# Pulmonary actinomycosis causing an unusual presentation in a patient with COPD: A case report

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*Abstract*

Herein, we report a 63-year-old patient with a background of COPD, heavy smoking, and poor dental hygiene presenting with progressive dyspnea, fever, and productive cough. The patient was worked up for possible pneumonia, but the chest radiograph revealed a right-sided pleural effusion. Further assessment of the pleural fluid revealed an exudative effusion. Histopathological examination of the pleural biopsy sample showed gram-positive branching filamentous rods with yellow Sulfur granules consistent with a diagnosis of pulmonary actinomycosis. The patient was initially treated with intravenous amoxicillin/sulbactam, then switched to oral amoxicillin. This case highlights a rare clinical presentation of pleural effusion in a patient with pulmonary actinomycosis.

Keywords: Pulmonary actinomycosis, Thoracic actinomycosis, COPD, Pleural effusion, sulfur granule

## *1 | INTRODUCTION*

Actinomycosis is a chronic granulomatous infection caused by the gram-positive anaerobic bacteria actinomyces, which form long branching filaments that resemble the hyphae of fungi [1, 2]. Actinomyces is a part of the normal flora that colonizes the mouth in humans [1, 2]. According to the site of involvement,

actinomycosis infection is classified into the following clinical forms: cervicofacial disease, which is the most common, followed by abdominopelvic and pulmonary. The pulmonary form of actinomycosis accounts only for around 15% of all cases [2]. The incidence is higher in men in their fourth and fifth decades (with male/female ratio being [?] 3:1), and smokers with poor dental hygiene are at increased risk [3]. The clinical and radiological findings of pulmonary actinomycosis may mimic pneumonia, tuberculosis, and malignancy, resulting in misdiagnosis and delay in treatment [1, 2]. In this article, we report a rare case of pulmonary actinomycosis in a patient with COPD associated with an unusual clinical presentation of pleural effusion.

## *2 | CASE PRESENTATION*

A 63-year-old man presented with a 2-week history of right-sided pleuritic chest pain with shortness of breath. He also experienced a high-grade fever with a productive cough. He denied hemoptysis, night sweats, and weight loss. His past medical history was significant for chronic obstructive pulmonary disease (COPD). He used to be a heavy cigarette smoker with 3–4 packs per day for at least 27 years, but he quit recently. He admitted being a heavy alcohol drinker but denied any drug use. He reported no history of trauma or surgery and no history of recent travel.

His vital signs were as follows: a body temperature of 38.6°C, a heart rate of 100 beats/min, a respiratory rate of 24 breaths per minute, and an oxygen saturation of 90% in room air. On physical examination, he looks thin and wasted, but he isn't jaundiced or cyanosed. On examination of the chest, there was reduced chest expansion on the right side. The percussion note was stony dull at the right base. Auscultation revealed diminished breathing sounds with a few crackles and wheezes. Examination of the mouth was notable for poor dentition. Cardiac examination was normal with no murmurs. Abdominal examination was normal with no tenderness, masses, or organomegaly. There are no palpable lymph nodes.

Laboratory studies were significant for a white blood cell count (WBC) of (17,400/mm3), with neutrophilia of 90%, a haemoglobin concentration of (11.5 g/dL), and an increased C-reactive protein (CRP) of (30.7 mg/dL). Renal function test (RFT) and electrolytes were normal. The liver function test (LFT) was also normal. Chest X-ray revealed a right-sided pleural effusion, and chest computed tomography was done to rule out any masses (Figure 1). A pleural fluid sample was aspirated, and analysis revealed a straw-coloured exudative effusion with elevated protein and lactate dehydrogenase (LDH). Also, pleural fluid revealed a high white blood cell count of (2930/μL), with 61.5% neutrophils and 37% lymphocytes. The pleural fluid adenosine deaminase (ADA) level was 36.7 IU/L. Cytologic analysis of the pleural fluid revealed inflammatory cells, but no microorganisms were isolated. Additionally, no malignant cells were found in the pleural fluid. Ultrasound-guided percutaneous pleural biopsy was performed, and both histological examination and microbiological assessment revealed a background of inflammatory cell infiltrates with yellow sulfur granules and gram-positive branching filamentous rods, which is consistent with a diagnosis of pulmonary actinomycosis. Importantly, the patient was investigated for human immunodeficiency virus (HIV), but the test result was negative.

The patient was treated with intravenous amoxicillin/sulbactam (3 g/ 8hrs) for two weeks, then switched to oral amoxicillin for six months. Additionally, a drainage chest tube was inserted, and all fluid was removed till dryness. The dentist was consulted to evaluate the patient's oral cavity and to discuss the optimum routine for better dental hygiene. Finally, follow-up at 8 months after discharge showed significant improvement in the patient's symptoms and resolution of the radiological changes.

## *3 | DISCUSSION*

In this article, we describe an interesting case of pulmonary actinomycosis in a patient with a background of COPD, heavy smoking, and poor dental hygiene. The patient's initial presentation with pleuritic chest pain, fever, productive cough, and dyspnea may give the impression of a clinical diagnosis of pneumonia. This makes pulmonary actinomycosis a very challenging condition to diagnose, and physicians need to maintain a high index of suspicion.

Actinomyces is a common commensal that forms part of the normal flora of the oral cavity. Pulmonary

actinomycosis is caused by aspiration of the oropharyngeal secretions; this results in a direct invasion of the bronchopulmonary tree, putting the lower segments of the right lung at a higher risk [4]. Moreover, individuals with poor dental hygiene and alcoholism are more susceptible to develop pulmonary actinomycosis, which was the case in our patient. Other predisposing factors for pulmonary actinomycosis infection include underlying lung disorders such as chronic bronchitis, emphysema, and bronchiectasis [5], which was also noted in our case.

The radiological features of pulmonary actinomycosis aren't specific; they may include consolidation, cavitation, abscess formation, draining sinuses, mass, and hilar or mediastinal lymph node enlargement. Pleural involvement may also result in pleural effusion, thickening, or empyema in about 15%–50% of cases [6]. These different findings make pulmonary actinomycosis difficult to spot early, leading to it being misdiagnosed as lung malignancy or pulmonary tuberculosis.

The diagnosis of pulmonary actinomycosis is challenging due to the difficulty of isolating the organism. Simple culture using a sputum sample, either expectorated or extracted using bronchoalveolar lavage (BAL), is inadequate for the diagnosis of pulmonary actinomycosis unless the patient presents with lung cavitation [2, 7]. The gold standard for diagnosis is the histopathological examination and bacterial culture in anaerobic conditions from a pleural biopsy sample, looking for gram-positive branching filamentous rods with yellow sulfur granules [1–3]. Although sulfur granules are considered to be a pathognomonic histological feature and quite suggestive of actinomyces, it is important to know that sulfur granules can also be found in nocardiosis, coccidioidomycosis, and aspergillosis [8]. Moreover, it is quite helpful to realize that a sample taken from the pleural effusion in patients with pulmonary actinomycosis is unlikely to grow or yield any bacterial growth [2].

The treatment regimen for pulmonary actinomycosis requires a prolonged course of high doses of beta-lactam antibiotics such as penicillin G, amoxicillin, or cephalosporin. The recommended treatment duration is 6–12 months with the administration of antibiotics intravenously over 2–6 weeks, followed by oral medications [3, 5]. In patients with penicillin allergies, the recommended options include clindamycin, doxycycline, and erythromycin, with the latter being a safe option for pregnant women [1–3]. Antibiotics are the cornerstone of actinomycosis treatment, and a good response is usually observed, as seen in our patient. Nevertheless, surgical management is indicated in patients who develop massive hemoptysis or a localized lung infection such as (empyema, or abscess), also in cases of sinus tracts or fistulas, and finally in those who don't respond to medical treatment [9].

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Not applicable.

CONFLICTS OF INTEREST

All authors declare that there are no conflicts of interest.

CONSENT

Written consent for publication has been obtained from the patient and the authors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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