

Pleural Infections

MICROBIOLOGY:

- **Community-acquired pleural infection:** *Streptococcus* species (50%) and anaerobes (20%) most common
 - *S. aureus* (10%) and gram-negative organisms (10%) are less common
- **Hospital-acquired pleural infection:** *S. aureus* (35%) and gram-negative organisms (20%) are most common
 - Anaerobes less common (10%)
- **Primary empyema:** empyema that occurs in the absence of underlying pneumonia. Can be seen in *S. aureus* bacteremia and invasive Group A streptococcal disease.

DIAGNOSIS:

What is a parapneumonic effusion:

- Pleural effusion in the setting of a pneumonia.
- Spectrum of pleural processes from uncomplicated (sterile) parapneumonic effusion to empyema (infected)
- Parapneumonic effusions are exudative, identified by the presence of any one of the following (Light's criteria):
 - Pleural fluid protein/serum protein >0.5
 - Pleural fluid LDH/serum LDH >0.6
 - Pleural fluid LDH > 2/3 upper limited of normal for serum LDH

Diagnostic imaging:

- CXR in particular lateral decubitus films showing more than 1cm of fluid
- Ultrasound Chest is more accurate for quantifying volume than CXR, can also detect septations and guide pleural drainage.
- CT Chest should be done in all cases of suspected empyema, and non-resolving pneumonia despite adequate antibiotic therapy

When to sample parapneumonic effusions:

- Pneumonia with non-resolving symptoms and persistent/progressive pleural effusion
- Pleural effusion is free-flowing >25mm in depth on lateral decubitus films or CT
- Pleural effusion is loculated on CT
- Pleural effusion is associated with thickened parietal pleura on contrast-enhanced CT

Investigations:

- Blood cultures in all patients suspected of having a pleural infection.
- Serum LDH and total protein concurrently with pleural fluid sampling
- Pleural fluid **ALWAYS** send: cell count & differential, bacterial culture, LDH, total protein, pH, glucose, cytology
 - As directed by history/presentation: AFB and mycobacterial culture, fungal culture

MANAGEMENT:

Classification	Antibiotics	Pleural Drainage
Uncomplicated Parapneumonic Effusion: No features of Complicated Parapneumonic Effusion or Empyema		
Community OR Hospital Acquired	Treat underlying pneumonia. <i>See CAP, HAP, or VAP in ASP Handbook.</i>	Chest tube generally unnecessary unless poor clinical progress
Complicated Parapneumonic Effusion: pH <7.20 OR glucose <3.4 mmol/L if pH not available OR Empyema: Visibly purulent OR Organisms seen on gram-stain OR Culture positive for known pathogen		
Community-Acquired	ceftriaxone 2 g IV q24h AND metronidazole 500 mg PO BID <i>If severe cephalosporin allergy:</i> moxifloxacin 400 mg PO/IV q24h OR clindamycin 450 mg PO TID <i>If MRSA suspected: ADD vancomycin¹</i>	Chest tube drainage
Hospital-Acquired	piperacillin-tazobactam 4.5 g IV q6h AND vancomycin ¹ <i>If severe penicillin allergy:</i> ciprofloxacin 750 mg PO BID AND metronidazole 500 mg PO BID AND vancomycin ¹ <i>If high risk for ESBL: meropenem 500 mg IV q6h</i>	Chest tube drainage
Oral Step-Down & Duration		
Oral Step-Down	Antibiotics with good oral bioavailability should be administered orally unless contraindicated: metronidazole, moxifloxacin, ciprofloxacin, and clindamycin. Amoxicillin-clavulanate can be used once adequate source control and clinical improvement.	
Duration	Uncomplicated Parapneumonic Effusion: 5-7 days to treat underlying pneumonia Complicated Parapneumonic Effusion OR Empyema: 3-6 weeks	

Doses may require adjustment for renal insufficiency

¹ *Vancomycin can usually be discontinued if blood and other relevant cultures are negative for MRSA. For vancomycin dosing, refer to "Vancomycin Dosing and Therapeutic Monitoring" in the ASP Handbook*

NOTES:

- Differential diagnosis for pleural acidosis and/or low glucose includes malignancy, TB, rheumatoid pleurisy, and lupus.
- Consider Respiriology/Thoracic Surgery and Infectious Diseases consultation for Complicated Parapneumonic Effusion and Empyema.