

## **Immediate Weight Bearing as Tolerated has Improved Outcomes Without an Increased Risk of Reoperation after Intramedullary Fixation for Subtrochanteric Fractures Compared to Modified Weight Bearing**

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**Background/Purpose:** Subtrochanteric femur fractures are commonly managed with operative fixation and restricted weight bearing because of a high complication rate resulting from cortical comminution and stress concentration during stance. Intramedullary nailing has become the primary fixation method primarily because of the improved biomechanical profile that has previously been demonstrated. The literature has established improved outcomes from early weight bearing for hip fractures and the safety has been demonstrated previously in comminuted femoral shaft fractures. Pilot data has previously been presented to suggest that early weightbearing may decrease overall length of stay, however no study to date has been adequately powered to evaluate the safety of this protocol. Our hypothesis was that immediate post-operative weight bearing as tolerated (WBAT) for subtrochanteric femur fractures would result in decrease length of stay (LOS) compared to non-weight bearing (NWB) without resulting in an increased risk of re-operation.

**Methods:** After IRB approval a retrospective cohort study was conducted from August 2008 to November 2015 at six level-1 trauma centres. Inclusion criteria were skeletal mature patients with a subtrochanteric femur fracture, defined as with in 5cm of the lesser trochanter (OTA Classification 31A.3 and 32A-32C.). Exclusion criteria was presentation GCS below 8, spinal cord injury with motor deficits, periprosthetic fracture and bisphosphonate-related atypical subtrochanteric femoral fractures. A total of 437 patients met the inclusion criteria and underwent intramedullary fixation with 299 patients who completed follow up until union. These cohorts were compared using univariate and multivariate regression analysis for statistical significance as well as to evaluate the potential for confounding. Patients were also evaluated regarding age, sex, mechanism of injury, implant type, implant size, degree of comminution and fracture type. Primary outcome was total length of stay (LOS), with secondary analysis of risk of re-operation.

**Results:** Of 437 patients met the inclusion criteria the majority of the patients were male (284, 61%) with the mean patient age was 51.4 years (range 17-98) with a bimodal distribution of 39.6 and 71.4 for high and low energy, respectively. Implant choice was predominantly cephalomedullary nail (63.2%, n=289), followed by reconstruction nail (26.5%, n=116) and standard piriformis entry (7.1%, n=31). The nail diameter was predominantly 10mm (30.9%, n=135) followed by 11mm (25.6%, n=112), 11.5mm (13.3%, n=58) and 12mm (12.6%, n=55). The majority of patients were treated with immediate WBAT (62.9%, n=275) compared to limited weight bearing (37.1%, n=162). Overall the WBAT group had a decreased LOS compared to the NWB group (5.7 vs 8.1, p=0.002). Utilizing multivariate regression high and low energy fracture patterns were analysed for the affect of weight bearing status, age, gender, Winquist-Hansen grade. For low energy fractures the strongest affect on length of stay was immediate weight bearing as tolerated (p=0.0106). For high energy fractures the strongest affect on length of stay was immediate weight bearing as tolerated (p=0.0227) with age also significant (p= 0.0485). In the 299 patients followed to union the overall complication rate was defined as reoperation for any reason related to the subtrochanteric fracture (9.7%, n=29) with nonunion the most common reason for reoperation (5.4%, n=16), followed by symptomatic hardware removal (3.3%, n=10) and infections (1.6%, n=5, 3 deep and 2 superficial). The risk of reoperation was lower in the WB group (8.8%, n=16) compared to the limited WB group (11.1%, n=13), however this did reach statistical significance (p=0.5083).

**Conclusion:** This study that demonstrates a decreased length of stay using a protocol of immediate post-operative weight bearing as tolerated for subtrochanteric femur fractures in a large multi-center cohort design. Additionally this is the first study adequately powered to demonstrate that this protocol does not increase in the risk of reoperation. Our data suggests that cephalomedullary implants continue to be the preferred nail. We plan to continue studying early weight bearing for subtrochanteric fractures with specific attention on the impact of post-operative coronal and sagittal alignment on the rate of nonunion.