# Lung Abscess

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## Abstract

Lung abscesses are most frequently caused by mouth anaerobes and may arise as a complication of aspiration pneumonia. Patients may present with a productive cough of foul smelling sputum with or without associated digital clubbing.

***SA Fam Pract 2007;49(5): 50-52***

### Introduction

A lung abscess can be defined as a suppurative lesion in the lung parenchyma caused by microbial infection and consisting of a 1 cm or larger cavity surrounded by inflammation and necrosis. Tumor necrosis and cavitations associated with collagen-vascular diseases (e.g. Wegener's granulomatosis) or tuberculosis are traditionally not included in this definition. The formation of multiple small (< 1 cm) abscesses is sometimes referred to as necrotizing pneumonia or lung gangrene. Both lung abscess and necrotising pneumonia are manifestations of a similar pathological process.

Lung abscesses are most frequently caused by mouth anaerobes and arise as a complication of aspiration pneumonia. Patients at risk are those predisposed to aspiration (alcohol abuse, decreased consciousness, epileptics, etc.), patients with bronchial occlusions (tumours, foreign objects, etc.) or those with poor periodontal hygiene. Certain necrotising pneumonias, usually aerobic in nature, can also lead to abscess formation. Other causes include septic emboli (e.g. infective endocarditis), infected pulmonary bullae or transdiaphragmatic spread of subdiaphragmatic sepsis.

Pathogens recovered in patients with a history of aspiration or poor oral hygiene are invariably anaerobes. Common isolates include *Peptostreptococci*, *Bacteroides*, *Fusobacterium* species and microaerophilic streptococci. Other organisms that are less frequently implicated include *Staphylococcus aureus*, *Streptococcus pyogenes*, *Haemophylus influenzae*, *Streptococcus pneumonia* (type III), *Klebsiella* and other gram-negative bacilli, *Actinomyces species* and *Nocardia*.

### Management

In most cases, the clinical course of an abscess of *anaerobic* polymicrobial nature is indolent and mimics that of pulmonary tuberculosis, with cough (initially dry, but later foul smelling and productive), shortness of breath, fever with night sweats, weight loss, and pleuritic chest pains lasting for several weeks of longer. Those with *aerobic infections* are usually more acutely ill and tend to have a non-resolving pneumonia picture. Both sets of patients may develop haemoptysis. Physical signs include varying degrees of fever (often swinging temperatures), evidence of gingival disease and halitosis. Digital clubbing is often present. Examination of the chest may reveal dullness, decreased breath sounds, course inspiratory crackles, bronchial or amphoric breathing or even a pleural friction rub (depending on the extend of pulmonary involvement and the presence of complications).

Complications include rupture or spread to the pleura (leading to empyema or pyo-pneumothoraces), systemic spread (may potentially lead to brain and other abscesses), life-threatening haemoptysis, bronchopleural fistulas, with pleural fibrosis and a trapped lung over a longer period of time.

### *Special investigations*

Special investigations may reveal signs of an acute infection with overwhelming polymorphonuclear leucocytosis with a left shift on full blood count, and a raised CRP. The chest X-ray in established abscesses typically shows an irregular shaped thick-walled cavity with an air-fluid level. Early abscesses may not have clear air-fluid levels (see figure 1 and 2). Aspiration classically involves the superior segment of the right lower lobe, the right middle lobe or the posterior segment of the upper lobe depending on the position of the patient during the episode of aspiration. (See figure 3) There may be varying degrees of surrounding lung infection and associated complications (e.g. empyema). A CXR may also point towards more sinister pathology (e.g. bronchial carcinoma). CT scanning gives superior visualisation of abscesses.

Sputum should be obtained for Gram stain, culture and sensitivity. There should be a low threshold for requesting acid fast staining, especially in a

**Figure 1:** A CXR (PA) showing an *early* lung abscess arising in the apical segment of the right lower lobe. Note the absence of an air-fluid level at this point.

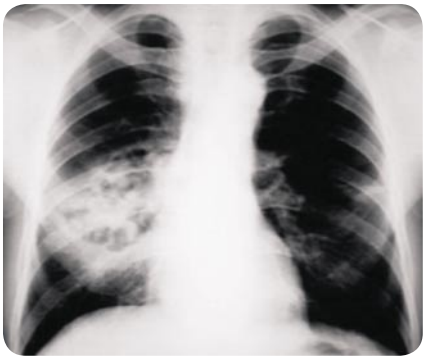


**Figure 2:** A CXR (PA) showing a lung abscess in the left upper lung zone. Note the air-fluid level.

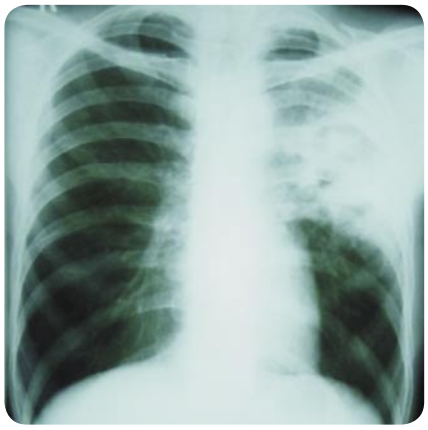
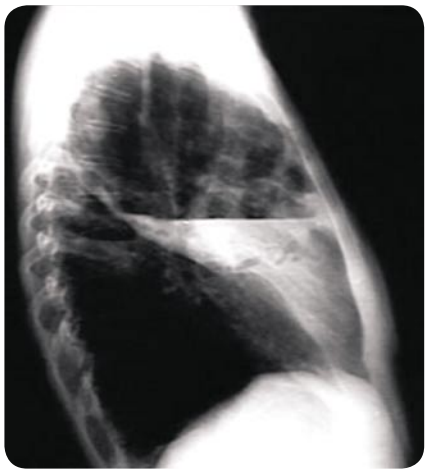


**Figure 3:** This lateral CXR clearly shows an air-fluid level in a right upper lobe lung abscess



setting where pulmonary tuberculosis is endemic. Transtracheal aspiration or transthoracic needle aspirations are infrequently performed. Blood cultures must be taken prior to the initiation of antimicrobials.

Flexible fiberoptic bronchoscopy should be performed where bronchial obstruction is suspected (to exclude bronchial carcinoma or even foreign object inhalation), with suspected cavitating carcinomas or severe haemoptysis.

***Differential diagnosis***

The differential diagnoses include pulmonary tuberculosis, cavitating neoplasms (e.g. squamous cell carcinoma), localised empyema, Wegener's granulomatosis and other vasculitides, lung parasites, infected bullae, infected congenital pulmonary lesion, cavitating lung infarcts or rarely sarcoidosis.

***Antibiotic choices***

Lung abscesses are managed with adequate antibiotics and non-surgical drainage. Aerobic infections can usually be managed using beta-lactam antibiotics alone (high-dose Penicillin G, Augmentin, second- or third-generation cephalosporins, etc.), although Augmentin also exhibits sufficient anaerobic cover. Most authorities, though, suggest treating anaerobic lung infections with clindamycin. Published trials have shown this drug to be superior to intravenous beta-lactam antibiotics. Clindamycin should initially be used intravenously, followed by a prolonged oral course. Although the duration of therapy is not well established, most clinicians prescribe antimicrobials for 4-6 weeks. Alternatives to clindamycin include a combination of a second-generation cephalosporin (e.g. cefuroxime or cefoxitin) and metronidazole. This combination is especially useful in suspected polymicrobial infection. Flucloxacillin should be added where Staphylococcal infections are suspected. Blood and sputum cultures and sensitivity, where available, should guide further decisions surrounding antibiotic choice. Consultation with local microbiological or infectious disease specialists are often necessary.

***Other treatment modalities***

Physiotherapy plays an important role in the management of these patients who may benefit from referral for education on postural drainage and other therapy. A therapeutic bronchoscopy may sometimes be required to remove foreign objects.

Surgery is very rarely indicated. The usual indications for surgery are failure to respond to medical management, suspected neoplasm or congenital lung malformation. Coexisting empyema require formal drainage.

The prognosis in the antibiotic era is generally favourable and over 90% of all uncomplicated cases are cured with medical management alone. A lung abscess caused by bronchial obstruction secondary to carcinoma has a much worse prognosis.

## REFERENCES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