Negative Pressure Dressing in the Management of Pyoderma Gangrenosum Ulcer

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The clinical management of pyoderma gangrenosum (PG) ulcers has been a challenging practice since the description of these chronic wounds. Advances in biotechnology in the past 2 decades have given us a better understanding of the histopathologic nature of this disease, and as a result, better therapeutic modalities have evolved. However, on occasion PG ulcers will present in a refractory manner that will mandate additional strategies to attain wound closure. We present herein the novel use of negative pressure dressings to effectively treat such a complex wound.

**REPORT OF A CASE**

A 57-year-old woman with a history of a very slowly healing PG ulcer on the lower part of her left leg for 2 years presented with increasing pain and ulcer size after more recent physical trauma. On physical examination, she had a rounded ulcer (diameter, 10 cm) with central granulation tissue, scant purulent drainage, and erythematous-violaceous undermining borders (Figure A). No lymphadenopathy, fever, or other constitutional symptoms were observed. Partial response and intolerance to previous therapies including intravenous pulses of methylprednisolone, intralesional triamcinolone acetonide, intravenous immunoglobulin, mycophenolate mofetil, and cyclophosphamide was noted.

Routine histological examination of a skin biopsy specimen taken from the erythematous-violaceous border showed a diffuse interstitial dermal neutrophilic-rich infiltrate, without evidence of vasculitis. The results of special stains for pathogenic mycobacteria or fungi were negative. Tissue cultures obtained for wide spectrum microorganisms revealed only methicillin-resistant *Staphylococcus aureus* (MRSA) sensitive to vancomycin. Findings from venous and arterial Doppler studies excluded underlying vascular disease. Results from extensive serological, coagulation, and hematological studies failed to demonstrate evidence of underlying connective tissue disease, antiphospholipid syndrome, myelodysplastic syndrome, paraproteinemia, or any other hematologic disease.

At the 3-week follow-up examination, after having received intravenous vancomycin and continued local wound care, the erythematous-violaceous undermining borders of the ulcer had significantly improved. However, the lesion was still tender and no reduction in ulcer size was appreciated.

**THERAPEUTIC CHALLENGE**

Immunomodulatory and immunosuppressive therapy are the mainstay of management of PG ulcers. The surgical management of active PG ulcers is discouraged owing to risk of pathergy-associated worsening. Unfortunately, some PG ulcers may take months or years to completely heal, even in patients with adequate medical therapy. Moreover, open wounds are more susceptible to infection, which can potentially act as a pathergy-triggering factor in PG ulcers.

Because of a history of partial response and intolerance and the potential risk of MRSA reinfection by immunomodulatory and immunosuppressive agents, a new rapidly acting therapeutic intervention to expedite healing was needed in our patient.

**SOLUTION**

Negative pressure dressing with the vacuum-assisted closure (VAC) system was concurrently used with intravenous antibiotic therapy to accelerate healing of the ulcer (KCI International, San Antonio, Texas). At the time of application of the VAC, the ulcer was completely filled with granulation tissue, there was no evidence of purulent drainage, and there was complete resolution of the erythematous-violaceous undermining borders. A polyurethane foam dressing was placed on the wound, followed by draping as per the manufacturer’s instructions to create an airtight seal. Suction tubing was applied and connected to the therapy unit. Intermittent therapy (5 minutes active and 2 minutes inactive) with 125 mm Hg of negative pressure was administered, with scheduled wound dressing changes every 48 hours.

At the time of the first VAC system dressing change, the wound borders had reepithelialized further into the wound bed, there was no evidence of erythematous-violaceous undermining borders, and the associated pain...
had significantly subsided (Figure, B). The VAC system was well tolerated and was used until complete wound closure, approximately 6 weeks after initiating therapy (Figure, C). At the 6-month follow-up examination, the PG ulcer remained completely healed.

**COMMENT**

The mainstay of therapy for PG is immunomodulatory and immunosuppressive medical therapy as well as management of possible underlying associated disease. Surgical and other invasive modalities are contraindicated as the primary or sole treatment of active PG ulcers. However, some authors have described a role for adjunctive surgical management including skin grafts, muscle flaps, and cultured keratinocyte autografts concomitant with or preceding primary effective immunopharmacologic therapy in noninfected and controlled PG ulcers.

In 1997, Argenta and Morykwas reported the successful use of the VAC system as a primary treatment of nonhealing skin ulcers (KCI International). Over recent years, the VAC system has become an important tool for the management of large, complex, acute, and chronic skin ulcers from a wide variety of causes. The mechanism of action of subatmospheric pressure therapy includes increased tissue perfusion, increased granulation tissue formation, reduced bacterial load, and removal of excess interstitial edema. In addition to its role in treating ulcers, the VAC system has also been used to bolster skin grafts and to reepithelialize donor sites.

The optimal subatmospheric pressure with the VAC system for wound healing appears to be approximately 125 mm Hg, using an alternating pressure cycle of 5 minutes of suction, followed by 2 minutes off suction. Dressing changes should be made every 48 to 72 hours to prevent growth of granulation tissue into the foam dressing. The VAC device can be applied over any type of tissue. Prior to application, the wound should be free of necrotic tissue and well vascularized. Complications with the VAC system are infrequent and usually yield low morbidity. These complications are typically associated with inadequate wound bed preparation, infrequent dressing changes, or inadequate pressures applied. Therapy with the VAC system has also been associated with local skin irritation, pain, maceration, tissue necrosis, bleeding, and infection. Owing to its mechanism of action, ie, through the application of subatmospheric pressure, the VAC system could be considered a minimally invasive interventional therapy and thus a potential eliciting factor for pathergy in PG ulcers. However, as shown in this report, the VAC system appears to exert its beneficial effect on long-term wound healing without the theoretical detrimental effects in a stable PG ulcer.

Negative pressure dressing in the management of PG was first described by Niezgoda and colleagues in 2006.
Contrary to our single modality approach, these authors used wide surgical debridement, hyperbaric oxygen, and VAC, followed by skin grafting, to successfully treat a similar patient with a medically stable lower extremity PG ulcer.14 Although optimal outcomes were achieved in both cases, more studies are necessary to accurately determine the role each of these modalities have on the healing of this complex wound. For now, the VAC system has proven to be a safe tool that should be included in the adjuvant therapeutic armamentarium for the management of controlled and slow-healing PG ulcers.

Accepted for Publication: April 20, 2007.

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Author Contributions: Study concept and design: Ghersi, Ricotti, Nousari, and Newman. Acquisition of data: Ghersi and Newman. Analysis and interpretation of data: Ghersi, Ricotti, and Newman. Drafting of the manuscript: Ghersi, Ricotti, Nousari, and Newman. Critical revision of the manuscript for important intellectual content: Ghersi, Ricotti, Nousari, and Newman. Administrative, technical, and material support: Ghersi, Ricotti, and Newman. Study supervision: Nousari and Newman.

Financial Disclosure: None reported.

REFERENCES


Submissions

Clinicians, residents, and fellows are invited to submit cases of challenges in management and therapeutics to this section. Cases should follow the established pattern. Manuscripts should be prepared double-spaced with right margins unjustified. Pages should be numbered consecutively with the title page separated from the text (see Instructions for Authors [http://archderm.ama-assn.org/misc/ifora.dtl] for information about preparation of the title page). Clinical photographs, photomicrographs, and illustrations must be sharply focused and submitted as separate JPG files with each file numbered with the figure number. Material must be accompanied by the required copyright transfer statement (see authorship form [http://archderm.ama-assn.org/misc/auinst_crit.pdf]). Preliminary inquiries regarding submissions for this feature may be submitted to George J. Hruza, MD (ghruza@aol.com). Manuscripts should be submitted via our online manuscript submission and review system (http://manuscripts.archdermatol.com).