

Rate of Refracture Following Removal of Hardware in Pediatric Femur Fractures*Jeremy Siu, BS; Chloe Chan; Ishaan Swarup, MD; Coleen S. Sabatini, MD*

Purpose: Both flexible intramedullary nails (FINs) and plate osteosynthesis are commonly used for treatment of femoral shaft fractures in pediatric patients. The purpose of this study is to determine the refracture rate following hardware removal in pediatric femur fractures.

Methods: This is a retrospective cohort study that utilized the Pediatric Health Information System (PHIS) database to determine the number of pediatric patients ages 4-10 years who underwent surgical fixation of a femur fracture and subsequent hardware removal between the years 2015 and 2019. All patients had a minimum 2-year follow-up to assess for refracture. Patients with metabolic bone disease, neuromuscular conditions, bone fragility disorders, nutritional deficiencies, and pathologic fractures were excluded.

Results: 2805 pediatric patients with 2881 femoral shaft fractures that underwent FIN fixation (48.4%), plate fixation (36.1%), splinting / casting (14.9%), or external fixation (0.6%) were included. Mean age of patients at index fracture was 7.2 years (standard deviation [SD], 2.1) and 69% were male. 880 patients (60%) in the FIN group had their hardware removed compared to 693 patients (68%) in the plate fixation group ($P = 0.07$), at an average of 287 ± 191 days vs 320 ± 203 days ($P = 0.03$). Refracture occurred in 13 patients (1.5%) who had their hardware retained and in 21 patients (1.4%) who had their hardware removed ($P = 0.732$). Among 65% of patients who underwent hardware removal, refracture occurred in 7 FIN patients (0.8%) and 14 plate fixation patients (2.2%) ($P = 0.04$). Refracture occurred within 365 days from hardware removal in 1 FIN patient (0.1%) and 7 plate fixation patients (1%) ($P = 0.01$). In logistic regression, patients with FIN fixation had lower odds of refracture following hardware removal compared to plate fixation (adjusted odds ratio, 0.39; 95% confidence interval, 0.15-0.97). Age and payor status did not reach statistical significance in multivariate analysis.

Conclusion: The rate of refracture after hardware removal for pediatric patients with a femoral shaft fracture was similar between patients with hardware retained and removed. However, patients with FIN fixation had a lower rate of refracture following hardware removal compared to plate fixation. This information can be helpful for advising families regarding risks of refracture following hardware removal.