

Treatment of FRI after intramedullary nailing of tibia fractures: assessment of nail retention and nail removal

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Objectives: Fracture related infection (FRI) is a severe, potentially limb-threatening complication after fracture fixation. Dilemma exists with regard to removing or retaining implants while treating the infection. The purpose of this study was to compare primary bone union and infection clearance in patients who had an infection following intramedullary nailing of the tibia treated either by retaining the implant or by removing the implant.

Methods: Patients from two level-I trauma centers were identified through billing registries and retrospectively reviewed between January 2013 and December 2020. We identified 44 patients who had a diagnosis of FRI within 90 days of their initial fixation and returned to the OR for operative treatment of the infection. The incidences of both primary union and infection clearance were calculated for both groups and multiple parameters that may be associated with success or failure were assessed.

Results: Four patients did not have complete records and were excluded. Of the remaining patients, 20 (50%) achieved infection clearance. Twenty-three (59%) patients achieved primary union whereas 16 (41%) had a primary outcome of either delayed union, nonunion, or amputation (one additional patient excluded as healing status unknown). Further analysis showed no significant difference ($X^2(39) = 1.13, p < .29$) in infection clearance between patients treated with nail retention (64%) versus nail removal (68%). No significant difference was seen in primary bone union ($X^2(39) = 3.24, p < .07$) with 36% of patients treated with nail retention and 68% of patients treated with nail removal reaching primary union; however, this does trend toward an association. Fewer surgeries performed for infection and complication after initial fixation was positively associated with infection clearance ($p < .04, M=4.6, SD=2.13, df=39$) and primary union ($p < .001, M=4, SD=2, df=38$).

Conclusion: Infection clearance seems similarly possible with both nail retention and nail removal strategies, with fewer number of surgeries performed for infection and complication improving the likelihood of infection clearance and bone union. This may suggest that more severe FRI's are less likely to unite and clear infection. Nail removal may play a role in increasing primary bone union; however, a larger sample size is needed for more definitive assessment.