CHAPTER **3**

DIFFICULT WOUND CLOSURES

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INTRODUCTION

Chronic wound management is one of the greatest challenges to the podiatric surgeon. In a world of "fix it quick," taking several months to heal a wound can be difficult for both the patient and surgeon. The definition of a challenging wound means different things to different people. It can be everything from a diabetic ulcer to a necrotic incision after ORIF of an ankle. When a wound fails to heal within an expected time frame, many factors must be considered. Everything from a patient's co-morbidities, general health, nutrition, circulation, social habits, and activity must be considered.

With the myriad of wound care products available to treat wounds chronically, few are available to treat them more acutely and aggressively. Closure of wounds has typically been the domain of plastic-type procedures, flaps and grafts, but a new device may offer an alternative. The Sure Closure System has been used in the past, but never seemed to develop a regular following. It utilized two large Keith needles and a spring loaded device to pull the skin edges together. While working on a similar uniform tension theory, it was primarily limited to a single direction of pull. This limited its use in the foot because of the frequency of irregularly shaped wounds.

MECHANICS

The ability to stretch skin relies on two basic properties, stress relaxation and elastic creep. Stress relaxation is noted when skin is stretched over time and then allowed to relax, generating laxity in the skin. This is differentiated from the concept of creep, which is more of a cellular level event. Creep occurs at the basement membrane level of the dermal collagen fibers. The normally compressed and irregularly organized fibers are forcibly straightened generating increased length.

DERMACLOSE RC

The DermaClose RC (Woundcare Technologies, Chanhassen, MN) device is used to apply a continuous controlled 1,200g force through a single monofilament suture wound around a series of skin anchors. Many similar homemade devices have been used in the past with vessel loops being threaded around stapled wound edges. The DermaClose allows for improved control and reproducibility. The primary indications are post-operative dehiscence, chronic plantar ulcers, acute surgical wounds, traumatic injuries, diabetic, burns, donor site wounds, and amputation sites.

ADVANTAGES

The advantages of the DermaClose are is applies constant dynamic pulling force to the wound; it typically is used for less than 1 week; and it can be used on circumferential or linear wounds. Additionally, it offers earlier closure of difficult wounds, and for larger wounds, multiple devices can be used.

TECHNIQUE

Preparing the wound bed prior to using the DermaClose RC is critical for success. First there must be adequate wound debridement. Next place the skin anchors 1-3 cm from the wound edges, penetrating the subcutaneous tissue. Secure each anchor with 2 staples, and attach line loop from the DermaClose RC controller around the anchors. The knob of the tensioning device is rotated until the clutch mechanism provides an audible indication. When adequate tissue movement is achieved, remove the skin anchors and tension controller and suture to retain closure.

CASE STUDY

The patient is a 74 year-old woman with a history of long term steroid use, poor skin, and a trimalleolar fracture. She underwent typical ORIF with lateral plate fixation, but developed significant wound complications. She ultimately required extensive wound care and intravenous antibiotics. Her hardware was removed and an acute closure performed with the DermaClose RC. The skin edges were re-approximated during day 1 of device application. The sutures were left in place for 3 weeks and primary healing obtained (Figures 1-10).

Figures 1. Initial post-operative wound complication with exposed hardware.

Figure 2.

Figure 3. Immediate post hardware removal and debridement.

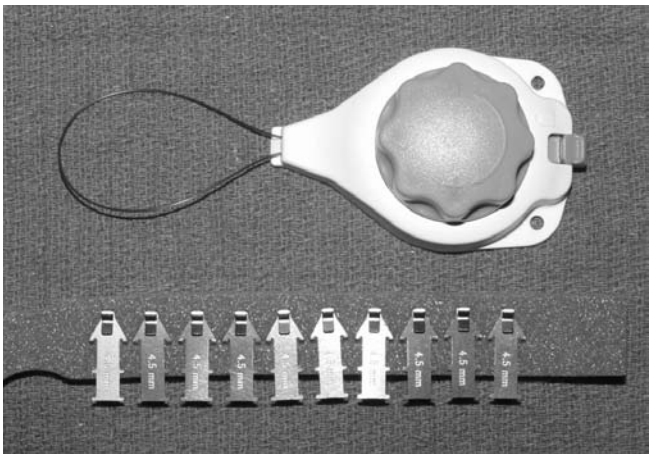
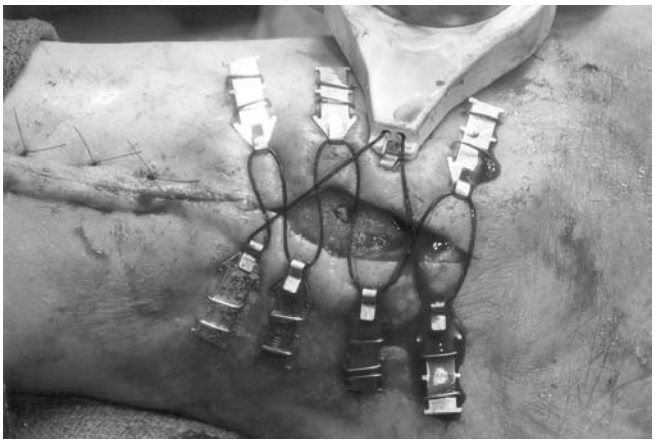


Figure 4. The DermaClose RC device and metal anchors.

Figure 5. Placement of skin anchors around wound.



Figures 6. Application of the DermaClose RC device and progressive closure of the wound with final suture placement. The device is actually engaged on a skin anchor as well. Note-Monofilament is twisted in Figure 6.

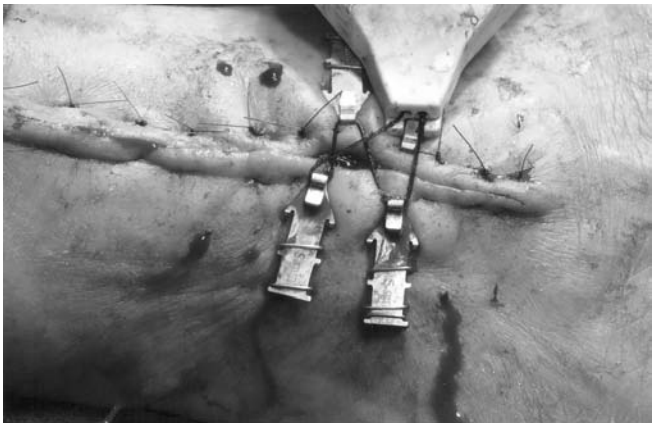


Figure 7.

Figure 8.

Figures 9. Final clinical appearance at 1 month postoperative.

Figure 10. 3 months postoperative.

SUMMARY

While all chronic wound products and devices have their place, the DermaClose RC offers the ability to accelerate healing and minimize the need for secondary wound healing. This may not become a first line of treatment, but another entity to be added to your armamentarium for large or chronic non healing wounds.

BIBLIOGRAPHY

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