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The Great Mimic: Blastomycosis Masquerading as Tubercular Empyema.

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ABSTRACT

Empyema necessitans is a rare complication of pleural infection in which pus extends from the pleural cavity through the chest wall into surrounding soft tissues. It is most commonly associated with tuberculosis, while fungal causes are exceedingly uncommon. We report a rare case of empyema necessitans caused by blastomycosis in a 42-year-old immunocompetent female with a known history of disseminated tuberculosis on antitubercular therapy. The patient presented with a progressively enlarging left chest wall mass and recurrent abscesses requiring repeated drainage. Imaging suggested empyema necessitans with possible malignant involvement. Histopathological examination of a repeat biopsy revealed numerous thick-walled yeast forms consistent with Blastomyces, highlighted by PAS stain, without evidence of granulomas or caseous necrosis. The findings established blastomycosis as the cause of the recurrent chest wall lesion. This case highlights the importance of considering rare fungal etiologies in persistent chest wall infections, even in patients with known tuberculosis.

Keywords: Empyema necessitans, Blastomycosis, Chest wall abscess, Disseminated tuberculosis.

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INTRODUCTION

Empyema is defined by the macroscopic presence of purulent pleural fluid and represents the severe end of the spectrum of pleural infections, which also includes complicated parapneumonic effusion. Most community-acquired pleural infections are caused by Gram-positive aerobic bacteria, particularly Streptococcus species, while Gram-negative organisms contribute less frequently.

Empyema necessitans is a rare late complication of inadequately treated empyema thoracis, in which pus dissects through the chest wall soft tissues and skin. The collection eventually ruptures externally, forming a fistulous tract between the pleural cavity and the skin. This condition is most commonly associated with Mycobacterium tuberculosis and Actinomyces israelii, although other organisms such as Blastomyces and Aspergillus have rarely been reported [1, 2].

Blastomyces is a dimorphic fungus endemic to North America, typically acquired through exposure to contaminated soil or decaying organic matter. Infection most commonly manifests as pulmonary disease, with presentations ranging from mild or subclinical respiratory illness to severe acute respiratory distress syndrome.

The diagnosis and management of fungal empyema thoracis require a multidisciplinary approach involving appropriate antifungal therapy, prompt drainage, pleural fluid analysis, and, when necessary, surgical intervention [3, 4].

Here, we present an unusual case of empyema necessitans caused by blastomycosis in an immunocompetent patient, highlighting the importance of considering fungal etiologies even in individuals without obvious risk factors or immunosuppression.

CASE PRESENTATION

We present the case of a 42-year-old female who was referred to our tertiary care center with a progressively enlarging left-sided chest wall mass and a history of recurrent chest wall abscesses that had required multiple incision and drainage procedures at an outside facility. Over a period of approximately six months, the patient underwent repeated surgical drainage for recurrent collections in the left chest wall; however, the swelling continued to recur, prompting referral for further evaluation and management.

The patient was a known case of disseminated tuberculosis, previously diagnosed based on microbiological confirmation. Her disease involved both pulmonary tuberculosis and intracranial involvement in the form of a tuberculoma. She had been receiving antitubercular therapy (ATT) for approximately one year at the time of presentation. Despite ongoing treatment, the patient reported progressive constitutional symptoms and new clinical concerns, including the development of upper limb weakness progressing to quadriparesis, along with the persistence and gradual enlargement of the left chest wall mass.

On clinical examination, a tender, fluctuant swelling was noted over the left anterior chest wall, suggestive of an underlying infective collection. Given her background history of tuberculosis and repeated abscess formation, the possibility of tubercular empyema with chest wall extension was strongly suspected. However, the recurrent nature of the swelling despite adequate antitubercular therapy raised concern for an alternative or coexisting pathology.

A contrast-enhanced computed tomography (CT) scan of the chest was performed for further evaluation. Imaging revealed features suggestive of an active infective process with empyema necessitans, characterized by a pleural collection extending through the chest wall into the adjacent soft tissues. In addition, the lesion demonstrated extension into the adjacent lung parenchyma, raising the possibility of an underlying malignant process. This radiological appearance created a diagnostic dilemma, as the imaging findings could represent chronic infection, inflammatory pseudotumor, or neoplastic pathology.

Routine laboratory investigations, including hematological and biochemical parameters, were within normal limits. Multiple biopsies had previously been obtained at outside institutions; however,

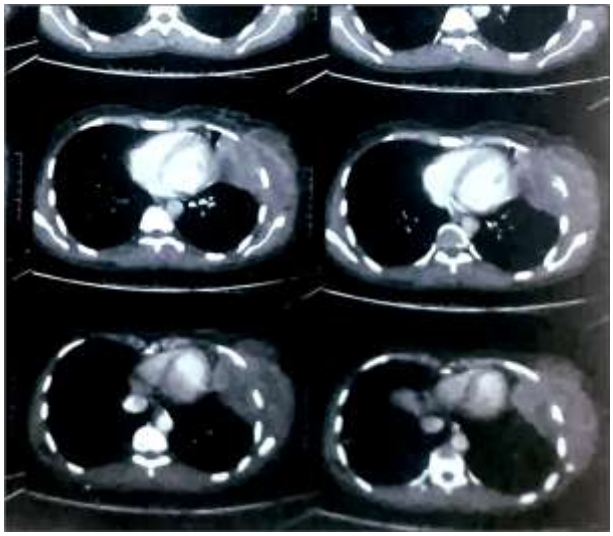
these samples were non-diagnostic, failing to establish a definitive etiology for the recurrent abscess formation. Given the persistence of the lesion and the uncertainty surrounding the diagnosis, a repeat biopsy was obtained from the chest wall mass and submitted for detailed histopathological examination.

Microscopic examination of the processed tissue sections revealed fibrocollagenous and fibroadipose tissue extensively infiltrated by numerous yeast forms of fungal organisms. These organisms demonstrated thick refractile walls with a characteristic capsule, morphologically consistent with Blastomyces species. Special staining with Periodic Acid–Schiff (PAS) with diastase digestion highlighted the fungal elements, confirming their presence within the tissue. Importantly, no well-formed granulomas or caseous necrosis were identified in the examined sections, effectively excluding a tubercular etiology for the chest wall lesion.

The histopathological findings established the diagnosis of blastomycosis involving the chest wall with features of empyema necessitans, which explained the patient's recurrent abscess formation and persistent mass. This diagnosis was particularly significant given the patient's prior confirmed diagnosis of disseminated tuberculosis, which had initially biased clinical suspicion toward a tubercular cause of the lesion.

This case is noteworthy and clinically significant for several reasons. First, blastomycosis presenting as empyema necessitans is extremely rare, particularly in patients already receiving treatment for disseminated tuberculosis, where recurrent infections are typically attributed to inadequate treatment response or drug resistance. Second, the patient had no clear environmental or occupational exposure history typically associated with blastomycosis, further complicating the diagnostic process. Third, the radiological findings mimicked malignancy, creating additional diagnostic uncertainty. Finally, repeated prior biopsies were non-diagnostic, emphasizing the importance of adequate tissue sampling and detailed histopathological evaluation in persistent or atypical chest wall lesions.

This case therefore highlights the importance of maintaining a broad differential diagnosis in patients with recurrent chest wall abscesses, even in those with a known history of tuberculosis. It underscores the need for clinicians and pathologists to consider rare fungal etiologies, particularly when clinical progression is inconsistent with the expected course of the presumed disease. Early recognition and accurate diagnosis are crucial, as appropriate antifungal therapy combined with surgical management can significantly improve patient outcomes.



CECT chest shows pleural collection with chest wall extension—empyema necessitans.

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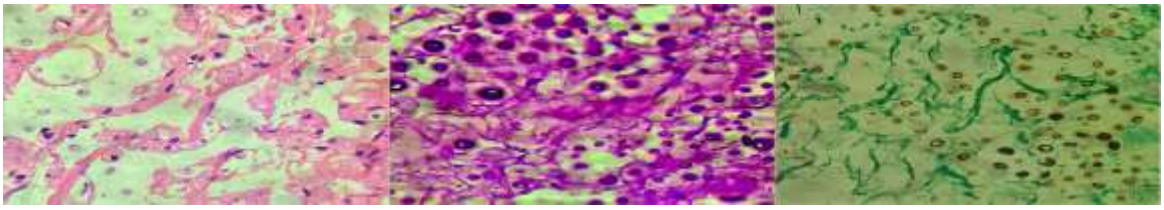

H&E 100x shows suppurative granulomas with thick-walled yeast displaying broad-based budding, highlighted by PAS (magenta) and GMS (black/brown).

DISCUSSION

Empyema refers to the macroscopic presence of purulent pleural fluid within the pleural space and represents the severe end of the spectrum of pleural infections, which also includes complicated parapneumonic effusion [1]. If left untreated, the infected pleural fluid may erode surrounding tissues and spontaneously drain through the chest wall. This condition is known as empyema necessitans, a rare complication characterized by the extension of pus from the pleural cavity through the soft tissues of the chest wall and eventually through the skin. In some cases, the infection may extend into adjacent regions such as the esophageal, breast, retroperitoneal, peritoneal, pericardial, and paravertebral areas [1].

Empyema necessitans can lead to significant complications, including bone erosion and soft tissue ulceration. The condition may initially remain asymptomatic and progress slowly over time [5].

The most common etiological agent associated with empyema necessitans is Mycobacterium tuberculosis. However, several other infectious organisms have also been reported, including Actinomyces species, Streptococcus pneumoniae, Staphylococcus aureus, Blastomyces species, pulmonary Aspergillus, secondary syphilis, and Salmonella typhi. Noninfectious conditions such as lymphoma and primary lung malignancy should also be considered in the differential diagnosis [5].

Fungal causes of empyema necessitans are rare but have been documented. These include infections caused by Aspergillus, Histoplasma, and Blastomyces species. Among these, blastomycosis is an infrequently reported cause of empyema. Many cases of fungal empyema are associated with predisposing factors such as immunosuppression, malignancy, tuberculosis, use of broad-spectrum antibiotics, or prior trauma or surgery. However, blastomycosis can occasionally occur in patients without identifiable risk factors. Studies suggest that nearly 39% of individuals with blastomycosis do not report classic environmental exposures such as contact with soil or dust near lakes and rivers [3].

Chronic pulmonary blastomycosis may present with nonspecific symptoms, including malaise, weight loss, night sweats, chills, fever, and hemoptysis. These clinical manifestations often overlap with other diseases, making differentiation difficult. Consequently, the differential diagnosis may include tuberculosis, malignancy, sarcoidosis, and other pulmonary fungal infections such as histoplasmosis [6].

In some cases, pulmonary blastomycosis may also produce radiological findings that closely resemble thoracic malignancy, further complicating the diagnostic process.

Diagnosing blastomycosis can be challenging. The organism is rarely isolated in blood cultures, and obtaining an adequate tissue sample for biopsy can be difficult. In addition, fungal sputum cultures have relatively low sensitivity. Because of these limitations, a definitive diagnosis often requires histopathological examination of tissue obtained through surgical biopsy, which may demonstrate the characteristic fungal forms [4].

Blastomycosis can be diagnosed through several methods, including antigen testing, direct visualization of fungal forms on histopathology or fungal smear, molecular testing of clinical specimens, and fungal culture. Importantly, Blastomyces species are not known to colonize or contaminate clinical specimens; therefore, their detection in tissue or culture is considered diagnostic of infection [4].

Radiologically, CT of the chest is the preferred imaging modality for evaluating the extent of empyema necessitans. It typically reveals a well-demarcated fluid collection extending from the pleural

cavity through the chest wall into adjacent compartments, sometimes accompanied by destruction of nearby ribs [1].

Management of empyema necessitans generally involves drainage of the pleural space, either through closed or open surgical techniques. This intervention helps prevent pleural fibrosis and allows re-expansion of the lung. In addition, appropriate antimicrobial or antifungal therapy should be administered based on the identified causative organism. Surgical debridement may also be necessary in cases with extensive tissue involvement.

Even after successful treatment, recurrence can occur within the first ten years, highlighting the need for long-term follow-up. Relapse is often associated with incomplete surgical resection or inadequate antimicrobial therapy. Therefore, accurate identification of the underlying cause is essential to ensure targeted therapy combined with effective surgical management to achieve complete recovery [1, 5, 7].

CONCLUSION

This case highlights the importance of considering rare fungal etiologies such as Blastomyces in patients presenting with recurrent chest wall abscesses and suspected empyema necessitans, even in the presence of a known diagnosis of tuberculosis. The overlapping clinical and radiological features can lead to diagnostic confusion with tuberculosis or malignancy, emphasizing the critical role of adequate tissue sampling and histopathological examination. Early recognition of the underlying etiology is essential to ensure appropriate antifungal therapy and surgical management, ultimately improving patient outcomes.

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