CHAPTER 47
Lung Abscess

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Introduction

A lung abscess is a cavity in the lung parenchyma that contains purulent material resulting from pulmonary infection. This chapter focuses on pyogenic lung abscesses and does not consider other causes of pulmonary cavitations with or without air fluid levels, such as tuberculosis or a complicated hydatid cyst. The role of surgery in lung abscesses is limited, with the vast majority being treated with antimicrobials and percutaneous techniques.

Demographics

Lung abscesses in previously well children are uncommon and are usually the complication of a virulent necrotising pneumonia. The incidence would thus depend on the burden of respiratory disease. This is in contrast to children at risk for lung abscesses, which would include children with impaired immunity (e.g., human immunodeficiency virus (HIV) or cystic fibrosis), an underlying anatomical abnormality (e.g., congenital cystic adenomatoid malformation or bronchopulmonary sequestration), or at risk for aspiration (e.g., neurodevelopmental anomalies or cerebral palsy).

Pathophysiology and Pathology

A pulmonary abscess develops when a localised infection within the parenchyma becomes necrotic, with subsequent cavitation. Several mechanisms exist for this process. The first is an unchecked infection secondary to impaired immunity, clearance of the organism, or virulence of the organism. Patients with impaired cellular or humoral immunity, which may be congenital or acquired, are unable to eradicate the infection, leading to breakdown. Nutritional deficiency can be a significant cofactor in Africa. Inadequate clearance may be secondary to a congenital cystic pulmonary lesion, an inhaled foreign body or bronchial narrowing. The latter, especially in the African setting, may occur secondary to tuberculosis (TB) lymphadenitis with a superadded infection. Cystic fibrosis also will lead to inadequate clearance, potentially leading to a lung abscess. Infection with a virulent organism, typically anaerobes, *Staphylococcus aureus*, streptococcal species, and *Klebsiella*, can cause a lung abscess. Delay in antimicrobial therapy in treating pneumonia is often causative in a lung abscess because the infection remains unchecked for a prolonged period. Unfortunately, in Africa, due to difficult health access, easily treated conditions may lead to significant morbidity, and mortality.

Second, pulmonary aspiration is a central contributing factor to lung abscess formation in many children. Aspiration usually occurs in children with a neurological deficit, particularly cerebral palsy. Any acquired depressed level of consciousness, such as trauma or postanaesthesia, would also place a child at risk. Children with incoordinate swallowing or muscle weakness are a second group of patients who frequently aspirate. Last are children with oesophageal abnormalities, including dysmotility, achalasia, and unrecognised trachea-oesophageal fistulas.

A final mechanism involves patients who develop a lung abscess secondary to septic emboli. This may be seen in children with right-sided endocarditis, long-term lines, or, rarely, in children with haematogenous spread from thrombophlebitis. *S. aureus* septicaemia may frequently result in this mechanism of lung abscess formation.

Clinical Presentation

The differentiation of pneumonia and lung abscess on purely clinical grounds is difficult. Fever and cough predominate but are not universal. Other findings include chest pain, anorexia, productive sputum, malaise, haemoptysis, chills, and halitosis. Signs of lung abscess are varied, but may include tachypnoea, dullness, bronchial breathing, amphoric breathing, and crepitations over the affected area.

Investigations

Radiology typically shows a cavity with an air fluid level; this needs to be differentiated from a pneumatocoele, complicated hydatid, or pyopneumothorax. Occasionally, to further delineate the anatomy, to exclude an underlying abnormality, or to facilitate percutaneous intervention, a computed tomography (CT) scan must be done. Ultrasound can be used if the abscess abuts the hemidiaphragm or chest wall, thus creating an acoustic window to enable visualisation.

Bacteriology, sputum, or pus, if intervention is performed, is invaluable in guiding antibiotic therapy. Ideally, this intervention should occur prior to commencement of antibiotic therapy. This may be done in the older child by using an induced sputum and in the younger child by bronchoscopy, if safe facilities exist.

Management

The mainstay of therapy involves prolonged antimicrobials. The exact duration and route of administration have not clearly been delineated in the literature. It would seem that it would be prudent to begin with intravenous antibiotics until signs and symptoms have settled, following which the remainder of the 4–6 week course may be given orally.

Drainage of the lesion can usually be achieved by using physiotherapy with postural drainage and percussion. In children unable to adequately expectorate, bronchoscopy can be a useful adjunct.

Antimicrobials should ideally be microbiologically directed, but empiric antibiotics with a B-lactam is usually adequate in the absence thereof. If there is consideration of coliforms, an aminoglycoside may be added, and if aspiration or anaerobes are considered to be causative, the addition of metronidazole or clindamycin is warranted. The latter makes an excellent single agent provided coliforms have been excluded. For primary abscesses, staph, strep, and coliforms should be considered; for secondary abscesses, it is important to cover anaerobes.

A significant morbidity is associated with surgery, such as empyema and air leaks, with mortalities of 5–10% having been reported. The need for surgery has further been minimised by percutaneous drains where interventional radiology is available. Thus, in most instances, surgical intervention should be reserved for underlying congenital anomalies and treatment failures. This would include large chronic abscesses, significant haemoptysis, bronchial stenosis, bronchiectasis, or massive necrosis.

Prognosis and Outcome

The outcome for lung abscesses is excellent, provided that appropriate antibiotics and postural drainage are instituted in a timely manner. Complications for surgery can be high; thus, surgery should be reserved for specific indications. Overall morbidity should be less than 5% and would occur predominantly in those with secondary abscesses, usually secondary to the comorbidity. Long-term follow-up of patients with primary abscesses shows no residual deterioration in lung function and a return to normal health.

Evidence-Based Research

Currently, there is a paucity of literature from Africa, and the literature from the developed world is limited to case reports. Further studies are needed, especially to look at the duration of antibiotic therapy.