

# Infiltrating Wound Vacuum-Assisted Closure With Topical Amphotericin for Mucormycosis Infection of the Achilles Tendon

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**Background:** The rarity and heterogeneity of mucormycosis make treatment variable, and no prospective or randomized clinical trials exist in plastic surgery literature. The use of wound vacuum-assisted closure in combination with the instillation of amphotericin B to treat cutaneous mucormycosis is not well documented.

**Case Presentation:** A 53-year-old man underwent left Achilles tendon reconstruction with allograft after a complete tear during exercise. About 1 week after the operation, he began having incisional breakdown

later found to be secondary to mucormycosis infection, prompting presentation to an emergency department. The use of negative pressure wound therapy with wound vacuum-assisted closure and intervals of instilling amphotericin B facilitated infection control in this lower extremity mucormycosis infection.

**Conclusions:** Patients with a localized mucormycosis infection may benefit from treatment with an instillation wound vacuum-assisted closure with topical amphotericin B as presented in this case study.

Vacuum-assisted closure (VAC) of wounds has become a foundational tool in the armamentarium of wound care specialists. Using a system consisting of a sponge, semi-occlusive barrier, and fluid collection device, VAC systems apply constant negative pressure resulting in macro and micro deformation to a wound, stabilization of the wound environment, and removal of inflammatory factors in wound fluid.<sup>1</sup> These conditions allow for the removal of drainage and fluid from a wound bed, reduced edema and inflammation, reduced bacterial load, recruitment of healing factors, approximation of wound edges, and increased blood flow to the wound.<sup>2</sup>

In complex, infected wounds, a variation of negative pressure wound therapy (NPWT) via the instillation of topical antibiotics (instillation VAC) has been used.<sup>3</sup> This variation has been advantageous even in soft tissue fungal infections. Early and aggressive treatment of such infections is critical to prevent dissemination, particularly in aggressive infections, such as mucormycosis.<sup>4</sup> We present a case of a patient with a mucormycosis infection of his left Achilles tendon and overlying skin who was successfully treated with surgical debridement and wound care with instillation NPWT with topical amphotericin B.

## CASE PRESENTATION

A 53-year-old man underwent left Achilles tendon reconstruction with allograft after a complete tear during exercise. He had no relevant medical history and was otherwise healthy, which he attributed to working out daily. About a week after the operation, he began having incisional breakdown, prompting presentation to an emergency department. There, he received IV antibiotics along with multiple debridements. After the wound failed to improve and intra-operative cultures grew mucormycosis, he was transferred to our facility for a higher level of care. On admission, he was immediately given IV amphotericin B and scheduled for repeat debridement.

After 1 prior debridement and 10 total days of IV amphotericin, a repeat debridement was performed. After the debridement, the instillation VAC was applied to the patient's left lower extremity wound with an instilling fluid of amphotericin B and the settings as follows: smart phase instill volume, 110 mL; soak time, 3.5 hours; target pressure, 125 mm Hg; intensity, low; and VAC therapy mode, continuous. After 5 days, the wound bed appeared clean without overt signs of infection. However, due to some toxicity to healthy surrounding soft tissue, the instillation VAC was discontinued and standard NPWT was started. The patient underwent

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**FIGURE** Fourteen Months After Definitive Reconstruction With Split Thickness Skin Graft and Local Wound Care



Photo courtesy Ahmed Suliman.

2 additional rounds of debridement with partial delayed closure. Four weeks after discontinuation of the instillation VAC, the wound appeared healthy and granulated so the patient underwent split-thickness skin grafting to the left posterior ankle. He subsequently completed a course of oral antifungal medication as an outpatient.

The patient was seen in the outpatient clinic for 14 months from the initial mucormycosis infection (Figure). He was happy with his outcome and limb salvage. The skin graft had almost complete take. He has a limited range of motion at the ankle but can grossly plantarflex and dorsiflex. He reports self-treatment with physical therapy and has returned to work.

### DISCUSSION

Mucormycosis is an infection caused by fungi in the class *Zygomycetes* and of the order *Mucorales* that typically occurs in immunocompromised patients, especially those with diabetic ketoacidosis and neutropenia. Given that this patient had no relevant medical history and was otherwise healthy, he was at extremely low risk of this type of infection. In this patient's case, the spores of this nonseptate hyphae wide-branching species were most likely introduced at the time of left Achilles ten-

don repair. Mucormycosis is progressive and can be fatal unless treated, with a mortality rate approaching 70%.<sup>5</sup> The rarity and heterogeneity of mucormycosis make treatment variable.<sup>6</sup> No prospective or randomized clinical trials exist in plastic surgery literature.

The use of wound VAC in combination with the instillation of amphotericin B to treat cutaneous mucormycosis is not well documented. Mucormycosis infections are traditionally addressed with surgical debridement and antifungal therapy, specifically IV amphotericin B.<sup>7,8</sup> As previously noted, NPWT has become the gold standard in treating complex wounds.<sup>3</sup> Additionally, wound VAC therapy with instillation has been noted in the literature as a reliable method to treat bacteria-infected wounds, providing a shorter treatment period and earlier wound closure.<sup>9</sup> Instillation VAC therapy has proven particularly useful in complex, infected wounds, such as aggressive fungal infections.

Mucormycosis treatment is challenging particularly in the extremities as management must balance both mortality and limb salvage. In this case, the use of NPWT with wound VAC and intervals of instilling amphotericin B facilitated infection control in this lower extremity mucormycosis infection. The significant

adverse effect profile of amphotericin B, particularly the nephrotoxicity, should be seriously considered when deciding the treatment regimen for patients affected by mucormycosis. Locally, topical amphotericin B has been reported to cause blistering, itchiness, redness, peeling, and dryness. However, topical preparations of amphotericin B are nontoxic unlike their IV counterpart, able to cross the physiological barriers of the skin while simultaneously targeting macrophages in the dermis and epidermis.<sup>10</sup>

## CONCLUSIONS

Although the mainstay of treatment for systemic mucormycosis is radical debridement and IV amphotericin B, a more localized infection may benefit from an adjunct like an instillation wound VAC with topical amphotericin B, as presented in this case study. Swift treatment with wound VAC was beneficial in the overall recovery and tissue healing of this patient and may be beneficial in similar cases.

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## Disclaimer

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tigational use of certain drugs. Please review the complete prescribing information for specific drugs or drug combinations—including indications, contraindications, warnings, and adverse effects—before administering pharmacologic therapy to patients.

## Ethics and consent

The patient provided informed consent.

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