ANAEROBIC LUNG INFECTIONS

Where do anaerobes come from?
- Commonly overlooked as pathogens because special precautions are needed for collection and transport, and culture growth is a slow process.
- Dominant bacteria of indigenous flora, whose role is to prevent colonization and infection of pathogenic organisms from outside sources. Most prevalent on the skin, nose, mouth, throat and colon. Bacteria thrive in microhabitats of reduced oxygen tensions such as gingival crevices, tonsillar crypts, teeth plaque, hair follicles, and sebaceous glands.
- Normally, in oral cavity there are about 10 CFU’s per ml and in the colon 10.

When do anaerobes cause infection?
- Normal aspiration: 45% healthy subjects aspirate during sleep and normal pulmonary clearance mechanism maintains the lower airways and parenchyma sterile (glottic closure, cough reflex) with no clinical consequence.
- Infection requires a combination of aspiration of large inoculums of a virulent bacteria AND impaired host defenses.
  - Anaerobic overgrowth in the oral cavity due to periodontal disease.
  - Impaired host defense due to stupor/coma, seizure, alcoholism, general anesthesia, dysphagia due to neurological or esophageal disease, underlying pulmonary abnormalities (bronchiectasis, pulmonary infarct, malignancy)

What are the top 3 anaerobes to cause infection?
- Fusobacterium nucleatum (gram-negative rods), peptostreptococcus (gram positive cocci), micro-aerophillic streptococcus (gram positive cocci); less commonly prevotella, bacteroides fragilis, clostridium perfringes, actinoymces
- In more than 2/3 cases part of a polymicrobial infection with other anaerobes, facultative and aerobic bacteria, most commonly in conjunction with pneumococcus, staph aureus, klebsiella and pseudomonas.

What is a typical clinical course of anaerobic pulmonary infection?
- Pneumonia:  fever (no rigors), cough (no sputum) and infiltrate in aspiration prone segments of lung (posterior segment of right upper lobe, superior segment of right lower lobe, right lung favored because of the more direct take-off of the right mainstem; note if aspirate in the upright position basilar segments of the lower lobes are affected). With appropriate treatment fever should resolve in 3 days, x-ray in 3 weeks. If not treated, within 7-10 days will begin to destroy tissue.
- Necrotizing pneumonia: toxic- appearing, fever, cough with putrid sputum, pleurisy and hemoptysis, x-ray with multiple small lucent areas of
necrosis/cavitations, may be associated with empyema. With appropriate
treatment, fever should resolve in 7 days but may take up to 21; and x-ray may
take months.
- Lung abscess: insidious onset, chronically ill-appearing with fatigue, low-grade
  fevers, weight loss, cough with purulent sputum and hemoptysis, x-ray with large
  abscess with single lung segment, may be associated with empyema. Course
  similar to necrotizing pneumonia.

What are complications of anaerobic infections?
- Bacteremia(<5%), supportive jugular vein thrombophlebitis (Lemierre’s
  syndrome), endocarditis, metastatic brain abscesses
- Life threatening hemoptysis, bronchopleural fistula

How do you diagnose and treat?
- Microbiologic diagnosis is very difficult. Coughed up sputum sample is useless
  because of contamination form oral cavity. Blood cultures are usually negative.
  New data shows bronchoscopy with BAL may be helpful, consider if patient is
  seriously ill. Thoracentesis for pleural fluid has best yield. When collecting your
  sample remember to use good technique, quick transport to lab.
- Traditionally, penicillin sensitive; NOW there is 25 % resistance due to
  penicillinase.
- Clindamycin 600 mg IV q 8hours, 300 mg PO QID (compared in small series to
  PCN, observed to be superior in terms of response rates, defervescence and
  decreased failure rates).
- Amoxicillin-clavulanate 875 mg BID or a combination of PCN(amox 500 TID) +
  metronidazole (500 BID/TID) seem to be comparable in published series.
- DO NOT use metronidazole as monotherapy because of high failure rates.
- Other antimicrobials that may be effective but have not been studied include:
  imipenam, zosyn, ceftriaxone.
- Drugs, which have poor activity against anaerobes include: septra, cipro,
  ceftazidine, aminoglycosides.
- Course: simple pneumonia treat for 10 days, complication treat for 6-8 weeks and
  possibly longer.
- Remember; TWO steps needed for anaerobic lung infection—if patient is
  edentulous, look for underlying malignancy.

What else cavitates? DDX
Infection: mycobacterium (TB, MAC), fungal (aspergillus, histo, cocci, blasto, crypto,
paracocci, sporotrichosis), parasites (echinococcus, paragonomiasis); bacteria (strept,
klebsiella, staph, nocardia, actinomyces), septic emboli
Inflammatory: WG, AS, RA
Neoplasm: squamous cell

References:
Up to date 2002.
Mandel et al. Principles and Practice of Infectious Disease 5th edition