Use of the CELLUTOME™ Epidermal Harvesting System and the SNAP™ Therapy System as Part of a Wound Management Strategy for Stalled, Chronic Wounds

This clinical case is based upon the clinical experience of Animesh Bhatia. Results may not be typical and individual results may vary. Users should read and understand all Instructions for Use, including safety information, prior to application of the product. The images contained in this case study are courtesy of Animesh Bhatia.

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INTRODUCTION

Traditionally, split-thickness skin grafts have been used for wound closure. This grafting option requires surgery, creates a second wound at the donor site, and can have complications (eg, graft rejection, graft contraction, or infection).[1, 2] Various grafting techniques have evolved over time, leading to the development of epidermal grafting as a viable alternative to traditional skin grafting procedures in challenging wounds that require only the epidermal layer.[3-6] Epidermal grafting differs from traditional grafting methods as it can be performed in an office or outpatient setting without the use of a surgeon, operating room, or anesthesia. Following grafting, bolsters are typically used to secure grafts in place over the wound. Options for bolsters range from secondary dressings and self-adhesive wraps to negative pressure wound therapy (NPWT).

I report on my experience with epidermal grafts harvested using the CELLUTOME™ Epidermal Harvesting System, followed by use of the SNAP™ System as a bolster, as part of my wound management strategy for stalled, chronic wounds.

METHODS

Prior to epidermal grafting, all wounds underwent wound bed preparation techniques using sharp debridement, collagenase ointment, collagen dressings, or PROMOGRAN PRISMA™ Matrix (Systagenix, an ACELITY Company, Gargrave, UK). After the wound beds showed healthy granulation tissue, epidermal grafting was performed.

Donor sites (thigh) were prepared for epidermal graft harvesting using hair removal and an isopropyl alcohol wash. The CELLUTOME™ System vacuum head and harvester were securely attached to the donor site. Negative pressure (-400mmHg to -500mmHg) and warmth (37°C to 41°C) were applied for 35-45 minutes. After epidermal microdomes were formed, the vacuum head was removed, the microdomes were harvested onto an ADAPTIC TOUCH™ Non-Adhering Silicone Dressing (Systagenix, an ACELITY Company), and the dressing with grafts attached was immediately placed over the wound and left in place for 7 days.

The epidermal grafts were bolstered using the SNAP™ System, a lightweight, portable, mechanically powered negative pressure system that provides -125mmHg of negative pressure. The SNAP™ Advanced Dressing was placed over the ADAPTIC TOUCH™ dressing and connected to the SNAP™ 125mmHg Therapy Cartridge. The SNAP™ System was then secured to the patient's extremity using the SNAP™ Therapy Strap. Dressing changes were performed per the manufacturer's instructions. In some cases, wounds required further debridements and/or use of collagen dressings as well as additional epidermal graft applications. Wounds were monitored weekly during either SNAP™ Advanced Dressing changes or re-application of collagen dressings and were considered healed when fully re-epithelialized.

CASE STUDIES

The following cases highlight the use of epidermal grafts bolstered with SNAP™ System. The patients were 3 females and 1 male with an average age of 79 years (range: 69-85 years) who had a pressure ulcer (n=1), venous leg ulcer (n=1), or traumatic wound (n=2).

CASE 1

The patient was an 85-year-old female who presented to the clinic with a 30-day-old stage 3 pressure ulcer on the right heel measuring 1.2cm x 1.8cm x 0.1cm (Figure 1A). Medical history included peripheral vascular disease (PVD), hypertension, hyperthyroidism, neuropathy, chronic kidney disease, gastroesophageal reflux disease, osteoarthritis, osteoporosis, coronary artery disease, cataracts, cardiomyopathy, and ischemic polymyelgia rheumatica. After the patient was in an Unna boot for 1 week, the wound received epidermal grafts, followed by SNAP™ System therapy, which was used as a bolster. One week later, a PROMOGRAN PRISMA™ Matrix dressing was placed over the wound. Two weeks later, a small portion of the wound with necrotic tissue was debrided using a curette. Following debridement, the wound was covered with a PROMOGRAN PRISMA™ Matrix dressing and patient was placed in an Unna boot. One week later the PROMOGRAN PRISMA™ Matrix dressing was re-applied. The next week, at 2 months after presentation, the wound was fully closed with no complications (Figure 1B).

CASE 2

The patient was a 69 year-old male who presented with a venous leg ulcer of the left medial shin measuring 1.7cm x 1.0cm x 0.4cm, which had been present for 120 days (Figure 2A). Medical history included tobacco use, hypertension, hyperlipidemia, coronary artery disease, and Vitamin D deficiency. Upon presentation, the wound showed signs of hypergranulation. Silver nitrate and a hydrogel sheet were applied to the wound. After 14 days, the wound still showed signs of hypergranulation and treatment was changed to Promogran Prisma™ Matrix dressings and off-loading using an Unna boot for 4 weeks. However, the wound remained open, and extensive debridement was performed to prepare the wound for epidermal grafting. One week later, epidermal grafts were applied (Figure 2B), followed by use of SNAP™ System as a bolster. The wound showed signs of re-epithelialization 7 days post grafting (Figure 2C), and SNAP™ Therapy was continued for an additional 5 weeks. Although wound appearance improved, the wound size was increasing; therefore, SNAP™ System therapy was discontinued (per patient request), and the wound received collagen dressings for the next 2 weeks. The wound was then debrided in preparation for a second application of epidermal grafts, but dermatitis developed around the wound area. Therefore, treatment was changed to sodium chloride impregnated gauze dressings (Mesalt® Sodium Chloride Impregnated Gauze, Mölnlycke Health Care, Gothenburg, Sweden) for the wound and a steroid cream for the dermatitis. By the 3-month follow-up, the dermatitis had resolved, and the wound was fully closed without complications (Figure 2D).

CASE 3

The patient was an 81 year-old female who presented with a traumatic wound of the right lower leg measuring 5.5cm x 4.7cm. Medical history included coronary heart disease, hypertension, atrial fibrillation, asthma, congestive heart failure, valve disease, osteoarthritis, shortness of breath, and swelling of feet and ankles. The patient had been treated at another facility with oral antibiotics and SILVERCEL™ Antimicrobial Alginate Dressing (Systagenix, an ACELITY Company). Upon presentation to my clinic, treatment was changed to collagenase ointment with wet/dry dressings daily. After 6 weeks, the wound underwent sharp debridement using a curette. One week later, epidermal grafts were applied to the wound (Figure 3A and 3B), and SNAP™ System therapy was used as a bolster. Wound re-epithelization was observed 3 weeks post grafting (Figure 3C). Six weeks later, the wound received a second application of epidermal grafts (Figure 3D) bolstered with SNAP™ System therapy and the SNAP™ Advanced Dressing. The SNAP™ Therapy system and dressing were changed once a week. The wound was fully closed without complications 5 weeks following the second epidermal graft application (Figure 3E).

DISCUSSION

The cases presented here were complex with each patient having multiple comorbidities that contributed to stalled, chronic wound healing. In these patients, debridement, collagenase ointments, and collagen dressings were first used to prepare the wound bed for epidermal graft application, which was followed by the use of SNAP™ System as a bolster. Additional graft applications as well as debridement and collagen dressings were sometimes necessary, and together, these different advanced wound therapies led to eventual closure of all wounds.

With the commercially available CELLUTOME™ System, the harvesting procedure is minimally invasive and can be performed in an office setting without any anesthesia. Several case series using this system to harvest epidermal grafts have been published with positive wound healing outcomes for a majority of patients with complex wounds.[3-8] In my recently published case series using epidermal grafts in patients with multiple comorbidities and chronic wounds, 82.4% (28/34) of the wounds showed complete healing.[9]

NPWT was used as a bolster over epidermal grafts in the 3 patients. NPWT is indicated for a variety of wounds and has been used as a bolster for skin grafts with positive results.[10, 11] The availability of a lightweight, mechanical NPWT system, such as SNAP™ System, has provided healthcare professionals the opportunity to use NPWT when the traditional powered NPWT systems may not be appropriate or available. SNAP™ System was used as the bolster in these patients, and all wounds remained closed at follow up.

In these patients, the combination of wound bed preparation, epidermal grafting, and SNAP™ System proved to be successful wound management tools. More studies are needed to determine the clinical and economic feasibility of this treatment regimen; however, these early experiences are promising.

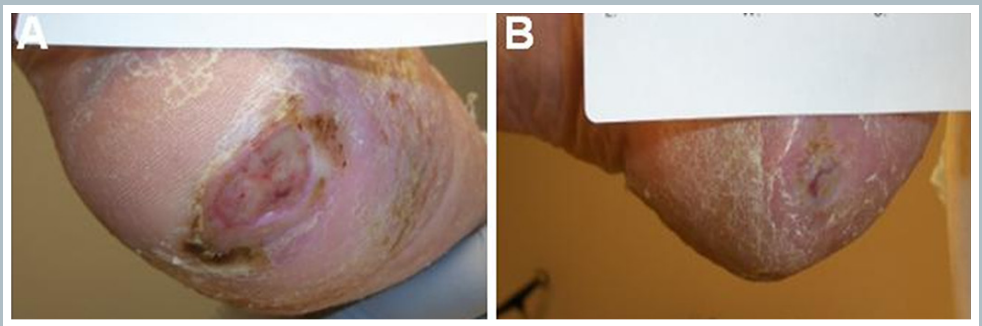

Figure 1. Stage 3 pressure ulcer on right heel. Wound at presentation (A) and wound fully closed at 2-month follow-up visit (B).

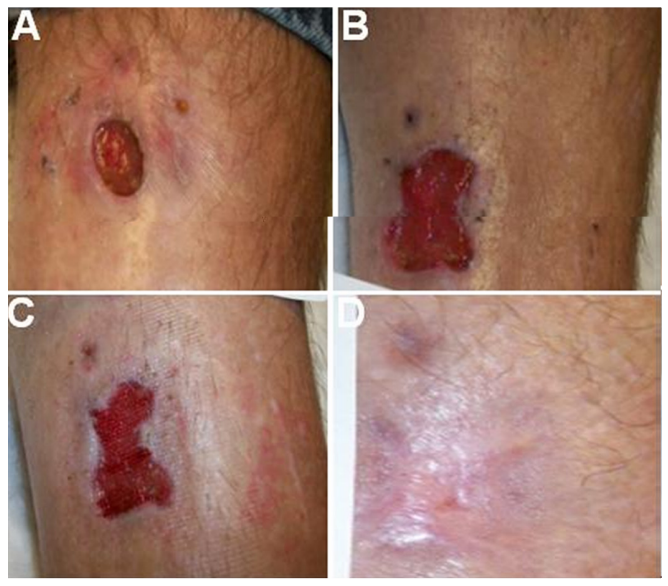

Figure 2. Venous leg ulcer of the left medial shin. Wound at presentation (A), wound on day of epidermal grafting (B), wound at 7 days post grafting (C), and wound fully closed at 3-month follow up (D).

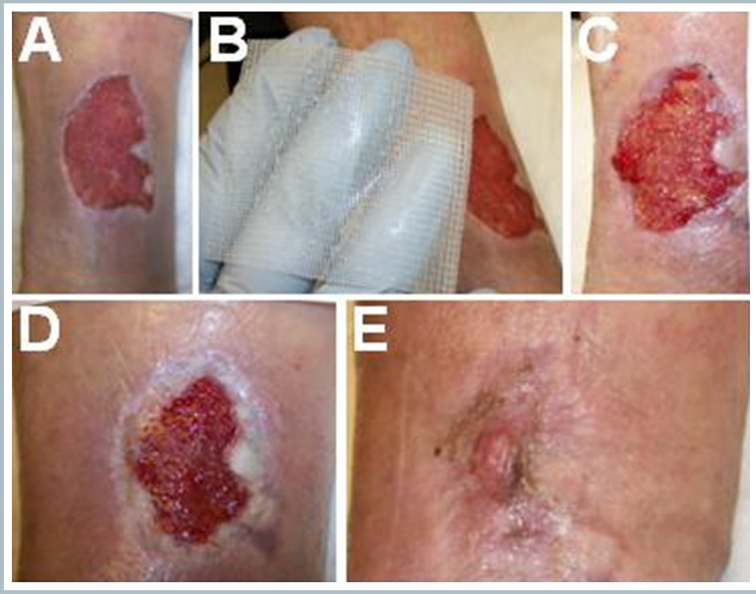

Figure 3. Traumatic wound of the right lower leg. Wound prior to epidermal graft application (A), application of epidermal grafts (D), and wound fully closed (E).

NOTE: Specific indications, contraindications, warnings, precautions and safety information may exist for all KCI and Systagenix products and therapies. Please consult a clinician and product instructions for use prior to application. Rx only.

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Dr. Bhatia serves as Vice President on the board of trustees of the Ohio Foot and Ankle Medical Association. He is also the Medicare Carrier Advisory Rep for Ohio. He serves on the BOT of the American Academy of Podiatric Practice Management (AAPPM), and was a Governor appointed physician member of the Ohio State Board of Orthotics, Prosthetics and Pedorthics. He is a board certified wound specialist, and a fellow of the ASPS and AAPPM. He also serves as Chairman of the APMA Coding Committee. He has lectured nationally and internationally on the topics of wound care, practice management and coding. Dr. Bhatia has been in private practice for eighteen years in Columbus, Ohio, and serves as Medical Director of a multi-specialty private practice group focused on podiatry and wound care. He is also the Assistant Medical Director of the Wound Clinic at Fairfield Medical Center in Lancaster, Ohio.

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