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CASE REPORT

Traumatic Mucormycosis of Auricular Cartilage in an Iranian Diabetic Patient

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Abstract: Mucormycosis is an uncommon and acute fungal infection, with high morbidity and mortality. Traumatic mucormycosis mainly occurs in military conflicts, civilian trauma, and vehicle accidents. Hurricanes, tornadoes, floods, and tsunamis also play a major role in causing mucormycosis by inoculation. Herein, we presented a case of trauma-related mucormycosis in a 70-year-old diabetic male. He referred to a specialty clinic due to the auricular swelling after having fallen and having a major trauma in his ear. Pathologic examination of necrotic cartilage revealed broad ribbon like aseptate hyphae. Antifungal therapy with amphotericin B deoxycholate (1.5 mg/kg/day) was administered for 6 weeks as an initial therapy, and the patient was discharged with a regimen of posaconazole oral solution (400 mg PO bid with meals) for 8 weeks. He followed up for one year and there was no recurrence of the infection. In conclusion, traumatic mucormycosis is a rare but potentially life-threatening fungal infection. Early diagnosis and surgical excision are essential regarding the management of this critical condition. Knowing the underlying diseases is preferable to early diagnosis and timely initiation of antifungal therapy in order to improve survival rates.
Keywords: traumatic implantation, mucormycosis, auricular cartilage, diabetic patient, Iran

Introduction

Mucormycosis is a fatal fungal infection mainly occurring in patients with diabetes mellitus, hematological disorders, and solid organ transplant recipients. It might also involve immunocompetent patients after burn and trauma.[1] The etiological agents belonging to the subphylum *Mucoromycotina* in the order *Mucorales* are ubiquitous environmental hyaline molds and produce airborne conidia which could often infect respiratory tract, sinuses, and wounds.[2] Cutaneous mucormycosis is the third most prevailing type of this infection (10–19%) with the potential to spread haematogenously in patients with multiple predisposing factors, if it is left untreated.[3] Traumatic mucormycosis predominantly occurs in military conflicts, civilian trauma, and vehicle accidents.[4] Herein, we presented an auricular chondritis due to the order of *Mucorales* in a diabetic patient.

Case Presentation

A 70-year-old diabetic man with hypertension referred to Al-Zahra clinic, Isfahan, Iran, in account of the auricular swelling after having fallen and having an ear trauma. He had fallen down the staircase and his head had hit the fences. The patient was taking Atenolol, Aspirin, and Glibenclamide (10 mg/day). He had type 2 diabetes for about 18 years, and his disease was under control. There was a soft, red, and about 2×2 cm lesion

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on the left ear concha (Figure 1). Auricular hematoma was the first diagnosis; and surgical incision and drainage with bolster placement was performed with local anesthesia. After 3 times of incision and drainage, and improper responses to the treatment, the patient underwent general anesthesia; necrotic cartilage was removed then and sent for pathologic examination. Histopathologic evaluation revealed broad ribbon like aseptate hyphae (Figure 2). Due to unreachable AmBisome (amphotericin B liposomal), amphotericin B deoxycholate was prescribed for him following renal function test parameters, regarding its nephrotoxicity. The patient was treated successfully taking amphotericin B deoxycholate (1.5 mg/kg/day) for 6 weeks as the initial therapy and was discharged with a regimen of posaconazole oral solution (400 mg PO bid with meals) administrated for 8 weeks. He followed up for one year and healed up without any evidence of recurrence (Figure 3).

Discussion

Mucormycosis is an uncommon, emerging fungal infection, with a high mortality rate among immunocompromised patients. In developed countries, even though the disease remains infrequent and is mainly seen in patients with hematological disorders, it is more prevalent in diabetic patients and in patients with a history of trauma.[5] The prevalence of mucormycosis differs regionally from 0.01–0.2/100,000 population in the US and Europe[6,7] to 14/100,000 population in India.[5] The most common clinical manifestations of the infection are rhino-orbito-cerebral (27–34%), pulmonary (21–30%), cutaneous (20–26%), and disseminated (14–15%).[8,9] Direct implantation of fungal conidia into the skin has been reported. Hurricanes, tornadoes, floods, and tsunamis play a major role in causing mucormycosis by inoculation of causative agents into the muscle, bones, and tendons.[10–14] Corticosteroid therapy can increase the risk of cutaneous mucormycosis;[15] however, the patient in the present case report had not taken any corticosteroid. Although trauma-related mucormycosis mainly occurs in adults, Kordy et al[16] reported a case of traumatic mucormycosis due to the *Apophysomyces elegans* in a child from Saudi Arabia. The infection was caused by a car accident and tearing the deep soft tissue in the soil. The patient was treated with surgical excision and administration of liposomal amphotericin B. The principal strategies regarding the treatment of this infection is a reversal of underlying immune-impaired or metabolic conditions, glycemic control, resection of necrotic tissue, and timely empirical antifungal therapy with liposomal amphotericin B, posaconazole, or voriconazole.[17,18] Even when fungal elements are seen in histopathologic examinations, cultures

Figure 1 Auricular swelling of the left ear before surgical excision.

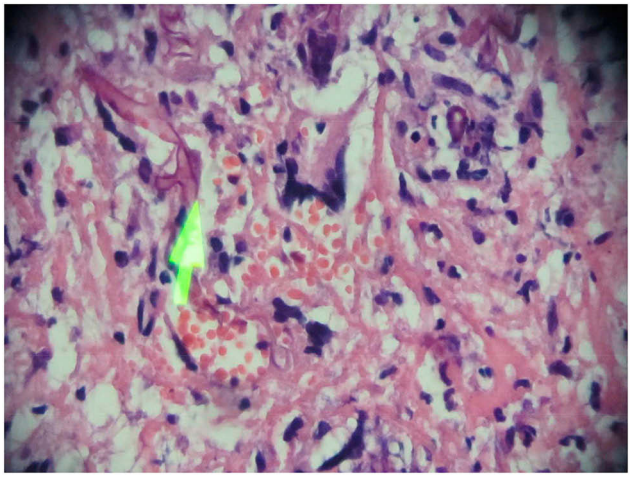

Figure 2 Broad aseptate hyphae (yellow arrow), typical for those species belonging to the Mucorales, Hematoxylin and Eosin (H&E) Stain, original magnification x 40.

are only positive in 10–50% of cases.[8] Coenocytic hyphae are fragile in nature, therefore, they might be damaged during tissue preparations.[19] In the present case, we also could not isolate the etiological agents of infection on culture media. For a better recovery of zygomycetes on synthetic media, avoidance of excessive homogenization of tissues is recommended. *Cunninghamella, Apophysomyces*, and *Rhizopus* show high minimum inhibitory concentrations (MIC) against amphotericin B, and *Mucor circinelloides* reveals resistance against posaconazole,[20,21] but the patient of the present case was treated successfully with conventional amphotericin B, and posaconazole as salvage therapy. Reduced susceptibility to antifungals is associated with necrosis of the affected tissues that prohibits penetration of antifungal drugs and immune cells into the infected areas.[8] Optimal management of the disease depends on distinguishing the infection patterns, available distinctive symptoms, and curative options, which differ from region to region of the world. Daily doses of liposomal amphotericin B ranged from 1 mg/kg to 10 mg/kg;[22] however, we treated our patient with a dose of 1.5 mg/kg/day of amphotericin B deoxycholate, because liposomal amphotericin B was unavailable due to the international sanctions. Amphotericin B deoxycholate has been the drug of choice for decades, yet its use is restricted by its remarkable nephrotoxicity, particularly in the doses and treatment periods needed for mucormycosis.[22–24] Patients receiving 10 mg/kg/day, had significant serum creatinine increments that were mostly reversible.[22,25] If fundamental kidney toxicity develops, the dose of antifungal can be decreased as necessary. However, doses below 5 mg/kg/day are suggested with marginal strength only.[26] Kyvernitakis et al[27] reported that combination therapy had no improved outcomes among 106 patients. Meanwhile, Reed et al[28]

Figure 3 Left ear after surgical excision and antifungal therapy.

represented a survival benefit of patients who were taking amphotericin B and caspofungin. Posaconazole oral suspension has been used successfully in first-line treatment, but, many important concerns due to its oral bioavailability led to the use of a delayed release pills with improved exposure and an intravenous infusion formulation.[29] Posaconazole delayed release pills are suggested for salvage therapy, and if only they are available, they should be preferred over posaconazole oral suspension.[22] In trauma-related mucormycosis, the trauma does not need to be immense. It could be caused by an insect bite, use of contaminated adhesive tape, and direct inoculation of a splinter to the cutaneous, subcutaneous or intramuscular tissues.[30] Superficial cutaneous mucormycosis is usually caused in healthy individuals, and is characterized by pustules, vesicles, and less commonly, eschars. Patients usually recover with proper debridement and use of intravenous amphotericin B in less than one month.[2,30]

Conclusion

Traumatic mucormycosis is a rare but potentially life-threatening fungal infection. Early diagnosis and surgical excision are essential regarding the management of this critical condition. Knowing the underlying diseases is preferable to early diagnosis and timely initiation of antifungal therapy in order to improve survival rates.

Ethical Approval

All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional Committee of Isfahan University of Medical Sciences.

Consent for Publication

Written informed consent was obtained from the patient for publication of data and images included in the present case report. Regarding the policies of Isfahan University of Medical Sciences, institutional approval was not required to publish this case report.

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Author Contributions

MM, and SHA clinically followed the patient and gave advice regarding the treatment of the patient. RM contributed to identifying the pathogen and drafted the manuscript. All authors contributed to the data analysis, and revising the article, they also gave the final approval of the version to be published, and agreed to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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