

CELLUTOME™ Epidermal Harvesting System After the Use of an Advanced Wound Dressing

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INTRODUCTION

Chronic wounds usually cost between \$28 billion to \$31.7 billion and affect 15% of 8.2 million Medicare beneficiaries.¹ As chronic wounds are a prevalent and complex problem for wound care clinicians, an organized and systemic approach to their management is required.² The TIMEO₂ (tissue debridement, infection management, moisture control, edge effect, oxygen therapy) wound bed preparation principle has been elucidated by the author and represents a systemic approach to correct molecular and cellular abnormalities and is a critical component to promote the healing of chronic wounds.^{3,4}

Advanced wound therapies and dressings have evolved to help maintain appropriate levels of wound bed moisture, promote development of granulation tissue, and remove exudate and infectious materials. However, some wounds require the additional step of a skin graft. Traditional split-thickness skin grafts (STSGs) require an operating room, anesthesia, and cause the creation of a secondary wound at the donor site. However, epidermal grafts may provide an alternate option to STSGs.

Epidermal grafts utilize autologous skin on the wound after the wound has already been prepared for expedited epithelialization. In our experience, most chronic wound care patients prefer epidermal grafting in the clinic as there is no requirement for anesthesia and minimal to no complications at the donor site as only the epidermal layer is harvested. Also, in certain conditions like pyoderma gangrenosum and for anatomical locations like the plantar area, epidermal harvesting may be preferred over a traditional STSG.⁵

This case study reports the use of advanced

wound therapies and dressings for wound bed preparation followed by epidermal grafting to promote wound healing in a dorsal right foot ulcer.

CASE STUDY

This case study delineates that the patient requires all components of TIMEO₂ for wound bed preparation⁴:

(T) Tissue debridement - where the patient requires multiple surgical debridement procedures

(I) Infection management - where the patient receives 6 weeks of intravenous ertapenem based on tissue and bone culture

(M) Moisture control with negative pressure wound therapy (NPWT)

(E) Edge effect with collagen

(O₂) Correction of hypoxia with hyperbaric oxygen therapy (HBOT) for wound bed preparation. Once the wound bed is prepared with good granulation, the epidermal graft is used for expedited epithelialization.

A 45-year-old male who works as an auto mechanic with a history of type II diabetes and hypertension presented with a wound on the dorsal right foot present for 50 days. The patient had been trying to manage the wound on his own with over-the-counter medications under the guidance of a primary care physician. However, the wound worsened, and the patient was admitted to the hospital with an infected deep abscess and severe diabetic foot infection. The wound underwent initial sharp debridement in the operating room. The patient was initially started on broad spectrum antibiotics (intravenous vancomycin and piperacillin/tazobactam)

The wound was classified as a Wagner

Grade 3 ulcer stemming from a diabetic wound/ulcer of the lower extremity (**Figure 1**). The wound measured 10 cm length x 4 cm width x 3 cm depth with exposed muscle and tendon. There was a large amount of serosanguinous drainage noted with the wound margins undermined and no granulation within the wound bed. We treated the patient's wound with 4x4 gauze soaked with 0.125% Dakin's solution. A 6-week course of intravenous ertapenem was initiated. Wound cultures were positive for methicillin sensitive *Staphylococcus aureus*.

After two weeks, the patient's wound margin was flat and intact with granulation tissue (67-100%) observed in the wound bed (**Figure 2**). A small area (1-33%) of adherent slough was noted in the wound bed following another surgical debridement and third toe amputation. Hyperbaric Oxygen Therapy (HBOT) at 2 atmospheres absolute (ATA) for 90 minutes a day and V.A.C.® Therapy at -125 mmHg was initiated. Dressing changes occurred three times per week.

A month later, the wound measured 7.5 cm x 3.5 cm x 0.9 cm; there was ~0.5 cm of undermining from 9-11 o'clock (**Figure 3**). A large amount of serosanguinous drainage was observed. The wound margin was still flat and intact. V.A.C.® Therapy and HBOT was continued.

Seven weeks after presentation, the wound measured 7.3 cm x 3.0 cm x 0.5 cm (**Figure 4**). There was a minimal amount of serosanguinous drainage, presence of 67-100% granulation tissue, and a small area of loose slough (1-33%) observed within the wound bed. V.A.C.® Therapy and HBOT were discontinued and the wound was deemed suitable for

epidermal graft placement.

The patient's right thigh was prepared for epidermal graft harvesting through hair removal and 70% isopropyl alcohol wash. The CELLUTOME™ Epidermal Harvesting System was applied to the thigh and epidermal grafts were harvested. The epidermal grafts were transferred to the wound using ADAPTIC TOUCH™ Non-Adhering Silicone Dressing. The epidermal grafts were bolstered with a secondary dressing, which was changed once a week, according to manufacturer's instructions. A transparent film dressing was applied to the donor site. The donor site was fully healed 7 days after graft harvesting. One month after epidermal grafting, the wound continued to improve and measured 5.4 cm x 1.8 cm x 0.3 cm. The ADAPTIC TOUCH™ Non-Adhering Silicone Dressing and secondary dressings were discontinued. A hydrogel and collagen dressing were applied with dressing changes once per week, according to manufacturer's instructions.

Approximately 18 weeks after presentation the wound was completely epithelialized (Figure 6).

CONCLUSION

Management of chronic wounds is a dynamic process, which requires evaluation and assessment of the wound on a regular basis. A comprehensive wound management algorithm using the TIMEO₂ principle may help to prepare the wound bed. It is also important to understand patient-specific factors and social determinants of health which may also affect wound healing. Ulcers with a poor prognosis should be treated with a more advanced therapy. It is important to identify patients who are unlikely to respond to conventional care early so that advanced therapies can be considered and initiated. Application of epidermal grafts is a good alternative treatment over traditional split-thickness skin grafts once the wound has 100% granulation tissue. Epidermal grafting has shown promising results after wound bed preparation using advanced dressings in a variety of wounds including those with numerous patient comorbidities and in patients where a STSG is contraindicated.⁶⁻⁸

References:

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Photos and patient information courtesy of Jayesh Shah, MD, South Texas Wound Associates, PA, San Antonio, TX.

As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition.

NOTE: Specific indications, contraindications, warnings, precautions, and safety information may exist for Systagenix and KCI (Acelity companies) products. Please consult a healthcare provider and production instructions for us prior to application.



Figure 1. Wound at presentation



Figure 2. Wound after 2 weeks of treatment with 0.125% Dakin's solution soaked gauze dressings



Figure 3. Wound after 1 month of V.A.C.® Therapy and HBOT



Figure 4. Wound 7 weeks after presentation



Figure 5. Wound one month after epidermal grafting



Figure 6. Wound completely epithelialized 18 weeks after presentation