

Type III Open Diaphyseal Tibia Fractures Treated with Single-Stage Immediate Intramedullary Nailing and Primary Closure Yield Low Rates of Flap Coverage

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Purpose: Type III open diaphyseal tibia fractures are associated with significant soft-tissue injury as a result of high-energy trauma. Staged fixation with delayed closure remains common practice due to concern for soft-tissue complications and infection. We hypothesize that type III open high-energy diaphyseal tibia fractures treated with immediate intramedullary nailing and primary closure yield low rates of flap coverage.

Methods: All type III open tibia (OTA 42/43) fractures treated at a single Level I academic trauma center between 2010 and 2020 were queried from a prospective database. The Gustilo-Anderson classification was noted in the index operative report. It is standard practice at this regional referral center to prioritize attempted primary closure of all open fractures without plastic surgery comanagement at the initial debridement using meticulous soft-tissue handling and the modified Allgower Donati suture technique for skin. Included patients sustained high-energy injuries and underwent intramedullary nailing at the initial surgery with at least 3 months of in-person postoperative follow-up. Patients with type IIIB and C injuries were excluded. Secondary procedures for soft-tissue coverage were tabulated as the primary outcome. Descriptive statistics are performed.

Results: There were 255 patients identified (73% type IIIA, 22% type IIIB, 7% type IIIC). A total of 107 patients met inclusion criteria. Average age was 40 years (range, 18-91). There were 28 female patients (26%). A total of 70 patients (65%) sustained polytrauma, 6 patients (6%) had diabetes mellitus, and 31 patients (29%) endorsed active tobacco use. The median follow-up was 10 months (range, 3-125). There were 95 of 107 patients (89%) who healed their soft-tissue envelope uneventfully. Among the patients who failed primary closure, five patients required free tissue transfers, five required local rotational flaps, and two underwent split-thickness skin grafting only.

Conclusion: The results of this study support our hypothesis that immediate intramedullary nailing and primary closure of high-energy type III open diaphyseal tibia fractures yields low rates of flap coverage. The vast majority of primarily closed wounds healed uneventfully. We recommend stable intramedullary fixation and meticulous soft-tissue closure when possible at the index procedure.