Experience Using A Synthetic Skin Substitute Following Acute Burn Injury At A Tertiary Burn Center

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Introduction

Advancements in burn wound management and closure strategies have led to the development of a variety of skin substitutes for partial thickness burn injuries. These vary in size, composition, and application technique. The benefits are myriad and include minimizing pain, dressing changes, donor site size and morbidity, and hospital length of stay. Here, we examined a DL-lactide and Ɛ-caprolactone synthetic copolymer used as a temporary, artificial burn dressing in the treatment of partial thickness wounds. This work aims to characterize the use of this product following burn injury at a single burn center to better optimize and protocolize future care.

Methods

Patients who were admitted to a regional burn center from November 2022 to October 2023 with partial thickness burns and underwent wound bed preparation and grafting with the synthetic product were retrospectively analyzed. Patient charts and operative reports were reviewed to collect demographic and burn injury characteristics. End points included graft size, time to wound healing, progression of wounds, wounds requiring reoperation, complications, and length of stay. Results were reported as mean ± standard deviation as appropriate. In terms of surgery, wounds were prepared by standard operative techniques until healthy bleeding tissue was encountered. Following hemostasis, wounds were covered with a synthetic skin substitute (Figure 1) and then placed in sterile dressings.

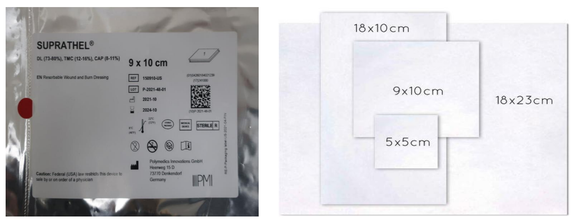

Figure 1: Packaging and Graphic Representation of the Skin Substitute

Results

There were 103 patients with partial thickness burn injuries underwent treatment with the product of interest (Table 1). The average age was 45.1 ± 15.2 years old, primarily male (62%), 33.9% were white, and 31.1% were African American. Among injury types, 57.3% of patients presented with a scald injury. Flame injuries were the next most common at 33.9% (Figure 2). The average TBSA burn was 6.0 ± 4.3%. 83.5% of patients were admitted to the floor, and of those admitted to the ICU, the most common reason was due to size of injury (Table 2). Among patients who received the product, 99% had one operation and only one patient required a subsequent autologous skin graft. The average graft size was 1240.8 ± 972.5 cm^2. 51.5% of patients were discharged the same day as their operation. Overall total length of stay was 4.9 ± 3.3 days for patients. The average time to wound healing was 30.4 ± 15.7 days. On average 208.8cm2 of graft was used per % TBSA burn. No wound infections were found following product placement. Graft sizes used are displayed in Figure 3.

Variable	Results
Age (years)	45.1 ± 15.2
Gender (male %)	62%
Race (%)	
White	33.9%
African American	31.1%
Hispanic	13.6%
History of Comorbidities (%)	68.0%

Table 1: Demographic Characteristics

Variable	Results
TBSA Burn (%)	6.0 ± 4.3%
Admission Type	
Floor (%)	83.5%
ICU (%	16.5%
Patients with Only 1 Operation (%)	99%
Discharged Same Day of Operation (%)	51.5%
Complications (#)	1-Progression to full thickness wounds
Reoperation (#)	1
Graft Size (cm^2)	1240.8 ± 972.5
Graft (cm^2):%TBSA Ratio	208.8
Overall Length of Stay (Days)	4.9 ± 3.3
LOS of Patients Not Discharged the Same Day	6.7 ± 4.1
Time to Wound Healing (Days)	30.4 ± 15.7

Table 2: Injury, Graft, and Outcome Characteristics

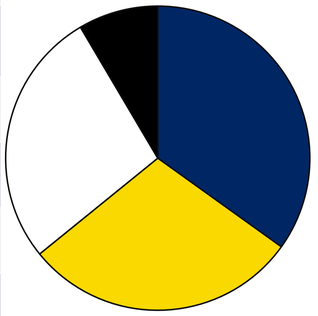

Figure 2: Injury Type

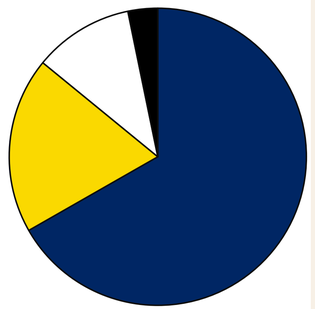

Figure 3: Graft Sizes Used

Discussion

The synthetic skin substitute was used in partial thickness burn wounds that were determined to not require autologous skin grafting. Length of stay remained short, and patients were often able to leave the same day as their procedure. Only one patient required reoperation for autologous skin grafting in our cohort due to progression of their wound.

Limitations

The limitations of this study include the retrospective nature of the data collection and the lack of a control group to directly compare wound healing rates and potential complications. This study also did not evaluate patient perceptions of the graft, such as associated pain. Finally, time to wound healing may be prolonged as it based on clinical documentation, and wounds may have healed prior to the clinic visit.

Next Steps

Future work to characterize the cost of this product through a cost effectiveness analysis will need to be performed to further guide clinical utility as there are increased efforts to improve efficiency in organizations.

Conclusion

- **Our experience with this skin substitute:**
  - **Short hospital length of stay**
  - **Minimal complications**
  - **Majority left the same day as their operation**
- **Future work through a cost effectiveness analysis will need to be performed to further guide clinical utility as there is a shift towards increased organizational efficiency**