

### General

- Aspiration pneumonia develops after the aspiration of colonized oropharyngeal contents. Aspiration of pathogens from a previously colonized oropharynx is the primary pathway by which bacteria gain entrance to the lungs.

### Pathogenesis:

- Any condition that increases the volume and/or bacterial burden of oropharyngeal secretion in the setting of impaired host defense mechanism may lead to aspiration pneumonia.
- Colonization of the oropharynx is another important step in the pathogenesis of aspiration pneumonia. The elderly have increased oropharyngeal colonization with pathogens such as *Staphylococcus aureus* and aerobic gram-negative bacilli (e.g., *Klebsiella pneumoniae* and *Escherichia coli*).
- Dysphagia is a key risk factor & commonly develops in the setting of stroke or neurodegenerative disease

### Clinical features:

- In patients with aspiration pneumonia, unlike the case of aspiration pneumonitis, the episode of aspiration is generally not witnessed. The diagnosis is therefore inferred when a patient with known risk factors for aspiration has an infiltrate in a characteristic bronchopulmonary segment.
- In patients who aspirate in the recumbent position the most common sites of involvement are the posterior segments of the upper lobes and the apical segments of the lower lobes. In patients who aspirate in the upright or semi-recumbent position the basal segments of the lower lobes are favored.
- The usual picture is that of an acute pneumonic process, which runs a course similar to that of a typical CAP. If untreated, however, these patients appear to have a higher incidence of cavitation and lung abscess formation.

- For initial treatment of aspiration pneumonia, use:

benzylpenicillin 1.2 g (child: 30 mg/kg up to 1.2 g) IV, 6-hourly  
PLUS

metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) IV, 12-hourly  
or metronidazole 400 mg (child: 10 mg/kg up to 400 mg) orally, 12-hourly.

- Alternatively, or in patients with immediate penicillin hypersensitivity, as a single drug use:

clindamycin 450 mg (child: 10 mg/kg up to 450 mg) IV or orally, 8-hourly  
OR

lincomycin 600 mg (child: 15 mg/kg up to 600 mg) IV, 8-hourly.

- Aerobic Gram-negative bacilli are uncommon causes of aspiration pneumonia, despite frequent appearance on Gram stains of sputum. If Gram-negative pneumonia is suspected (eg in alcoholic patients), use:

metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) IV, 12-hourly  
or metronidazole 400 mg (child: 10 mg/kg up to 400 mg) orally, 12-hourly

PLUS EITHER

ceftriaxone 1 g (child: 25 mg/kg up to 1 g) IV, daily

OR

cefotaxime 1 g (child: 25 mg/kg up to 1 g) IV, 8-hourly

OR (as a single preparation)

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

OR

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

- If infection with *Staphylococcus aureus* is suspected or proven, see *Staphylococcal pneumonia*.

- Switch to oral therapy after there has been significant improvement (eg when fever and/or other objective signs are resolving), and the patient is able to tolerate oral medication.  
Use:

amoxicillin+clavulanate 875+125 mg (child: 22.5+3.2 mg/kg up to 875+125 mg) orally, 12-hourly

- In patients with penicillin hypersensitivity, use:

clindamycin 450 mg (child: 10 mg/kg up to 450 mg) orally, 8-hourly.

- For uncomplicated aspiration pneumonia, 7 days of therapy is usually adequate, but extensive disease or abscess formation may require more prolonged high-dose therapy and/or surgery

aspiration pneumonia

aspiration syndromes

aspiration pneumonitis

lung abscess

### Definition:

- Aspiration pneumonitis is best defined as acute lung injury after the aspiration of regurgitated gastric contents.

### risk factors for aspiration during endotracheal intubation:

#### Emergent situations

Upper gastrointestinal hemorrhage

Difficult intubation/multiple intubation attempts

Advanced age (>70 yr)

Seizures

Conditions predisposing to gastroesophageal reflux:

Bowel obstruction

Ileus

Hiatal hernia

Peptic ulcer disease

Gastritis

### pathogenesis:

- aspiration of gastric contents results in a chemical burn of the tracheobronchial tree and pulmonary parenchyma with an intense parenchymal inflammatory reaction.

### the role of bacteria:

- Gastric acid prevents the growth of bacteria, and thus the contents of the stomach are normally sterile. Bacterial infection, therefore, does not play a significant role in the early stages of acute lung injury after aspiration of gastric contents.
- Bacterial superinfection may occur at a later stage; however, the incidence of this complication has not been studied.
- Colonization of the gastric contents by potentially pathogenic organisms may occur when the gastric pH is increased by the use of antacids, H2 blockers, or proton pump inhibitors. In addition, gastric colonization by gram-negative bacteria occurs in patients receiving gastric enteral feedings, as well as in patients with gastroparesis and small bowel obstruction. In these circumstances the pulmonary inflammatory response is likely to result from both bacterial infection and the inflammatory response of the gastric particulate matter.

### clinical manifestations:

- Aspiration of gastric contents can present dramatically with a full-blown picture that includes gastric contents in the oropharynx, wheezing, coughing, shortness of breath, cyanosis, pulmonary edema, hypotension, and hypoxemia, which may progress rapidly to severe acute respiratory distress syndrome (ARDS) and death.
- Many patients may not develop signs or symptoms associated with aspiration, whereas others may develop a cough or wheeze.
- In some patients aspiration may be clinically silent, manifesting only as arterial desaturation with radiologic evidence of aspiration.

### use of antimicrobials

- While common practice, the prophylactic use of antibiotics in patients with suspected or witnessed aspiration is not recommended. Similarly, the use of antibiotics shortly after an aspiration episode in a patient who develops a fever, leukocytosis, and a pulmonary infiltrate is discouraged because it may select for more resistant organisms in a patient with an uncomplicated chemical pneumonitis.
- empirical antimicrobial therapy is appropriate in patients who aspirate gastric contents in the setting of small bowel obstruction or in other circumstances associated with colonization of gastric contents.
- Antimicrobial therapy should be considered in patients with an aspiration pneumonitis that fails to resolve within 48 hours. Empirical therapy with broad-spectrum agents is recommended.
- Lower respiratory tract sampling in intubated patients may allow targeted antimicrobial therapy and the discontinuation of antibiotics in culture-negative patients.

- Lung abscesses usually develop either as a result of aspiration of organisms in patients with dental caries, aspiration of foreign bodies (eg a tooth, a peanut), or as a consequence of severe necrotising pneumonia.

- Patients with altered conscious states (eg from anaesthesia, or alcohol intoxication, or postictal) and/or with swallowing difficulties are at particular risk. Septic emboli are occasionally a cause in intravenous drug users, often with right-sided endocarditis.

- Lung abscesses can also be a consequence of septic thrombophlebitis of pelvic or internal jugular veins (Lemierre syndrome).

- If the cause is necrotising pneumonia, pathogens such as *Staphylococcus aureus* (eg post-influenza) and *Klebsiella pneumoniae* should be considered.

- Infection of pre-existing bullae in a patient with emphysema can masquerade as a primary lung abscess.

- Tumours, vasculitis and tuberculosis can also present as solitary cavitating pulmonary lesions.

- Where possible, attempts should be made to identify the causal organism. Bronchoscopy or fine needle aspiration may be needed to obtain diagnostic specimens or remove a foreign body.

- If the abscess has clearly cavitated and the patient has a productive cough, the abscess is probably draining into the airways, and antibiotics and physiotherapy should be sufficient. If that is not the case, drainage of the abscess via a percutaneous catheter (eg inserted under ultrasound or computerised tomography [CT] guidance) is recommended.

- For empirical antibiotic therapy (after obtaining appropriate cultures), see recommendations for aspiration pneumonia.

- Antibiotic therapy is generally required for at least 10 to 14 days, but should be continued until the patient's sputum is no longer purulent and the abscess cavity is free of fluid (in some cases this may require up to 4 weeks of treatment).