Soft-Tissue Coverage Before 12 Days Prevents Fracture-Related Infection in IIIB Open Tibial Fractures

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Purpose: Tibial fractures pose an increased risk of fracture-related infection (FRI) due to the high incidence of open injuries and tenuous soft-tissue coverage. Fractures requiring flaps for adequate coverage, Gustilo-Anderson IIIB (GA3B), are associated with the highest infection risk. While an orthoplastic approach has been shown to decrease infection risk, prompt availability of specialized coverage varies across trauma centers. This study aims to assess whether the timing of flap intervention correlates with infection risk, and whether there is a specific time frame to accomplish this.

Methods: A single-center retrospective cohort study was conducted between January 2012 and July 2023. The analysis included patients with GA3B open tibial fractures. Variance homogeneity for the time to flap coverage was evaluated using the variance homogeneity test. The correlation between the time to flap and FRI was assessed using the Student T test. The receiver operating characteristic (ROC) curve and Youden index were employed to identify which is the time interval to definitive coverage with the lowest infection risk.

Results: Out of 803 patients with tibial fractures, 332 (41%) had open fractures, and 75 (9.3%) were classified as GA3B open fractures. 21 patients (28.4%) had FRI. Variance heterogeneity was determined, and the Student's t- test found a statistically significant correlation between time to coverage and FRI risk (P = 0.001). The area under the ROC curve was 0.83 (good), and the cutoff value to predict FRI, according to the Youden index, is less than 12 days (sensitivity of 100% and specificity of 34.6%).

Conclusion: Fracture-related infection in GA3B open tibial fractures is influenced by various factors, with the timing of flap coverage emerging as a crucial contributor. Ideally, initiating flap coverage on the same day as the injury, alongside fracture fixation, is recommended. The data in this series, reflecting our orthoplastic reality, affirm a correlation between timely flap intervention and infection risk. Statistical analysis indicates that achieving flap coverage within 12 days is pivotal, making it an integral element of a standardized protocol involving antibiotic prophylaxis, surgical debridement, and fracture stabilization.