

Can We Avoid Primary Failure of Subtrochanteric Femur Fractures?

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Purpose: The purpose of this study was to identify factors associated with primary failure following subtrochanteric femur fracture fixation.

Methods: A consecutive series of patients who sustained an AO/OTA Type 32Axa, 32Bxa, or 32Cxa subtrochanteric fracture were reviewed. All patients were treated with a cephalomedullary nail (CMN). Each patient was reviewed for demographics, injury characteristics, perioperative parameters, and clinical and radiographic outcomes. Primary failure was defined as nonunion or implant failure that required revision surgical intervention, excluding distal locking screws. Univariable analyses were performed to compare patients who developed surgical failures (nonunion or early broken nail) versus those who healed appropriately.

Multivariable binary logistic regression analyses were conducted to identify factors independently associated with surgical failure.

Results: 230 patients with 232 fractures were identified who met inclusion criteria. 14 (6.1%) experienced surgical failure. Univariable analysis revealed that lower American Society of Anesthesiologists (ASA) score class ($P = 0.030$), AO/OTA Type 32A fracture ($P = 0.044$), postoperative varus alignment ($P = 0.043$), and patient-reported history of bisphosphonate usage ($P = 0.028$) were associated with failure (nonunion or broken nail). Postoperative apex anterior alignment trended toward significance ($P = 0.051$). Other malalignments, apex posterior alignment ($P = 1.00$) and valgus alignment ($P = 0.349$), were not associated with failure. No other demographic features (age, sex, body mass index, Charlson Comorbidity Index), injury characteristics (mechanism of injury, atypical fracture), or perioperative parameters (1 vs 2-screw CMN design, number of distal locking screws, CMN diameter, open reduction) were associated with surgical failure. Multivariable binary logistic regression analysis demonstrated that as ASA score class increases by 1 unit, the risk of surgical failure decreases by $0.377\times$ (95% confidence interval: 0.153-0.930, $P = 0.034$).

Conclusion: Lower ASA score class, AO/OTA Type 32A fractures, postoperative varus alignment, and history of bisphosphonate usage are associated with failure to heal or develop early implant failure following subtrochanteric fracture fixation. Among these factors identified with surgical failure, only alignment is modifiable. Thus, efforts should be made to avoid these parameters.