ONE MINUTE CONSULT

BRIEF ANSWERS TO SPECIFIC CLINICAL QUESTIONS

Q: Are antibiotics indicated for the treatment of aspiration pneumonia?

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A: Antibiotics are indicated for primary bacterial aspiration pneumonia and secondary bacterial infection of aspiration (chemical) pneumonitis, but not for uncomplicated chemical pneumonitis.

THREE TYPES OF 'ASPIRATION PNEUMONIA'

Aspiration pneumonia is a broad and vague term mainly used to refer to the pulmonary consequences of abnormal entry of exogenous or endogenous substances into the lower airways. It can be classified as:

- Aspiration (chemical) pneumonitis
- Primary bacterial aspiration pneumonia
- Secondary bacterial infection of chemical pneumonitis.

These three are sometimes difficult to differentiate, as their signs and symptoms can overlap.

CHEMICAL PNEUMONITIS

Aspiration of stomach contents is relatively common, even in healthy people, and usually has no clinical consequences.[1] However, it has also been closely related to community-acquired and nosocomial pneumonia in some studies.[2,3]

Chemical pneumonitis is usually a consequence of the aspiration of a large volume (≥ 4 mL/kg) of sterile acidic (pH < 2.5) gastric contents into the lower airways (Mendelson syndrome).[4,5] The clinical picture varies from asymptomatic to signs of severe dyspnea, hypoxia, cough, and low-grade fever; these signs and symptoms may develop rapidly, within minutes to hours after a witnessed or suspected episode of aspiration.[2,6,7] However, they represent an inflammatory reaction to the gastric acid rather than a reaction to bacterial infection.[8–10]

Chemical pneumonitis affects the most dependent regions of the lungs

Chest radiography shows infiltrates in the most dependent regions of the lung. If aspiration occurs while the patient is supine, the posterior segments of the upper lobes and the apical segments of the lower lobes are most affected. The basal segments of the lower lobes are usually affected if aspiration occurs while the patient is standing or upright.[1,2,11,12]

Chemical pneumonitis can be hard to differentiate from bacterial aspiration pneumonia

Clinical course varies

The clinical course varies. In almost 60% of cases, the patient's condition improves and the lung infiltrates resolve rapidly, within 2 to 4 days. On the other hand, in about 15% of cases, the patient's condition deteriorates quickly, within 24 to 36 hours, and progresses to hypoxic respiratory failure and acute respiratory distress syndrome.

In the other 25% of cases, the patient's condition may improve initially but then worsen as a secondary bacterial infection sets in. The death rate in these patients is almost three times higher than the rate in patients with uncomplicated chemical pneumonitis.[11,13]

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Treatment of uncomplicated cases is mainly supportive

The treatment of uncomplicated chemical pneumonitis involves supportive measures such as airway clearance, oxygen supplementation, and positive pressure ventilation if needed. An obstructing foreign body may need to be removed.[12,14] Corticosteroids have been tried, without success.[11–13,15]

Empiric antibiotic treatment is controversial

Chemical pneumonitis can be difficult to differentiate from bacterial aspiration pneumonia, and whether to give antibiotics is controversial.[16] A survey of current practices among intensivists showed that antimicrobial therapy was often given empirically for noninfectious chemical pneumonitis.[17] This practice raises concerns of higher treatment costs and antibiotic resistance.[16,18,19] Additionally, antibiotics do not seem to alter the clinical outcome, including radiographic resolution, duration of hospitalization, or death rate, nor do they influence the subsequent development of infection.[1,11,13,20]

In cases of witnessed or strongly suspected aspiration of gastric contents, antibiotics are not warranted since bacterial infection is not likely to be the cause of any signs or symptoms.[2,7,16] However, to detect secondary infection early, the patient's respiratory status should be monitored carefully and chest radiography should be repeated.

For nosocomial bacterial aspiration pneumonia, start with a broad-spectrum antibiotic and adjust later

In less clear-cut cases, ie, if it is not clear whether the patient actually has chemical pneumonitis or primary bacterial aspiration pneumonia, it is prudent to start antibiotics empirically after obtaining lower-respiratory-tract secretions for stains and cultures, and then to reassess within 48 to 72 hours. The antibiotics can be discontinued if the patient has rapid clinical and radiographic improvement and negative cultures. Those whose condition does not improve or who have positive cultures should receive a full course of antibiotics.[21,22]

PRIMARY BACTERIAL ASPIRATION PNEUMONIA

Primary bacterial aspiration pneumonia—ie, caused by bacteria residing in the upper airways and stomach gaining access to lower airways through aspiration in small or large amounts—is the most common form of aspiration pneumonia, although the actual episode of aspiration is seldom observed.

Signs of bacterial pneumonia

Primary bacterial aspiration pneumonia bears the hallmarks of bacterial pneumonia.[12] The clinical picture is more indolent than chemical pneumonitis and includes cough, fever, and putrid sputum, mainly in patients who have clinical conditions predisposing to aspiration (eg, coma, stroke, alcoholism, poor dentition, tube feedings).[1,12,20]

The characteristic signs on chest radiography are infiltrates involving mainly the lung bases (the right more then the left). If untreated or inadequately treated, complications such as lung abscess, empyema, bronchiectasis, and broncopleural fistula are common.[23]

Are aerobic organisms replacing anaerobic ones in the community?

The causative organisms in community-acquired aspiration pneumonia are still debated despite abundant research. Older studies[1,24,25] found mostly anaerobic organisms (peptostreptococci, peptococci, *Fusobacterium*, *Prevotela*, *Bacteroides*) as the underlying pathogens, whereas more recent studies[16,26,27] found mostly aerobic organisms (*Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*, Enterobacteriaceae) and failed to recover anaerobic organisms. These discrepancies may be the result of different techniques used to isolate organisms: older studies used transtracheal sampling, and transtracheal aspirates may be easily contaminated or colonized by oropharyngeal flora; more recent studies used protected specimen brushes to collect lower-airway specimens.[2]

In addition, the pathogenic organisms that predominate in community-acquired aspiration pneumonia, as listed above, are different from those most often found in nosocomial cases; gram-negative bacilli (*Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Escherichia coli*) are most often isolated in patients with aspiration pneumonia acquired in hospitals and nursing homes.[16,27,28] *S aureus* also is an important causative organism in nosocomial cases.[16,28]

Knowing the causative organisms in bacterial aspiration pneumonia is important for guiding antimicrobial therapy.

Antibiotics are required for bacterial aspiration pneumonia

A course of antibiotics is required for bacterial aspiration pneumonia. While there are no definitive recommendations for the duration of treatment, 7 to 8 days is probably appropriate in uncomplicated cases (ie, no lung abscess, empyema, bronchopleural fistula).[22,29] Patients who have complications may need drainage of abscesses or empyema along with a longer duration of antibiotic therapy until clinical and radiographic signs improve.

For community-acquired cases of aspiration pneumonia, a number of antibiotics have proven effective:

- Clindamycin (Cleocin) is still the agent most commonly used, although it lacks gram-negative bacterial coverage.
- Beta-lactam penicillins and newer quinolones have been used successfully.[2,29–31] In addition to covering the previously mentioned bacteria, these antibiotics have the added benefit of covering anaerobic bacteria.
- Metronidazole (Flagyl) should not be used alone because it has a higher clinical failure rate.[32,33]

For nosocomial aspiration pneumonia, giving a broad-spectrum antibiotic empirically is warranted. Beta-lactam penicillins with extended gram-negative coverage, carbapenems, or monobactams in combination with an antistaphylococcal drug have been advocated for nosocomial aspiration.[2,22] A strategy of broad-spectrum coverage followed by narrowing or de-escalating coverage according to lower respiratory tract cultures is encouraged.[21,22,34]

SECONDARY BACTERIAL INFECTION OF CHEMICAL PNEUMONITIS

Nearly 25% of patients with chemical pneumonitis improve initially, then show clinical deterioration secondary to superimposed bacterial infection.[13] Chest radiographs show worsening of initial infiltrates or the development of new ones. The causative organisms and treatment depend on whether the superimposed infection is community-acquired or nosocomial, as is the case in primary bacterial aspiration pneumonia.

PREVENTING ASPIRATION

Measures should be taken to prevent aspiration pneumonia and chemical pneumonitis, especially in institutionalized patients at high risk.[12]

Elevation of the head of the bed while feeding, dental prophylaxis, and good oral hygiene are known to reduce the incidence of these problems.[35–37]

A swallowing evaluation for patients with dysphagia can identify those at higher risk of aspiration. These patients may be candidates for postural adjustments, diet modification, strengthening, and other measures offered by the speech and language pathology teams to improve swallowing physiology, biomechanics, safety, and endurance.[2,35]

Measures should be taken to prevent aspiration in patients at high risk

Although percutaneous endoscopic gastrostomy tubes are often placed in patients who have aspirated or who are at high risk of aspiration, they do not protect against aspiration, nor do orogastric or nasogastric tubes.[38]

To date, we have no evidence that prophylactic antibiotic therapy prevents bacterial aspiration pneumonia. In addition, this practice encourages the development of resistant organisms.[19,39,40]

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