

Soft Tissue Healing in Type II and IIIa Tibial Fractures: A Retrospective, Multi-Institutional Comparison of Factors Affecting Bony Union

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Purpose: Open tibia fractures are challenging orthopaedic injuries considering their high risk of infection and nonunion. Past research has focused on Gustilo-Anderson type IIIB injuries with studies showing that more aggressive initial soft-tissue reconstruction with free tissue transfer leads to shorter time to soft-tissue healing and bony union. We hypothesize that more rapid soft-tissue healing among Gustilo-Anderson type II and IIIA tibia fractures is associated with shorter time to union.

Methods: We conducted a multicenter retrospective review of type II and IIIA open tibial shaft and plafond fractures. Chart review identified patient baseline demographics, comorbidities, injury severity, and surgical outcome data. The primary analysis used Cox proportional-hazards models to assess the association between time to soft-tissue healing and the hazard of achieving bony union.

Results: Overall, 144 patients were identified and 105 completed follow up and were included in our survival analysis. Bony union was achieved in 92 (87.6%) patients while 13 (12.4%) experienced nonunion. Patients with nonunion were more likely to have a larger area soft-tissue defect ($p = 0.018$) and experience deep-space infection ($p < 0.001$). The hazard of achieving bony union with complete soft-tissue healing at 90, 120, 180, and 360 days was 96%, 81%, 67%, and 24%, respectively.

Conclusion: Delayed soft-tissue healing and increased soft-tissue injury severity are associated with increased risk of nonunion in open tibia fractures. Our results support more aggressive soft-tissue coverage in certain fractures, likely resulting in increased recategorization of IIIA fractures as IIIB following free tissue transfer.