Rhinocerebral zygomycosis in a diabetic patient

Mirella Alves da Cunha¹, Andréia Ferreira Nery¹, Francisco Pignataro Lima², José Diniz Junior³, José Maciel Neto⁴, Nicácia Barbosa Calado¹, Kleber Giovanni Luz¹ and Eveline Pipolo Milan¹

ABSTRACT

Rhinocerebral zygomycosis is the most frequent form of fungal infection caused by members of the Zygomycetes class. A fatal case of rhinocerebral zygomycosis caused by Rhizopus (oryzae) arrhizus with histopathological and mycological diagnosis is reported in a diabetic patient.

Keywords: Zygomicosis. Diabetes mellitus. Tuberculosis.

INTRODUCTION

Zygomycosis is a term used for a variety of fungal infections caused by members of the Zygomycetes class¹. The genus Rhizopus accounts for a large proportion of cases of the order Mucorales, while Rhizopus (oryzae) arrhizus is the main species identified worldwide²,³. The most frequent form of infection is rhinocerebral, which manifests in the nasal mucosa and paranasal sinuses and may spread to the orbit through the ethmoid, maxillary sinuses or tear ducts, reaching the brain through the orbital vessels⁴.

The infection may be gastrointestinal, pulmonary, cardiac, rhinomaxillary, rhinocerebral-orbital or disseminated⁴,⁵. It is most common in immunocompromised individuals, patients with uncontrolled diabetes mellitus, hematological malignancy, advanced renal disease or with a transplanted kidney⁶. It generally occurs through inhalation of spores or, less frequently, percutaneously⁵,⁷. Rapid fungal invasion of tissue may occur as well as vascular invasion, with consequent ischemia and necrosis⁸. Healthy individuals seem to have strong natural immunity against zygomycosis and cutaneous-mucosal barrier integrity is the main line of defense against spores⁹,¹⁰.

The aim of this report is to present a case of rhinocerebral zygomycosis in a female diabetic patient.


Tel: 55 84 3201-5747; 55 84 9402-7404
e-mail: evepipolo@gmail.com
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Extensive secretion drainage was performed, resulting in temporary clinical improvement. Sudden onset left hemiparesis developed three days after surgery.

Histopathological examination of the nasal region using both routine staining, hematoxylin eosin, and spatial staining, Gomori Methenamine Silver (GMS) and Periodic Acid- Schiff (PAS), for fungus, revealed wide irregular non-septate hyphae, with frequent branches at right angles invading the mucosa, and extensive necrotic areas (Figure 2). The material was cultured in Sabouraud dextrose Agar medium at 25°C. After 4 days, the growth of white aerial mycelium with cottony texture was observed, subsequently becoming covered with black dots. Micromorphology showed hyphae that were non-septate and unbranched sporangiophores arising opposite the rhizoids. Each sporangiophore sustained a round sporangium, full of spores that had a flat base (Figure 3). The fungus was diagnosed as *Rhizopus (oryzae) arrhizus*.

The patient was admitted to the ICU 18 days after hospital admission exhibiting a reduced level of consciousness. Amphotericin B was administered immediately, but the patient died 4 days later.

**DISCUSSION**

The rhinocerebral form of zygomycosis is the most frequently reported in diabetic patients. In the case discussed here, the patient presented with a permanent hypoglycemic condition, resulting from the clinical decomposition of diabetes mellitus. She was at the end of treatment for pulmonary tuberculosis, with no signs of clinical respiratory improvement. Considering the likely cellular dysfunction of macrophages and neutrophils inherent in diabetic individuals and the greater possibility of invasive disease in immunosuppressed individuals, it can be hypothesized that the etiologic agent of the initial pulmonary disease was the zygomycete, which, in light of her diabetes-related depressed immune system, spread to the CNS.

It should also be emphasized that the relation between tuberculosis and pulmonary tuberculosis remains unclear. Fungal infection may occur in cavities resulting from microbacterial invasion. Patel et al reported a recent case of concurrent zygomycosis and pulmonary tuberculosis in an elderly cardiopathic individual with a history of smoking, but with no other immunodepressive factors.

With respect to the clinical manifestations of cerebral zygomycosis, Sundaram et al reported headaches, fever, unilateral facial edema, visual disorders and loss of vision as the most frequent symptoms. Although the patient in question showed a compatible clinical picture, it is also symptomatic of other diseases. Diagnosing invasive zygomycosis is particularly difficult, since it is based on histopathological examination showing fungal invasion of the tissues. Furthermore, clinical suspicion depends on imaging examinations, such as computerized axial tomography and magnetic resonance, which are useful for demonstrating compromised bones and paranasal sinus compromise, in addition to showing the extension of the lesion.

At admission, she exhibited extensive tissue destruction and necrosis, indicating that the disease had been contracted approximately one month earlier. Difficulties inherent to the public health service delayed magnetic resonance and surgical intervention. Histopathological and culture results were available only three days before death, at which time amphotericin B was administered.
The prognosis of rhinocerebral zygomycosis is cautious and depends on several factors, such as the infection site, rapid diagnosis and severity of immunodepression\(^1\). Since its course is invariably fatal, early diagnosis is essential\(^7\).

It must be emphasized that both diagnostic difficulties and delayed surgical treatment in conjunction with early antifungal administration were factors that directly influenced the fatal outcome in this patient. Additionally, the lack of well designed studies that describe the natural evolution of zygomycosis with simultaneous compromise of the lungs, facial sinuses and CNS and that discuss its correlation with pulmonary tuberculosis, also contributed to the death of this patient.

REFERENCES