

THE CUTTING EDGE

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Maggot Therapy for Venous Stasis Ulcers

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REPORT OF A CASE

A 74-year-old man with a history of recurrent venous stasis ulcers presented to the clinic with a 1-month history of an enlarging, erythematous, tender, right pretibial wound. He recalled no trauma. Despite bedrest and oral dicloxacillin as prescribed, the patient returned to the clinic the following week with a larger wound, now described as a central black eschar with surrounding cellulitis. He was admitted for therapy with intravenous antibiotics (piperacillin and tazobactam) and frequent bedside surgical débridement. He did not tolerate a trial of hydrotherapy because of symptomatic hypotension. Plastic surgery consultants recommended split-thickness skin grafting after wound débridement; the wound was débrided two to three times weekly, limited primarily by the patient's pain and by concerns about the great depth of the wound and the patient's poor healing ability. Between débridements, his wound was dressed with hydrocolloid pads to aid in autolysis or with a solution of 0.1% sodium hypochlorite and 0.05% sodium bicarbonate (quarter-strength Dakin's solution) wet-to-dry gauze bandages for disinfection. The wound continued to progress during the first 4 weeks of hospitalization, and his physicians referred him for evaluation for maggot débridement therapy (MDT).

In addition to his recurrent venous stasis ulcers, this man's medical history was notable for hypertension, chronic atrial fibrillation, congestive heart failure, diet-controlled diabetes, and gout. His medications included warfarin, benazapril, furosemide, potassium, allopurinol, and quinidine sulfate (375 mg/d). He did not smoke, and he had discontinued alcohol use 6 years previously. Findings from his physical examination revealed geographically shaped eschars wrapping circumferentially around his right leg (**Figure 1**). The surrounding tissue was erythematous; peripherally, it was violaceous. Despite the many attempts at débridement, the sites of granulation tissue were few and sparse.

THERAPEUTIC CHALLENGE

We needed to develop a maggot therapy dressing from low-cost, readily available materials, that could effectively maintain the maggots inside the wound and yet

also allow oxygen to freely reach the maggots inside and permit the liquified necrotic tissue to drain out. Unlike most of our other patients, however, this patient had a wound that required that the dressing wrap completely around the leg.

SOLUTION

Our usual maggot dressing is essentially a two-layered construction. The bottom layer (ie, the underdressing or cage dressing) is affixed to the intact skin surrounding the wound and is covered by a layer of chiffon. The underdressing is responsible for containing the maggots within the wound. A top dressing of dry gauze is placed over the chiffon so as to absorb the drainage. For this patient, a ring of Duoderm (ConvaTech/Bristol-Myers Squibb Co, Princeton, NJ) was applied to the intact skin just proximal to his ulcer. A similar ring was placed distally (**Figure 2**). Two coats of cement (Skin Bond Cement, United Medical/Pfizer Hospital Products Group Inc, Largo, Fla) were then applied to the hydrocolloid pad. At this point, young sterile maggots were placed onto the wound. The foot of a large 92% nylon, 8% spandex stocking (generic nylon stockings, distributed by Ralph's Grocery Co, Los Angeles, Calif) was severed, and the remains were sterilized in 0.1% sodium hypochlorite for 10 minutes. The tubular nylons were pulled socklike up over the wound, and the proximal and distal edges were glued to the Duoderm rings with another layer of cement. Silk tape was placed over the pad-mounted portions of the nylons, and a ring of transparent semipermeable membrane sheets (Bioclusive, Johnson & Johnson Products Inc, New Brunswick, NJ) was placed over this and over the neighboring skin to protect the dressing materials from soiling. This entire underdressing was usually left in place until the larvae were fully grown, usually 48 hours. The dry gauze, wrapped around the top of the dressing to absorb the drainage, was changed every 4 to 6 hours and as needed.

His wound responded well to maggot therapy, being completely débrided in just 3 weeks (six treatments) (**Figure 2**) and not requiring any skin grafting (**Figure 3**).



Figure 1. Despite 4 weeks of hospitalization with biweekly sharp débridement and intravenous antibiotics, our patient's eschar continued to increase in size.



Figure 2. The ulcer after 3 weeks (six cycles) of maggot débridement therapy. The proximal and distal rings of Duoderm, to which the nylon stocking was cemented, can be seen.

COMMENT

For centuries, the infestation of wounds by certain species of fly maggots has been recognized to débride, to enhance healing, and to decrease the mortality associated with the underlying injury.¹ The practice of using maggots to treat bone and soft-tissue infections was commonly employed by surgeons in the United States and Europe during the 1930s and 1940s.²⁻⁴ The past 15 years have seen an increase in published reports of MDT being used successfully to treat temporal mastoiditis, Fournier's gangrene, necrotizing tumor masses, and other soft-tissue wounds that had not responded favorably to more conventional treatments.⁵⁻⁸ This case represents the first report of maggot therapy being used for venous stasis ulcers. Maggot débridement therapy efficiently removed the eschar. Maggot débridement therapy could be continued safely while the wound was lined with both necrotic and healthy granulation tissue, without any harm to the young healthy tissue. Although this patient did experience discomfort when the maggots became almost fully grown, the pain was not as severe as he experienced during his previous wet-to-dry dressing changes or surgical débridements. His pain was adequately controlled with acetaminophen and codeine.

Early MDT dressings were quite elaborate, expensive, and time consuming to construct.⁹⁻¹⁴ The dressings described herein were relatively simple and inexpensive to construct. Like our standard MDT dressing, this nylon stocking MDT dressing prevented the maggots from escaping, permitted oxygen to enter the dressing, facilitated liquid drainage, and required minimal main-



Figure 3. The wound healed completely within 6 weeks. His scar, seen here 2 months later, rapidly faded.

tenance. Its only drawback, readily observed during its application, was that many of the smaller maggots immediately escaped through the stocking material. This could be overcome by using larger larvae or by placing enough larvae to compensate for the loss. The escaped maggots, if they did not find their way back into the wound, died of starvation or were discarded

unnoticed along with the infectious waste when the nursing staff routinely changed the overlying soiled gauze wrap.

Our nylon stocking design has proven to be a useful dressing for applying MDT, whether to circumferential leg wounds, irregularly shaped foot ulcers, or amputation stump wounds.¹⁵

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Submissions

Clinicians, local and regional societies, residents, and fellows are invited to submit cases of challenges in management and therapeutics to this section. Cases should follow the established pattern and be submitted double-spaced and in triplicate. Illustrations must be clear and submitted as positive color transparencies (35-mm slides) or black-and-white prints. Do not submit color prints unless accompanied by original transparencies. Material should be accompanied by the required copyright transfer statement, as noted in "Instructions for Authors." Material for this section should be submitted to June K. Robinson, MD, Department of Dermatology, Northwestern University Medical School, 303 E Chicago Ave, Chicago, IL 60611. Reprints are not available.