Treatment of Complex Posttraumatic Wounds Without Free Flap Coverage: Are Stem Cells the Orthopaedic Surgeon's New Free Flap?

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Background/Purpose: Free flap coverage is often the treatment of choice for complex posttraumatic orthopaedic wounds. Exposed hardware, bone, and tendon can further complicate the ability to achieve competent and timely wound coverage especially in a compromised host. Patients with multiple medical comorbidities are noted poor flap candidates with high rates of flap failure and complications. The purpose of this study reviewed the results of treatment using a porcine extracellular matrix to achieve stable/durable wound coverage for patients presenting with complex posttraumatic wounds that were deemed poor free flap candidates.

Methods: We prospectively applied Extracellular Matrix MatriStem (ACell) to complex posttraumatic orthopaedic lower extremity wounds. This xenograft extracellular matrix is applied as a powder or single or multilayer sheet formulations that is placed directly into the open wounds. Inclusion criteria included patients with complex lower extremity wounds as a result of trauma/surgical intervention. All wounds potentially required free flap coverage but were deemed poor free flap candidates by the consulting plastic surgery service. Conditions precluding flaps included obesity (body mass index >35 kg/m^2), prior leg trauma with inadequate vasculature, severe venous stasis disease, vascular occlusive disease, uncontrolled diabetes, renal dialysis, uncontrolled wound infection, recent myocardial infarction and other chronic medical comorbidities. MatriStem was applied following serial debridements to achieve a stable wound. Exposed hardware, tendon or bone was *not* routinely removed unless grossly infected. Following application, wounds were sealed with occlusive dressings to maintain local biology. Dressings were changed at weekly intervals until regenerate tissue was present. Time to complete wound and skeletal healing was noted. Residual infection, secondary procedures, and functional outcomes were recorded.

Results: 55 patients were treated with the material overall including 15 with orthopaedic conditions. Of these patients screened, and material applied, 12 patients had adequate follow-up for review (>1 year). Pathology consisted of ankle/pilon fractures (4), open tibial shaft fractures (4), and Achilles tendon repair (4). Six patients required secondary application, but all wounds healed with durable wound coverage, (average 14 weeks) with no additional intervention other than split-thickness skin graft (6 patients). All patients healed their orthopaedic pathology without residual infection. Five of 6 patients presenting with retained hardware had total wound healing with hardware in place. The remaining patient achieved subtotal coverage over a large plate that was subsequently removed following fracture healing, allowing complete healing.

Conclusion: With this early experience, we advocate this material for complex orthopaedic wounds in patients that are not flap candidates, even in patients with exposed hardware provided the wound is not grossly infected. This material facilitates closure with simple dressings and avoids the need for advanced plastic surgical wound closure techniques or prolonged negative pressure wound therapy.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.