The Healing Power of Nature

SUCCESSFUL DIABETIC LIMB SALVAGE UTILIZING A NOVEL FISH-SKIN GRAFT* – A CASE REPORT

Mark Suski, MD, FACS
Los Robles Regional Medical Center, Department of Plastic Surgery, Thousand Oaks, CA

Kerecis®

PURPOSE

Total knee arthroplasty is associated with wound complications including dehiscence and surgical site infections (SSI)1. Metabolic disease and trauma augment post operative complications1,2. To avoid amputations in high-risk patient's health care providers have turned to advanced biologics. The purpose of this case study was to determine the effectiveness of novel fish skin graft (FSG) for the treatment of surgical dehiscence.

METHODS

The patient is a 65-year-old female with history of uncontrolled diabetes, obesity, and s/p right total knee arthroplasty. The patient sustained a mechanical fall resulting in ORIF of a right distal tib/fib fracture which resulted in surgical dehiscence. After 6 weeks of local wound care the patient presented with fever, chills, and purulent drainage from the site of her dehisced wound. The patient was admitted, and cultures of the infected wound showed Klebsiella and the patient was started on culture specific IV antibiotics. Wound exploration confirmed devitalized periosteum and areas of exposed bone confirming clinical diagnosis of osteomyelitis. The patient's orthopedic surgeon recommended above the knee amputation which was declined. Due to her uncontrolled diabetes the patient was not considered for free tissue transfer. Our initial surgical plan consisted of orthopedic removal of all internal hardware, placement of an external fixator device, and negative pressure wound therapy. Our secondary surgical plan included cultures and the application of FSG when the wound was devoid of colonization.

CASE 1
65-YEAR-OLD FEMALE TOTAL KNEE ARTHROPLASTY

Kerecis Applications Three total applications of fish skin graft

Patient Outcomes: Three applications of fish skin graft resulted in good healing progression with complete granulation tissue coverage over all exposed bone and periosteum at 40 days from first application to closure.

Post orthopedic debridement

First application of fish-skin graft

1 week after first application

2 weeks after first application

1 week after second application of fish-skin graft

1 week after third application of fish-skin graft

Post STSG placement

Long term follow up status post STSG

RESULTS

Once the soft tissue infection resolved, the intact fish skin graft was placed on the wound at bedside for 3 applications at 2-week intervals, resulting in complete granulation tissue coverage over all exposed bone and periosteum. After the external fixator was removed, reconstruction was completed with a staged split thickness skin graft. The patient is currently ambulatory and has maintained stable soft tissue coverage.

DISCUSSION

Readmission rates for lower extremity arthroplasty can be as high as 15% burdening surgeons and hospital resources while decreasing patient's quality of life[3]. Patients with underlying comorbidities and who have experienced a post-traumatic injury have an increased risk of wound complications. Advanced biologics can increase healing rates thus reducing a patient's length of stay which drains hospital resources. The FSG was a cost-effective and clinically relevant adjunctive treatment option for this patient. The suggested mechanisms of action include rapid cell ingrowth and neovascularization, low immunogenicity, and bacteriostatic properties of the FSG, all of which have previously been reported[4,5,6].

References:
1. Sershon, R. A., Tecle, N., Della Valle, C. J., Levine, B. R., Berger, R. A., & Nam, D. (2018). The Impact of an Acute, Traumatic Wound Dehiscence on Clinical Outcomes Following Primary Knee Arthroplasty. The Journal of arthroplasty, 33(8), 2613–2615.
2. Dasari, N., Jiang, A., Skochdopole, A., Chung, J., Reece, E. M., Vorstenbosch, J., & Winocour, S. (2021). Updates in Diabetic Wound Healing, Inflammation, and Scarring. Seminars in plastic surgery, 35(3), 153–158.
3. Phruetthiphat, O. A., Otero, J. E., Zampogna, B., Vasta, S., Gao, Y., & Callaghan, J. J. (2020). Predictors for readmission following primary total hip and total knee arthroplasty. Journal of orthopaedic surgery (Hong Kong), 28(3), 2309499020959160.
4. 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.
5. Stone R 2nd, Saathoff EC, Larson DA, Wall JT, Wienandt NA, Magnusson S, Kjartansson H, Natesan S, Christy RJ. Accelerated Wound Closure of Deep Partial Thickness Burns with Acellular Fish-Skin Graft. Int J Mol Sci. 2021 Feb 4;22(4):1590.
6. Baldursson BT, Kjartansson H, Konrádsdóttir F, Gudnason P, Sigurjonsson GF, Lund SH. Healing rate and autoimmune safety of full-thickness wounds treated with fish skin acellular dermal matrix versus porcine small-intestine submucosa: a noninferiority study. Int J Low Extrem Wounds. 2015 Mar;14(1):37-43.

*Kerecis™, Kerecis, Isafjordur, Iceland