

Initial Report of a New Minimally Invasive Autologous Skin Graft Technique

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Abstract

Split thickness skin grafting (STSG) has been used for 150 years as the standard of care for closing suitable wounds. It requires that a wound is clean, has a relatively low bacterial count, and has a well vascularized wound bed. The result of a split STSG is the creation of a healed wound with a base that is essentially scar and an epithelial cover. The grafts shrink up to 30% of their area which can be an advantage or a terrible problem. It leaves a painful donor site for at least a week post op, as well as a visible and unattractive scar. Since this is a reliable technique for dealing with open wounds, it is still in wide use. The disadvantages of STSG, however, are substantial and have led to a search for less invasive alternatives.

Background

There are currently a variety of alternate techniques and of skin substitutes. Until SkinTE, there was not a reasonably effective application for a wide variety of wounds using autologous, homologous skin constructs (AHSC). Unfortunately, SkinTE is no longer commercially available. The latest generation of autologous skin constructs was introduced to clinical practice this year. I have personally used this product and the company kindly provided me with their initial raw data to analyze.

Methods and Materials

The clinical use of this product between April 1, 2022 and October 1, 2022 consisted of 20 cases in 19 patients. Demographic information includes age and sex. Medical history includes the nature and history of the wound, comorbidities, medications used by the patient at the time of treatment, wound size at the time of treatment with, wound progress, and the date of healing. Eleven males and 8 females with a mean age of 59 years old (range 30-94 yo) comprised the cohort. Ten patients had Mohs surgery wounds, 3 had venous leg ulcers (VLU), 3 had diabetic foot ulcers (DFU), 3 were surgical wounds (including 1 non-healing below the knee amputation stump, 1 abdominal wound following surgery for stage 4 colon cancer while the patient was on chemotherapy, and 1 complex traumatic wound), and 2 pressure ulcers (PU) both on the same patient. The mean size of the wounds was 27.5 cm² with a range in size of 1.5 – 357 cm².

The process involves harvesting patient's skin in the form of a small skin only biopsy. The biopsy size depends on the size of the ulcer being treated. In general, the biopsy is 2-3 x 1 cm and is performed under local anesthesia. The skin is submitted to the company. It is then minimally manipulated without enzymes or tissue culture techniques. The skin cells are reformatted into a collagen base and returned within 48 hours to be applied to the patient's wound. The application consists of debriding the wound, then placing the returned graft over the wound. A non-adherent material is then placed over the wound and fixed in place. A negative pressure dressing is then used to seal the wound and graft.

Results

There were no complications. In no case did the wounds get worse following application of the graft material. The co-morbidities included 7 patients with hypertension, 6 with Diabetes Mellitus type 2, 3 with chronic renal failure, 2 with Cardiac Atherosclerotic Disease, 1 with congestive heart failure, 2 with peripheral vascular disease both requiring below the knee amputation, and 1 with metastatic stage 4 colon cancer on chemotherapy. All patients who were treated for Moh's tumor resection defects were examined on their 12th week after AHSC placement and were fully healed. The patients with venous leg ulcers were healed at 5 and 13, and 23 weeks respectively. The non-healing below the knee amputation incision in a vasculopath healed in 7 weeks. The surgical wound in the colon cancer patient on chemotherapy healed in 13 weeks. The trauma patient with a 17 x 21 cm wound was healed at his 13th week examination. One of the VLU patients was healed in 5 weeks, another at 13 weeks, and the remaining VLU was healed at 23 weeks (the patient traveled out of the country between week 8-23).

Future Direction

The graft has been used in a variety of patients with acute and chronic wounds. Although the current sample is small, there have not been any adverse effects and no complications have occurred. All but one of the patients completely healed during the observation period, including the patients with very complex wounds. Further evaluation is necessary to be able to fully endorse this approach, but the initial data is promising.



Figures:

1. Morell Lavallee lesion
2. Multiple debridements
3. AHSC in collagen suspension
4. Application to wound
5. Healed week 13 post application.



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