CASE REPORT

Cutaneous Mucormycosis in a Leukemic Patient

Sajad Ahmad Salati and Sari M. Rabah

ABSTRACT

Mucormycosis is a fulminant and uncommon fungal infection of skin which mostly occurs in immunocompromised patients. Early diagnosis followed by aggressive debridement and administration of antifungal agents is the key to management. We report primary cutaneous mucormycosis in a 23 years old patient of acute leucocytic leukemia who developed this lesion over volar surface of right forearm at the site of intravenous cannulation during induction phase of chemotherapy. The condition was treated successfully by wide surgical debridement, amphotericin-B, wound care and definitive reconstruction with skin graft.

Key words: *Mucormycosis. Immunocompromise. Debridement. Amphotericin B. Acute leucocytic leukemia.*

INTRODUCTION

Mucormycosis is a saprophytic fungal infection of the mucorales order characterized by broad, aseptate and thick-walled hyphae that branch at 90° angles.[1] On the basis of site of involvement, mucormycosis may be subdivided into several distinct clinical forms viz. rhino cerebral, pulmonary, gastrointestinal, cutaneous, disseminated and other rare forms, the rhino cerebral form being the commonest one. This fungus causes deep seated infection, usually affecting the dermis and sub-dermal tissues. The mucor invades and proliferates in the walls of the blood vessels leading to thrombosis and subsequent infarction and necrosis of the areas supplied by the affected vessels.[2] Immunocompetent individuals are able to phagocytize the spores and hence, do not develop the infection.[3] However, in the immunocompromised the infection can run a fulminant course. Risk factors for development of this infection include Diabetes mellitus, acidosis, leukemia, bone marrow hypoplasia, and treatment with corticosteroids, radiotherapy, antimetabolite or immunosuppressive drugs.[1,3] Rarely no apparent predisposing factor may be present in a patient. Two types of cutaneous mucormycosis have been described:[4] superficial and gangrenous. Superficial cutaneous mucormycosis is characterized by vesicles or pustules involving the superficial dermis and subcutaneous tissues. As the superficial disease progresses, it turns into the gangrenous form which is characterized by ulceration and formation of an eschar.[4] This case suffered from the gangrenous variant of this fungal infection.

Department of Plastic Surgery, King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia.

Correspondence: *Dr. Sajad Ahmad Salati, Department of Plastic Surgery, King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia.*
E-mail: docsajad@yahoo.co.in

Received April 16, 2010; accepted July 02, 2010.

CASE REPORT

A male aged 23 years, who had been diagnosed as a case of acute leucocytic leukemia, developed a small reddish painless maculopapular lesion over volar surface of right forearm during induction phase of chemotherapy being administered as per standard hospital protocols. The patient attributed this lesion to a puncture wound and taped it with adhesive at the site of intravenous cannulation. Over a period of 2 days, the lesion increased in extent and turned painful and blackish as seen in Figure 1. There was neither foul odor nor purulent discharge. The affected forearm turned edematous but the systemic features of infection like chills and fever were absent. Complete blood counts showed pancytopenia (Hb level of 7.1 g/dl, WBC at 0.6 x 10^9/l with 81% neutrophils and platelet count of 42 x 10^9/l). The lesion was assessed and specimen taken for histopathological, Gram staining, culture, sensitivity and fungal studies. Microscopic examination revealed broad, irregularly walled, non-septate fungal hyphae consistent with mucormycosis. Wide debridement of all necrotic tissue was done till the healthy and bleeding tissues were reached as depicted in Figure 2. Histopathological examination showed necrosis of dermal layer and thrombosis of cutaneous vessels. Silver staining of the specimen showed broad aseptate hyphae with vascular invasion suggestive of mucormycosis. Blood cultures were negative for bacteria or fungi.

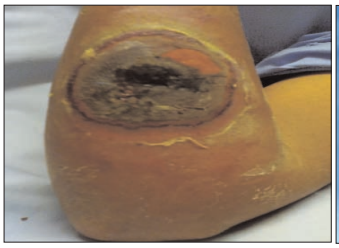

Figure 1: Mucormycosis of right forearm after 2 days of onset.

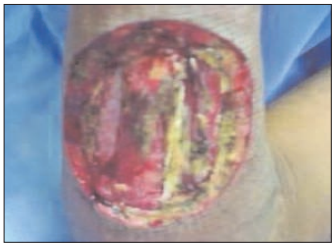

Figure 2: Same lesion as in figure 1, after wide debridement.

Intravenous amphotericin was added and regular wound care with silver dressings (Aquacel silver) was provided. Amphotericin therapy was initiated with a daily dose of 0.5 mg/kg/body weight (cumulative dose of 1 gm). Liver and kidney functions monitored during amphotericin therapy, remained within normal limits. At 3 weeks, the wound bed was covered with healthy granulation tissue and surrounding erythema and induration resolved completely. The defect was then reconstructed with split-thickness skin grafts harvested from the right thigh of the patient. The cosmetic outcome was satisfactory and the patient did not develop any further fungal lesions during the hospital stay. The donor site also healed without any complication.

DISCUSSION

This patient developed cutaneous mucormycosis lesion during induction phase of chemotherapy for management of acute leucocytic leukemia. The patient was neutropenic at that time and this could have predisposed him for this fungal infection which otherwise rarely occurs in immunocompetent subjects. Tissue injury due to intravenous cannulation and use of adhesive tapes to secure the cannula might have led to localization in that area. There are reports of mucormycosis developed in immunocompromised patients after such minor trauma as intravenous cannulation, lumbar puncture, insulin injection, biopsy, burns, use of surgical splints, urinary catheterization, tattooing, insect bites, abrasions and sites of application of skin adhesives.[5-6]

The key to management lies in early diagnosis of the infection and this is possible only if high index of suspicion and low threshold for biopsy of cutaneous lesions is maintained in high risk patients as mentioned above.[7] Potassium hydroxide preparation of biopsy specimen allows for the direct microscopic identification of characteristic aseptate thick-walled hyphae with right-angle branching as was seen in the specimen of this patient. Various tissue staining methods such as hematoxylin-eosin, PAS, and Gomori's methylamine silver stain have also been found useful in defining the morphology of mucor. Evidence of hyphae invading tissue is diagnostic of invasive mucormycosis as was evident in this case.

The disease is suggested by the aggressive clinical features but needs confirmation by microscopic examination and fungal culture.[8] Clinical features alone are not sufficiently distinctive to provide a specific diagnosis as similar lesions can be caused by aspergillosis, histoplasmosis, cryptococcusis, vasculitis, pyoderma gangrenosum, pseudomonal infection, and other progressive necrotizing infections of skin and muscle.[8,9] Urgent and wide debridement of all necrotic tissues is mandatory as was done in this case, because of its aggressiveness and high risk of dissemination with potential fatal outcome.[6-8]

Debridement needs to be supplemented with management of underlying disease and systemic amphotericin-B which is administered till the progression of disease is halted as in this case.[6,7] Amphotericin-B is nephrotoxic and renal functions need to be monitored during therapy. Other adjunctive therapies for mucormycosis are reported in literature which include antibiotics like rifampicin, antifungal agents like itraconazole, capsofungin, fluconazole, miconazole and posaconazole, hyperbaric oxygen and cytokines including gamma interferon.[7] However, none of these adjuvant agents were required here.

To conclude, it is stressed that in immunocompromised patients, every necrotic cutaneous lesion should be approached with high degree of suspicion and biopsied to detect mucormycosis at the earliest.

REFERENCES

1. Roden MM, Zaoutis TE, Buchanan WL, Knudren TA, Sarkisnva TA, Schaufele RL, *et al.* Epidemiology and outcome of mucormycosis: a review of 929 reported cases. *Clin Infect Dis* 2005; **41**:634-53.
2. Spellberg B, Edwards J, Ibrahim A. Novel perspectives on mucormycosis: pathophysiology, presentation, and management. *Clin Microbial Rev* 2005; **18**:556-69
3. Zirak C, Brutus JP, De Mey A. Atypical cause of forearm skin ulceration in a leukemic child: mucormycosis: a case report. *Acta Chir Belg* 2005; **105**:551-3.
4. Ryan ME, Ochs D, Ochs J. Primary cutaneous mucormycosis: superficial and gangrenous infections. *Pediatr Infect Dis* 1982; **1**:110-4.
5. Chander J, Kaur J, Attri A, Mohan H. Primary cutaneous zygomycosis from a tertiary care centre in north-west India. *Indian J Med Res* 2010; **131**:765-70.
6. Bakr A, Wafa E, Fouda A, Elagroudy A, Gheith O, Sobh M, *et al.* Successful treatment of mucormycosis in a renal allograft recipient. *Clin Exp Nephrol* 2008; **12**:207-10. Epub 2008 Mar 20.
7. Sankar J, Arun S, Sankar MJ, Seth R, Thavraj V, Kabra SK, *et al.* Primary cutaneous mucormycosis during induction chemotherapy in a child with acute lymphoblastic leukemia. *Indian J Pediatr* 2009; **76**:1161-3. Epub 2010 Jan 14.
8. Nouri-Majalan N, Moghimi M. Skin mucormycosis presenting as an erythema-nodosum-like rash in a renal transplant recipient: a case report. *J Med Case Reports* 2008; **2**:112.
9. Adriaenssens K, Jorens PG, Meuleman L, Jeuris W, Lambert J. A black necrotic skin lesion in an immunocompromised patient. Diagnosis: cutaneous mucormycosis. *Arch Dermatol* 2000; **136**: 1165-70.