Does Intramedullary Nail Fixation of the Tibia Pose the Same Risk of Pulmonary Complications as It Does in the Femur? A Propensity Score-Weighted Analysis of 1541 Fractures

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Purpose: A subset of polytrauma patients with femoral shaft fractures are thought to be at risk for poor pulmonary outcomes with initial intramedullary nailing (IMN) and are thus treated initially with "damage control". This concern does not exist for the tibia despite data demonstrating that IMN of the tibia also intravasates marrow that makes its way to the lungs. The aim of this study was to compare the differences in the duration of mechanical ventilation between femur and tibia factures treated with IMN. The secondary aim was to compare differences in the risk of pulmonary complications between the 2 fracture locations.

Methods: This retrospective cohort study was performed at a single Level-I trauma center. Our registry was queried for patients who had undergone IMN of tibial or femoral shaft fractures between January 2008 and September 2014. Those with concomitant tibial and femoral shaft fractures were excluded. Patient demographics and admission data, including ISS, were collected. Ventilator days was the primary outcome. ICU days, tracheostomy, pulmonary embolism (PE), acute respiratory distress syndrome (ARDS), and mortality were secondary outcomes. Propensity score weighting was used to balance baseline covariates for an adjusted analysis. A subgroup analysis included only patients with an ISS >17. A total of 1541 fractures were included (699 tibia and 842 femur). The femur cohort had a lower proportion of male patients, a higher median ISS (14 vs 10; P <0.001), and a greater proportion with a thoracic abbreviated injury scale (AIS) >2 (36% vs 25%; P <0.001) compared to the tibia. There was no difference in age. The subgroup of patients with an ISS >17 included 577 patients (219 tibias and 358 femurs).

Results: In the unadjusted analysis, femur fractures had an increase in ventilator days (1.4 days; P <0.001), ICU days (1.8 days; P <0.001), and tracheostomy (odds ratio [OR]: 1.7; P <0.01). There was no difference in the rate of PE, ARDS, or mortality (OR: 1.2, 1.6, and 1.2; P >0.2). In the propensity score-adjusted estimates, there were no differences in any of the measured outcomes (P >0.40). In polytrauma patients we found no difference in the length of ventilator or ICU days, or the risk of tracheostomy, PE, ARDS, or mortality in the unadjusted (P >0.2) or propensity score-weighted estimates (P >0.3).

Conclusion: The findings are surprising and suggest that IMN fixation of the tibia in polytrauma patients may have a similar increased risk of poor pulmonary outcomes as femoral nailing, after adjustment for important covariates linked to poor pulmonary outcomes. Clinicians should consider that tibial nailing may also have vital consequences on lung function and future clinical study is needed to further verify this hypothesis.

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