

Fish Skin Xenografts in the Management of Posterior Heel and Achilles Tendon Wounds

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Statement of Purpose

The aim of this study was to review a complicated non-healing surgical wound case treated with multiple modalities and ultimately going on to heal following application of fish skin xenograft.

Level of Study

Level IV, Case study

Introduction

Postoperative surgical wound dehiscence is something every surgeon will encounter during their career. There are a multitude of different techniques that one may pursue in order to achieve healing. Such techniques include routine local wound care, allografts, xenografts, and washout with delayed primary closure.

There are four main stages of wound healing which include hemostasis, inflammation, proliferation, and maturation. Chronic wounds will arrest in the inflammatory phase being unable to progress to the proliferative phase where new tissue is produced.

This case study focuses on a patient who underwent elective Haglund's resection with Achilles tendon debridement and repair with a foot and ankle specialist which resulted in a non-healing surgical wound. Under the care of the primary surgeon, diligent local wound care and application of an allograft was attempted with no success in improvement of wound. Patient ultimately had successful healing following debridement and multiple applications of a fish xenograft skin substitute.



Wound dehiscence following elective Haglund's resection and Achilles tendon debridement and repair

Methods

Patient presented with a posterior heel/Achilles tendon wound following posterior heel surgery. Wound was treated by the primary surgeon for 7 months. Wound care included serial debridements, wound care products such as silver and collagen, and allograft and xenograft applications. No improvement or healing during this time. Patient was referred to plastic surgery who recommend flap with external fixation. Patient deferred treatment by plastics and was referred to a different foot and ankle specialist. Patient presented with an initial wound measuring 2.5 cm x 1.5 cm x 1.0 cm with exposed Achilles tendon. The initial surgery performed was a wound debridement, graft application with bone biopsy and wound cultures obtained. Following stable wound confirmation, there were 2 applications of fish skin xenograft over the course of 6 weeks. Patient maintained offloading in CAM boot and had wound care with either non-adherent dry sterile dressing or betadine.

Results

Patient underwent surgical intervention with bone biopsy and wound cultures with application of primary fish skin xenograft. Pathology resulted negative for osteomyelitis. Bone and soft tissue cultures had no growth on gram stain, aerobic, and anaerobic cultures. Within the course of the next six weeks following surgery patient had 2 fish skin xenograft applications with approximately 3 weeks between each application. Granulation tissue over the exposed Achilles tendon was achieved after first application. Second application following primary application led to complete healing of the wound. Healing was achieved by day 68 from initial application. No recurrence of wound as of 8 months post procedure.



Posterior heel/Achilles wound: 3 weeks following primary application of fish skin xenograft. Prior to application number 2.



Prior to application number 2



Posterior heel/Achilles wound: Healed. 68 days following second application.

Discussion

While ultimately this patient went onto heal after two applications of fish skin xenograft, other factors besides the therapy applied to the non-healing wound should be taken into consideration. Important considerations include well balanced diet, glucose control in the diabetic population, offloading the wound properly, diligent local wound care, and adequate blood supply to the non-healing wound. A study in 2022 assessed wound healing in groups of rats with varying amounts of protein in their diet. They found that the group that received compound protein had faster rates of wound healing and higher rates of vascularization, collagen deposition, and epithelization noted on the pathology report.

In regards to blood flow, there is literature detailing the angiosomes of the posterior heel and Achilles area with recommendations on incision planning. It can be a difficult area to heal, and wound management is challenging if it occurs. Incisions are best placed between two well supplied angiosomes. Yepes et al concluded through their cadaveric study that a medial or lateral incision in posterior Achilles tendon surgery had a greater microvascular supply than a direct posterior incision.

Bruggeman et al has determined patients with no risk factors such as DM, smoking, and PAD had Achilles wound complications in 6.2% of patients studied while those with risk factors increased to 10.4%. Achilles procedures are prone to wound healing complications, so it remains important to have an arsenal of wound management options.

In this case study the patient went on to heal the chronic non-healing posterior Achilles tendon wound with two applications of fish skin xenograft. Fish skin xenograft may be a viable option for challenging Achilles wounds with exposed tendon. Further retrospective comparative studies will need to be completed and ultimately a prospective comparative while initial results are promising on case reviews.

References

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