

Introduction

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Invasive fungal sinusitis is defined as the presence of fungal hyphae within the mucosa, submucosa, bone, or blood vessels on histopathology [1]. Once considered a rare disorder, today it is being reported with increasing frequency around the world. Invasive zygomycosis followed by invasive aspergillosis is an important concern in India as the world's highest number of cases of zygomycosis are being reported from here [2]. It is often misdiagnosed or there is a delay in diagnosis resulting in high rate of morbidity as well as mortality. Successful patient outcome depends on high index of clinical suspicion; adequate and appropriate sinus biopsies; rapid microbiological, pathological, and radiological diagnosis; followed by prompt aggressive and concomitant surgical debridement, antifungal treatment, and management of the underlying or predisposing metabolic or other systemic disorders.

Of the approximately 1.5 billion [3] fungal species supposedly existing in the world, approximately 400 are human pathogens, and again, only 50 of these cause systemic or central nervous system infections. Many of these are ubiquitous in our environment. Although many humans are colonized by fungi, an intact immune system prevents subsequent infection [4] as well as its progression.

Invasive fungal sinusitis is usually seen in immunocompromised individuals. Factors predisposing to the development of invasive fungal sinusitis include [1, 2, 5–8]:

- Metabolic or systemic disorders
 - Diabetes mellitus
 - Hematological disorders, e.g., leukemia, lymphomas, and aplastic anemia
 - Hemochromatosis
 - Acquired immunodeficiency syndrome (AIDS)

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- Iatrogenic immunosuppression
 - Systemic steroid therapy
 - Chemotherapy with neutropenia
 - Prolonged antibiotic therapy
- Post-organ or stem cell transplantation

Occasionally invasive fungal sinusitis may occur in immunocompetent individuals [1, 7, 8]. Noninvasive fungal disease may progress to invasive disease (mixed infection) if the immunological status of a patient changes. Such a progression may be precipitated by a change of host defenses [9], and the diagnosis of “invasion of tissue” in such cases requires an experienced histopathologist.

The best outcome reported in acute fulminant invasive fungal sinusitis is near 50 % survival [1]. To improve survival rates, clinicians must be aware of the manifestations of the disease and have access to good diagnostic mycology and pathology laboratories for rapid diagnosis which is essential for the management of this disease. Only a multidisciplinary management approach can ensure successful outcomes in patients of invasive fungal sinusitis.

References

1. de Shazo RD, O'Brien M, Chapin K, et al. A new classification and diagnostic criteria for invasive fungal sinusitis. *Arch Otolaryngol Head Neck Surg.* 1997;123(11):1181–8.
2. Chakrabarti A, Chatterjee SS, Shivaprakash MR. Overview of opportunistic fungal infections in India. *J Med Mycol.* 2008;49:165–72.
3. Hawksworth DL. The magnitude of fungal diversity: the 1.5 million species estimate revisited. *Mycol Res.* 2001;105:1422–32.
4. Bazan 3rd C, Rinaldi MG, Rauch RR, Jinkins JR. Fungal infections of the brain. *Neuroimaging Clin N Am.* 1991;1:57–88.
5. Epstein VA, Kern RC. Invasive fungal sinusitis and complications of rhinosinusitis. *Otolaryngol Clin North Am.* 2008;41:497–524.
6. Stringer SP, Ryan MW. Chronic invasive fungal rhinosinusitis. *Otolaryngol Clin North Am.* 2000;33(2):375–87.
7. Gillespie MB, O'Malley BW. An algorithmic approach to the diagnosis and management of invasive fungal rhinosinusitis in the immunocompromised patient. *Otolaryngol Clin North Am.* 2000;33(2):323–34.
8. Sridhara SR, Paragache G, Panda NK, et al. Mucormycosis in immunocompetent individuals: an increasing trend. *J Otolaryngol.* 2005;34(6):402–6.
9. Gungor A, Adusumilli V, Corey JP. Fungal sinusitis progression of disease in immunosuppression – a case report. *Ear Nose Throat J.* 1998;77:207–15.