Case Report / *Olgu Sunumu*

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Rhinoorbital Mucormycosis in an Immunocompetent Child Case

İmmünkompetan Bir Çocuk Olguda Rinoorbital Mukormikozis

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Abstract

Mucormycosis usually causes opportunistic infections in diabetic and immunocompromised patients. We aimed to present a pediatric case who was previously healthy and diagnosed with rhinoorbital mucormycosis. A 4.5-year-old male patient was diagnosed with preseptal abscess due to swelling in the right eye four months ago and abscess drainage was performed. Three months later, the patient was admitted to our hospital with swelling in the right eye again. The patient's radiological findings were consistent with mucormycosis. Sinus drainage was performed. Pathological evaluation of the biopsy material was reported as mucormycosis. The patient was treated with liposomal amphotericin B. Due to insufficient clinical response and progression detected on control imaging, the patient underwent reoperation on the 31st day of treatment. Since *Aspergillus* could not be excluded, voriconazole was added to the treatment. Histopathological findings again confirmed mucormycosis. The patient received parenteral treatment for 101 days (liposomal amphotericin B 101, voriconazole 70 days) and was discharged with oral posoconazole. Liposomal amphotericin B is the first choice in the treatment of mucormycosis and the prognosis is determined by timely and appropriate surgery.

Keywords: Child, liposomal amphotericin B, mucormycosis, posaconazole

Öz

Mukormikozis, genellikle diyabetik hastalar ve immünsuprese kişilerde ortaya çıkan fırsatçı bir enfeksiyondur. Bu yazıda, daha önce sağlıklı olan bir çocukta rinoorbital mukormikozis tanısı alan bir olgu sunulmaktadır. Dört buçuk yaşında erkek hasta, dört ay önce sağ gözünde şişlik oluşması nedeniyle preseptal selülit ve apse tanısı alarak apse drenajı yapılmış, ancak üç ay sonra sağ gözünde yeniden şişlik oluşması üzerine hastanemize başvurmuştur. Hastanın radyolojik bulguları mukormikozis ile uyumlu bulunmuş, sinüs drenajı gerçekleştirilmiş ve biyopsi materyalinin patolojik değerlendirmesi mukormikozis olarak raporlanmıştır. Hastaya lipozomal amfoterisin B tedavisi başlanmış, ancak klinik yanıtın yetersiz olması ve kontrol görüntülemelerde progresyon saptanması üzerine tedavisinin 31. gününde tekrar opere edilmiştir. *Aspergillus* dışlanamadığı için tedaviye vorikonazol eklenmiş ancak, patolojik değerlendirme yeniden mukormikozis ile uyumlu bulunmuştur. Hasta, 101 gün parenteral antifungal tedavi (lipozomal amfoterisin B 101, vorikonazol 70 gün) sonrası oral posakonazol ile taburcu edilmiştir. Mukormikozis tedavisinde lipozomal amfoterisin B ilk seçenektir ve prognozu zamanında ve uygun yapılmış cerrahi belirlemektedir.

Anahtar Kelimeler: Çocuk, lipozomal amfoterisin B, mukormikozis, posakonazol

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Introduction

Mucormycosis usually causes severe life-threatening fungal infections by destroying tissues due to vascular invasion in the presence of an underlying predisposing disease, especially in immunocompromised individuals. Although mucormycosis is classified as rhinocerebral, pulmonary, cutaneous, gastrointestinal and disseminated according to organ involvement, the most common form is rhinocerebral (39%) involvement (1). Rhinocerebral mucormycosis is characterized by rhinonasal, rhinoorbital and rhinoorbitocerebral involvement. Rhinoorbital disease starts with invasion of mucormycosis spores into the nasal mucosa by inhalation, spreads to the paranasal sinuses and causes sinusitis. Orbital involvement is seen with invasion of the infection from the paranasal sinuses to the orbital wall. Pain, chemosis, vision loss, ophthalmoplegia and proptosis may be observed. Liposomal amphotericin B is the most active drug against mucor in vitro and is the first choice in initial treatment (2). Mucormycosis causes tissue necrosis and vascular thrombosis and prevents diffusion of antifungals to the site of infection. Therefore, surgical debridement has been shown to be effective in the treatment of this disease and to improve survival (3). Surgery is especially recommended in rhinoorbital mucormycosis; repeated debridement until a clear and viable surgical margin is established increases the treatment response (4). In this article, we present a pediatric case who was diagnosed with rhinoorbital mucormycosis in a previously healthy patient in our clinic.

Case

A 4.5-year-old male patient with no previous known disease received treatment with a prediagnosis of preseptal cellulitis in an external center to which he presented four months ago because of swelling under his right eye and was drained considering an abscess. Three months after the operation, the patient was admitted to our hospital because of reoccurrence of swelling under the right eye and outward enlargement of the eye. The general condition of the patient was good, he was conscious and coherent. The patient had swelling, proptosis and limitation of movement in the right eye and other system examinations were normal (Figure 1). Orbital cellulitis, orbital abscess and mucormycosis were considered in the ophthalmologic examination. On maxillofacial-orbital magnetic resonance imaging (MRI), there was an appearance consistent with changes primarily secondary to inflammatory processes which caused expansion in the right medial canthus preseptal distance, pushed the optic nerve extraconal muscles causing proptosis in the right eye, did not cause significant invasion and bone destruction, no abscess formation was observed. There were signs of sinusitis at the bilateral ethmoid cellular level and right maxillary sinus level. A biopsy was performed on the relevant lesion by the department of ophthalmology. Sinus drainage was performed by the department of ear, nose and throat (ENT) diseases and biopsy was performed from the lesion (Figure 2). Liposomal amphotericin B (5 mg/kg/g) was started. Pathology result: Periodic acid-Schiff (PAS) and Grocott's methenamine silver paint (GMS) revealed a small number of fragmented, thick hyphae with morphologic features compatible with mucormycosis, causing necrotic granulomatous inflammation, progressing into the tissue. Investigations for tuberculosis, rheumatologic disease, malignant disease and immunodeficiency were normal. On the 31st day of liposomal amphotericin B treatment, intravenous voriconazole (8 mg/kg/dose) was added to the patient's treatment because

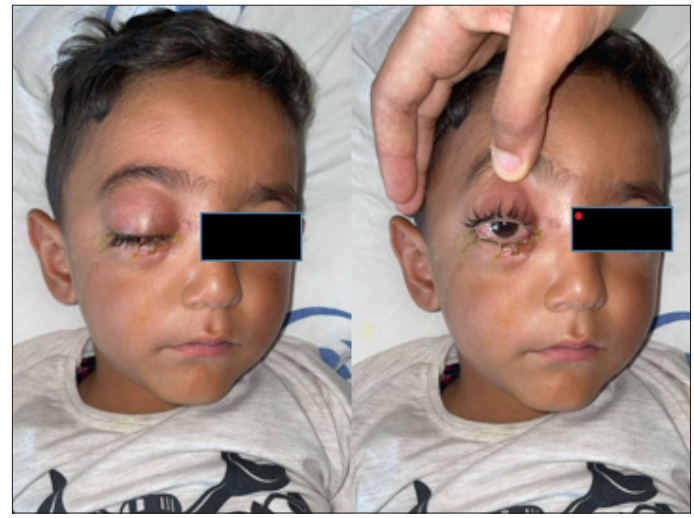

Figure 1. Left picture: Lid swelling and proptosis are observed together at the time of the patient's first presentation to the emergency room. Right picture: When the patient's eyelid is opened, intense chemosis and limitation of eye mobility are seen.

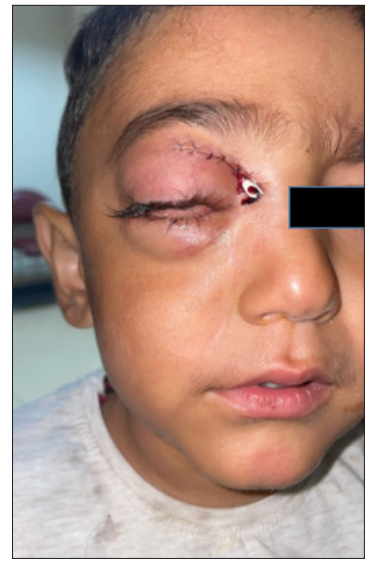

Figure 2. Post operative day one appearance of the patient after orbital abscess drainage and endoscopic sinus surgery.

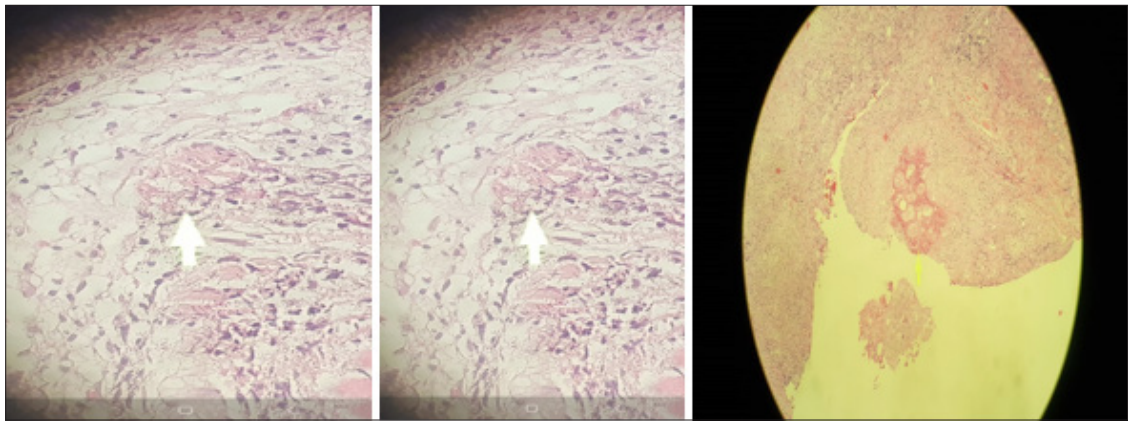

Figure 3. Pathology images (PAS and GMS findings consistent with mucormycosis with few fragmented, thick hyphae, morphologic features compatible with mucormycosis, causing necrotic granulomatous inflammation, progressing into the tissue).

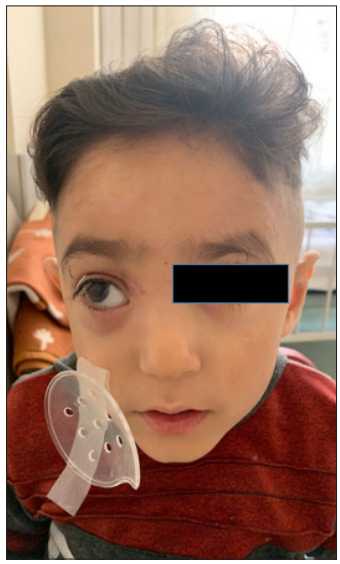

Figure 4. Clinical appearance of the patient before discharge with improvement. Proptosis and lid edema had improved and eye movements were free and relaxed.

Aspergillus could not be excluded due to the progression of the findings in the paranasal-orbital MRI performed due to increased swelling in the nose and eyes. The patient was operated again by the ENT department. Pathologic evaluation was again compatible with mucormycosis (Figure 3). The patient's clinical and radiologic findings regressed in the follow-up and was discharged on the 101st day of treatment (liposomal amphotericin B 101, voriconazole 70 days) with oral posaconazole (6 mg/kg/dose) (Figure 4).

Discussion

Mucormycosis is an acute, life-threatening opportunistic fungal infection that progresses by angioinvasion and is often caused by one of the three members of the mucorales fungi of the *Zygomycetes* class called *Rhizopus*, *Absidia* and *Mucor* (5). In a comprehensive review of 929 patients between 1940 and 2003, poorly controlled diabetes (36%) was found to be the most common risk factor, and hematologic cancers (17%) and hematopoietic stem cell or solid organ transplantation (12%) were reported to be other common causes. Another 19% of the cases were immunocompetent patients with no known underlying conditions and the main risks identified in these patients were previous operation, penetrating trauma and burns (1). According to the three-year RetroZygo study conducted in France, hematologic malignancy was found as a risk factor in almost half of the patient population, followed by diabetes (23%) and trauma (18%), respectively (2). Similar results were obtained in a study published in 2021 in our country; 20 pediatric cases with biopsy-proven mucormycosis were examined and hematologic malignancy was observed as the underlying condition in 75% of the patients (6). In our case, diabetes, malignancy and other immunosuppressive causes were not detected, but there was a history of previous surgery as a risk factor.

In a case series published in 2020 including five previously healthy children presenting with orbital cellulitis, mucormycosis was diagnosed by histopathologic examination or culture in all patients. In these cases, minor surgical procedure to the lacrimal duct, trauma, horticultural history, corn feed store and exposure to hay were determined as risk factors (7). In a previously healthy adult case, it was observed that rhinocerebral mucormycosis developed 45 days after a tooth root canal procedure (8). In another study published in 2023, involving four immunocompetent pediatric cases, orbital mucormycosis due to direct traumatic injury after bird pecking was reported (9). Risk factors frequently shown in the development of orbital mucormycosis include hematologic malignancies (17 to 77% of cases) and immunosuppressive conditions such as diabetes; trauma, burns, minor surgical procedures such as tooth extraction, denture placement, lacrimal canal operation, and surgical operations related to the sinus and its neighborhood. Isolated orbital mucormycosis has rarely been reported

in immunocompetent individuals without well-known predisposing factors (10). In our case, it was known that abscess drainage was performed three months before admission, and it was thought to be mucormycosis related to the operation; penetrating trauma and other risk factors for orbital mucormycosis were not found.

In rhinoorbital cerebral mucormycosis, infection begins with inhalation of spores into the oral and nasal cavity. An acute sinusitis attack may progress to pansinus involvement and spread to the palate and brain within a few days. Due to the angioinvasive nature of the fungus, this leads to severe tissue ischemia and necrosis (11). In our patient, a history of sinusitis could not be obtained, but sinusitis was present on imaging. It could not be differentiated whether mucor developed after sinusitis or whether sinusitis findings were present with the spread of mucormycosis to the sinuses.

Clinical symptoms and findings in orbital involvement of mucormycosis include periorbital edema, pain, proptosis, ophthalmoplegia and decreased vision. Our patient presented to us with swelling in the right eye. It is essential to evaluate the patients with a multidisciplinary approach and to make a differential diagnosis with ophthalmologic examination. Computed tomography (CT) and MRI are the best imaging modalities for early diagnosis of suspected rhinocerebral mucormycosis. Although CT is not sensitive enough in the initial phase of the disease, it can provide sufficient information when bone destruction occurs. MRI provides earlier detection of intracranial involvement and is superior to CT in this respect (12). Since our patient presented to us more than three months later, both CT and MRI revealed findings compatible with mucormycosis. Cerebral involvement was not observed on cranial MRI.

Biopsy and tissue culture are required for the definitive diagnosis of mucormycosis. Histopathologic examination of tissue fixed with specific fungal dyes shows septate hyphae with right-angled branching and the presence of tissue infarction and vascular invasion findings are diagnostic. In our patient, the diagnosis was confirmed by the presence of hyphae compatible with mucormycosis on histopathologic examination of the biopsy material. Since rhinocerebral mucormycosis causes vascular thrombosis and tissue necrosis, diffusion of antifungals into this area becomes difficult. Therefore, eradication of mucormycosis, local control and debridement of necrotic tissues are the decisive factors for definitive cure. Liposomal amphotericin B is recommended as the first choice for the treatment of mucormycosis group fungi. Although the optimal dose has not been defined, the use of high dose liposomal amphotericin B has been found to be associated with good prognosis (13). Posaconazole is not recommended as initial treatment in invasive mucormycosis infections and is used in salvage or maintenance treatment (14). In our patient, liposomal amphotericin B treatment was started after surgical debridement. Posaconazole was used in maintenance treatment at discharge.

In conclusion, mucormycosis can also occur in immunocompetent individuals. Early diagnosis, appropriate antifungal treatment and surgical debridement can lead to complete recovery.

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References

1. *Roden MM, Zaoutis TE, Buchanan WL, Knudsen TA, Sarkisova TA, Schaufele RL, et al. Epidemiology and outcome of zygomicosis: A review of 929 reported cases. Clin Infect Dis 2005;41:634-53. https://doi.org/10.1086/432579*
2. *Lanternier F, Dannaoui E, Morizot G, Elie C, Garcia-Hermoso D, Huerre M, et al. A global analysis of mucormycosis in France: The RetroZygo study (2005-2007). Clin Infect Dis 2012;54(1):S35-43. https://doi.org/10.1093/cid/cir880*
3. *Cornely OA, Arikan-Akdagli S, Dannaoui E, Groll AH, Lagrou K, Chakrabarti A, et al. ESCMID and ECMM joint clinical guidelines for the diagnosis and management of mucormycosis 2013. Clin Microbiol Infect 2014;20(3):5-26. https://doi.org/10.1111/1469-0691.12371*
4. *Vironneau P, Kania R, Morizot G, Elie C, Garcia-Hermoso D, Herman P, et al. Local control of rhino-orbito-cerebral mucormycosis dramatically impacts survival. Clin Microbiol Infect 2014;20(5):O336-9. https://doi.org/10.1111/1469-0691.12408*
5. *Abu El-Naaj I, Leiser Y, Wolff A, Peled M. The surgical management of rhinocerebral mucormycosis. J Craniomaxillofac Surg 2013;41:291-5. https://doi.org/10.1016/j.jcms.2012.03.019*
6. *Alabaz D, Yılmaz G, Uğuz A, Özdemir S, Şaşmaz İ, Bayram İ. Mucormycosis in a pediatric population: A review of 20 cases from southern Turkey. Turk J Pediatr 2021;63:11-22. https://doi.org/10.24953/turkjped.2021.01.002*
7. *Amanati A, Barzegar H, Pouladfar G, Sanaei Dashti A, Abtahi MB, Khademi B, et al. Orbital mucormycosis in immunocompetent children; review of risk factors, diagnosis, and treatment approach. BMC Infect Dis 2020;20(1):770. https://doi.org/10.1186/s12879-020-05460-2*
8. *Ajdari A, Zolfagharypoor A, Firouzifar M, Akbarbour M. Rhinocerebral mucormycosis in immunocompetent patients: A case report and review of literature. Infection 2024;52:673-84. https://doi.org/10.1007/s15010-023-02147-z*

9. *Rajabi MB, Sadeghi R, Shahgoli SS, Kermani NM, Rafizadeh SM, Aghajani AH, et al. Unusual orbital mucormycosis due to pecking injury: Clinical characteristics and outcomes of four immunocompetent pediatric patients. Orbit 2023;43(5):649-55. https://doi.org/10.1080/01676830.2023.2252054*
10. *Elinav H, Zimhony O, Cohen M, Marcovich A, Benenson S. Rhinocerebral mucormycosis in patients without predisposing medical conditions: A review of the literature. Clin Microbiol Infect 2009;15(7):693-7. https://doi.org/10.1111/j.1469-0691.2009.02884.x*
11. *Gamaletsou MN, Sipsas NV, Roilides E, Walsh TJ. Rhinoorbital cerebral mucormycosis. Curr Infect Dis Rep 2012;14:423-34. https://doi.org/10.1007/s11908-012-0272-6*
12. *Dhiwakar M, Thakar A, Bahadur S. Improving outcomes in rhinocerebral mucormycosis early diagnostic pointers and prognostic factors. J Laryngol Otol 2003;117:861-5. https://doi.org/10.1258/002221503322542854*
13. *Ringden O, Meunier F, Tollemar J, Ricci P, Tura S, Kuse E, et al. Efficacy ofnamphotericin B encapsulated in liposomes (AmBisome) in the treatment of invasive fungal infections in immunocompromised patients. J Antimicrob Chemother 1991;28(Suppl B):73-82. https://doi.org/10.1093/jac/28.suppl_B.73*
14. *Page AV, Liles WC. Posaconazole: A new agent for the prevention and management of severe, refractory or invasive fungal infections. Can J Infect Dis Med Microbiol 2008;19:297-305. https://doi.org/10.1155/2008/825901*