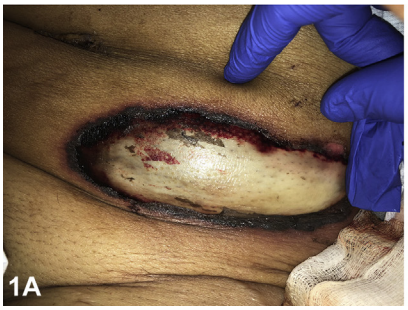
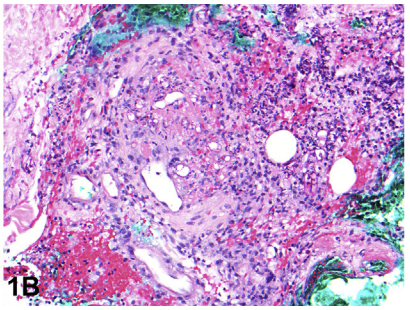
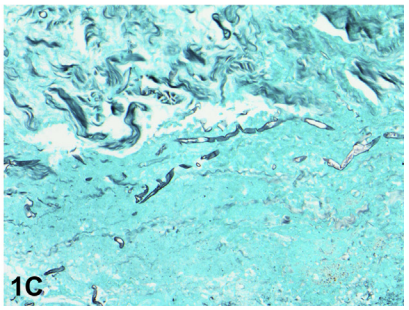
Necrotic plaque on the abdomen after liver transplant

Yana Kost, BA, Emily Hejazi, MD, Yiang Hui, MD, Bijal Amin, MD, and Yevgeniy Balagula, MD
Bronx, New York







CASE PRESENTATION

A 47-year-old man with a medical history significant for decompensated cirrhosis was admitted for orthotopic liver transplant followed by systemic immunosuppressive therapy. Five days after surgery, he developed a tender lesion on the left lower quadrant of his abdomen. Clinical examination revealed a large ovoid necrotic plaque with an undermined, violaceous border surrounding a white lesion bed with denuded epidermis, indicating previous epidermal necrosis followed by subsequent erosion of the tissue (Fig 1, *A*).

The patient was afebrile and blood culture results were negative. Computed tomography and magnetic resonance imaging scan results of the sinuses and chest, abdomen, and pelvis were unremarkable. A tissue culture and punch biopsy were obtained (Fig 1, *B* and *C*).

Question 1: What is the most likely diagnosis?

A. Heparin-induced skin necrosis

B. Cutaneous mucormycosis

C. Cutaneous aspergillosis

D. Ecthyma gangrenosum

E. Bullous pyoderma gangrenosum

Answers:

A. Heparin-induced skin necrosis—Incorrect. Heparin-induced skin necrosis shows epidermal necrosis and thrombotic vasculopathy but no fungal organisms.

B. Cutaneous mucormycosis—Correct. Mucormycosis have nonseptate, wide (5-20 μm) hyphae that often branch at 90-degree angles.[1] Histopathologic findings revealed branching nonseptate fungal hyphae of variable thickness in the deep dermis and subcutis associated with significant tissue necrosis and inflammatory infiltrate. Periodic acid Schiff-diastase stain highlighted the wide-branching hyphae.

C. Cutaneous aspergillosis—Incorrect. Cutaneous aspergillosis can present with similar clinical findings. However, histologically it forms finer septate hyphae that have 45-degree branching angles.[2]

D. Ecthyma gangrenosum—Incorrect. Mucormycosis and ecthyma gangrenosum can both show

From Division of Dermatology, Department of Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx.
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Correspondence to: Yevgeniy Balagula, MD, Division of Dermatology, Department of Medicine, Albert Einstein College of Medicine/Montefiore Medical Center, 3411 Wayne Ave, Bronx, NY 10467. E-mail: yebalagula@gmail.com.

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neutrophilic infiltrate, but mucormycosis is characterized by fungal hyphae rather than bacterial organisms.

E. Bullous pyoderma gangrenosum—Incorrect. Biopsy of the necrotic eschar border would show dense and sterile neutrophilic infiltrate without bacterial or fungal organisms.

Question 2: Among those listed below, which is not a risk factor for this condition?

A. Uncontrolled diabetes

B. Steroid use

C. Surgery

D. Burns

E. Low iron states

Answers:

A. Uncontrolled diabetes—Incorrect. Hyperglycemia and ketoacidosis impair neutrophil chemotaxis, which partially accounts for the association of diabetes with mucormycosis.[3]

B. Steroid use—Incorrect. Systemic glucocorticoids impair macrophage function and increase the risk for mucormycosis.[3] Furthermore, patients with impaired immune defenses, including those with hematologic malignancies and hematopoietic stem cell transplants, lack adequate neutrophil and macrophage function, allowing the fungal spores to overcome phagocytosis and germinate into the angioinvasive form of infection.[3]

C. Surgery—Incorrect. Nosocomial mucormycosis infections have been reported related to application of adhesive tape, surgical intervention, and intravascular devices.[4]

D. Burns—Incorrect. Stress-induced hyperglycemia contributes to the increased susceptibility of burn patients to mucormycosis.[3]

E. Low iron states—Correct. Iron starvation was recently found to induce apoptosis in *Rhizopus oryzae*, the most common organism of the Mucorales order, suggesting that iron-overload rather than low-iron states may represent a risk factor for infection.[3] Deferoxamine use has also been found to be associated with mucormycosis.[3]

Question 3: Which of the following would be most optimal initial therapy?

A. Amphotericin B lipid formulation therapy

B. Posaconazole

C. Isavuconazole

D. Voriconazole

E. Surgical debridement

Answers:

A. Amphotericin B lipid formulation therapy—Correct. Intravenous lipid formulation is the preferred initial therapy because of its better safety profile. It is also less nephrotoxic, allowing longer treatment periods with higher doses.[3]

B. Posaconazole—Incorrect. Posaconazole is an acceptable second-line therapy in mucormycosis and can be used for patients with refractory disease or intolerance to amphotericin B.[3]

C. Isavuconazole—Incorrect. Like posaconazole, isavuconazole can be used for long-term treatment and in patients at high risk for nephrotoxicity, but it is not considered a first-line treatment.[3]

D. Voriconazole—Incorrect. Voriconazole is not active against mucormycosis.[3] Furthermore, it has been shown in murine models that infection with an *R oryzae* strain pre-exposed to voriconazole is associated with decreased survival rate.[3,5]

E. Surgical debridement—Incorrect. Performed in conjunction with systemic therapy, surgical debridement is a critical component of management but should not be used as monotherapy. Furthermore, treatment with hyperbaric oxygen may be an adjunctive intervention because increased oxygen pressure improves neutrophil-killing ability, reverses acidosis to promote amphotericin B action, inhibits fungal growth, and improves wound healing.[3] Our patient was treated with intravenous amphotericin B, followed by oral posaconazole in combination with serial surgical debridements and a successful skin graft placement. Four weeks after the initial presentation, surgical pathology from debridements showed no evidence of residual infection.

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