

Postoperative Outcomes Based on Timing of Fixation and Flap Coverage in Gustilo-Anderson 3B Tibia Fractures

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Purpose: The management of Gustilo 3B open tibia fractures remains problematic with high complication rates. Controversy persists about coverage timing, and whether the clock starts at time of injury or definitive fixation. We retrospectively reviewed postoperative outcomes of 3B open tibia fractures and the effect of fixation and flap timing.

Methods: The PearlDiver database identified 1066 Gustilo 3B tibia fractures with flap coverage within 45 days of fixation (2009-2021). Fixation within 3 days of injury was classified as prompt. The remaining fixations were designated as delayed. Flap coverage within 3 days of fixation was considered prompt. Coverage after this was considered delayed. We evaluated for complications and return to operating room. Separately, we stratified patients by days to definitive fixation or days to soft-tissue flap coverage, irrespective to the other. We compared 1-year complication incidence using linear regression analysis.

Results: 252 patients (23.6%) received prompt fixation and prompt flap. 519 (48.7%) received prompt fixation and delayed flap. 271 (25.4%) underwent both delayed fixation and flap while only 24 (2.3%) received prompt flap following a delay in fixation. Patients with delayed flap had higher reoperation rates within 90 days, irrespective of fixation timing (odds ratio [OR] 2.20, $P < 0.0001$). Prompt fixation/delayed flap patients had fewer complications than those with delayed fixation/delayed flap. Surgical site infection (SSI) and wound disruption (WD) were elevated with delayed fixation compared to the prompt fixation cohort (OR 1.65, $P = 0.0097$; OR 1.76, $P = 0.0032$). By linear regression analysis, SSI, WD, and reoperation incidence increased by 0.53% ($P < 0.0001$), 0.84% ($P < 0.0001$), and 0.63% ($P = 0.0009$), respectively, with each day between fixation and soft-tissue flap coverage. Days from injury to fixation was significant for increased WD incidence (0.38%, $P = 0.03$).

Conclusion: Early flaps were associated with fewer complications. Very few patients with delayed fixation received prompt flap coverage. Prior research suggested that delayed fixation had few consequences when followed by prompt flap coverage. However, this appears to be rare in practice. Our findings suggest that this approach is associated with increased WD. Prompt multidisciplinary orthoplastic management of Gustilo 3B tibia fractures is crucial to achieve optimal outcomes in these injuries.