

FYI

Aspiration

Background

Aspiration, ie, the act of taking foreign material into the lungs, can cause a number of syndrome determined by the quantity and nature of the aspirated material, the frequency of aspiration, and the host factors that predispose the patient to aspiration and modify the response. Three types of material cause 3 different pneumonic syndromes. Aspiration of gastric acid causes chemical pneumonia (CP). Aspiration of bacteria from oral and pharyngeal areas causes bacterial pneumonia (BP). Aspiration of oil, eg, mineral oil or vegetable oil, causes exogenous lipoid pneumonia, a rare form of pneumonia. In addition, aspiration of a foreign body may cause an acute respiratory emergency and, in some cases, may predispose the patient to bacterial pneumonia.

Pathophysiology

Aspiration, particularly during sleep, is a common event in healthy individuals. No disease ensues because the aspirated material is cleared by mucociliary action and alveolar macrophages. The nature of the aspirated material, volume of the aspirated material, and state of the host defenses are 3 important determinants of aspiration pneumonia.

CP, also known as Mendelson syndrome, is due to the parenchymal inflammatory reaction caused by a large volume of gastric contents independent of infection. If the pH of the aspirated fluid is less than 2.5 and the volume of aspirate is greater than 0.3 mL/kg of body weight (20 – 25 mL in adults), it has a greater potential for causing CP. The initial chemical burn is followed by an inflammatory cellular reaction fueled by the release of potent cytokines, particularly tumor necrosis factor-alpha and interleukin-8. BP caused by aspiration can occur in the community or in the hospital (ie. nosocomial). In both situations anaerobic organisms alone or in combination with aerobic and/or microaerophilic organisms play an important role. Nosocomial BP caused by aspiration is common and the major pathogens involved are hospital-acquired flora through oropharyngeal colonization (eg, Enteric gram-negative bacteria, staphylococci).

In anaerobic pneumonia, the pathogenesis is related to the large volume of aspirated anaerobes (eg, as in persons with periodontal disease) and to host factors (eg, as in alcoholism) that suppress cough, mucociliary clearance, and phagocytic efficiency. Selection and colonization of gram-negative organisms in the oropharynx, sedation, and intubation of the patient's airways are important pathogenetic factors in nosocomial pneumonia.

History

Chemical pneumonitis

- Acute onset
- Abrupt development of symptoms within a few minutes to 2 hours of the aspiration event
- Respiratory distress and rapid breathing
- Audible wheezing
- Cough with pink or frothy sputum

Bacterial pneumonia

- Subacute or insidious onset. Symptoms occur in a matter of days when aerobic organisms are the pathogens and in days to weeks when anaerobic organisms are the pathogens.
- Cough with purulent sputum
- Absence of rigors
- Putrid odor of sputum (a clue to anaerobic bacterial pneumonia)
- Weight loss

Physical

Chemical pneumonia

- Tachypnea
- Tachycardia
- Fever
- Rales
- Wheezing
- Cyanosis (possibly)
- Tracheal secretions that are food or milk products
- Increased tracheal secretions

Bacterial pneumonia

- Periodontal disease (primarily noted as gingivitis)
- Bad breath
- Clubbing of fingers (possibly)
- Fever
- Bronchial breath sounds and rales over a consolidated posterior area.

Causes

Almost all patients who develop aspiration pneumonia have one or more of the predisposing conditions listed below. While all the listed conditions predispose the patient to chemical pneumonia (CP), conditions that alter consciousness and periodontal disease specifically predispose the patient to bacterial pneumonia (BP).

Conditions associated with altered or reduced consciousness

- Alcoholism
- Drug overdose
- Seizures
- Stroke
- Head trauma
- General anesthesia

Esophageal conditions

- Dysphagia
- Esophageal strictures
- Esophageal neoplasm
- Esophageal diverticula
- Tracheoesophageal fistula
- Gastroesophageal reflux disease

Neurologic disorders

- Multiple sclerosis
- Dementia
- Parkinson disease
- Myasthenia gravis
- Pseudobulbar palsy

Mechanical conditions

- Nasogastric tube
- Endotracheal intubation
- Tracheostomy
- Upper gastrointestinal endoscopy
- Bronchoscopy
- Gastrostomy or postpyloric feeding tubes

Other types of conditions

- Prolonged vomiting
- Prolonged recumbency
- General deconditioning and debility
- Critical illness

Lab Studies

- Arterial blood gas demonstrates acute hypoxemia in patients with chemical pneumonia (CP) and normal-to-low partial pressure of carbon dioxide with respiratory alkalosis.
- CBC count may reveal an elevated WBC count, increased neutrophils, anemia, and thrombocytosis in patients with bacterial (BP) caused by anaerobic bacteria.
- Elevated WBC count and increased neutrophils may be present in patients with CP.
- Sputum Gram stain and microscopy reveal a multitude of bacteria (eg, cocci, bacilli, coccobacillary forms, spirochetes, filiforms) in patients with BP caused by anaerobic bacteria. Findings on sputum culture may not isolate organisms because the major pathogens are anaerobes.
- In nosocomial BP, sputum culture may be helpful in detecting gram-negative bacteria.

Gastroesophageal reflux during gastrostomy feeding

Gastroesophageal reflux and aspiration in patients fed via the gastrostomy tube may be caused by LES relaxation secondary to gastric distention caused by distention of the stomach

Treatment

Antibiotic's broad spectrum.

Suspected aspiration (formula coming from trach)

1. Turn off feedings
2. Suction trach
3. Keep patient at 45 degrees or on right side
4. Vent GTT to allow formula to escape via tube as opposed to aspiration.
5. Pulse ox - check sats
6. Respiratory assessment (ie, color, breaths)
7. Notify parent immediately and/or physician.
8. Continue to assess for respiratory distress