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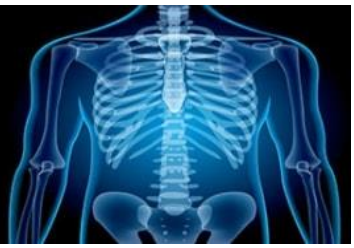

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Mucormycosis presenting as a mediastinal mass with vascular encasement in an immunocompetent male

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Abstract
Mucormycosis is an opportunistic fungal infection that typically involves the rhino-orbito- cerebral region, lungs, or gastrointestinal tract. Mediastinal involvement is extremely rare and poses a significant diagnostic challenge, often mimicking neoplastic or granulomatous diseases.
We report a 38-year-old male who presented with progressive dyspnoea on exertion for two months. Contrast-enhanced CT chest revealed a large ill-defined homogenously enhancing soft-tissue lesion in the anterior and middle mediastinum with vascular encasement. The imaging differentials included lymphoma and aggressive infection. Histopathological examination of biopsy specimen demonstrated fungal hyphae which were broad, branching with non-parallel edge, confirming mucormycosis. The patient was managed with antifungal therapy.

Keywords: Mediastinal mucormycosis, fungal infection, Computed tomography, Magnetic resonance imaging

Introduction
This uncommon fungal infection, due to species of the order *Mucorales*, is marked by its angioinvasive nature, fulminant course, and significant mortality. The disease is classically encountered in immunocompromised hosts, particularly those with uncontrolled diabetes, haematological disorders, prolonged corticosteroid use, or recipients of organ transplants. The most frequent sites of involvement include the rhino-orbito-cerebral region, lungs, gastrointestinal tract, and skin, with thoracic disease usually manifesting as pulmonary infection.
Primary mediastinal mucormycosis is exceptionally rare, with very few cases documented to date. Its presentation on imaging is often non-specific, making it difficult to distinguish from more common mediastinal pathologies such as neoplasms (lymphoma, thymoma, germ cell tumours, thyroid neoplasms, and metastatic deposits) as well as granulomatous infections like tuberculosis.
The occurrence of this infection in immunocompetent individuals is even more unusual, as the absence of well-known predisposing factors lowers the clinical suspicion and can delay diagnosis. Cross- sectional imaging with computed tomography (CT) and magnetic resonance imaging (MRI) plays a key role in delineating the lesion, assessing its extent, suggesting possible differentials, and directing biopsy for histopathological confirmation.
Here, we describe an unusual case of mediastinal mucormycosis in a previously healthy 38-year-old male, highlighting the characteristic imaging findings, diagnostic difficulties, and the essential contribution of radiology in patient evaluation and management.

Case Report
A 38-year-old male, previously healthy with no significant comorbidities, presented with progressive shortness of breath on exertion for the past two months. There was no history of cough, hemoptysis, chest pain, fever, weight loss, or night sweats. The patient had no known history of diabetes mellitus, tuberculosis or contact with TB patients, immunosuppressive therapy, or prior COVID-19 infection. On examination, vital signs were stable. Systemic examination revealed normal air entry bilaterally. Laboratory investigations, including complete blood counts and blood sugar levels, were within normal limits. HIV serology was negative.

Imaging Features
Chest radiograph revealed mediastinal widening with no significant parenchymal abnormality.

Plain and contrast-enhanced axial CT scan (Figure 1) demonstrated a large, ill-defined, hypodense, homogeneously and mildly enhancing lesion in the anterior and middle mediastinum (prevascular and visceral mediastinum as per ITMIG classification). The lesion encased the ascending aorta, arch of the aorta, its branches, right pulmonary artery, bilateral brachiocephalic veins, azygos vein, and the entire length of the superior vena cava without significant luminal narrowing, showing normal contrast opacification. Adjacent peribronchial consolidation was noted involving the perihilar region of the right lung, with air bronchograms and distorted, dilated bronchi within. (Figure 3A & 3B)

Magnetic resonance imaging (MRI) revealed a T1 isointense and T2 intermediate signal intensity lesion without diffusion restriction in the anterior and middle mediastinum. (Figure 4)

Positron emission tomography (PET) scan demonstrated an FDG-avid, ill-defined soft tissue mass involving the anterior and middle mediastinum (Figure 5). The imaging differentials considered were lymphoma, granulomatous infection such as tuberculosis.

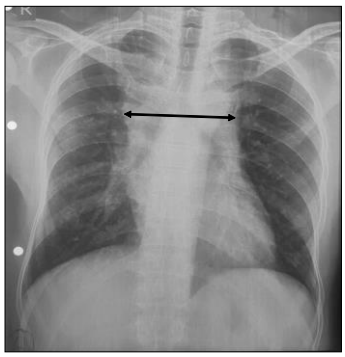

Fig 1: A 38 year old male patient with frontal PA radiograph showing mediastinal widening (marked by black double sided arrow) with no significant parenchymal abnormality.

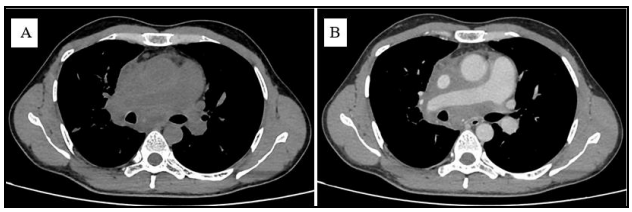

Fig 2A and 2B: Plain and contrast enhanced axial soft tissue CT scan shows a large ill-defined hypodense homogenously mildly enhancing lesion is seen in the anterior and middle mediastinum (prevascular and visceral mediastinum - According to ITMIG classification) encasing the ascending aorta, arch of aorta, its branches, RPA, bilateral brachiocephalic veins, azygous vein and entire length of SVC without significant luminal narrowing and normal contrast opacification.

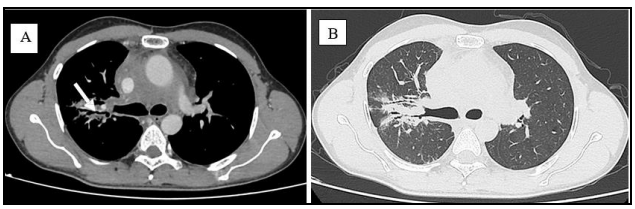

Fig 3A and 3B: Contrast enhanced soft tissue and HRCT lung window axial CT scan reveals adjacent peribronchial consolidation involving perihilar region of right lung, with air bronchogram and distorted dilated bronchi within. (marked by white arrow)

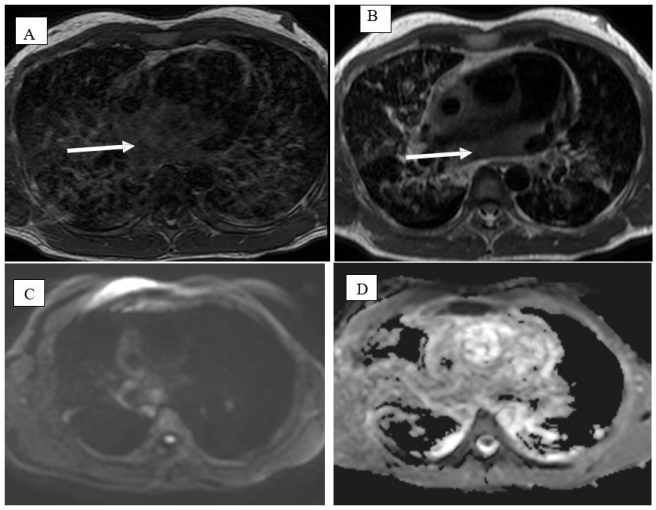

Fig 4A, 4B, 4C and 4D: Reveals T_1 isointense (4A) and T_2 intermediate signal intensity (4B) anterior and middle mediastinal lesion not showing restricted diffusion (4C).

Diagnosis and Management

CT-guided core biopsy of the lesion was performed. Histopathological examination showed fibrocollgenous tissue with epithelioid cell granulomas, some of which demonstrated negative shadows and occasional giant cells. On special staining, Gomori methenamine silver (GMS) stain highlighted broad, branching fungal hyphae with irregular, non-parallel edges. Acid-fast bacilli (AFB) and periodic acid-Schiff (PAS) stains were negative. No malignant cells were identified. The findings were consistent with mucormycosis.

The patient was started on intravenous liposomal amphotericin B 50 mg daily for 14 days and was discharged and transitioned to oral posaconazole 100 mg twice daily.

The patient showed gradual symptomatic improvement following antifungal therapy. Follow-up imaging is planned after three months to assess reduction in the size of the mediastinal mass

Discussion

Mucormycosis is a rare but highly invasive fungal infection caused by fungi of the order *Mucorales*. It is characterized by angioinvasion, tissue necrosis, and rapid progression, with mortality rates reported as high as 40-80% depending on the site of involvement and timeliness of treatment [1]. The infection is classically associated with immunocompromised states such as uncontrolled diabetes, haematological malignancies, organ transplantation, and prolonged corticosteroid use [2]. The most common presentations include rhino-orbito-cerebral and pulmonary forms, while gastrointestinal, cutaneous, and disseminated disease are less frequently observed. Thoracic disease usually manifests as pulmonary parenchymal infection; isolated mediastinal involvement is extremely uncommon, with only a few reports in the literature [3, 4].

Our case is particularly unusual as the patient was immunocompetent, with no underlying systemic illness or prior immunosuppression. Although rare, similar cases have been described in non- immunocompromised individuals, underscoring that invasive fungal infections cannot be entirely excluded in this population [3, 4]. The absence of traditional risk factors reduces clinical suspicion and often delays diagnosis, highlighting the critical role of imaging in

raising early suspicion.

Radiologically, mediastinal mucormycosis lacks pathognomonic features and can mimic lymphoma, tuberculosis, or other granulomatous conditions. In our case, CT revealed a large mediastinal mass with mild homogeneous enhancement and extensive vascular encasement but preserved luminal patency. This appearance closely resembled lymphoma, which typically presents as a bulky, homogeneous mass. However, necrosis and associated parenchymal consolidation with air bronchograms, as seen here, are atypical for lymphoma and should alert radiologists to the possibility of infection. Tubercular lymphadenopathy may also mimic this appearance but more often demonstrates peripheral rim enhancement or calcification rather than diffuse vascular encasement.

Definitive diagnosis rests on histopathology, with broad aseptate hyphae and irregular branching on GMS staining being characteristic. In our case, biopsy confirmed mucormycosis, consistent with earlier reports of mediastinal involvement [3, 4]. Management includes prompt initiation of antifungal therapy, with liposomal amphotericin B as the first-line agent and posaconazole for step-down therapy. Early recognition and therapy remain the most important prognostic factors [5].

This case adds to the limited literature describing mediastinal mucormycosis, particularly in immunocompetent hosts, and emphasizes that radiologists should consider invasive fungal infection in the differential diagnosis of necrotic mediastinal masses with vascular encasement.

Conclusion

Mediastinal mucormycosis is an exceptionally rare and often fatal manifestation of invasive fungal disease. Its clinical and imaging features are nonspecific and can closely mimic lymphoma or granulomatous infections, particularly in immunocompetent individuals where clinical suspicion is low. This case highlights the crucial role of radiology in raising early suspicion, guiding biopsy, and establishing a definitive diagnosis. Prompt initiation of antifungal therapy can significantly improve outcomes. Radiologists should, therefore, consider mucormycosis as a remote differential diagnosis in cases of mediastinal masses with vascular encasement, irrespective of the patient's immune status.

Conflict of Interest

Not available

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Not available

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