



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**BULLOUS LUNG DISEASE MIMICKING LUNG ABSCESS: A CASE REPORT**

**KEY WORDS:**

**Tivya Kulasegaran** Medical Registrar (FRACP), Prince Charles Hospital, Queensland Health, Australia

**Pranav Kumar\*** FRACP, Respiratory Physician, Mackay Base Hospital, Queensland Health, Australia  
\*Corresponding Author

**INTRODUCTION :**

A lung abscess is a localized area of destruction of lung parenchyma in which infection by pyogenic organisms results in tissue necrosis and suppuration.

Lung abscess is a type of liquefactive necrosis of pulmonary tissue and formation of cavities (more than 2cm) containing necrotic debris or fluid caused by bacterial infection [1].

Bullous lung disease is characterized by the development of bullae within the lung parenchyma. A bulla is a permanent, air-filled space within the lung parenchyma that is at least 1 cm in size and has a thin or poorly defined wall; it is bordered only by remnants of alveolar septae and/or pleura. This case presented as Lung abscess which was in fact an infected bulla. The presence of an air-fluid level inside the bullae can pose a diagnostic challenge, which could lead to misdiagnosis, invasive investigations and unnecessary treatments.

**Case Presentation :**

A 41 year-old man with no significant medical history presented with left-sided pleuritic chest pain, shortness of breath and non-productive cough for two weeks. He presented with Wet cough intermittently for last 3-4 months. He denied any history of hemoptysis. Shortness of Breath was mainly with physical exertion. He denied any fever, chills or night sweats or weight loss. He used to drink 6 beers a day with no history of any drug use. He was working as a green keeper. His Grand father died of lung cancer. Patient was in no acute distress with SpO2 of 98% while breathing ambient air. He was afebrile, and his vital signs were within normal limits. Physical examination revealed impaired note and decreased breath sounds over the right upper lobe. The remainder of the exam was unremarkable.

His WBC was 22.3 x 10 with ESR: 86 mm/hr. Sputum gram stain has grown staphylococcus which were sensitive to Flucloxacillin, cephalexin and co-trimoxazole. Sputum was negative for Mycobacteria and B. pseudomallei. He was tested negative for HIV, ANA, ENA, ANCA and Rh Factor.

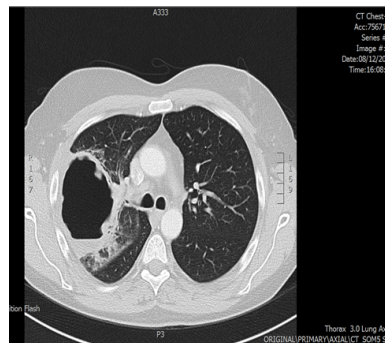
ABG has revealed PH: 7.45, PCO2: 42 mm hg with PO2: 59 mmhg with HCO3 of 29.

Chest X-ray showed a large, round, and well-demarcated lucency containing an air-fluid level occupying the right upper lobe.

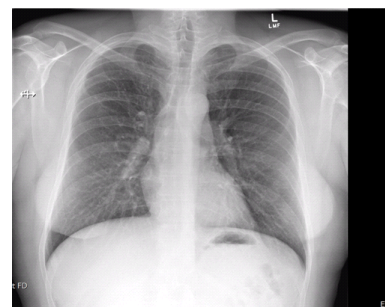
CT chest revealed numerous prominent mediastinal lymph nodes seen. There was a large cavitating lesion identified in the right upper lobe. This measures 10.0 x 7.8 cm in size. Adjacent ground-glass and consolidation were seen. Only a small fluid component is seen within this cavity.



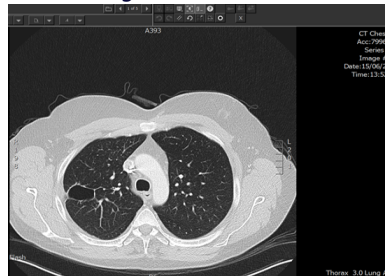
**A. ) panel: chest radiograph showing right-sided upper zone cavity with fluid level**



**B. panel CT chest showing large cavitating lesion identified in the right upper lobe.**



**C. Panel CXR showing resolution of fluid filled cavity**



**D. Panel chest CT-scan slice showing a thin walled bulla**

Bronchoscopy hasn't revealed any intrabronchial obstructing lesion. The patient was treated with supplemental oxygen, bronchodilators, inhaled corticosteroids, and analgesics and flucloxacillin.

Within few days, significant clinical improvement along with normal inflammatory markers were observed, and the patient was safely discharged.

**Discussion :**

Bullae with air-fluid levels are considered to be a separate pathologic entity from a lung abscess. The etiology remains controversial, and few possible mechanisms have been suggested in the literature. One suggested that a reactive accumulation of sterile inflammatory fluid in the bulla due to contiguous

parenchymal inflammation is the culprit. Another proposed mechanism involves loss of airway communication between the bulla and larger airways due to mucus plugging, leading to inadequate drainage of the sterile fluid within the bulla.

Diagnosis is typically made based on the distinctive air-fluid level appearance on chest radiograph and CT scan, absence of purulent productive cough, and the presence of clinically Symptomatic disease. Routine use of invasive diagnostic procedures has been widely discouraged. Patients should be treated conservatively, as antibiotics should be reserved for patients who develop signs of infection within the bulla as observed in this case, Successfully distinguishing this disease process from other causes of cavitory lung disease, particularly lung abscess, is paramount as invasive diagnostic interventions and unnecessary therapies can be avoided for this benign disease.

A lung abscess is a localized area of destruction of lung parenchyma which infection by pyogenic organisms results in tissue necrosis and suppuration.

- **Classification**
- **Primary.**
  - in previously healthy patients who aspirate oral contents.
  -
- **Secondary.**
  - in patients with an underlying predisposition for pulmonary infection.
  - Lung Abscess can also be classified as
  - **Acute**
  - **Chronic** >> 4 or more weeks
- **Mechanisms of infection**
- **Aspiration**
- **Factors predisposing to aspiration are**
  - i. Dental/periodontal sepsis.
  - ii. Paranasal sinus infection.
  - iii. Decreased conscious level.
  - iv. Impaired laryngeal closure.
  - v. Disturbances of swallowing.
  - vi. Delayed gastric emptying/gastro-oesophageal reflux
- **Necrotizing pneumonia**
  - Staphylococcus aureus
  - Streptococcus milleri/intermedius
  - Klebsiella pneumoniae
  - Pseudomonas aeruginosa
- **Haematogenous spread from a distal site**
  - Urinary tract infection
  - Abdominal sepsis
  - Pelvic sepsis
  - Infective endocarditis
  - Intravenous drug abuse
  - Infected intravenous cannulae
  - Septic thrombophlebitis
  - Pre-existing lung disease
  - Bronchiectasis
  - Cystic fibrosis
  - Bronchial obstruction
    - Tumour
    - Foreign body
- **Others**
  - Infected pulmonary infarct
  - Trauma
  - Immunodeficiency
- **Microbiological characteristics(2)**
  - Anaerobic bacteria
  - Most commonly implicated
  - The main groups of anaerobes are as follows.
    1. Gram-negative bacilli making up the genus Bacteroides.
    2. Gram-positive cocci, mainly Peptostreptococcus and anaerobic or microaerophilic streptococci.
    3. Long thin Gram-negative rods comprising Fusobacterium

species .

- **Aerobic organisms**
- **Gram-positive aerobes**
  - Staph. aureus > most common
  - Strep. pyogenes
  - Strep. Pneumoniae
- **Gram-negative aerobes**
  - Klebsiella pneumonia
  - Ps. Aeruginosa
  - Haemophilus influenzae,
  - Escherichia coli,
  - Acinetobacter species,
  - Proteus species
  - Legionella species.
- **less common organisms**
  - I. Tuberculosis and other non-tuberculous mycobacterial infection.
  - II. Actinomyces israeli
  - III. Pulmonary botromycosis
  - IV. pneumonic plague
  - V. Salmonella infection
  - VI. Pasteurella multocida infection
  - VII. Lactobacillus casei infection
  - VIII. Strep. mitis
  - IX. Bacillus anthracis
  - X. Rhodococcus equi in immunocompromised patients.
- **Fungal**
  - Cryptococcus neoformans,
  - Aspergillus spp.,
  - Mucor spp.,
  - Blastomyces dermatitidis,
  - Histoplasma capsulatum,
  - Coccidioides immitis
- **Parasitic**
  - Paragonimus westermani
  - Entamoeba histolytica
- **CLINICAL FEATURES**
  - Subacute presentation in Aspiration pneumonia and IV dru abusers ( septic pulmonary infarcts arising from endocarditis )
  - Acute and severe presentation in Necrotizing pneumonias.
  - Common symptoms include
    - Cough with purulent sputum
    - Fever
    - Dyspnea
    - Chest pain
    - Hemoptysis
- **Signs**
- **No specific signs**
- **May be present**
- **Digital Clubbing**
- **Dullness to percussion and diminished breath sounds**
- **pleural friction rub**
- **INVESTIGATIONS**
  - Radiography
  - CT chest
  - Microbiological sampling
  - Blood cultures
  - Sputum gram stain and culture-sensitivity
- **Others**
  - I. Percutaneous transtracheal aspiration.
  - II. Percutaneous needle aspiration of a lung abscess under fluoroscopic or CT control.
- Bronchoscopy is diagnostically important when the differential diagnosis includes cavitating lung cancer.
- **Indications** of bronchoscopy are

- i. Atypical presentation of a patient who has no risk factors for aspiration .
- ii. Clinical or radiographic signs of an endobronchial lesion
- iii. Massive hemoptysis .
- iv. A differential diagnosis that includes non-infectious causes of a cavitory lesion .
- v. An immunocompromised host suspected of having unusual etiologic pathogens .

- There may be little evidence of consolidation in surrounding lung when compared with an abscess.
- The margin of the bulla can often be seen to have a thin, smooth wall on plain films or CT
- Hiatus hernia
- double cardiac shadow'on the posteroanterior chest radiograph .
- On the lateral view the typical appearance of a gastric air bubble behind the heart, often with a fluid level
- Others
- Infected congenital pulmonary lesions
- Pulmonary haematoma
- Cavitated pneumoconiotic lesions
- Hydatid cysts and other lung parasites
- Cavitating pulmonary infarcts
- Wegener's granulomatosis

**TREATMENT(3)**

- Antibiotics
- Benzylpenicillin, clindamycin and metronidazole
- Antipseudomonal penicillins
- Imipenem
- Cefoxitin is the most potent in vitro against the B. fragilis group.
- Chloramphenicol is very effective in vitro against virtually all anaerobes.
- The macrolides are not ideal as single agents.
- Tetracyclines are best avoided as significant numbers of resistant anaerobic strains have emerged.
- Quinolones are also relatively ineffective against anaerobes.
- Antibiotics
- Flucloxacillin or other antistaphylococcal penicillins for Staph aureus and vancomycin for MRSA.
- It is common practice to give antibiotics intravenously initially as above, converting to oral therapy when a favourable response has become plainly evident.
- The pyrexia may take 7 days or more to return to normal.
- It is usual to treat for 4–6 weeks and this may sometimes need to be extended for up to 3 months. Physiotherapy may be useful in helping the patient to clear purulent material.
- Bronchoscopic drainage of lung abscesses using cardiac catheters is seldom used.
- The main role of bronchoscopy in lung abscess is diagnostic.
- Surgery
- Intercostal catheter or tube drainage to an underwater seal bottle .
- Open drainage via pneumonostomy .
- Indications for lobectomy include

  - i. Massive hemoptysis unresponsive to bronchial artery embolization,
  - ii. Failure to respond to antibiotics,
  - iii. Underlying cavitory cancer, and abscesses distal to an obstructing lesion that cannot be resolved.
  - iv. Extremely large lung abscesses (i.e., >6 cm) may not respond to medical management require resection.

**Author Contributions**

**Tivya Kulasegaran** – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, revising it critically for important intellectual content, Final approval of the version to be published

**Pranav Kumar** – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

**Guarantor of Submission**

The corresponding author is the guarantor of submission.

**Source of Support**

None

**Consent Statement**

Written informed consent was obtained from the patient for publication of this case report.

**Conflict of Interest**

Authors declare no conflict of interest.

**REFERENCES**

- 1]. Bartlett JG, Finegold SM. Anaerobic pleuropneumonia infections .Medicine (Baltimore). 1972;51(6):413-50.
- 2] Leatherman JW, Iber C, Davies SF. Cavitation in bacteremic pneumococcal pneumonia: Casual role of mixed infection with anaerobic bacteria. Am Rev Respir Dis. 1984; 129:317-21.
- 3] Smith DT. Medical treatment of acute and chronic pulmonary abscesses Thorac Surg. 1998; 17:72.