Orthoplastic Reconstruction of Grade IIIB Open Tibial Fractures Using Devitalized Cortical Segments: The Bristol Experience 2014-2018

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Purpose: Type IIIB open tibial fractures are devastating high-energy injuries requiring joint decision-making between orthopaedic and plastic surgeons. At initial debridement, the surgeon will often be faced with large bone fragments with tenuous if any soft-tissue attachments, with convention being that these are discarded to avoid infection. We aimed to determine if orthoplastic reconstruction using mechanically relevant devitalized bone (ORDB) was associated with an increased infection rate in type IIIB open tibial shaft fractures.

Methods: This was a retrospective comparative cohort study of 113 patients, over a 4-year period in a Level- Itrauma center. The primary outcome measure was deep infection rate and the number of operations. The secondary outcomes were nonunion, infection associated flap failure, isolated flap failure, and overall complication rate. A binary logistic regression model was utilized for primary and secondary outcomes. We assumed a priori that P values of less than 0.05 were significant.

Results: Median age was 42.9 years (interquartile range [IQR] 37) with a median follow-up of 1.7 years (IQR 0.9). 44 patients had ORDB as part of their reconstruction, with the remaining 69 not requiring this. Eight patients (8/113, 7.1%) developed a deep infection (ORDB 1/44, non-ORDB 7/69). This was not significant (P = 0.119). The median number of operations was 2. 16 operations (16/223, 7.2%) were reoperations as a result of complications. Two of these operations (2/16, 12.5%) were in patients who underwent ORDB. There was no association between reoperation and ORDB (P = 0.389). There was no significant difference in secondary outcomes between groups.

Conclusion: The data published in this study suggest that mechanically relevant devitalized bone fragments can safely be used in the definitive reconstruction of these injuries when this is undertaken in a single sitting as part of an effective orthoplastic approach.