

Surprise IIIB Open Tibia Fractures: Can We Predict Wound Healing Failures in Primary Closure of Open Tibia Fractures?

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Purpose: Despite appearing amenable to primary closure at definitive fixation, Gustilo-Anderson (GA) type I–IIIA injuries may result in wound healing failure requiring a subsequent rotational or free flap. The purpose of this study is to investigate the rate and characteristics of GA type I–IIIA tibia fractures requiring soft-tissue coverage in a delayed fashion secondary to wound healing complications.

Methods: A retrospective review of patients age 18 years and older with open tibia fractures (AO/OTA 41A-C, 42A-C, and 43A-C) was conducted at an academic Level I trauma center from 2013 to 2023. Patients initially treated at another facility and those with less than 3 months of follow up were excluded. Patient demographics, injury characteristics, and medical and surgical treatments were recorded. The primary outcome of interest was the rate of conversion from GA types I–IIIA to IIIB postoperatively.

Results: A total of 258 patients with open tibia fractures was included, 186 (72%) were male, and the average age was 44.8 years (range 18–88). 31 patients were initially type IIIB or IIIC, and therefore were ineligible for conversion. Of the remaining 227 patients, 37 (16.3%) were ultimately converted to a IIIB. 22 (60%) of conversions occurred in AO/OTA 42 injuries; 12 (32%) occurred in AO/OTA 43 injuries. 21 (57%) conversions occurred in AO/OTA C type fractures (41C:2, 42C:10, 43C:9); 23 (62%) conversions were GA type IIIA, and 10 (27%) were GA type II. Increased age was a risk factor for conversion to a IIIB (average 44.1 years vs 49.1 years, $p = 0.018$). Polytrauma status, AO/OTA 43B injuries, and Gustilo-Anderson type approached significance ($p = 0.053$, 0.058 , and 0.056 respectively). No relationship between type of antibiotic administered and conversion risk was identified ($p > 0.24$ for all). No medical comorbidities (diabetes, chronic kidney disease, organ transplant, inflammatory arthropathy) or social factors (alcohol abuse, drug use, tobacco abuse) were identified as risk factors ($p > 0.35$ for all).

Conclusion: Flap coverage because of wound healing failure was ultimately required in 16.3% of open tibia fractures primarily closed at definitive fixation. Further work to develop predictive risk algorithms and mitigation strategies is warranted.