

Open Tibia Fractures: So You Think the Wound Is Healed? Not So Fast*Abhishek Ganta, MD; Sara Jo Solasz, BA; Garrett Esper, BA; Kenneth A. Egol, MD;**Sanjit R. Konda MD**NYU Langone Health, New York, New York, UNITED STATES*

Purpose: Our objective was to investigate factors associated with the need for delayed soft-tissue coverage following open tibial shaft fractures.

Methods: A consecutive series of patients who presented to a single Level I trauma center with an open tibial shaft fracture were identified over a 2-year period. Included patients underwent primary closure of their open wound at index hospitalization and were discharged home. Delayed soft-tissue procedure was defined as requiring skin graft, artificial collagen matrix, rotational flap, free flap, or nonreconstructable defect requiring amputation following index hospitalization. Recorded variables included: demographic characteristics, Gustilo-Anderson classification, open wound location, fracture pattern, development of wound complications, need for reoperation, soft-tissue procedures, and intraoperative culture results. Univariate analysis was performed to evaluate differences between patients that required delayed soft-tissue coverage and those that did not. Significant factors were included in a binomial logistic regression analysis to model factors that were independently associated with need for delayed soft-tissue coverage. All data analyses were calculated using IBM SPSS Statistics Software Version 25.0.

Results: 35 patients with mean age 40.3 ± 14.5 years were included for study analysis. There were 3 (8.6%) type 1, 7 (20.0%) type 2, and 25 (71.4%) type 3 open fractures. Delayed soft-tissue coverage procedures were required for 10 patients (28.6%) and included 3 (30.0%) skin grafts, 1 (10.0%) collagen matrix, 1 (10.0%) rotational flap, 2 (20.0%) free flaps, and 3 (30.0%) amputations. Univariate analysis revealed that delayed soft-tissue coverage was associated with development of eschar ($P = 0.007$), presence of wound drainage ($P = 0.002$), need for reoperation ($P < 0.005$), and positive wound culture ($P = 0.001$). Multivariate analysis revealed that all 4 factors had heterogeneity and were predictive of requiring a delayed soft-tissue procedure. Patients who developed an eschar were 3.9 times more likely to require delayed soft-tissue coverage. In addition, patients with grade III open fractures were 2.9 times more likely and those with positive cultures were 2.7 times more likely to undergo delayed soft-tissue coverage. Patients who met all 4 criteria had a positive predictive value of 97.1% to require a delayed soft-tissue coverage procedure.

Conclusion: Patients with the constellation of factors of increasing severity open fracture type, development of an eschar and wound drainage from open wound site, and positive intraoperative cultures after index hospitalization are at high risk for requiring delayed soft-tissue coverage procedures. This information can be used to counsel patients and inform decision-making.