORY OR CARDIAC DISTRESS
- Intrapleural fibrinolytic agents may assist, but have not been shown to provide mortality benefit
- VATS useful in treatment of loculated empyema

Drainage

Empyemas, as with any collection of pus, always require adequate drainage.

Indications for drainage of **parapneumonic effusion** are:

- large size (greater than one third of the hemithorax)
- frankly purulent or turbid fluid on sampling (ie an empyema)
- presence of bacteria on Gram stain or culture of pleural fluid indicating a developing empyema
- pleural fluid pH less than 7.2
- pleural fluid LDH more than 1000 units/L
- continued fever and sepsis despite adequate antibiotic therapy
- loculated pleural effusions.

Antibiotic therapy:

If the patient is very sick, use:

1 **piperacillin+tazobactam 4+0.5 g (child: 100+12.5 mg/kg up to 4+0.5 g) IV, 8-hourly**

OR

1 **ticarcillin+clavulanate 3+0.1 g (child: 50+1.7 mg/kg up to 3+0.1 g) IV, 6-hourly.**

LUNG ABSCESS:

- A localised suppurative necrotising process occurring within the pulmonary parenchyma
- Most common cause is ASPIRATION
  - can occur as result of bacteraemia from outside lungs
- Other causes:
  - NEOPLASM (primary & metastatic)
  - Pulmonary infarction
  - Penetrating chest trauma
  - Fungal/parasitic infection
- Secondary lung abscess is one associated with malignancy, immunosuppression or extrapulmonary infection and has high mortality rate (66-75%)
  - Primary lung abscess has mortality rate of 2-3%

PATHOPHYSIOLOGY:

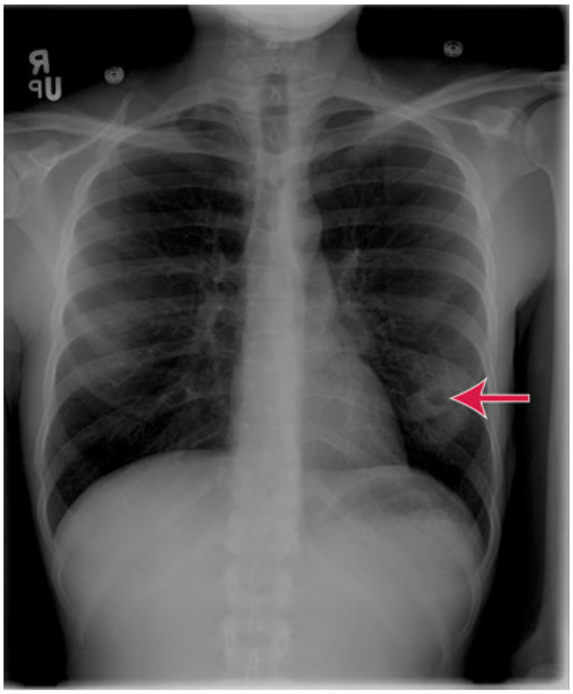
- Caused by breakdown or overwhelming of usual pulmonary defense mechanisms
- Anaerobes are the most common isolate from immunocompetent hosts --> associated with aspiration.
- Aerobic bacteria are implicated in hospital-acquired infection and have a higher mortality rate
- Infectious abscesses typically occur in the basal segments of the lower lobes or posterior segments of the upper lobes
  - If they occur in the anterior section of the lung, think MALIGNANCY
  - Cancer causes up to 30% of abscesses in the adults

CLINICAL FEATURES:

- Several weeks of cough, fever, pleuritic chest pain, weight loss & night sweats
- Cough may be productive of putrid sputum or haemoptysis
- Because progression is indolent, normal signs of sepsis may be absent.

DIAGNOSIS:

- Usually made by CXR showing area of dense consolidation with an AIR-FLUID LEVEL INSIDE A THICK-WALLED CAVITY



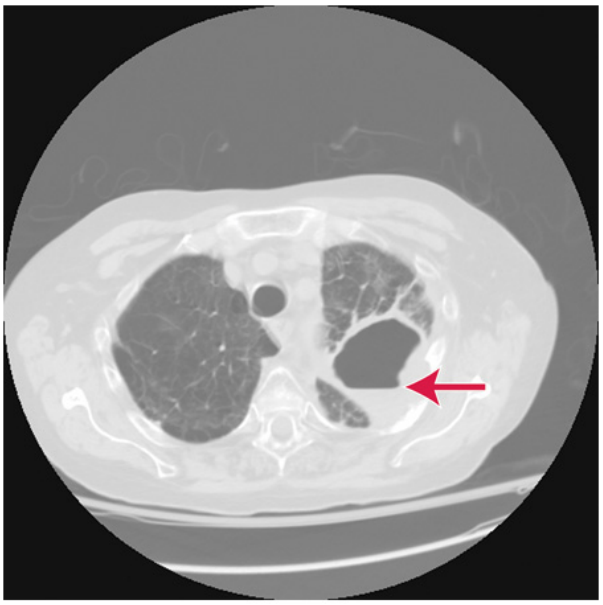


Table 69-2 Causes of Cavitary Lung Lesions	
Bullae	(with or without infection)
Mycobacteria	Tuberculosis
Bacterial	Anaerobic bacteria
	Staphylococcus aureus
	Gram-negative bacteria
	Pneumococcus
	Actinomycosis
	Nocardiosis
Fungi	Coccidioidomycosis
	Histoplasmosis
	Blastomycosis
	Aspergillosis
	Cryptococcus
Parasitic	Echinococcosis
	Amebiasis
Neoplastic	Bronchogenic carcinoma (squamous cell or adenocarcinoma)
	Metastatic cancer (colorectal or renal)
	Lymphoma or Hodgkin disease
Inflammatory	Wegener granulomatosis
	Sarcoidosis
Thromboembolism	Septic
	Thrombus
Congenital	

REMEMBER THAT A HIATUS HERNIA CAN GIVE THE APPEARANCE OF A CAVITARY PULMONARY LESION

TREATMENT:

- Medical management will successfully treat 70-90% of lung abscesses
- Drainage occurs spontaneously from communication of the abscess cavity with the tracheobronchial tree
- Coverage against anaerobes is typical --> clindamycin & metronidazole
- Complications of abscess: empyema, massive haemoptysis, failure of abscess to resolve (~10% need surgery), contamination of uninvolved lung

Table 69-3 Factors Associated with Poor Outcome in Lung Abscess
Aerobic infection
Advanced age
Debilitation
Extrapulmonary infection
Immunosuppression
Malignancy
Malnutrition
Sepsis

DISPOSITION:

- All newly diagnosed lung abscesses should be admitted to hospital for workup & treatment.
- IV ABx should be started in ED.