

# Intra- And Post-Operative Outcomes Following Subtrochanteric Fracture in Osteoporotic Patients With and Without History of Anti-Resorptive Therapy

Ronak J. Mahatme<sup>1</sup>, Ethan M. Gasteyer<sup>1</sup>, Faryal S. Mirza<sup>2</sup>

<sup>1</sup>University of Connecticut School of Medicine, Farmington, CT, <sup>2</sup>Director, Osteoporosis Clinic, UConn Health, Farmington, CT  
[mahatme@uchc.edu](mailto:mahatme@uchc.edu)

**Disclosures:** Ronak J. Mahatme (N), Ethan M. Gasteyer (N), Faryal S. Mirza (N)

**INTRODUCTION:** Osteoporosis and low bone density are associated with a high risk of fragility fractures. Antiresorptive agents are commonly used to combat osteoporosis and reduce fracture risk by decreasing osteoclast activity and bone resorption. These agents also reduce bone remodeling which may lead to the aggregation of microcracks. Rarely, long-term use of antiresorptive therapy (ART), particularly bisphosphonates, may result in a certain kind of subtrochanteric fracture (STF) known as an atypical femoral fracture (AFF). STF may also occur in the absence of ART. There is a need to assess the potential impact of ART at the time of STF development on subsequent fracture healing by evaluating intra-operative and post-operative outcomes. The purpose of this study is to compare the intra-operative and post-operative outcomes following subtrochanteric fracture between osteoporotic patients being treated with ART and osteoporotic patients without history of ART.

**METHODS:** The Epic SlicerDicer Tool was used to identify patients with osteoporosis and subtrochanteric fracture (STF) between January 2018 and July 2023 in a single academic medical center. Patients were selected based on the subtrochanteric fracture diagnosis code and not all fractures were AFF. Those with a history of previous hip fracture or total hip arthroplasty, or age >90 years were excluded. Patients being treated with ART at the time of STF were matched 1:1 to a control group of patients presenting with STF and without history of ART based on sex and age at the time of fracture. Intra-operative outcomes and post-operative outcomes were extracted via chart review and compared. Intra-operative outcomes included procedure type, procedure time, and estimated blood loss. Post-operative outcomes included length of stay, 30-day emergency department (ED) visits, 90-day complications, rate of secondary surgeries, and 4-month mortality.

**RESULTS:** A total of 60 patients with osteoporosis were selected based on diagnosis of subtrochanteric fracture during the study period. After screening with the exclusion criteria, 15 patients were being treated with ART at the time of fracture. These included 5 patients with AFF and 10 patients who did not meet the criteria for AFF. These patients were matched with 15 patients with STF and without history of ART prior to the STF. Out of the 15 patients being treated with ART, 11 were on bisphosphonates (alendronate, ibandronate, or zoledronic acid) and 4 were on a RANKL inhibitor (denosumab) at the time of fracture for an average duration of ART of 4.2 years. The average age at time of fracture was 77.8 +/- 8.7 in the ART group and 79.3 +/- 10.1 in the non-ART group (p = 0.67). In terms of intra-operative and post-operative outcomes, there were no significant differences in procedure time (161.8 +/- 37.9 min vs. 153.8 +/- 39.7 min; p = 0.61), estimated blood loss (171.4 +/- 70.6 mL vs. 189.3 +/- 102.2 mL; p = 0.60), or length of hospital stay (3.1 +/- 1.4 days vs. 3.6 +/- 2.0 days; p = 0.44) between the two groups (Table 1). The ART group showed a trend towards lower rates of 30-day ED visits (0% vs. 20%; p = 0.07) and a higher 4-month mortality (2 males and one female, 20% vs. 0%; p = 0.07). Two patients in the ART group who had AFF required secondary surgery compared to one patient in the non-ART group (p=0.41).

**DISCUSSION:** Prolonged ART is associated with reduced bone remodeling and the propagation of microcracks. AFF are a rare complication of prolonged ART. Subtrochanteric fractures are typically treated with intramedullary nails and heal by endochondral ossification. From a biological perspective, decline in bone remodeling delays the conversion of calcified cartilage callus to mature bone. Our study does not show any significant differences in intra-operative outcomes between these two groups of patients. Two patients in the ART group who had AFF required secondary surgery for non-union compared to one patient in the non-ART group. There was also a trend towards higher mortality in the ART group, likely related to complicated medical history with multiple comorbidities in these patients. One limitation of the study is a relatively low number of patients with subtrochanteric fractures and an even lower numbers of AFF in the single academic medical center database. This study should be replicated in collaboration with multiple medical centers to increase sample size and thus statistical power.

**SIGNIFICANCE/CLINICAL RELEVANCE:** AFF are a rare complication of ART, usually associated with longer duration of therapy. Patients with AFF are more likely to have a secondary surgery to aid with fracture healing and there is also concern about increased mortality in this group. Drug holiday should be considered and the need for continued ART beyond five years should be assessed in all patients with osteoporosis.

**IMAGES AND TABLES:**

	Age		Procedure Time		Estimated Blood Loss		Length of Stay		30-Day ED Visits		Secondary Surgery Rate		4-Month Mortality	
	Mean +/- SD	P Value	Mean +/- SD (min)	P Value	Mean +/- SD (mL)	P Value	Mean +/- SD (days)	P Value	n (%)	P Value	n (%)	P Value	n (%)	P Value
<b>Antiresorptive Therapy (n=15)</b>	77.8 +/- 8.7	0.67	161.8 +/- 37.9	0.61	171.4 +/- 70.6	0.60	3.1 +/- 1.4	0.44	0 (0)	0.07	2 (16.7)	0.41	3 (20)	0.07
<b>Non-Antiresorptive Therapy (n=15)</b>	79.3 +/- 10.1		153.8 +/- 39.7		189.3 +/- 102.2		3.6 +/- 2.0		3 (20)		1 (6.7)		0 (0)	

**Table 1.** Intra-operative and post-operative outcomes following subtrochanteric fracture in osteoporotic patients being treated with antiresorptive therapy at the time of fracture versus osteoporotic patients without history of antiresorptive therapy. SD; standard deviation. ED; emergency department.