

Aspiration Pneumonia

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Aspiration

Definition •

Misdirection of mouth and gastric contents into the larynx resulting from alteration in lower airway defenses such as glottic closure and the cough reflex •

Incidence

Half of all adults aspirate small amounts of oropharyngeal contents in their sleep •

Aspiration may occur in up to 10% of nursing home residents annually •

Risk aspiration

The risk of aspiration with modern anesthesia is about 1 in 3,000 anesthetics, with a mortality of approximately 1: 125,000, accounting for between 10% to 30% of all anesthetic deaths.

The risk of aspiration is greatly increased in patients intubated emergently in the field emergency department, or ICU.

TABLE 76-1. 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

Reduce the risk of aspiration in ETT intubation

- removing dentures ●
- clearing the airway ●

in certain circumstances placing a nasogastric tube ●
to empty the Stomach before intubation.

***If there is an immediate risk of airway compromise, endotracheal intubation should be performed before placement of a nasogastric tube.**

clearing the airway



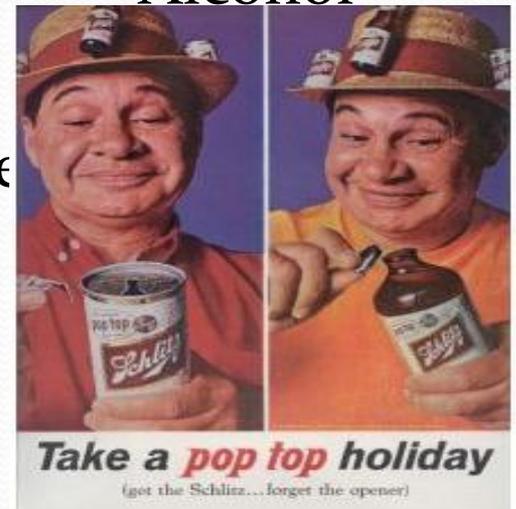
Predisposing Factors

Decreased consciousness •

Alcohol •



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Predisposing Factors

Esophageal disorders •

GERD •

Stricture •

Tracheoesophageal fistula •

Incompetent cardiac sphincter •

Protracted vomiting •

Predisposing Factors

- Disruption of glottic closure ●
 - Endotracheal intubation ●
 - NG tube ●
 - Endoscopy/bronchoscopy ●

Predisposing Factors

Neuromuscular disorders •

Multiple sclerosis •

Parkinson's •

Myasthenia gravis •

Aspiration Pneumonitis

- Mendelson first described aspiration pneumonitis in 1946
- 44016 (po-obstetric patient-half resive anesthesia with mask) 66 patients aspirated gastric contents after ether anesthesia.
- All patients had recovery within 2 days

Aspiration Pneumonitis

Definition

Acute lung injury following the aspiration of regurgitated gastric contents and results in a chemical burn of the tracheobronchial tree and pulmonary parenchyma with an **intense parenchymal inflammatory reaction**

chemical Pneumonitis

Pathophysiology •

Animal models demonstrate that clinically significant •
pneumonitis results from aspirating at least 1ml/kg of
pH<2.5 gastric contents

Fluids that are not harmful to the airway •

Water, saline, barium, gastric contents with pH>2.5 •

Pathophysiology

Experimental studies have shown a biphasic pattern of lung injury after acid aspiration.

The first phase peaks at 1 to

2 hours after aspiration and presumably results from the direct caustic effect of the low pH on the alveolar-capillary wall lining cells.

The second phase, which peaks at 4 to 6 hours, is associated with infiltration of neutrophils into the alveoli and lung interstitium with a histologic picture of acute inflammation.

Chemical Pneumonitis

Clinical features •

Abrupt onset of dyspnea •

Low grade fever •

Pink frothy sputum •

Diffuse crackles on exam •

CXR: diffuse infiltrates •

Chemical Pneumonitis

Xray of chemical pneumonitis 2 hours after aspiration event



Chemical Pneumonitis

Treatment •

Ventilatory support may be necessary •

Corticosteroids: beneficial in animal models, •
unsuccessful in humans

Antibiotics •

Up to 25% of patients have bacterial superinfection (Dines et al) •

Bacterial Pneumonitis

Clinical features •

Much more insidious onset than chemical pneumonitis •
(days to weeks)

Cough •

Fever •

Purulent sputum •

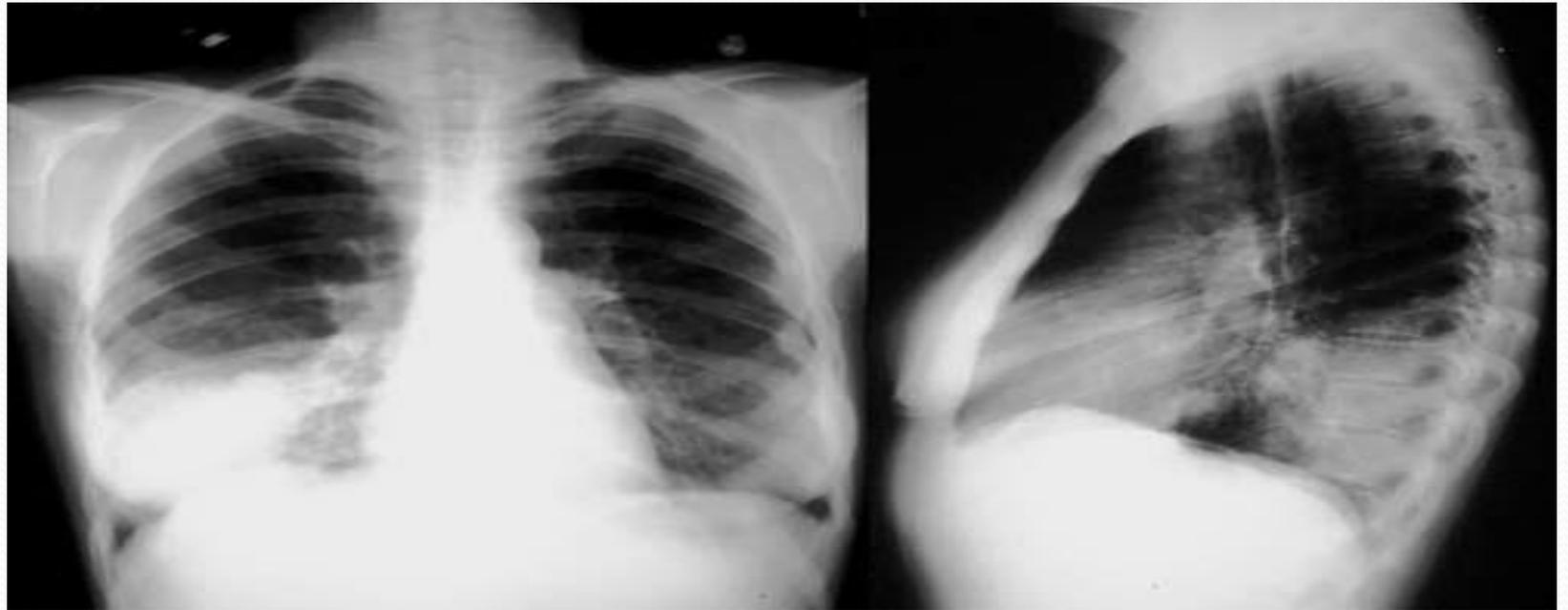
CXR: Infiltrate frequently in dependent segments •

Bacterial Pneumonitis

Patient 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.**

patient aspirate in the upright or semi-recumbent position the **basal segments of the lower lobes are favored.**

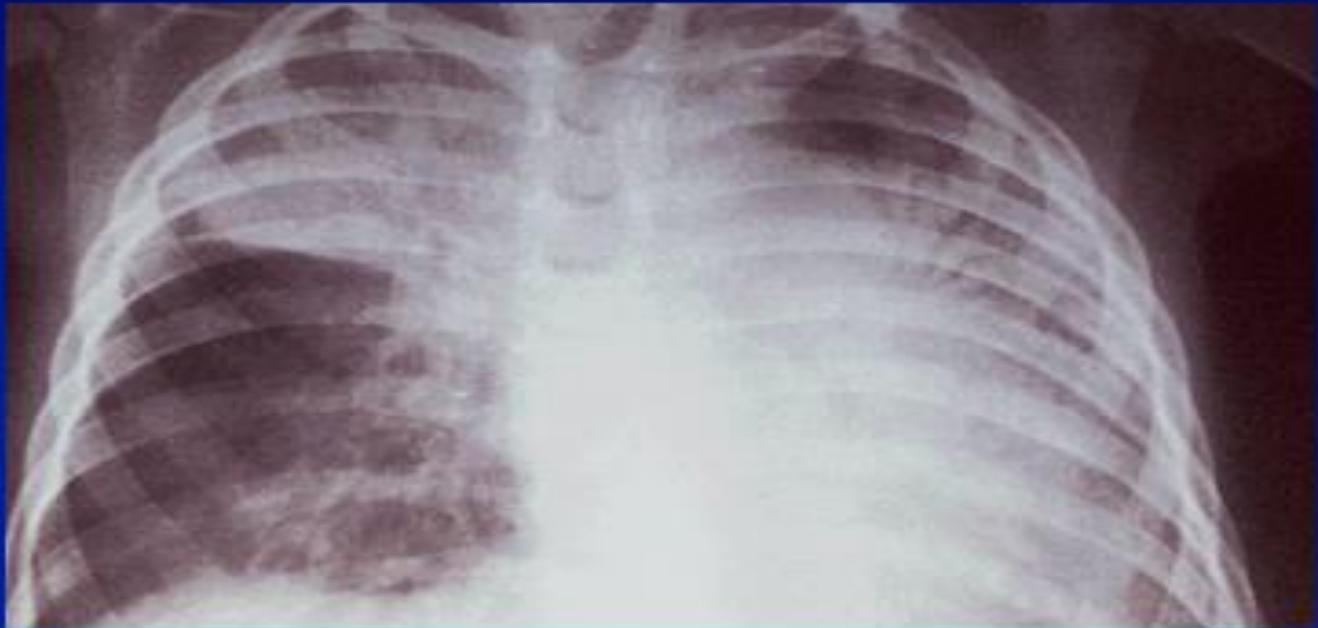
Bacterial Pneumonitis



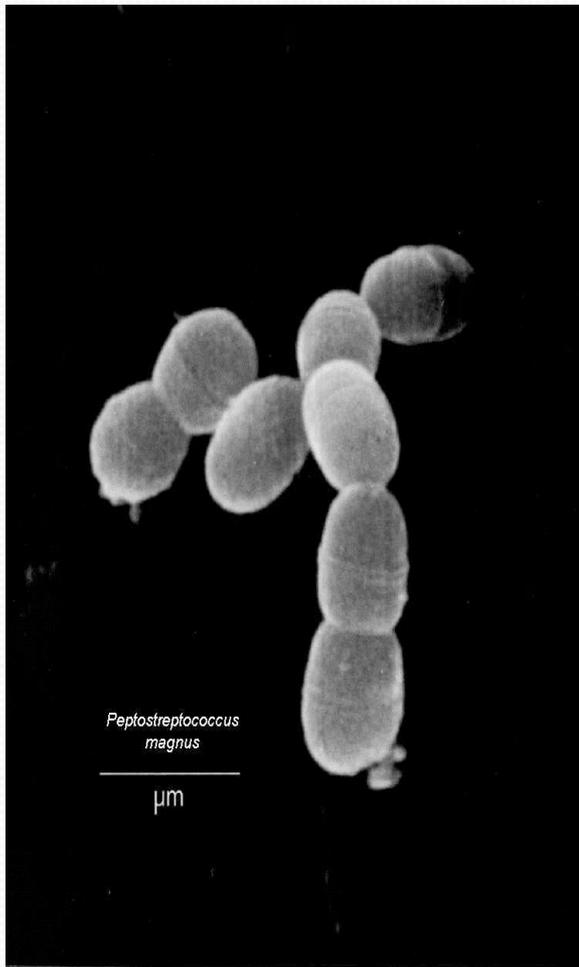
Xray of bacterial aspiration pneumonia •

Bacterial Pneumonitis

Pneumococcal pneumonia: lobar consolidation affecting both lungs. An air bronchogram is easily seen in the left middle zone



Bacterial Pneumonitis



Microbiology •

Anaerobes •

Peptostreptococcus •

Fusobacterium •

Bacteroides •

Gram negative bacilli •

Klebsiella in alcoholics •

E coli, serratia, proteus •

Gram positive bacteria •

Staph, Hemophilus, streptococcus •

Bacterial Pneumonitis

Treatment •

The choice of antibiotics should •
depend on the setting in which the aspiration occurs
(**home, nursing home, hospital**) or premorbid
condition.

Bacterial Pneumonitis

Antimicrobial agents with *gram-negative* activity such as fluoroquinolones, thirdgeneration cephalosporins, piperacillin, or a carbapenem are usually required.

Antimicrobials with specific anaerobic activity are not routinely warranted and may be indicated only in patients with severe periodontal disease, patients expectorating putrid sputum, and patients with a necrotizing pneumonia or lung abscess

Bacterial Pneumonitis

All elderly patients with CAP and all patients with aspiration pneumonia require consultation by a speech and language pathologist to assess for the presence of ***dysphagia***

Solid Particle Aspiration

Large particles •

Sudden respiratory distress, cyanosis, aphonia •

Heimlich! •

Small particles •

Irritative cough, unilateral wheezing •

Remember: bacterial superinfection is common •

Assessment of Dysphagia

- Clinical signs of dysphagia
 - Drooling
 - Coughing before, during, or after swallow
 - Multiple swallows per mouthful
 - Unusual head posturing while swallowing
- Clinical exam for diagnosis
 - Sensitivity 80%, Specificity 70%

Assessment of Dysphagia

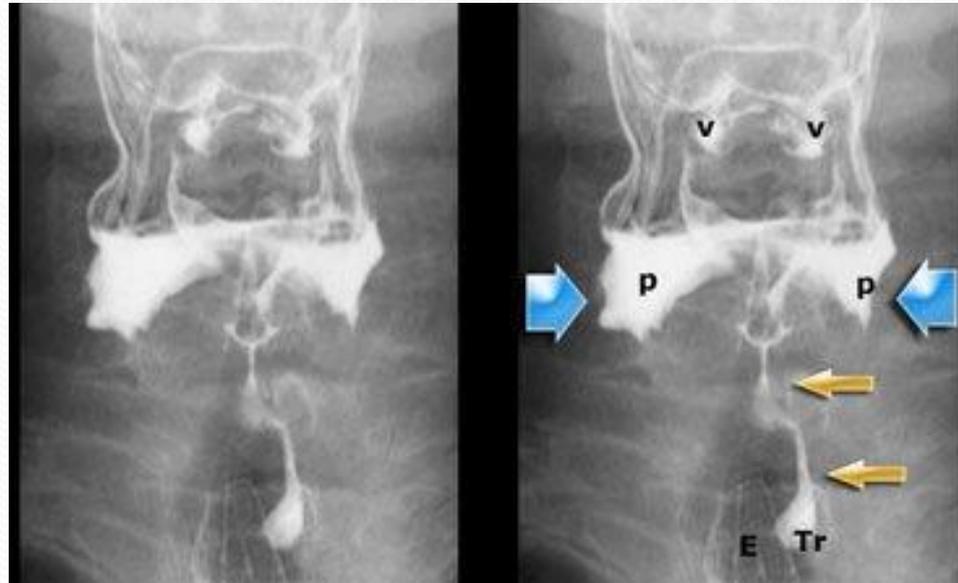
Modified barium swallow (MBS) •

Patients swallow small amounts of different textured barium and evaluated by flouroscopy

One study demonstrated that MBS did not change the sensitivity of clinical exam, but did make the evaluation more specific •

Laryngoscopy •

Modified Barium Swallow



Stasis of contrast at the level of the pyriform sinuses (blue arrows) with subsequent aspiration (yellow arrows) •

Tube Feeding

Short term dysphagia •

In moderately disabled CVA patients with dysphagia, •
tube feeding has been shown to be associated with less
pneumonia than oral feeds (54% vs. 13%, $p < 0.001$) for
stroke patients with dysphagia (Nakajoh)

Prevention

- HOB elevated 30-45 degrees ●
- Oral decontamination with chlorhexidine ●
- Chin down - helps to narrow the airway ●
- Head tilt to stronger side when swallowing ●

Prevention

***Substance P**

Believed to play a major role in the cough

and swallow sensory pathways

***ACE**

inhibitors prevent breakdown of substance P

576 elderly patients with HTN: 3% pneumonia in those treated with ACEI vs. 9% in those treated with Ca channel blocker.

References

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**Thanks
For Your
Attention**

