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CASE REPORT

Postoperative diagnosis of pulmonary actinomycosis in a patient with bronchiectasis – a rare case

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ABSTRACT

Introduction and aim. Pulmonary actinomycosis is a rare chronic infection caused by *Actinomyces* species, often mimicking tuberculosis, malignancy, or other chronic lung diseases both clinically and radiologically. These similarities frequently lead to diagnostic delays. We present a rare case of pulmonary actinomycosis in a patient with long-standing bronchiectasis who developed acute hemoptysis during anticoagulant therapy.

Description of the case. A 59-year-old woman with a ten-year history of bronchiectasis and recent mechanical aortic valve replacement presented with persistent hemoptysis while on warfarin. Thoracic computed tomography revealed bronchiectatic changes and opacities in the right middle lobe. Bronchoscopy showed bloody, encrusted material, but no definitive diagnosis was made. Due to ongoing symptoms and radiological suspicion of malignancy, an urgent right middle lobectomy was performed. Histopathological analysis confirmed pulmonary actinomycosis, revealing filamentous organisms via PAS, Gram, and Grocott's staining.

Conclusion. This case highlights the importance of considering pulmonary actinomycosis in patients with bronchiectasis and unexplained hemoptysis, particularly when standard treatment fails. Surgical resection may be essential for both diagnosis and treatment. The case underscores how structural lung disease and anticoagulant use can reveal rare infections otherwise masked by chronic symptoms.

Keywords. actinomycosis, bronchiectasis, hemoptysis, lobectomy, pulmonary infection

Introduction

Thoracic actinomycosis is a rare chronic pulmonary infection caused by filamentous, Gram-positive, facultatively anaerobic bacteria of the genus Actinomyces. Although the disease more commonly affects anatomic regions such as the oral cavity, pharynx, face, and abdomen, thorax infection occurs in approximately 15% of cases and can extend to the lung parenchyma, central airways, pleura, mediastinum, and chest wall.[1] The clinical presentation is usually nonspecific and may include symptoms such as chronic cough, productive sputum, hemoptysis, chest discomfort, fever, and weight loss. These symptoms in conjunction with overlapping radiographic features often resemble more common pulmonary diseases such as tuberculosis, lung cancer, or chronic bronchiectasis. As a result, timely and accurate diagnosis can be difficult. Radiographic findings often show mass-like consolidations, cavitary lesions, infiltrative shadows, morning opacities or pre-existing bronchiectatic changes.[2]

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The diagnosis of pulmonary actinomycosis is particularly difficult in individuals with preexisting structural lung abnormalities such as bronchiectasis. In such cases, clinical symptoms are often mistakenly attributed to the underlying chronic disease, leading to a delayed diagnosis. Furthermore, radiological findings are often similar to those seen in malignant neoplasms or other chronic pulmonary infections, further complicating the clinical picture. When hemoptysis occurs in patients receiving anticoagulant therapy, the differential diagnosis usually focuses on neoplastic processes or exacerbations of bronchiectasis, while rare infectious causes such as actinomycosis may be overlooked inadvertently.[3]

Histopathological examination remains the cornerstone in the diagnosis of pulmonary actinomycosis, as it allows the identification of filamentous organisms that stain positive using Schiff-, Gram-, and Grocott periodic acid techniques. Microbiological detection, on the other hand, is often limited due to the slow growth of the organism and its need for strict anaerobic conditions. Recognized risk factors include underlying structural lung abnormalities such as bronchiectasis or emphysema, poor oral hygiene, dental infections, chronic systemic disease, and immunosuppression. Of the various species, Actinomyces israelii is the most frequently isolated. Clinical symptoms often remain latent until complications such as hemoptysis, abscess formation, pleural effusion, or fistula formation occur.[4]

Due to its clinical and radiographic similarity to pulmonary malignancies, actinomycosis is often misinterpreted as cancer, leading to delays in diagnosis and potentially unnecessary invasive procedures. Surgical resection is usually reserved for cases with persistent hemoptysis, failure of drug therapy, or when malignancy cannot be definitively ruled out. Histopathological analysis of surgically removed tissue remains the most reliable diagnostic tool in these cases.[3]

The present case is particularly noteworthy because long-standing bronchiectasis and hemoptysis exacerbated by anticoagulant therapy occurred simultaneously and ultimately required emergency surgical resection. It emphasizes the importance of considering thoracic actinomycosis in the differential diagnosis of hemoptysis in patients with structural lung disease, especially when conventional diagnostic methods are inadequate to clarify the underlying cause.

This case illustrates a particular clinical context characterized by the coexistence of two unusual but clinically relevant conditions: chronic bronchiectasis and hemoptysis triggered by anticoagulant therapy, which eventually led to the diagnosis of pulmonary actinomycosis. There are few reports in the literature of thoracic actinomycosis that occurs under such circumstances. By highlighting this atypical diagnostic convergence, this case emphasizes the need to maintain a heightened clinical suspicion for rare infectious etiologies, especially in patients with pre-existing structural lung disease and unexpected clinical deterioration. Furthermore, it emphasizes the crucial role of a multidisciplinary approach in cases where standard diagnostic pathways do not provide a definitive diagnosis.

Aim

This report describes a rare case of pulmonary actinomycosis in a patient with long-standing bronchiectasis who developed clinical symptoms after starting anticoagulant therapy. The diagnosis was finally confirmed by surgical resection. This case illustrates the importance of considering infectious causes in the differential diagnosis of patients with unexplained hemoptysis, especially when structural lung abnormalities are present.

Description of the case

A 59-year-old woman was admitted with complaints of hemoptysis and cough that had persisted for about a week and had worsened significantly in the last few days. The medical history revealed a productive chronic cough that had persisted for 10 years and had been treated intermittently with antibiotics. Previous imaging studies had revealed bronchiectasis in the right middle lobe, which had remained stable but symptomatic over the years.

Her comorbidities included type 2 diabetes mellitus, hypertension, hyperlipidemia and a history of surgical treatment for aortic stenosis. She had undergone mechanical aortic valve replacement a year earlier and continued to receive long-term oral warfarin therapy. She was a lifelong non-smoker but had been exposed to textile dust due to her many years of working in the textile industry.

On physical examination, the patient was alert and in good general health with stable vital signs. Auscultation revealed diminished breath sounds in the right middle lung zone and a mechanical heart valve murmur was heard on cardiologic examination. Peripheral oxygen saturation was 96% in room air. Laboratory results showed a hemoglobin level of 8.8 g/dL, a leukocyte count of 6,610/mm^3, a platelet count of 283,000/mm3, a CRP of 16.2 mg/L, and an INR of 1.1. Liver and kidney function tests were within normal limits.

Thoracic computed tomography (CT) showed traction bronchiectasis in the right middle lobe surrounded by morning opacities, parenchymal fibrosis, and volume loss (Fig. 1). No mass lesions, cavitary changes, or lymphadenopathy were observed. Flexible bronchoscopy revealed bloody, encrusted, irregular, nonspecific material in the right middle lobe bronchi, which was aspirated and removed. No signs of massive active bleeding were noted during the procedure.

As hemoptysis persisted during anticoagulant therapy and conservative treatment did not respond, a

multidisciplinary team and emergency surgery was performed to remove the right middle lobectomy. Postoperatively, she was monitored in the intensive care unit for one day and then transferred to the general ward in stable condition. On the second postoperative day, 250 ml of chest drainage and an air leak were detected. On day 3, the drainage volume had decreased and the air leak had disappeared, so that the chest tube could be removed. The patient was mobilized, tolerated oral nutrition, and had adequate oxygen supply. She was discharged on postoperative day 4 without complications.

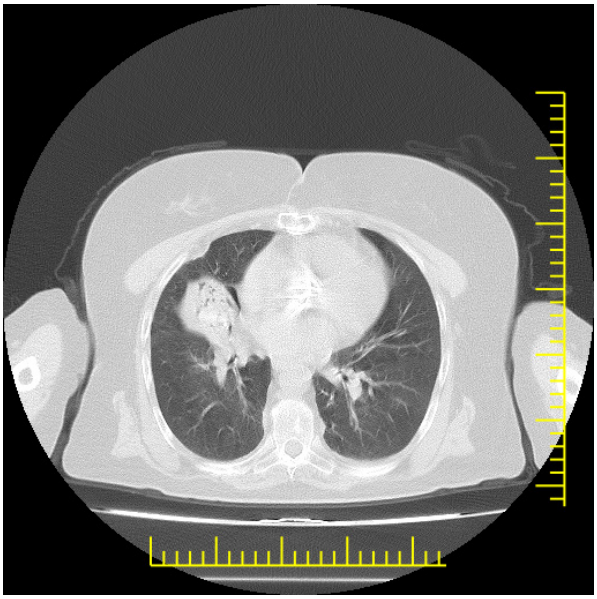

Fig. 1. Thoracic CT showing traction bronchiectasis in the right middle lobe

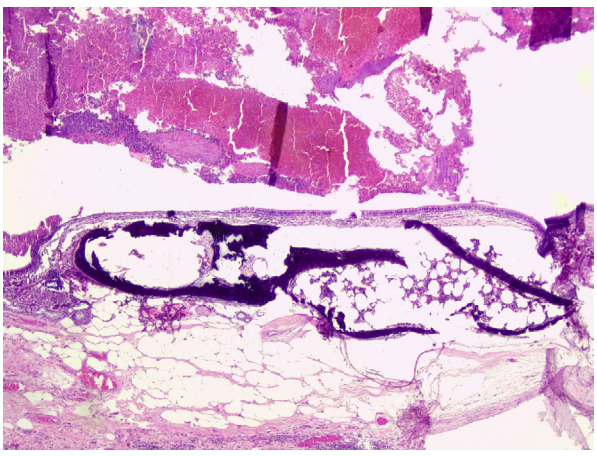

Fig. 2. Ossification and bone marrow formation in bronchial cartilage (H&E stain, x40)

Histopathologic analysis of the resected sample revealed advanced destructive bronchiectasis, parenchymal fibrosis, ossification in cartilage, and necrotic areas in the bronchial wall (Fig. 2). These necrotic areas contained filamentous organisms that stained positive with PAS, Gram, and Grocott's techniques (Figs. 3 and 4), suggesting pulmonary actinomycosis. No bacterial growth was observed in culture. Examination of the mediastinal lymph nodes showed reactive changes and anthracosis without evidence of malignant or specific pathology.

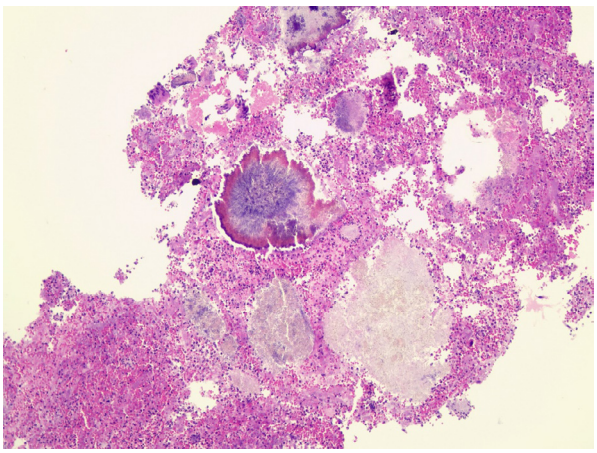

Fig. 3. Basophilic filamentous microorganism – *Actinomyces* (H&E stain, x100)

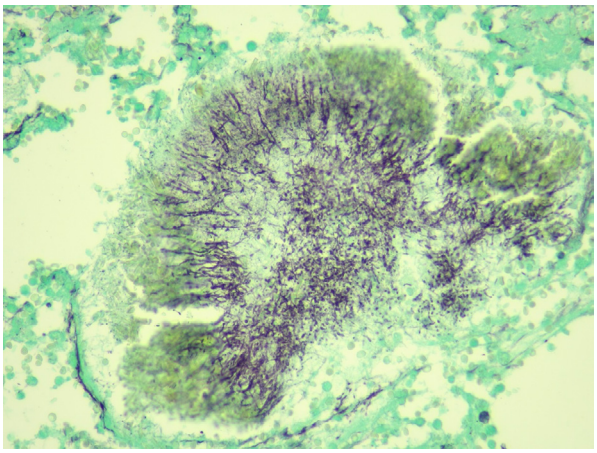

Fig. 4. Filamentous *Actinomyces* organisms highlighted by Grocott's methenamine silver stain (×400)

The infectious disease team recommended 6 months of oral amoxicillin (1 g, three times a day). Due to possible interactions between warfarin and amoxicillin, close monitoring of INR was recommended. The patient was referred to the outpatient departments of thoracic surgery and cardiology for follow-up care.

Discussion

Pulmonary actinomycosis is a rare but clinically significant infection that poses significant diagnostic challenges due to its similarity to more common pulmonary diseases such as tuberculosis or malignancies. The nonspecific clinical presentation and radiologic characteristics often contribute to delayed diagnosis.

In the present case, radiological imaging initially suggested a malignancy and the final diagnosis was made only after surgical resection and histopathologic analysis, confirming the reputation in the literature as the 'great masquerader'.[5]

A critical aspect in this case was the presence of long-standing bronchiectasis, which likely created a favorable environment for colonization and the development of low-grade, chronic infection. Cardoso et al.[6] reported that actinomycosis is often inconspicuous in patients with bronchiectasis, which can delay clinical recognition. In our case, the patient's chronic respiratory symptoms were initially attributed to her known bronchiectasis. However, the onset of hemoptysis, likely exacerbated by anticoagulant therapy, led to the clinical recognition of a previously hidden underlying infection. This demonstrates how structural lung abnormalities and anticoagulation can work together to reveal severe, previously unrecognized infections.

Bloody, crusted material was observed on bronchoscopic examination, but this finding was nonspecific and non-diagnostic according to the literature, which states that such features are not pathognomonic. Although modern diagnostic methods such as endobronchial ultrasound (EBUS) or bronchoscopic biopsy can be effective in selected cases, their utility is often limited by the accessibility of the lesion and the patient's condition. In our patient, progressive hemoptysis required urgent surgical intervention, which not only relieved symptoms, but also allowed histopathological confirmation.[7]

Microbiologic confirmation of actinomycosis is inherently difficult. In this case, culture results were negative, reflecting the well-documented difficulties in isolating Actinomyces species due to their slow growth and strict anaerobic requirements. Yuan et al.[8] successfully identified Actinomyces graevenitzii using advanced bronchoalveolar lavage and techniques, but such methods are not commonly used in routine clinical practice. Therefore, histopathology remains the most reliable diagnostic method, especially in diagnostically complex cases.

In the differential diagnosis, the possibility of coexisting malignancies should also be considered. Sugihara et al.[9] described a case in which pulmonary adenocarcinoma and actinomycosis were present simultaneously, which further complicated the clinical evaluation. Although no malignancy was detected in our patient, this possibility was carefully considered because the radiographic features suggested a neoplastic process.

Immunosuppression is another recognized risk factor for actinomycosis. Facchin et al.[10] reported a more aggressive disease course in patients with hematologic disease. Although our patient did not have immunosuppressive disease, chronic bronchiectasis may compromise local immune defenses and lead to a similar outcome.

Another consideration is the effect of long-term antibiotic use on the airway microbiota. Choo et al.[11] found that chronic macrolide therapy can alter microbial balance and possibly increase susceptibility to anaerobic infections. Although our patient did not receive such treatment, this factor remains relevant in the broader context of the treatment of patients with bronchiectasis.

Comparative case analyses illustrate the diagnostic challenges associated with pulmonary actinomycosis. Cardoso et al. pointed out that in patients with bronchiectasis, clinical overlap with other chronic infections often led to delays in diagnosis. Similarly, Sugihara et al.[9] reported a case in which actinomycosis coexisted with adenocarcinoma, increasing the suspicion of malignancy and further complicating the diagnostic process. Our case mirrors these findings, as the initial symptoms were attributed to pre-existing bronchiectasis, which delayed further investigation. These examples confirm the label of the 'great masquerader' and emphasize the need for a comprehensive and critical differential diagnosis in such cases.

Finally, several diagnostic limitations contributed to the late recognition of thoracic actinomycosis in this case. Although positron emission tomography (PET/CT) can be helpful in differentiating between infectious and malignant lesions, it was not performed due to the urgency of the clinical situation. A preoperative biopsy was also not possible due to the peripheral location of the lesion and the unspecific bronchoscopic findings. These challenges highlight the difficulty of making a diagnosis in the absence of definitive imaging or biopsy data, a problem that has also been encountered in previous case series of thoracic actinomycosis.

Study limitations

This case highlights several diagnostic challenges associated with rare pulmonary infections. First, although the histopathological findings were suggestive of actinomycosis, microbiological confirmation was lacking due to the difficulty in isolating Actinomyces species, which require strict anaerobic conditions and grow slowly. Second, no PET/CT scan was performed, which, although not standard for infections, could have provided metabolic information and helped differentiate between malignancy and infection, potentially speeding up the diagnosis. Thirdly, bronchoscopy did not provide diagnostic material, probably due to the peripheral location of the lesion or the patchy nature of the infection, emphasizing the limited sensitivity of minimally invasive methods. Therefore, a definitive diagnosis could only be made by surgical resection. As this is an isolated case, generalizability is limited. However, it emphasizes the diagnostic complexity of pulmonary actinomycosis in

patients with structural lung disease and anticoagulation and the need for increased clinical suspicion and timely use of advanced or surgical diagnostics when standard procedures are not conclusive.

Conclusion

Pulmonary actinomycosis is a rare but clinically relevant infection that frequently mimics malignancy or other chronic pulmonary disease, often leading to a delayed or inaccurate diagnosis. This report contributes to the limited literature by presenting a rare case in which pulmonary actinomycosis developed in a patient with chronic bronchiectasis and became clinically apparent after anticoagulant-induced hemoptysis. The need for surgical resection to make a definitive diagnosis despite nonspecific radiographic findings and nondiagnostic bronchoscopic evaluations highlights the diagnostic limitations of conventional noninvasive procedures in such complex cases. This case emphasizes the need to include rare infectious etiologies, such as actinomycosis, in the differential diagnosis of hemoptysis, especially in patients with preexisting structural lung abnormalities. Early recognition and a coordinated multidisciplinary approach are crucial to minimize diagnostic delays and achieve optimal clinical outcomes. To our knowledge, this case is one of the few documented cases in which pulmonary actinomycosis has been associated with bronchiectasis and hemoptysis during anticoagulation therapy.

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Declarations

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Author contributions

Conceptualization: M.K. and K.C. Methodology: M.K. Clinical data acquisition and interpretation: M.K., K.C., and G.K.G. Pathological analysis and reporting: G.K.G. and N.B. Writing – Original Draft Preparation: M.K. and T.D. Writing – Review & Editing: T.D. and N.B. Visualization: G.K.G. and M.K. Supervision: T.D. and N.B. Project Administration: M.K. and K.C.

Conflicts of interest

The authors declare no competing interests.

Data availability

Not applicable.

Ethics approval

Written informed consent was obtained from the patient for the use of clinical data, medical images, and related information presented in this case report. The patient was assured that all personally identifiable information would be treated confidentially and that all data would be anonymized to protect privacy.

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