Comparing Radiographic Progression of Bone Healing in Gustilo Anderson IIIB Open Tibial Fractures Treated With Muscle Versus Fasciocutaneous Flaps
Devan Mehta, BA; Salma Abdou, BA; Toni McLaurin, MD; Nirmal Tejwani, MD; John Stranix, MD; Vishal Thanik, MD; Philipp Leucht, MD

Purpose: In Gustilo Anderson IIIB (GA3B) tibial fractures, soft-tissue coverage with muscle or fasciocutaneous (FC) flaps is essential. Animal models suggest faster callus formation and higher bone mineral density under muscle flaps, but there are no analogous clinical data comparing the bone regenerative milieu generated by each flap. The purpose of this study is to compare muscle versus FC flaps for the treatment of GA3B tibial fractures with the primary outcome of radiographic union.

Methods: We identified patients with GA3B tibial fractures at our institution that received muscle or FC flaps and had primary radiographic follow-up for at least 6 months. The radiographs of each patient were reviewed by a single, blinded author and assigned a Radiographic Union Score for Tibial (RUST) fractures. Number of patients reaching bony union (RUST ≥10) as well as mean RUST scores in each group were compared at time of injury, 3 months, 6 months, and 12 months from the original fracture date.

Results: 39 patients (40 lower extremities) met our inclusion criteria. 12 injuries received FC flaps (30%) and 28 injuries received muscle flaps (70%). There was a significant difference (P = 0.026) in the mean RUST score at 6 months between the muscle group (8.54 ± 1.81) and the FC group (6.92 ± 2.46). There was no significant difference in the mean RUST score at 3 months (P = 0.056) and at 12 months (P = 0.947) between the 2 groups. There was also significance in the number of fractures reaching union, favoring muscle flaps, at 6 months (P = 0.020).

Conclusion: Traditional teaching supports muscle flaps as the superior tissue of choice in providing vascularity and mesenchymal stem cells to healing bone. This data demonstrates that while patients with GA3B fractures who received muscle flaps have faster radiographic progression of bone healing in the first 6 months than patients who received FC flaps, ultimately, the difference in bone healing at 12 months is not statistically significant. This may suggest that muscle flaps have more of a positive impact on the earlier stages of fracture healing. Whether these data correlate to differences in bone quality is a subject for further research.