Pulmonary Aspiration

Harmeet Bedi, MD
Clinical Assistant Professor
Interventional Pulmonology
Introduction & Terminology

• Pulmonary aspiration is the entry of liquid and/or solid matter through the glottic opening (vocal cords) into the tracheobronchial tree of the lungs

• Origin of the liquid/solid matter can be from endogenous (i.e. gastric liquid/vomit, oropharyngeal secretions) or exogenous (i.e. food, dietary liquids) sources
“Pulmonary aspiration”: Generally occurs as a consequence of one or more of the following conditions:

**Dysphagia** from neurologic conditions, regional mass effect, post-extubation, esophageal disease

**Impaired consciousness** with compromise of cough reflex and glottic closure (i.e. seizures, medications, alcohol, illicit drugs, anesthesia)

**Mechanical disruption** of glottic structures and/or protective mechanisms (i.e. endotracheal intubation, tracheostomy, nasogastric tube)

**Increased gastric contents** (i.e. GERD, obstruction, tube feeds)
Introduction & Terminology

• **Consequences of pulmonary aspiration:**
  
  • **Chemical pneumonitis**
  
  • **Bacterial infection:**
    - Pneumonia (or commonly referred to as “aspiration pneumonia”)
    - Lung abscess
    - Empyema (infection of the pleural space)
  
  • **Foreign body aspiration**
Introduction & Terminology

• Technically, almost all pneumonias are “aspiration pneumonias”, exceptions:
  • Tuberculosis, Legionella PNA, and viral PNAs (i.e. Influenza, COVID19, etc.)

• Nasopharyngeal flora is the source

• Microaspiration - approximately 50% of healthy adults aspirate during sleep*

• Hence why we treat with different antibiotics for:
  • Community-acquired PNA (i.e. Strep pneumoniae, Haemophilus, etc.)
  • Hospital-acquired PNA and ventilator-acquired PNA (i.e. MRSA, Pseudomonas, etc.)

• PNAs develop as results of different factors:
  • Immunity status, h/o lung disease, mucociliary clearance, inoculum quantity & frequency, and virulence of organism

Chemical Pneumonitis

• Macroaspiration of gastric contents (acid, generally pH<2.5, even as little as 25mL)

• Generally perioperative

• Acute injury and inflammatory cascade

• Generally presents with acute decompensation

• Hard to distinguish against aspiration pneumonia

• Supportive therapy, does not require antibiotic therapy (however empiric abx should be started at onset), and bronchoscopy
Aspiration Pneumonia

• **Inpatient Clinical Features:**
  • Acute/subacute onset of respiratory symptoms (wheezing, cough, SOB/DOE)
  • Abnormal vital signs (tachycardia, fever +/-, tachypnea)
  • Requiring O2 (or increased requirement)
  • Witnessed aspiration event (but commonly not present)

• **Outpatient Clinical Features:**
  • Asymptomatic to mild respiratory symptoms
  • **Loss of appetite, fatigue**
  • May or may not have recent history of recent pneumonia/hospitalization
  • Witnessed dysphagia symptoms are common (coughing with eating/drinking)
Aspiration Pneumonia

• Diagnosis
  • STRONG clinical suspicion
    – H/o risk factors for dysphagia
    – Witnessed dysphagia symptoms
    – Debilitated state?
    – Recent hospitalization/pneumonia?

• Imaging and Swallow Studies
  – Normal CXRs can be seen early on with aspiration PNA
  – Study showed that 28% of patients had normal CXR but abnormal CT chest*
  – Hallmark of aspiration: abnormalities in gravity-dependent regions of the lung (right>left lower lobe and posterior segments of upper lobes)

• Microbiological studies (sputum culture and bronchoscopy)
  – Generally not needed and can be difficult to obtain
  – Consider bronchoscopy referral for recurrent PNAs in the same region of the lung

Aspiration Pneumonia
Aspiration Pneumonia

Aspiration pneumonia in adults – Uptodate.com
Lung Abscess
Empyema
Aspiration Pneumonia

• **Microbiology**
  - Historically: anaerobes were considered the culprit
  - **Current literature:** very likely mixed with aerobic and anaerobic bacteria
  - Important: evaluate oral cavity and dentition
  - Culprit organisms are based upon community vs hospital-acquired risk factors

• **Treatment**
  - Treat underlying etiology of dysphagia and speech/swallow therapy
  - **Outpatient (CAP profile):** Augmentin (amoxicillin + clavulanate), if PCN allergic: clindamycin and consider adding fluoroquinolone
  - **Inpatient (CAP profile):** Unasyn (ampicillin + sulbactam), if PCN allergic: ceftriaxone + metronidazole
  - **HAP or concern for MDR:** Zosyn or a carbapenem, okay to start MRSA coverage with Vancomycin but discontinue if MRSA testing is negative
Foreign Body Aspiration – Iron Pill Aspiration Syndrome
Foreign Body Aspiration – Iron Pill Aspiration Syndrome
Foreign Body Aspiration – Dental Bridge
Foreign Body Aspiration – Capsule Endoscopy
Foreign Body Aspiration – Barium Aspiration
Prevention

• Chemical pneumonitis: pre-operative fasting for 8 hours for solids and 2 hours for clear liquids

• Minimize aspiration-promoting medications: sedatives, antipsychotics, antihistamines

• Speech & swallow evaluation + treatment

• Early mobilization for hospitalized and debilitated patients

• ACE inhibitors for acute stroke: reduced risk of aspiration (elevation of substance P)*

• Oral hygiene care studies have been equivocal overall (i.e. chlorhexidine rinse, tooth extractions, oral care) – advise dental/oral care

Summary

• Maintain high clinical suspicion for this population of patients

• Gravity-dependent PNA on chest imaging should bring aspiration into your differential diagnosis

• Recurrent pneumonias in the same location (RED FLAG, warrants further investigation)

• Antibiotic coverage should be based upon patient’s risk profile (community vs hospital/MDR organisms) and ensure anaerobic bacteria coverage

• Prevention is the best treatment (challenging in our population)
Thank You!