

Cephalomedullary Nail Versus Sliding Hip Screw for Fixation of OTA 31A1/2 Intertrochanteric Femur Fractures: A 12-Year Comparison

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Background/Purpose: Intertrochanteric and pertrochanteric femur fractures are among the most common orthopaedic injuries in the elderly population, with an annual incidence of more than 145,000 in the United States. With an annual expenditure upward of \$6 billion dollars in direct hospital costs and a first-year mortality of greater than 20%, outcomes after treatment of intertrochanteric femur fractures have become a major focus. The purpose of this study was to retrospectively compare failure and complications associated with cephalomedullary nail (CMN) versus sliding hip screw (SHS) fixation for intertrochanteric femur fractures at a single Level I trauma center.

Methods: Intertrochanteric femur fractures were identified in 535 patients. 333 were found to be OTA 31A1.1-3, 31A2.1-3 fracture patterns and 89 were excluded for follow-up of less than 6 months. 244 patients were included in the final analysis, 131 receiving a CMN and 113 receiving an SHS. Medical records were reviewed for demographics, surgeon training, comorbidities, complications, and subsequent hip surgery, including removal of painful implants. Radiographs were reviewed for OTA classification, reduction quality, tip-apex distance (TAD), collapse, fracture, and cutout. Failure was defined as cutout, nonunion, fracture, collapse of more than 2 cm on follow-up radiographs, or revision surgery, not including removal of symptomatic implants or treatment of underlying arthritis. Chi-square or Fisher exact tests were used to calculate P values for failure, complications, and 30-day and 1-year mortality. Adjusted P values were calculated using logistic regression or Firth logistic regression adjusting for sex, age, Lezzone comorbidities, days since surgery, and TAD. Odds ratios were calculated for failure, complications, and 30-day and 1-year mortality. Hazard ratios were calculated for comparative overall mortality. Results were stratified by fracture type as stable (AO 31A1.1-2.1) and unstable (AO 31A2.2-3). In stable fractures CMN was more likely to be used in women and an SHS in men ($P = 0.028$). There was no difference in the unstable fracture group. TAD in stable CMN patients was 17.3 ± 5.9 compared to 26.2 ± 7.9 in the stable SHS group ($P < 0.001$) while it was 19.0 ± 5.3 in the unstable CMN group compared to 24.0 ± 6.7 in the unstable SHS patients ($P = 0.004$). In stable fracture patterns there was no difference in collapse ($P = 0.223$), complications ($P = 0.881$), failure ($P = 0.233$), or mortality ($P = 0.736$). In unstable fractures CMN had significantly less collapse ($P < 0.001$) and failure ($P = 0.46$) but no difference in complication ($P = 0.126$) or mortality ($P = 0.586$).

Conclusion: There were no significant differences in failure or complication rates when comparing the CMN to the SHS in stable intertrochanteric hip fractures while the CMN had significantly reduced failure and collapse rates in unstable intertrochanteric hip fractures.

Outcome	CMN	DHS	P-value	Adjusted P	Odds/Hazard ratio (95% CI) (CMN vs. DHS)
Collapse (mm)	-2.9 (6.6) ¹	8.5 (11.7) ¹	<0.01 ²	<0.01 ⁴	-11.05(-13.83 to -8.27) *
Complication	41 (31.3%)	43 (38.1%)	0.268 ³	0.359 ⁵	0.74 (0.39 -1.41)
Failure	9 (6.9%)	21 (18.6%)	0.006 ³	0.037 ⁵	0.355 (0.134 - 0.94)

¹Mean (SD), ² Wilcoxon rank sum test and T-test (same result), ³ Chi-square test, ⁴Analysis of covariance adjusting for sex, age, lezzoni comorbidities, total-tad, and days since surgery. ⁵ Logistic regression adjusting for sex, age, lezzoni comorbidities, total-tad, days since surgery
*parameter estimate for nail vs. plate