Application of Intact Fish Skin Grafts* to Facilitate Healing of a Dysvascular Diabetic Ulcer of the Hand: A Case Study

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INTRODUCTION

Diabetic patients are more at risk for developing dysvasuclar ulcers due to poor blood perfusion leading to often painful and necrotic ulcerations (Bohnet et al., 2019). Typically, advanced technologies, including skin substitutes, are utilized to aid in the definitive closure of acute and chronic wounds. A novel skin substitute, fish skin, has emerged and has effectively healed acute wounds faster with improved functional outcomes (Baldursson et al., 2015 & Wallner et al., 2022). The primary purpose of this case series was to investigate fish skin graft (FSG) for the treatment of a hard-to-heal dysvascular ulceration.

METHODS

The patient is a 49-year-old male with a history of type 1 diabetes. He has a history of a below-knee amputation on the left and a transmetatarsal amputation of the right foot. Patient was initially consulted for the ulcer to the anterior aspect of the tibial tuberosity of each lower leg. These had developed as the patient found it necessary to crawl to get into the bathroom due to his living quarters..

The patient presented to the hospital on April 19,2023 for cellulitis of the right hand. He had burned the hand with hot water several weeks earlier. Subsequent developed infection to the right hand primarily affecting the lateral aspect including the 5th fin-ger Patient was admitted for IV antibiotic therapy, wound management and evaluation. Consultation was directed to the Wound Care Center for recommendations for the 5th finger and lateral aspect of the hand. Initial evaluation revealed that the 5th finger was ischemic with early gangrenous changes. The orthopedist was consulted at this time after cultures revealed Proteus mirabilis and methicillin-resistant Staph aureus.

Patient subsequently underwent amputation of the 5th finger,right hand on April 26, 2023. Treatment at that time also included partial resection of the 5th metacarpal. Necrotic tissue persisted to the wound with exposed 5th metacarpal. The patient was brought back to the OR and additional bone of the 5th metacarpal was resected. Treatment at that time also included application of fiagmented fish skin and Surgimend. Wound VAC therapy was performed following surgery. Additional micronized fish skin graft and Surgimend was applied 2 weeks later.

CASE: 49-YEAR-OLD MALE DIABETIC ULCERATION

Patient History: 49-year-old male with hx DM 1, underwent previous left BKA and TMA of the right foot.

Wound History: Patient presented after sustaining a burn two weeks earlier Pt was admitted for sepsis, UTI and abscess with cellulitis to the right hand.

Fish Skin Graft Applications: Two applications of fragmented fish skin graft and Surgimend in office and OR setting

Patient Outcomes: Good healing progression seen at 4 weeks post fish skin graft application and wound size and appearance improved at each follow up visit. Completely healed at 11 weeks after initial presentation

Final healing outcome



RESULTS

The patient was followed at the wound care center upon dischage. Wound Vac dressing changes were performed twice weekly until cellulitis developed to the fourth finger. The patient was transferred to a tertiary care hospital on May 26,2023. He was seen by the Orthopedic Hand Specialist, who indicated that the initial site with fish skin graft was healing without incident. Amputation of the fourth finger was required and a rotational skin flap wasperformed.

The patient was discharged two weeks later and returned for care at WCC. The wound sites were completely healed as identified on the final visit at 11 weeks.

CONCLUSIONS

This case represents the ability of a less than optimal wound environment to be well managed to support healing utilizing fish skin grafting when combined with proper debridement and vacuum assisted closure therapy.

The fragmented and intact fish skin is a homologous structure that maintains chemical and mechanical properties with the benefits of naturally occurring polyunsaturated fatty acids. These factors aided in the recruitment of new human skin cells and subsequently complete healing of the ulceration (Magnusson et al., 2017).

The right hand was dysvascular, however, this healed with repeat surgeries, including partial amputation of the fifth ray and the fourth finger; fish skin grafts, epeat Vera Flow and Wound Vac dressing changes; IVantibiotic therapy; and occupational therapy to prevent contracture of the remaining fingers. The patient is able to use his right hand for daily living tasks after preventing an amputation below the elbow which was initially recommended.



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