**Title: Importance of Invasive Diagnostic Techniques in the Early Detection of Pulmonary Mucormycosis in Diabetic Patients: A Case Series**

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**Abstract**:

**Background**: Pulmonary mucormycosis is an aggressive and potentially fatal angio-invasive fungal infection predominantly affecting immunocompromised individuals, especially those with uncontrolled diabetes mellitus. Early diagnosis remains challenging due to nonspecific clinical and radiological features, often resulting in delayed treatment and high mortality rates.

**Objective**: To highlight the importance of invasive diagnostic techniques in the early and definitive diagnosis of pulmonary mucormycosis in diabetic patients.

**Methods**: This case series describes five patients with uncontrolled diabetes mellitus who presented with severe respiratory symptoms and radiological features suggestive of pulmonary infection. Initial sputum microscopy and cultures were inconclusive in most cases. All patients underwent invasive diagnostic procedures including bronchoscopy, transbronchial lung biopsy, bronchoalveolar lavage, or thoracoscopy. Histopathological examination confirmed the diagnosis by demonstrating broad, aseptate, irregularly branching fungal hyphae consistent with Mucorales species.

**Results**: All five patients exhibited severe clinicoradiological disease, including cavitary lesions, ground-glass opacities, pleural effusion, and airway obstruction. Noninvasive diagnostic methods failed to establish the diagnosis in the majority of cases. Invasive modalities enabled early histopathological confirmation, facilitating prompt initiation of antifungal therapy with amphotericin B and management of underlying risk factors. Early diagnosis and aggressive treatment contributed to improved clinical outcomes.

**Conclusion**: Pulmonary mucormycosis in diabetic patients requires a high index of suspicion. Invasive diagnostic techniques play a crucial role in timely confirmation when noninvasive methods are inconclusive. Early histopathological diagnosis combined with prompt antifungal therapy significantly improves patient outcomes in this life-threatening infection.

**Keywords**: Pulmonary mucormycosis, Diabetes mellitus, Bronchoscopy, Thoracoscopy, Amphotericin B, Invasive diagnosis.

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