



CASE REPORT

— WOUND CARE —

WOUND HEALING IN
A DIABETIC PATIENT
IMPROVED WITH
USE OF A TOPICAL
COMPOUNDED
PREPARATION

PREPARED BY



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WOUND HEALING IN A DIABETIC PATIENT IMPROVED WITH USE OF A TOPICAL COMPOUNDED PREPARATION

— Josh Wilde, PharmD —

SUMMARY: A 26 year old male diabetic patient smoking 1 pack per day developed an MRSA skin infection and ulceration following hardware implantation in elbow. Failed therapies with skin graft techniques and topical bacitracin therapy. Started compounded wound care product and within one week ulcer reduced in size by 75%. Complete resolution of wound within one month of treatment despite previously failed traditional therapies. This case report provides evidence of the efficacy of a novel compounded wound care product.



Figure 1

INTRODUCTION:

The latin phrase *secundum artem* means "according to the art" or when used in medicine "use your skill and judgement." Wound care is as much an art as it is a science as there are guidelines that exist and a large assortment of available tools, yet many providers find success with a variety of options. In cases of delayed wound healing or failure of complete closure it is important to use both knowledge and judgement, *secundum artem*, to ensure best results.

Smoking has been shown to have a multitude of negative impacts on health overall and is generally recognized as a public health concern.¹ One side effect to smoking is that of delayed wound healing due to effects of the toxic constituents of cigarette smoke, particularly nicotine, carbon monoxide, and hydrogen cyanide. Nicotine is a vasoconstrictor that reduces nutritional blood flow to the skin impairing wound healing. Nicotine also increases platelet adhesiveness raising the risk of microvascular occlusion and reduces proliferation of red blood cells, fibroblasts, and macrophages needed for wound healing. Carbon monoxide halts oxygen transport and metabolism. Hydrogen cyanide inhibits enzymes necessary for oxidative metabolism and transport at a cellular level.² Slower healing has been observed clinically in smokers with wounds resulting from trauma, disease or surgical procedures.³

Patients with diabetes are at an increased risk of delayed wound healing and further complications. Diabetic foot ulcers for example are a leading cause of amputations and affect nearly 15% of people with diabetes.⁴ Wounds in diabetic patients have a prolonged inflammatory phase which decreases peripheral blood flow and decreases local angiogenesis. Other factors leading to delayed wound healing also include impaired nitric oxide synthesis, altered

metabolism, structural and functional changes in fibroblasts and increased matrix metalloproteinases activity. All of these factors combine and contribute to the lack of healing in patients with diabetes.

CASE REPORT:

Patient is a 26 year old male with diabetes. 1 pack per day smoking history. Following elbow fracture surgical intervention was required for hardware implantation. A methicillin resistant Staphylococcus aureus (MRSA) infection occurred near surgical site following surgery. Wound dehiscence occurred measuring 3 cm in diameter (Figure 1). Skin graft was placed 2 weeks later after removal of stitches which proved to fail and came off with removal of bandage a few days following placement. Topical Bacitracin showed some benefit but with very slow progress.

Started compounded wound care product (figure 2) after several weeks of failed therapies. Product contained a combination of aloe vera, ciprofloxacin, misoprostol, nifedipine, phenytoin, and prilocaine.

Ulcer measured 2 cm at commencement of compounded product. After 7 days of use wound measured at only 0.5 cm and after 2 weeks open ulceration was no longer present. By patients one month follow up appointment wound was considered to be completely healed. To date patient has had zero recurrence or continuation of issues.

CONCLUSIONS:

After failed attempts of standard therapies the compounded product in question was able to improve wound healing and allowed for complete wound closure after a few short weeks. The compounded preparation is a combination of a variety of products that seem to work synergistically to provide maximal results. While all of the products have differing activities and mechanisms of action this report provides some evidence to their usefulness in aiding wound healing.

Aloe Vera has long been used for its skin healing properties in traditional medicine throughout the world. It has been shown to provide effects by modulating the inflammatory process, increasing wound contraction and epithelialization, decrease scar tissue size and increase alignment and organization of the regenerated scar tissue.⁵ Reduction of pain has been seen as well as increased absorption of other drugs through the skin which aids in the synergism seen in our compound.⁶

Ciprofloxacin is a fluoroquinolone with broad spectrum of coverage and is considered bactericidal in its activity.⁷ Prilocaine is a local anesthetic to provide pain relief through desensitization of the affected area.

Aloe Vera	0.2%
Ciproflaxacin	2.0%
Misoprostol	0.0024%
Nifedipine.....	2.0%
Phenytoin	5.0%
Proprietary base.....	QS

Figure 2 -
Wound Care
Product Formula

Misoprostol is a synthetic prostaglandin that is often used in the treatment of gastric ulcers. The potential pharmacological benefits are through modulation of the inflammatory process. Tissue injury induces the production of prostaglandins to aid in wound healing. Prostaglandins cause vasodilation through activation of the adenylate cyclase pathways via the production of cyclic adenosine monophosphate.⁸ It is thought that through the increased circulation and pro-inflammatory response misoprostol applied topically aids in wound healing.

Nifedipine is known as a calcium channel blocker and is primarily used for its antianginal effects. Cellular calcium metabolism appears to regulate extracellular matrix production as well as other critical steps in wound healing.⁹ Nifedipine increases blood flow through vasodilatory properties to accelerate the wound healing process which is especially important in those predisposed to decreased circulation as seen in diabetic patients.⁸

The antiepileptic drug phenytoin is thought to have activity through modification of collagen remodeling by decreasing collagenase activity, increasing epidermal and keratinocyte growth factor receptors, and accelerates initial inflammatory responses by inducing new vessel formation.¹⁰

The exact mechanism of action of each product on wound healing is not fully understood but through the evidence currently available provides a basis of use for these products combined for accelerating the wound healing process.

This case report serves as evidence for the use of a specialty compounded preparation for the use of wound healing and closure. The product was successful after failure of more traditional and proven therapies and could be considered as an alternate therapy in wound treatment.



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