Comparison of Split-Thickness Skin Grafts vs Bilayered Bioengineered Skin Substitutes in Diabetic Patients

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STATEMENT OF PURPOSE

To present two patients with diabetic wounds comparing the healing time of split-thickness skin grafts vs bilayered bioengineered skin substitutes. Healing potential of grafts vary on a multitude of factors from blood flow to graft take. This study depicts the differences in healing times associated with two different grafts. It is also the start of a larger case series to see if one graft has any superior advantages versus the other. We hope will stimulate further research in this area.

LITERATURE REVIEW

Ulcers of the lower extremity can occur for many reasons such as venous insufficiency, peripheral arterial disease, and peripheral neuropathy. In addition, healing can be rendered with co-morbidities such as diabetes, smoking, and underlying infection. It is estimated that diabetic foot ulcers affect 68 per 1,000 people being the most common severe complication of this disease. These ulcerations can start from small blisters and progress to proximal amputations quickly when healing of the wound is affected. About 20% of patients with ulcers receive some sort of amputation in the treatment process.1

Treatment for lower extremity ulcerations combine several modalities such as local wound care, negative pressure therapy, and grafting. Grafting can be either done in the clinic setting with synthetic products or done in the operating room harvesting autograft. There has been much controversy on if split-thickness skin grafts are appropriate for diabetic ulcerations due to the impaired healing process. However, Rose et al in 2014 found no statically significant difference in diabetic vs non-diabetic groups undergoing a split-thickness skin graft for a foot ulcer.1

Moreover, new synthetic grafts derived from human tissue are on the rise for promoting healing in the clinic environment without the need for a formal surgery and risks associated with it. Apligraf is the first engineered skin that is US Food and Drug Administration approved to promote healing of ulcers that have failed standard wound care. It is a bi-layered bioengineered skin substitute derived from neonatal foreskins. Even though it might take anywhere from one to five applications, it does increase wound healing. Veves et al in 2001 looked at 208 patients and found that the application of this graft had a median time to closure of 65 days compared to 90 days with no application. They concluded this is a useful adjunct therapy in the management of these ulcerations.1

METHODS

CASE SERIES

Split-Thickness Skin Graft

A 57 year old female presented status post gangrene debridement to the wound care center. She underwent weekly debridements and application of negative pressure therapy. Past medical history included diabetes mellitus and peripheral vascular disease. The wound was on the left foot dorsal aspect measuring 19 cm x 8 cm x 0.3 cm.

Bilayer Bioengineered Skin Substitute

A 57 year old female presented status post midfoot amputation to the wound care center. Following sterile technique, the skin substitute was meshed and applied. The graft was held in place with steri-strips and a non-adherent bulky dressing. Patient was immobilized each time the graft was applied.

RESULTS

The patient who underwent the split-thickness skin graft had the wound for 43 days prior. It took her 29 days to heal after the application of the graft. No complications occurred along the way.

The patient who underwent the bilayered bioengineered skin substitute needed 5 applications of the graft. The grafts were done every 1-2 weeks depending on clinical progression. She went on to heal after 56 days of the initial application of the graft. No complications occurred along the way.

DISCUSSION

Overall, this case study aims to show the results and differences in application of split-thickness skin grafts and synthetic grafts to foot ulcers. Although both grafts have specific indications and contraindications in wound care applications, this study highlights that both modalities can be successful in healing clinically indicated wounds with either type of graft. In our limited study, it is seen that the autogenous split-thickness skin graft may afford a faster rate to healing and be most cost effective with fewer applications required for healing. However, this outcome needs to be further evaluated with a larger study to indicate if there is indeed a significant difference in rate of healing, as well as significant differences in other graft associated wound parameters. The next phase of this study will aim to confirm whether either graft type offers a superior advantage versus the other.

REFERENCES