Lung Abscess

Synonyms: pyogenic lung infection/pneumonia, necrotising pneumonia

Severe, localised suppurative infection in the substance of the lung, associated with necrotic cavity formation. The process is usually surrounded by a fibrous reaction, forming the abscess wall. Multiple small abscess formations may occur - sometimes referred to as necrotising pneumonia.

The most frequent cause is aspiration of anaerobic organisms from the mouth in those predisposed to aspiration pneumonia, with immunodeficiency and cough reflex. A pneumonitis develops which progresses to abscess formation over a period of days or weeks.

Precipitating mechanisms

These include:

- Inhalation of a foreign body.
- Bacteraemia seeding in the lungs.
- Tricuspid endocarditis leading to septic pulmonary embolus.
- Extension of hepatic abscess.
- Association with lung cancer.
- Proximal to bronchial obstruction.
- Complication of severe or incompletely treated pneumonia (particularly staphylococci or klebsiellae).
- Penetrating pulmonary trauma - eg, a stab wound.

NB: Lung abscesses may present acutely or more chronically.

Types of lung abscesses

- Primary abscess - occurs in previously normal lungs and may follow aspiration.
- Secondary abscess - occurs in patients with an underlying lung abnormality.

Causative organisms

Common pathogens causing lung abscess include anaerobes, Staphylococcus aureus and enteric Gram-negative rods like Klebsiella pneumoniae.

Anaerobes
- Peptostreptococcus spp.
- Bacteroides spp.
- Fusobacterium spp.
- Microaerophilic streptococci

Aerobes
- S. aureus.
- Streptococcus pyogenes.
- Haemophilus influenzae.
- Pseudomonas aeruginosa.
- K. pneumoniae - becoming more prevalent.
- Burkholderia cepacia - particularly associated with cystic fibrosis.
- Streptococcus pneumoniae.
- Legionella pneumoniae.
- Actinomyces spp.
- Nocardia spp.
- Proteus mirabilis.
- Pasteurella multocida - zoonotic infection from cats/dogs/cattle.
- Burkholderia pseudomallei - a soil-borne Gram-negative infection which causes a condition called melioidosis. It affects animals and humans, especially in Southeast Asia and northern Australia.

Other organisms
- Mycobacterial infections - predominantly tuberculosis (TB).
- Fungal lung infections, such as Aspergillus, Cryptococcus, Histoplasma, Blastomyces, Coccidioides species.
- Parasites, such as Entamoeba histolytica, Paragonimus spp.
Epidemiology
Incidence and prevalence figures have not been established.

Risk factors
- Alcoholism or drug misuse.
- Following general anaesthesia.
- Diabetes mellitus.
- Severe periodontal disease.
- Stroke/cerebral palsy/cognitive impairment/impaired consciousness leading to increased risk of aspiration.
- Immunosuppression, particularly chronic granulomatous disease in children.
- Congenital heart disease.
- Chronic lung disease, particularly cystic fibrosis.

Presentation

Symptoms
- Onset of symptoms is often insidious (more acute if following pneumonia).
- Spiking temperature with rigors and night sweats.
- Cough ± phlegm production (frequently foul-tasting and foul-smelling and often blood-stained).
- Pleuritic chest pain.
- Breathlessness.

Signs
- Tachypnoea.
- Tachycardia.
- Finger clubbing in chronic cases.
- Dehydration.
- High temperature.
- Localised dullness to percussion (if consolidation is also present or effusion).
- Bronchial breathing and/or crepitations (if consolidation is present).
- Also look for signs of severe periodontal disease and infective endocarditis.

Differential diagnosis
- Other causes of chest infection or pneumonia - eg, TB and opportunistic mycobacteria.
- Neoplasia - eg, cavitating bronchial carcinoma.
- Pulmonary infarction or pulmonary embolism.
- Vasculitis - eg, granulomatosis with polyangiitis (Wegener’s granulomatosis).
- Sarcoidosis with cavities.
- Infected bronchogenic cyst.

Investigations
- FBC - normocytic anaemia or neutrophilia..
- Renal function.
- LFTs.
- Blood cultures and sputum cultures (including AAFB).
- ESR/CRP usually elevated.
- CXR - shows walled cavity, usually with a fluid level; may also be presence of an empyema or effusion.
- Tapping or draining of fluid or empyema with microbiology and cytology of samples.
- CT scan of the thorax - may detect multiple small abscesses.
- Fibre-optic bronchoscopy can exclude obstruction and provide samples for culture.
- Trans-thoracic biopsy/aspiration (usually with ultrasound guidance) or trans-tracheal biopsy.

Management

Supportive measures
- Analgesia.
- Oxygen if required.
- Rehydration if indicated.
- Postural drainage with chest physiotherapy.

Antibiotics
Most lung abscesses (80-90%) are now successfully treated with antibiotics.[8]
- Begin with intravenous treatment, usually for about 2-3 weeks, and follow with oral antibiotics for a further 4-8 weeks.
• Recommended first-line therapy includes beta-lactam/beta-lactamase inhibitor or cephalosporin (second- or third-generation) plus clindamycin.[10]
• 15-20% of anaerobic bacteria are resistant to penicillin only, so a combination of penicillin and clavulanate or a combination of penicillin and metronidazole should be considered as alternatives[14].
• Regimen should be altered once the organism is known.

Surgery

• If the condition fails to resolve with conservative measures, drainage via a bronchoscope, CT-guided percutaneous drainage or cardiothoracic surgical intervention may be required[10].
• Surgery is associated with a number of complications, such as empyema and bronchoalveolar air leak - especially so in children[11, 12].

Where slow resolution occurs, the possibility of malignancy or unusual organisms must be considered.

Complications

These include:

• Empyema.
• Pneumatocele.
• Bronchopleural fistula.
• Distant complications from haematogenous spread (eg, brain abscess).

Prognosis

• There is an overall 90% cure rate with antibiotic therapy.[13]
• Morbidity and mortality are more likely to be associated with underlying pathology such as bronchial carcinoma.
• Prognosis is adversely affected by older age and multiple comorbidities.[14]
• Other poor prognostic factors include pneumonia, reduced level of consciousness, anaemia and infection with P. aeruginosa, S. aureus and K. pneumoniae[15].

Further reading & references


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