An Aggressive Multidisciplinary Approach Reduces Mortality in Rhinocerebral Mucormycosis

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Introduction

Rhinocerebral mucormycosis occurs in immunocompromised hosts with uncontrolled diabetes, solid organ transplants, and hematologic malignancies.[1,2,4-5,7-9] Primary disease is in the paranasal sinuses but often progresses intracranially, via direct extension or angioinvasion.[8] Rhinocerebral mucormycosis is rapidly fatal with a mortality rate of 85%, even when maximally treated with surgical debridement, antifungal therapy, and correction of underlying processes.[1,4,8]

Methods and Materials

We performed a retrospective chart review of patients with rhinocerebral mucormycosis from 2011-2014. These patients were analyzed for symptoms, surgical and medical management, and outcome.

Results

All four patients diagnosed with rhinocerebral mucormycosis presented with some degree of headache, facial and orbital pain, with ophthalmologic symptoms ranging from pain, ptosis, and proptosis to ophthalmoplegia and blindness. All patients had a diagnosis of diabetes mellitus, while half also were immunosuppressed following renal transplants. The patients had magnetic resonance imaging (MRI; Figure 1) and computed tomography (CT) findings consistent with fulminant sinusitis, but fungal, specifically mucor, sinusitis was diagnosed based on histopathology.

The patients all underwent several sinus debridements with otolaryngologists with intraoperative neurosurgical collaboration, and then subsequently were treated with Amphotericin B. Half of the patients also underwent orbital exenteration of the infiltrated globe with ophthalmology.

Ultimately 50% of the patients succumbed to their disease. Overall time to diagnosis was an average of seven days. There were an average of four surgical debridements in the four patients. Both antifungal therapy and surgical debridement were launched on the day of diagnosis, and average prognosis after presentation was approximately 51 days in the two patients who died (Table 1). The other two patients have survived 18-24 months at the time of publication.

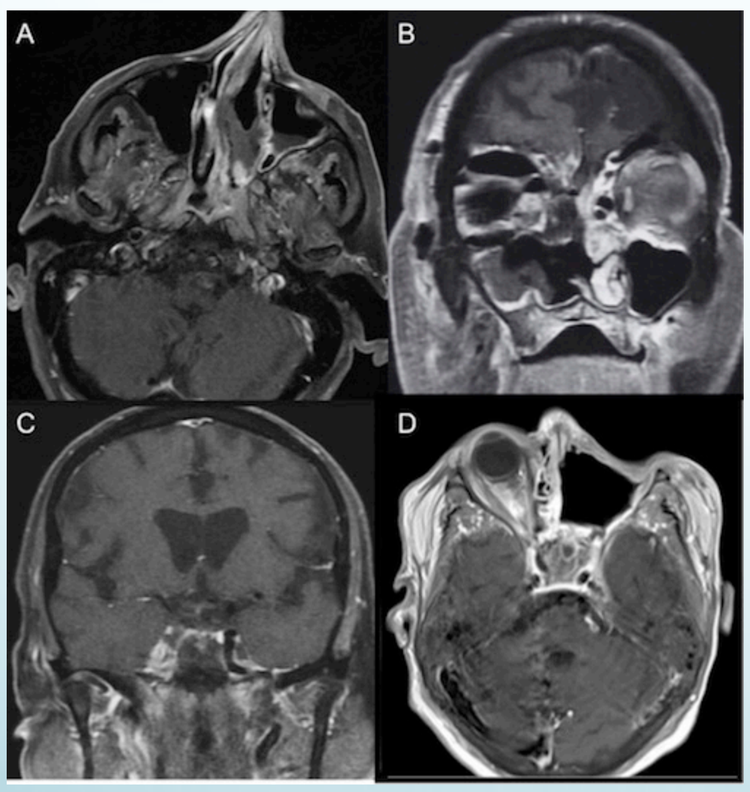

Figure 1: Axial and coronal T1-weighted, gadolinium enhanced, magnetic resonance imaging (MRI) showing (a-b) sinonasal and (c-d) cavernous sinus invasive fungal infiltration

Table 1: Timing of presentation and treatment

Patient	1	2	3	4	Average
Demographics	61, M	76, M	29, F	53, F	
Symptom onset to presentation (days)	36	29	15	3	21 ± 13
Time to diagnosis* (days)	2	15	10	2	7 ± 6
Time to antifungal therapy** (days)	0	0	0	0	0
Surgical procedures	3	3	2	7	4 ± 2
Time to first surgery** (days)	0	0	0	0	0
Time to death* (days)	13	-	-	88	51 ± 53

*From presentation to medical care (including OSH)
**From diagnosis

Discussion

Rhinocerebral mucormycosis occurs in patients who are immunocompromised, most commonly secondary to hematologic malignancy, diabetes mellitus, or iatrogenically following organ transplantation.[1,4,8] With the increasing prevalence of diabetes and ubiquitous nature of the filamentous fungi, an increased incidence of rhinocerebral mucormycosis is expected.[1,5,7]

Clinical symptoms usually begin as non-specific malaise and headache, progressing to acute sinusitis, facial edema, orbital symptoms, rhinorrhea, and eventual ophthalmoplegia, blindness, and lethargy.[8] Differentiation from the more common and less morbid bacterial sinusitis can be challenging and is the greatest cause of treatment delay.[1,8]

Intracranial extension occurs in 80% of cases and causes encephalopathy, cerebritis, and angioinvasion leading to cavernous sinus thrombosis and cerebrovascular accidents.[2,5,8] Early diagnosis, and subsequent treatment, has been shown to portend higher survivability.[1,4,8] The key to management of this rapidly progressive fulminant disease is swift commencement of multidisciplinary treatments.

Conclusions

Given the high morbidity and mortality of invasive rhino-orbito-cerebral fungal infections, a comprehensive and efficient multidisciplinary approach must be executed. This includes aggressive surgical debridement of disease in the paranasal sinuses, foramina of the skull base, and intracranial components, as well as initiation of a robust anti-fungal medical regimen with close follow-up. Despite aggressive measures, the overall mortality of rhinocerebral mucormycosis remains high, and future studies must focus on avenues of securing an earlier diagnosis, enacting aggressive multidisciplinary management, and pursing new avenues of treatment.

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