

Quantitative Difference in Embolic Load Between Femoral and Tibial Shaft Fractures Treated with Reamed Intramedullary Nail Fixation

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Purpose: Intramedullary nail (IMN) fixation of femoral and tibial shaft fractures is considered the standard of care in adults. However, few studies have compared the quantitative difference in embolic load between femoral and tibial shafts undergoing definitive fixation. The purpose of this study was to compare the volume of embolic load during IMN fixation of femoral and tibial shaft fractures.

Methods: This prospective study enrolled patients treated for isolated femoral and tibial shaft fractures with IMNs. All patients underwent continuous transesophageal echocardiography intraoperatively, and embolic load was measured during 5 stages: preoperative, initial guidewire, reaming, nail insertion, and postoperative. A mixed effects model was used to compare embolic load across these stages and between femurs and tibias.

Results: 19 patients (11 femur, 8 tibia) with a mean age of 43 years (range, 18-71) were enrolled. In both groups, reaming was associated with a significant increase in embolic load when compared to preoperative measures (mean difference: 6.9, 95% confidence interval [CI]: 3.9-15.9, $P < 0.01$) (Fig. 1). Similarly, embolic load was higher during nail insertion (mean difference: 3.1, 95% CI: -0.17 to 6.3, $P = 0.06$). There was no observed difference when preoperative values were compared to guidewire insertion (mean difference: -2.2, 95% CI: -5.5 to 1.0, $P = 0.18$) or postoperatively (mean difference: -2.8, 95% CI: -6.8 to 1.2, $P = 0.17$). The mean point estimate for embolic load was higher in femur patients than tibia patients (mean difference: 2.5, 95% CI: -1.0 to 6.0, $P = 0.15$), although this was not statistically significant.

Conclusion: Fat emboli and their resulting sequelae are well-recognized complications associated with IMN fixation. The results of this study challenge prior evidence that peak showers occur during initial cannulation of the intramedullary canal, and suggest greater embolic load with fixation of femoral shaft fractures in comparison to tibial shaft fractures.

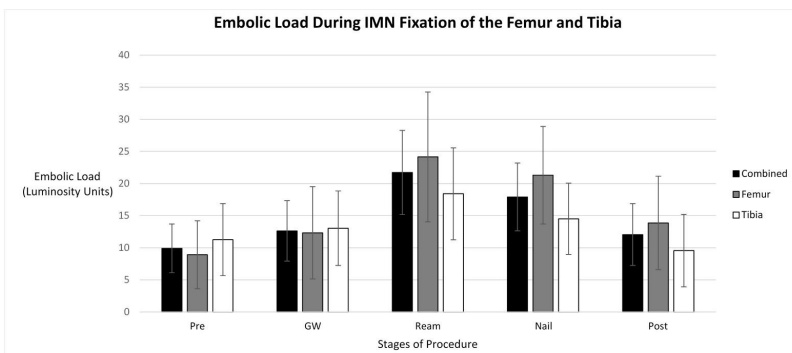


Figure 1. The comparison of embolic load (Luminosity Units) preoperatively (Pre), during guidewire insertion (GW), reaming (Ream), nail insertion (Nail), and postoperatively (Post) during intramedullary nailing of the femur or tibia.

* signifies $p < 0.05$

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.