Healing Skin Grafts over Chronic Wounds with Vacuum Assisted Closure* and Silver Dressings**

Stanley N. Carson MD FACS, Angie Rodriguez, P.T., Jackie Hebert, P.T.,
Stephanie Lee-Jahson P.T.A., CWS, Eric Travis, D.P.M. Private Practice and
Fountain Valley Regional Hospital Wound Care Program, Fountain Valley, California

Introduction

We have used wound Vacuum Assisted Closure (V.A.C.)* extensively to establish and promote healing in hundreds of chronic wounds over the past several years.[1] As an extension of this use, we began using the V.A.C. as the p rimary dressing for skin grafts when done to close chronic wounds. Others have also developed and used these techniques.[2,3,4]

We have used V.A.C. on over three hundred skin grafts covering chronic wounds. This has been done to insure take of the graft, expedite graft adherence during the revascularization phase, produce just the right amount of moisture for graft viability, protect the graft from trauma, and prevent contaminat ion.

Subsequently, this has also been extended to skin grafts over surgical dehiscences following primary repair, skin grafts over acute wounds in areas with difficult contours and areas with frequent motion such as knees and ankles and mediastinal areas.

Early on we noted a tendency for the V.A.C. dressed skin grafts over large chronic wounds to develop some infections. This was as much as 10%, which in itself is not remarkable for chroni c wounds. Although infection is one of the complications of any type of skin graft, grafts over chronic wounds appear to be particularly prone. Many chronic wounds have large numbers of colonized bacteria which are frequently resistant to many antibiotics (MRSA, VRE). Furthermore, as these wounds are colonized and not infected at the times of grafting, prolonged use of antibiotics prophylactically in these wounds, even with grafts may itself lead to complications and is quite costly. [5 and refs]

At this point we began to use silver plated, porous, polymeric fabric** between the V.A.C. sponge and the graft instead of an inert mesh fabric to prevent and control infection. The silver fabric also serves as a protective layer between the graft and the sponge and allows easy removal of the V.A.C. dressing without disturbing the graft.[6,7,8] It is also possible that silver has further protective effects on wound healing and graft take as has been implied by others.[8]

Technique

A single dose of preoperative antibiotics based on results of prior wound cultures is given 1-2 hours before surgery. The wound is debrided and prepared for grafting in the operating roo m. A split thickness skin graft is prepare at 12-15 thousandths thickness and meshed 1.5:1. It is oriented, trimmed and sewn to the prepared wound bed with 4-0 nylon sutures. The silver fabric is trimmed to fit over this, not extending over the wound edges. The V.A.C. sponge and clear dressing is placed over this and vacuum connected. We set the V.A.C. at 125mm Hg continuous and leave it on for seven days, removing it at that time.

Report

One hundred consecutive patients with chronic wounds of the legs and trunk receiving skin grafts dressed with Vacuum Assisted Closure (V.A.C.)++ and silver dressings* are reported. Patients had appropriate wound care and failed to epithelialize for 5 weeks or more before instituting skin graft, with combined V.A.C. and silver dressings.

Wounds measured 8 x 5 x 1 cm to 40 x 16 x 3cm. Etiologies included infectious, traumatic, diabetic, arterial and venous origins.

97 patients progressed to satisfactory healing and closure with skin grafts. Closure was maintained on follow up at 8 weeks. Three patients failed to heal but did not appear to have infections. Rather, nonhealing appeared to be a result of lack of formation of vascular attachment of grafts. This appeared to be a result of the patient/caregiver inadvertently disconnecting the V.A.C. for long periods (over 1 hour) which results in maceration of the area. All healed with subsequent grafts.

V.A.C. and silver fabric are a very effective dressing for skin grafts over chronic wounds. Infection seems to be well controlled during their combined use. Areas with complex contours can be easily dressed and protected.

This work was unsupported. Presented at SAWC/AAWC 2004.

Privacy regulations observed and informed consents obtained in all cases. Poster compiled 01/2004.

*** Kinetic Concepts, Inc. ,San Antonio, TX 78230**
*** * SilverlonTM Argentum Medical, Lakemont, GA 30552**

Figure 1. Left to Right. Wound to be grafted, silver fabric over wound, V.A.C.* over silver. Patient had necrotizing fasciitis with significant tissue loss and was successfully grafted.**

Figure 2. Silver and V.A.C. dressing being removed (left) at 7 days; graft at 6 weeks. This was a case of trauma with secondary abscess and tissue loss of the leg.

Patient Population	N=100
Lower Extremity Wounds	N=84
Trunk/Chest	N=16
Age	15-89 years
Male	46
Female	54
Diabetes	37
Tobacco use	16
Renal failure	6
Ischemia Doppler ankle pressure less than .8 arm pressure	31
Grafted areas	25-243 sq.cm

Table I. Demographics of population receiving skin grafts.

References

1. Carson, S, Hebert, J, Overall, K. et al., Vacuum assisted closure for healing chronic wounds and skin grafts in the lower extremities. To be published, Ostomy Wound Management, March 2004.
2. Ford CN, Reinhard ER, Yeh D, et al., Interim analysis of a prospective, randomized trial of vacuum-assisted closure versus the healthpoint system in the management of pressure ulcers. Ann Plast Surg (United States), Jul 2002, 49(1) p55-61.
3. De Franzo AJ, Argenta LC, Marks MW, et al, The use of vacuum -assisted closure therapy for the treatment of lower-extremity wounds with exposed bone. Plast Reconstr Surg (United States), Oct 2001, 108(5) p1184-91.
4. Sposato G, Molea G, Di Caprio G, et al., Ambulant vacuum -assisted closure of skin-graft dressing in the lower limbs using a portable mini-VAC device. Br J Plast Surg (England), Apr 2001, 54(3) p235-7.
5. Sibbald RG, Orsted H, Schultz GS, Coutts P, Keast D, Preparing the wound bed 2003: focus on infection and inflammation. Ostomy Wound Manage 2003-12-4 49(11) 23-51
6. Demling R, DeSanti L. Effect of silver on wound management. Wounds 2001:13; 11-19.
Innes ME; Umraw N; Fish JS; Gomez M; Cartotto RC.The use of silver coated dressings on donor site wounds: a prospective, controlled matched pair study. Burns 2001 Sep;27(6):621-7.
7. Kirsner R, Orsted H, Wright B. Matrix, metalloproteases in normal and impaired wound healing: a potential role of nanocrystalline silver. Wounds 2001:13; 5C; 5-10
8. Carl Van Gils, MS, DPM, The Foot and Ankle Institute, St. George, UT; LeeAnn Stark MS, APRN, CFNP, CWOCN, and Brenda Forbes RN BSN CDE. The combined benefit of negative pressure therapy, elemental silver contact layer and bilayered living skin equivalent in the treatment of chronic hard to heal lower extremity wounds. Presented at Symposium on Advanced Wound Care April 27-30, 2002 Baltimore MD

*** Kinetic Concepts, Inc. ,San Antonio, TX 78230**
*** * SilverlonTM Argentum Medical, Lakemont, GA 30552**