

## Minimizing Leg-Length Discrepancy After Intramedullary Nailing of Comminuted Femoral Shaft Fractures: A Quality Improvement Initiative Using the Scout CT Scanogram

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**Purpose:** We attempted to minimize leg-length discrepancy (LLD) after intramedullary nailing of comminuted femoral shaft fractures, as a quality improvement initiative using the scout CT scanogram after all such cases over a 5-year period. We asked: (1) if we were better doing this with retrograde nails or antegrade nails, (2) if mechanism of injury of either gunshot wound (GSW) or motor vehicle accident (MVA) had an effect, and (3) if we improved over the course of this study.

**Methods:** An IRB-approved study following a quality improvement initiative was performed. Between June 2008 and August 2013, 74 consecutive patients with a Winquist III (20 patients) or IV (54 patients) (AO/OTA type C1, C2, and C3) femoral shaft fracture pattern were treated with a statically locked intramedullary nail (using our best efforts, ie, Bovie cord and radiolucent ruler) followed by a postoperative day 1 or 2 CT scanogram. The average age was  $33 \pm 16$  years (range, 16-94; median, 28). There were 63 men and 11 women. 39 patients had an antegrade femoral nail while 35 patients had a retrograde nail. GSW ( $n = 45$ ) was the most common mode of injury followed by MVA ( $n = 21$ ) and falls ( $n = 7$ ). The first 37 patients were compared to the last 37 patients.

**Results:** 44 femurs were short, 24 were long, and 6 had no difference in length. The average discrepancy was  $9.6 \text{ mm} \pm 8.0 \text{ mm}$ . Eight patients had  $>20 \text{ mm}$  LLD, 7 had 15-19.9 mm LLD, 17 had 10-14.9 mm LLD, and 42 patients had 0-9.9 mm LLD. Although not significantly different, antegrade nail (6/39 [15%]) patients and 9/35 (26%) of retrograde nails patients had a significant LLD of  $\geq 15 \text{ mm}$  ( $P = 0.27$ ). There was no significant difference in GSWs versus blunt trauma injuries. We found that our ability to normalize the LLD after these injuries did not improve from the first group of (7/37) patients to the second group of (8/37) patients. 13 out of 15 patients agreed to a correction that was performed at the time of the initial admission and was corrected to less than 6-mm discrepancy in every case.

**Conclusion:** The rate of significant LLD ( $\geq 15 \text{ mm}$ ) after locked intramedullary nailing of comminuted (Winquist III and IV) femur fractures at our institution was found to be 20%. We were better at antegrade nailing than retrograde nailing in our ability to equalize the leg lengths. Mechanism of injury did not make a significant difference in our ability to correctly accomplish this and we did not improve despite our best efforts during the course of this study. 13 of 15 patients were corrected during the same admission. We recommend using full-length CT scanograms after intramedullary nailing of comminuted femur fractures to ensure that LLD is minimized.