# Meshed Human Reticular Acellular Dermal Matrix for Wound Closure Over Bone: A Case Series

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## STATEMENT OF PURPOSE

To evaluate the use of a Human Reticular Acellular Dermal Matrix for assistance with wound closure over bone.

## LITERATURE REVIEW

Wound healing with exposed bone proves to be an obstacle in wound healing. Exposed structures such as tendon and bone make the development of granulation tissue very difficult. Sparse literature is out there to support granulation tissue development over bone with use of dermal substitutes. There is a case series with bilayer wound matrix with some efficacy of deep structure coverage [1]. There is little evidence in the literature to support the use of Human Reticular Acellular Dermal Matrix (HR-ADM) in coverage over deep structures such as bone and tendon. HR-ADM has been shown to lead to rapid re-epithelialization of wounds and serves as a dermal scaffold [2]. Most data in the literature is aimed at smaller case reports but no high level studies to support HR-ADM over deep structures [3].

## Introduction

Soft tissue deficits in the lower extremity with exposed bone in the setting of comorbidities such as peripheral vascular disease, diabetes, and infection lead to osteomyelitis, limb loss, decreased function and overall decreased quality of life. The importance of achieving granulation tissue and soft tissue coverage over bone becomes paramount in the wound healing process. Medical considerations such as optimized nutritional and vascular status should be performed in combination with the surgical debridement process. Surgical considerations to optimize success of grafting over bone in the lower extremity include adequate debridement, offloading, and reduction of shearing forces. There is a scarcity of evidence for use of dermal matrices for coverage over bone. The purpose of this study is to present our case series of utilizing HR-ADM to assist with bone coverage in the operative room setting.

## Materials and Methods

In this case series we present 10 patients who underwent amputation with exposed bone after the amputation. Meshed HR-ADM was then applied directly over bone and secured to the adjacent soft tissue with either absorbable sutures or staples. Negative pressure wound vac therapy (NPWT) was then utilized with a non adherent dressing for roughly 4 weeks at 120 mmHg and weekly wound vac changes. NPWT was discontinued when full incorporation of the HR-ADM was achieved and proceeded to use placental tissue graft every other week until complete wound healing. Patients were seen weekly in the wound care center and local wound care was performed with either collagen dressings or placental tissue applications every other week until wound closure.


Figures 1-3 from left to right; Fig 1 on initial presentation with prior incision and drainage; Fig 2 intra op post debridement with exposed bone; Fig 3 with application oh HR-ADM

## Results

10 patients who underwent initial amputation or debridement of bone with HR-ADM were included in this study with NPWT application. In our small case series, 100% of these patients had complete closure of the wound.

Figures 4 and 5 from left to right; Fig 4 healthy granulation tissue with bone coverage at 10 weeks, Fig 5 with complete epithelialization at 15 weeks

## ANALYSIS & DISCUSSION

Closure of post-surgical wounds post-amputation with exposed bone presents a major problem in regards to limb salvage. The longer wounds are left open, the higher chances of infection, but in patients that require amputation, the rate is significantly increased due to their underlying medical comorbidities. The results from this case series, provide evidence that HR-ADM applied over bone with NPWT supported wound closure. This was beneficial to prevent more proximal amputations and support limb salvage.

## REFERENCES

1.)Hughes LP, Forman S, Krieg JC, Hughes WB. The Use of Integra Dermal Regeneration Templates and Cortical Bone Fenestrations over Exposed Tibia. Plast Reconstr Surg Glob Open. 2021 Feb 1;9(2):e3340. doi: 10.1097/GOX.0000000000003340. PMID: 33680636; PMCID: PMC7928537.

2) Dolivo D, Xie P, Hou C, Li Y, Phipps A, Mustoe T, Hong S, Galiano R. Application of decellularized human reticular allograft dermal matrix promotes rapid re-epithelialization in a diabetic murine excisional wound model. Cytotherapy. 2021 Aug;23(8):672-676. doi: 10.1016/j.jcyt.2020.11.009. Epub 2021 Jan 8. PMID: 33423866.

3) Wilson TC, Wilson JA, Crim B, Lowery NJ. The Use of Cryopreserved Human Skin Allograft for the Treatment of Wounds With Exposed Muscle, Tendon, and Bone. Wounds. 2016 Apr;28(4):119-25. PMID: 27071139.