

- Lobar pneumonias evolve through four stages: congestion, red hepatization, gray hepatization, and resolution.
- Other common causes of acute pneumonias in the community include *H. influenzae* and *M. catarrhalis* (both associated with acute exacerbations of COPD), *S. aureus* (usually secondary to viral respiratory infections), *K. pneumoniae* (observed in patients who are chronic alcoholics), *P. aeruginosa* (seen in persons with cystic fibrosis, in burn victims, and in patients with neutropenia), and *L. pneumophila*, seen particularly in organ transplant recipients.
- The term *atypical organisms* is used for *Mycoplasma pneumoniae*, *Chlamydomphila pneumoniae*, *Coxiella burnetii*, and viruses (influenza viruses types A and B, human metapneumovirus) since they are not detectable on Gram stain nor do they grow on the standard bacteriologic culture media.
- Bacterial pneumonias are characterized by predominantly intra-alveolar neutrophilic inflammation while viral pneumonia shows interstitial lymphocytic inflammation. Characteristic viral inclusions may be seen.
- Lung abscess is often caused by anaerobic organisms or by mixed infections and frequently occur in debilitated individuals following aspiration of oral flora.

Aspiration Pneumonia

Aspiration pneumonia occurs in markedly debilitated patients or those who aspirate gastric contents either while unconscious (e.g., after a stroke) or during repeated vomiting. These patients have abnormal gag and swallowing reflexes that predispose to aspiration. The resultant pneumonia is partly chemical due to the irritating effects of gastric acid, and partly bacterial (from the oral flora). Typically, more than one organism is recovered on culture, aerobes being more common than anaerobes. This type of pneumonia is often necrotizing, pursues a fulminant clinical course, and is a frequent cause of death. In those who survive, lung abscess is a common complication.

Microaspiration, in contrast, occurs frequently in almost all people, especially those with gastroesophageal reflux disease. It usually results in small, poorly formed nonnecrotizing granulomas with multinucleated foreign body giant cell reaction. It is usually inconsequential, but may exacerbate other preexisting lung diseases such as asthma, interstitial fibrosis, and lung rejection.

Lung Abscess

The term *pulmonary abscess* describes a local suppurative process that produces necrosis of lung tissue. Oropharyngeal surgical or dental procedures, sinobronchial infections, and bronchiectasis play important roles in their development.

Etiology and Pathogenesis. Although under appropriate circumstances any pathogen can produce an abscess, the commonly isolated organisms include aerobic and anaerobic streptococci, *S. aureus*, and a host of gram-negative organisms. Mixed infections often occur because of the important causal role played by inhalation of foreign material. *Anaerobic organisms* normally found in the oral cavity,

including members of the *Bacteroides*, *Fusobacterium*, and *Peptococcus* species, are the exclusive isolates in about 60% of cases. The causative organisms are introduced by the following mechanisms:

- **Aspiration of infective material** (the most frequent cause). This is particularly common in acute alcoholism, coma, anesthesia, sinusitis, gingivodental sepsis, and debilitation in which the cough reflexes are depressed. Aspiration first causes pneumonia which progresses to tissue necrosis and formation of lung abscess.
- **Antecedent primary lung infection.** Postpneumonic abscess formations are usually associated with *S. aureus*, *K. pneumoniae*, and type 3 pneumococcus. Posttransplant or otherwise immunosuppressed individuals are at special risk.
- **Septic embolism.** Infected emboli from thrombophlebitis in any portion of the systemic venous circulation or from the vegetations of infective bacterial endocarditis on the right side of the heart are trapped in the lung.
- **Neoplasia.** Secondary infection is particularly common in the bronchopulmonary segment obstructed by a primary or secondary malignancy (*postobstructive pneumonia*).
- **Miscellaneous.** Direct traumatic penetrations of the lungs; spread of infections from a neighboring organ, such as suppuration in the esophagus, spine, subphrenic space, or pleural cavity; and hematogenous seeding of the lung by pyogenic organisms all may lead to lung abscess formation.

When all these causes are excluded, there are still cases in which no discernible basis for the abscess formation can be identified. These are referred to as *primary cryptogenic lung abscesses*.

MORPHOLOGY

Abscesses vary in diameter from a few millimeters to large cavities of 5 to 6 cm (Fig. 15-36). They may affect any part of the lung and may be single or multiple. Pulmonary abscesses due to aspiration are more common on the right (because of the

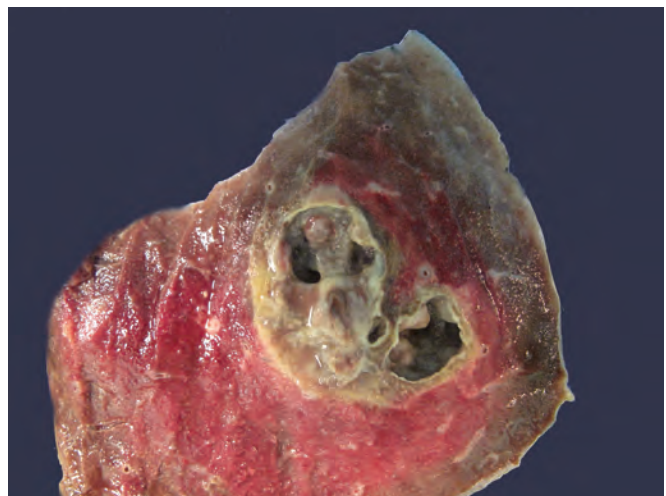


Figure 15-36 Cut surface of lung showing two abscesses. (Courtesy Dr. M. Kamran Mirza, University of Chicago, Chicago, Ill.)