The Healing Power of Nature

Fish Skin Graft (FSG) for the treatment of hard-to-heal ulcerative necrobiosis lipoidica diabeticorum (NLD)

Tracy Robertson, FNP-BC
Advanced Total Wound Care, Bay City, MI

INTRODUCTION

Patients with Diabetes Mellitus are at risk for cutaneous pathological conditions. Typical conditions are well-managed in the clinical setting; however, there are sparse treatment options for less common conditions1. Necrobiosis lipoidica diabeticorum (NLD) is a rare, chronic condition with unknown causes. NLD is a granulomatous disease associated with collagen degeneration, abnormal thickening of blood vessel walls, and lipid deposition, often resulting in ulceration and, if untreated squamous cell carcinoma2. Fish skin graft (FSG) treats acute and chronic wounds. FSG's inherent omega-3 fatty acid content may positively affect inflammatory ulcerations like NLD. Therefore, the purpose of this case was to investigate FSG for the treatment of ulcerative NLD.

METHODS

The patient is a 45-year-old male diagnosed in 2019 by his dermatologist with ulcerative NLD. Prior to diagnosis, the patient received several failed treatments. The patient had no treatment with oral steroids due to being a brittle diabetic; however, his dermatologist treated him with oral antibiotics and topical corticosteroids, which failed to close the ulcerations.
Upon presentation, the patient had a violaceous plaque with open bilateral ulcers on the anterior aspect of his lower extremities that had been left open to the air. The ulcerations presented with moderate serous drainage, and the patient stated he was experiencing progressive and intense pain. He had not taken pain medication. Initial treatment consisted of topical tacrolimus 0.1% applied daily. Due to the increased inflammation, treatment included 1,200 mg of omega-3 fatty acids per day and the application of FSG.

CASE: 45-YEAR-OLD BILATERAL LOWER EXTREMITY ULCERATIONS

Patient History: 45-year-old male with past medical history of DMII, NLD, hypertension, hyperlipidemia

Wound History: Patient presented with NLD developed anterior bilateral lower extremity ulcerations with a moderate amount of drainage

Kerecis Applications: A total of three applications to RLE and eight applications to LLE.

Patient Outcomes: Patient tolerated weekly debridements and eight applications of fish skin graft to achieve 100% wound closure on both extremities. Healthy granulation tissue with improved epithelization observed in all ulcerations.

RLE

Initial presentation **RLE**

Week 1
First application of fish skin graft

Week 2
Wound size: 5.0x7.0x0.3cm

Week 3
Wound size: 0.8x1.0x0.1 cm

Week 4
Follow-up

Week 6
Final healing outcome

LLE

Initial presentation **LLE**

Week 1
First application of fish skin graft

Week 2
Follow-up

Week 5
Individual ulcers were measured at this time

Week 9
Final healing outcome

RESULTS

The patient received eight weekly applications of the FSG, which successfully healed the bilateral ulcerations (Initial Total Surface Area = 42 cm); 6 cm (L) x 7 cm (W) x 0.3 (D). There were linear reductions in wound width, length, and depth, with the most notable changes at week five. Interestingly, the patient stated that his pain levels dropped significantly after the first application of the FSG.

CONCLUSIONS

Patients with diabetes have significant morbidites that often results in pathology, including ulcerations. While there are treatment options for common conditions, sparse options exist for rare manifestations. FSG is a novel biological option that augments tissue regeneration due to biochemical and biomechanical properties preserved during patented processing3,4. In our patient, the FSG graft was able to heal long-standing ulcerative NLD and reduce pain. Future studies should investigate our findings in a large representative population.

References

1. Bristow I. (2008). Non-ulcerative skin pathologies of the diabetic foot. Diabetes/metabolism research and reviews, 24 Suppl 1, S84–S89. https://doi.org/10.1002/dmrr.818
2. Lepe, K., Riley, C. A., & Salazar, F. J. (2022). Necrobiosis Lipoidica. In StatPearls. StatPearls Publishing.
3. Magnusson S, Baldursson BT, Kjartansson H, Rolfsson O, Sigurjonsson GF. Regenerative and Antibacterial Properties of Acellular Fish Skin Grafts and Human Amnion/Chorion Membrane: Implications for Tissue Preservation in Combat Casualty Care. Mil Med. 2017 Mar;182(S1):383-388. doi: 10.7205/MILMED-D-16-00142. PMID: 28291503.
4. Yoon, J., Yoon, D., Lee, H., Lee, J., Ju, S., Kym, D., Yim, H., Hur, J., Chun, W., Kim, G., & Cho, Y. S. (2022). Wound healing ability of acellular fish skin and bovine collagen grafts for split-thickness donor sites in burn patients: Characterization of acellular grafts and clinical application. International journal of biological macromolecules, 205, 452–461. https://doi.org/10.1016/j.ijbiomac.2022.02.055