Application of Human Reticular Acellular Dermal Matrix* and Dehydrated Human Amnion/Chorion Allograft** for Limb Salvage of Complex Heel Wounds with Osteomyelitis

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INTRODUCTION

Lower limb amputations secondary to chronic, non-healing ulcerations are understood to be associated with higher rates of morbidity and mortality. Specifically, plantar heel ulcerations with clinical osteomyelitis are often treated with partial calcanectomy or lower limb amputation, both of which have severe functional limitations that can result in further deterioration and morbidity/mortality of the affected patient. These cases examine the role of human reticular acellular dermal matrix (HR-ADM) and dehydrated human amnion/chorion allograft (dHACA) to treat complex heel wounds with osteomyelitis that would have otherwise been treated with lower limb amputations.

METHODS

Case 1 is a 42-year-old male who presented with an infected open wound of his right heel. Case 2 is a 43-year-old female who presented with an infected open wound of her left heel. In both cases, acute osteomyelitis of the calcaneus was confirmed. Initial treatment modalities included incision and drainage with extensive debridement to excise all necrotic, nonviable tissue and placement of antibiotic infused cement beads. When the infection cleared, a foot intrinsic muscle flap with application of HR-ADM was performed. There was follow-up at the wound care center for continued management with biweekly dHACA application until closure.

RESULTS

Full wound closure was achieved in both cases after application of HR-ADM and dHACA with no known recurrence (greater than 1.5 years in Case 1, 10 months in Case 2).

DISCUSSION

Plantar heel ulcerations with associated calcaneal osteomyelitis can be difficult cases to manage. Treatment options such as partial calcanectomies or lower limb amputations have both been documented to have severe functional limitations for affected patients. HR-ADM and dHACA are both effective modalities to assist wound closure in these complex cases.

- *AlloPatch® Pliable (MTF Biologics, Edison, NJ)
- **AmnioBand® Membrane (MTF Biologics, Edison, NJ)

CASE 1

Patient Information: 42 year old male, first met in July 2018, history of gun shot wound as a child with residual metallic fragments in spine resulting in residual unilateral cavus foot deformity with neuropathic ulcer to right plantar heel

Patient History/Initial Examination:

- . History of recurrent heel wound on/off 4 years, Neuropathy
- . October 2018, bone biopsy was negative of osteomyelitis, wound biopsy negative for malignancies, patient refused surgical intervention/care
- . Wound care center attempts Collagen dressings (Fibracol, Prisma), foam dressings (Hydrofera blue), Oral/topical antibiotics, total contact casting
- . March 2019, patient complained of pain and tenderness to the heel, which is abnormal given neuropathic history Wound bed found packed with copious amounts of Prisma collagen dressing; upon removal, significant undermining of wound with extensive track from heel wound into medial ankle observed

Treatment:

- . Radiographs/bone scan confirmed suspicion for osteomyelitis, patient unable to get MRI due to residual bullet fragment in spine
- . Patient admitted to the hospital, started on IV antibiotics; Plan for immediate surgical intervention
- Surgical plan debridement/irrigation and drainage, bone biopsy with antibiotic spacer/beads placement, application of offloading multiplanar fixation frame to prevent pathologic fracture of calcaneus
- Options discussed with patient- BKA (below knee amputation) vs attempted salvage; patient wished for salvage . Patient discharged from hospital with external fixator and antibiotic spacer; after 4 weeks repeat bone biopsies
- demonstrated negative residual osteomyelitis; plan for secondary staged salvage procedure
- . Plan for salvage Gastrocnemius recession, distal tibial BMA, reset osteomyelitic margins/deficit, cal x-sectional graft with BMA, P-B inner frame inside circ frame, axial k-wire across calc graft, Abd Minimi muscle flap, 4 cm x 4 cm HR-ADM placed over muscle flap

Outcomes:

- . Wound resolution at Week 9, subsequent removal of external fixators at Week 10 and Week 12
- No known recurrence since 2019



JULY 2018



ABX Spacer and Frame



MAR 2019 MAR 2019 Bone scan showing osteomyelitis

JUNE 2019



JUNE 2019

CASE 2

Patient Information: 43 year old female with history of bilateral heel wounds; left heel ulceration became acutely infected; patient was hospitalized with MRI findings consistent with acute osteomyelitis

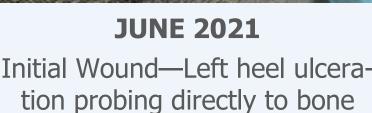
Patient History/Initial Examination:

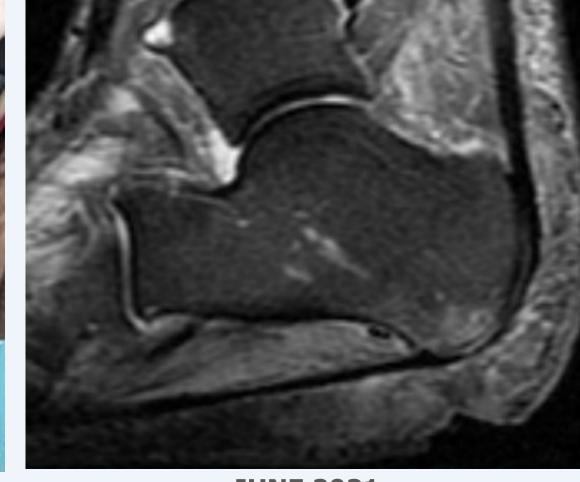
- . Neuropathy, Diabetes Mellitus Type II, Congestive heart failure, Hepatitis C, Chronic kidney disease, lymphedema
- . History of intravenous drug abuse

- . Patient admitted to the hospital, started on IV antibiotics. Plan for immediate surgical intervention
- . Staged surgical plan:
- . Stage 1- debridement/irrigation and drainage, bone biopsy with antibiotic spacer/beads placement
- . Stage 2 Antibiotic spacer/beads removal, switch to absorbable antibiotic spacer, application of offloading multiplanar fixation frame to prevent pathologic fracture of calcaneus, abductor digiti minimi muscle flap placement, 4 cm x 4 cm HR-ADM over muscle flap
- . Four applications of dHACA were placed over the plantar heel wound bed superficially 2 cm x 3 cm (x2), 2 cm x 2 cm (x2); Mepilex/Steristrips were used as dressings over the dHACA

- . External fixation removed at Week 6 due to frame complications; wound resolution at Week 17
- . No known recurrence







consistent with osteomyelitis



rated, dHACA applied



Week 8—dHACA re-application



AUG 2021 Week 9—Endoform dressings applied



SEP 2021 Week 12



OCT 2021 Week 15



OCT 2021 Week 17—Wound closed



8 Months post-closure— Wound remained closed