

## CASE REPORT:

# Topical Gel for the Treatment of a Refractory Leg Ulcer

**“The strongest vinegar of a white color, honey, Egyptian alum, the finest natron; having toasted these things gently, pour in a little gall; this cleanses fungous ulcers, renders them hollow, and is not pungent.”**

Hippocrates<sup>1</sup>  
400 BC

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## Introduction

No site on the human or animal body is exempt from possible injury. Wound healing is often a necessary event in recovery from trauma, and many of the earliest recorded medical texts such as the Edwin Smith papyrus<sup>2</sup> (ca 1600 BC) and the Ebers papyrus<sup>3</sup> (ca 1534 BC) contain formulations thought to promote wound healing and prevent infection.

In the mid-1900s, the availability of penicillin<sup>4</sup> was an important triumph in the fight against infections that, when inadequately treated, were relentlessly fatal. The effective delivery of antibiotics and other medications to certain injury sites, however, has continued to challenge pharmacists and physicians. Now new vehicles for transdermal drug delivery enable the healing of persistent wounds that have not improved with prior treatment. This case report describes the effect of a topical gel used to treat a large ulcer that had been refractory to cure for 2 years.

## Case Report

A 55-year-old man fractured all the bones in his left foot and ankle as well as his left tibia when he fell 12 feet through a trap door at the factory in which he worked. An orthopedic surgeon treated the fractures, but lymphedema and a large ulcer subsequently developed on the patient's injured leg. During the next 2 years, he was treated by a sequence of physician specialists who attempted to heal the ulcer; the first was a vascular surgeon who implanted a pump to relieve lymphedema in the leg. That was not successful, and the skin around the ulcer began to split. The vascular surgeon then lanced the swollen area around the ulcer to remove exudate. At that point, the ulcer increased in size to 12 cm x 12 cm x 1.5 cm, and the surrounding skin split open. The vascular surgeon debrided the ulcer and referred the patient to the lymphedema clinic of an orthopedic surgeon. Daily for 21 days, a lymphedema

specialist in the clinic debrided the ulcer and a massage therapist massaged the injured leg. The patient had been treated only with oral morphine sulfate, which was prescribed for 1 month after surgery to relieve postsurgical pain, and oral warfarin sodium (Coumadin), which he continued to take to prevent blood clots. Two preparations (one was a gel base containing misoprostol 0.0024%, phenytoin 1%, metronidazole 2%, and lidocaine 2% and the other, nifedipine 16% in a gel base) were applied topically as treatment for 42 days, at which time the ulcer was 95% healed; only a small scab remained.

## Comment

Wound care is critical because without it, loss of mobility or death from overwhelming systemic infection can occur, especially in immunocompromised patients or those with lymphedema or peripheral vascular disease. Even newer antibiotics require a special vehicle to reach the site of the injury. We have found, though, that if an effective base is used, only topical preparations are necessary to heal wounds unless the patient has underlying health problems. We've also discovered that other medications taken by the patient might not be working well because of the total-body effect of a nonhealing wound. If proper wound care is provided, an estimated 20%

The wound-care gel used in treating this patient was created by Adam Israel, the head of research and development at Lee Silsby Compounding Pharmacy, in 2001. It is extremely effective in conveying a wide variety of drugs to the wound site. Alan Israel has received prescriptions for this preparation from wound-care clinics throughout Cleveland. The photographs in this article chronicle the use of that formulation, which healed a wound refractory to all other treatment.

It should be noted that, because of his gender, the patient described in this case report was not required to wear a finger cot or gloves to apply the gel. However, the wound gel and the nifedipine gel are labeled with a caution advising caregivers who are pregnant or could become pregnant to wear gloves when applying either preparation.

Patient's wound before treatment



less of a patient's other medications (analgesics, drugs for cardiac conditions, medications that treat hypertension or vascular conditions, insulin) are required.

When my son Adam and I first met the patient described above, he was in a wheelchair; on his left leg was a horrendous ulcer caused by lack of circulation to the injured area. When we first saw the ulcer, we noted its clear, whitish secretions that were present even though the wound had already been cleaned. We knew that in those types of injury, dry skin indicates good circulation. The ulcer and the skin surrounding it were not dry. The injured leg was hot to the touch, but no infection was present. Leg tissue distal to the ulcer was swollen, and the skin was very sensitive. The patient would try to treat that area, but often his fingernail would lightly scratch the surface of the skin, which would split.

Although this patient was overweight, he had no other compromising problem. After Adam and I had examined him, we devised a "wound gel": a formulation consisting of misoprostol 0.0024% (a gastric antisecretory and antiulcer agent that exerts a protective effect on gastroduodenal mucosa), phenytoin 1% (for wound healing), metronidazole 2% (for odor control), and lidocaine 2% (for pain relief) in a gel base. The next day, we met the patient in the surgeon's office to deliver the wound gel and nifedipine 16% in a gel base (which we had compounded from a formulation we'd found in the *International Journal of Pharmaceutical Compounding*<sup>5</sup>). The nifedipine gel was used to encourage vasodilatation, epidermolysis, and possible

After 14 days of treatment



microvascular neogenesis<sup>5</sup> in the area surrounding the ulcer. Both gels, which were dispensed in EMP (plastic pushup ointment) jars, are stable for 14 days; every 2 weeks, we supply new containers of those preparations to our patients who use them.

We explained the application of the gels to the lymphedema nurse specialist in the orthopedic surgeon's clinic, where the patient was treated once daily for 3 weeks. During the first treatment, the ulcer was debrided and was flushed with 0.9% sodium chloride solution.

After 35 days of treatment



Previously applied gauze that had adhered to the wound or to surrounding skin was removed before the wound gel and the nifedipine gel were applied. During the second treatment (the next day), the ulcer was again debrided and was flushed with 0.9% sodium chloride solution, the gels were applied, and the ulcer was covered with a patch over which gauze was rolled and secured. If the ulcer was dry during subsequent daily treatments, the nurse specialist would

first spray it with distilled water and would apply just enough of the wound gel to cover the surface of the ulcer. She would then paint a thin layer of the nifedipine gel around the wound. Between visits to the lymphedema clinic, the patient changed the gauze if the ulcer oozed and then applied the nifedipine gel to the skin around the wound. After 21 days of daily visits to the clinic, he continued his treatment at home; he applied both gels as directed twice daily for 21 days. During that time, he was evaluated at the clinic once weekly until the 42nd day of therapy, at which time no additional visits to the clinic were deemed necessary.

During his 6 weeks of treatment, a total of about 240 g of each gel was applied to the ulcer and surrounding skin. As a result of that protocol, the wound healed so fast that minimal skin care for the

edematous tissue distal to the ulcer was necessary. The patient just applied a good body cream to the outer areas of skin not treated with the nifedipine gel. As the treatment progressed, that surrounding skin became drier because the nifedipine was working.

By day 42 of treatment with the wound gel and the nifedipine gel, the patient's ulcer was 95% healed; only a small scab remained. No additional treatment is anticipated. Occasionally, the patient applies the nifedipine gel to the former ulcer site if he bumps that area. However, the ulcer is not expected to recur as long as the patient's nutritional status is good and he takes care of himself.

## References

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