

Single Stage “Fix and Flap” Orthoplastic Approach to Severe Open Tibial Fractures: A Systematic Review of the Outcomes

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Abstract : Gustilo-anderson grade III tibial fractures are exquisitely difficult injuries to manage as they require extensive soft tissue repair in addition to fracture fixation. These injuries are best managed collaboratively by Orthopedic and Plastic surgeons. While utilizing an Orthoplastics approach has decreased the rates of adverse outcomes in these injuries, there is a large amount of variation in exactly how an Orthoplastics team approaches complex cases such as these. It is sometimes recommended that definitive bone fixation and soft tissue coverage be completed simultaneously in a single-stage manner, but there is a paucity of large scale studies to provide evidence to support this recommendation. It is the aim of this study to report the outcomes of a single-stage "fix-and-flap" approach through a systematic review of the available literature. Hopefully, this better informs an evidence-based Orthoplastics approach to managing open tibial fractures. Systematic review of the literature was performed. Medline and Google Scholar were used and all studies published since 2000, in English were included. 103 studies were initially evaluated for inclusion. Reference lists of all included studies were also examined for potentially eligible studies. Gustilo grade III tibial shaft fractures in adults that were managed with a single-stage Orthoplastics approach were identified and evaluated with regard to outcomes of interest. Exclusion criteria included studies with patients <16 years old, case studies, systemic reviews, meta-analyses. Primary outcomes of interest were the rates of deep infections and rates of limb salvage. Secondary outcomes of interest included time to bone union, rates of non-union, and rates of re-operation. 15 studies were eligible. 11 of these studies reported rates of deep infection as an outcome, with rates ranging from 0.98%-20%. The pooled rate between studies was 7.34%. 7 studies reported rates of limb salvage with a range of 96.25%-100%. The pooled rate of the associated studies was 97.8%. 6 reported rates of non-union with a range of 0%-14%, a pooled rate of 6.6%. 6 reported time to bone union with a range of 24 to 40.3 weeks and a pooled average time of 34.2 weeks, and 4 reported rates of reoperation ranging from 7%-55%, with a pooled rate of 31.1%. A few studies that compared a single stage to a multi stage approach side-by-side unanimously favored the single stage approach. Outcomes of Gustilo grade III open tibial fractures utilizing an Orthoplastics approach that is specifically done in a single-stage produce low rates of adverse outcomes. Large scale studies of Orthoplastic collaboration that were not completed in strictly a single stage, or were completed in multiple stages, have not reported as favorable outcomes. We recommend that not only should Orthopedic surgeons and Plastic surgeons collaborate in the management of severe open tibial fracture, but they should plan to undergo definitive fixation and coverage in a single-stage for improved outcomes.

Keywords : orthoplastic, gustilo grade iii, single-stage, trauma, systematic review

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