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Zygomycosis and Post SARS-CoV-2

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Dear Editor,

Zygomycosis, also known as mucormycosis, is a life-threatening disease caused by saprophytic fungi from the division Zygomycota (1). Predisposing factors include high-dose chemotherapy, immunodeficiency, cancer, trauma, leukopenia, malnutrition, prolonged steroid use, uncontrolled diabetes, and organ or bone marrow transplantation. According to studies, the risk factors for zygomycosis vary geographically. For example, leukemia is recognized as the most important risk factor in Europe, while in the Middle East, India, and Mexico, diabetes is the primary risk factor (2-4). Additionally, iron metabolism and high serum iron concentrations directly affect the development of zygomycosis (5). Pathogenicity varies depending on the fungal agent involved, but mortality rates are typically high, especially in respiratory or disseminated forms (6).

During the pandemic of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which causes coronavirus disease (COVID-19), mucormycosis cases increased, leading to the recognition of SARS-CoV-2 as a potential new risk factor for zygomycosis. This is because both SARS-CoV-2 and its treatments cause changes in the immune system, making patients more susceptible to infections. A decrease in T cells has been associated with an increased risk of fungal infections (7, 8). Severe SARS-CoV-2 disease is linked to elevated levels of pro-inflammatory markers, such as IL-1, IL-6, and tumor necrosis factor-alpha, which can further predispose individuals to life-threatening zygomycosis infections (9). The high mortality of zygomycosis is often due to complications such as rhinocerebral involvement, angioinvasion, and deep infections (10).

Diagnostic techniques for zygomycosis include biopsy, direct examination with KOH, and culture on selective media such as Sabouraud Dextrose Agar with chloramphenicol. Confirmation through histopathology is also essential for identifying the specific species of zygomycosis. However, early treatment should not be delayed while waiting for fungal culture results (11, 12). Treatment often requires a combination of intravenous antifungal therapy, such as liposomal amphotericin B, and other antifungals like posaconazole or isavuconazole, alongside surgical excision, making management of the disease challenging (13, 14). The prognosis depends on several factors, including rapid diagnosis and timely treatment. The Food and Drug Administration (FDA) has approved amphotericin B and isavuconazole for managing zygomycosis (15, 16).

Key underlying factors that influence outcomes include elevated serum iron levels, uncontrolled diabetes, high doses of chemotherapy (17), and the type of immunodeficiency (e.g., HIV/AIDS, solid organ transplantation, and hematopoietic stem cell transplantation). Despite early identification and treatment, the overall mortality rate remains approximately 50% (5, 14, 18).

The high incidence of zygomycosis associated with SARS-CoV-2 highlights the urgency for studies that focus on disease manifestations, considering age and gender, to develop new diagnostic strategies and reduce mortality rates. Moreover, it is recommended to conduct

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histopathological research specific to certain communities to further enhance treatment strategies, which should be a priority for future research.

Footnotes

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