

Examining Distal Interlocking Screw Loosening in Femoral Intramedullary Nails

Sarah Wegman, BA¹, Hashim Shaikh, MD¹, James Brodell, MD¹, Thomas Rodenhouse, MD¹, Noah Joseph, MD¹

¹University of Rochester Department of Orthopaedics, Rochester, NY
Sarah_wegman@urmc.rochester.edu

Disclosures: None

INTRODUCTION: The purpose of this study is to identify risk factors associated with the loosening of distal femoral interlock screws in patients who underwent intramedullary femoral nail fixation, ultimately resulting in the removal of hardware (ROH).

METHODS: A retrospective analysis using current procedural terminology codes identified patients undergoing femoral nail fixation (antegrade or retrograde) at our level I tertiary center from January 1, 2015, to September 1, 2023. Demographic and surgical characteristics were collected to assess for differences between two groups: those requiring a subsequent procedure for ROH secondary to distal interlock screw loosening ("ROH Group"), compared to those who did not demonstrate distal interlock screw loosening ("Non-ROH Group"). Measurements were performed from the apex of Blumensaat's line to the distal femoral interlock and to the most distal aspect of the nail. The P-value was set at a significance level of $p < 0.05$.

RESULTS: A total of 309 patients (174 male, 135 female) who underwent 319 primary intramedullary femoral nail fixations were included for final analysis. There were 36 femurs (11.3%) that underwent subsequent ROH. The frequency of implant makes was observed as follows: Synthes Retrograde/Antegrade Femoral Nail (42.7%), Synthes Retrograde Femoral Nail-Advanced (30.9%), Synthes Recon (10.1%), Stryker T2 (10.0%), Smith & Nephew Trigen (3.5%), and Zimmer (2.8%), with no significant differences identified between the ROH and Non-ROH group ($p=0.51$). However, it was observed that there was a significantly greater proportion of ROH cases with retrograde nail fixation (15.2%) compared to those with antegrade fixation (5.0%; $p=0.02$). Patients who underwent ROH had significantly greater nail diameters compared to those who did not require any ROH ($11.4\text{mm} \pm 1.0\text{mm}$ vs. $11.0\text{mm} \pm 1.0\text{mm}$; $p=0.04$). Additionally, the ROH group exhibited a significantly shorter distance from Blumensaat's line to the most distal aspect of the nail (ROH: $8.6\text{mm} \pm 9.8\text{mm}$ vs Non-ROH: $13.3\text{mm} \pm 15.1\text{mm}$; $p=0.02$) and a reduced distance from the Blumensaat's line to the most distal interlock (ROH: $21.5\text{mm} \pm 12.9\text{mm}$ vs Non-ROH: $29.8\text{mm} \pm 22.4\text{mm}$; $p=0.001$). No significant differences were identified between the two groups for age, BMI, race, payer group, gender, injury severity score, length of stay, or nail length.

DISCUSSION: Retrograde femoral nails have increased rate of removal of hardware relative to antegrade nailing for femur fractures. Removal of hardware was associated with decreased nail distance from the knee joint.

SIGNIFICANCE/CLINICAL RELEVANCE: Distal femoral interlock screw loosening and subsequent removal of hardware is associated with significant morbidity, and understanding risk factors that predispose to screw loosening is an important aspect of mitigating this risk.