Are Geriatric Distal Femur Fractures Diagnostic of Clinically Significant Osteoporosis? An Analysis of Secondary Fractures

Kevin Li, Saad Mohammad, Christian Cisneros, Gele Moloney[1]
[1]University of Pittsburgh Medical Ctr

INTRODUCTION: As the population continues to age, geriatric distal fractures are becoming increasingly prevalent. Many of these injuries are low energy, ground-level falls consistent with an underlying diagnosis of osteoporosis. While fractures of the hip, distal radius, and vertebral bodies have gained recognition as diagnostic of clinically significant osteoporosis, fractures of the distal femur remain less appreciated. The rate of secondary fracture after low energy distal femur fracture in the elderly is not well defined. The study aimed to examine the incidence of subsequent fractures after operative treatment of low energy distal femur fracture and the associated risk factors in geriatric patients.

METHODS: An Institutional Review Board (IRB) approved retrospective cohort analysis was conducted on adults over 60 years old undergoing operative fixation of an isolated distal femur fracture (AO/OTA 33) over a consecutive five-year period. Inclusion criteria were age 60 years or older, low energy mechanism of injury, and operative fixation of an isolated distal femur fracture. Polytrauma patients, patients with fracture secondary to high energy mechanism, and patients with atypical fractures secondary to medications were excluded. Demographic information, preoperative comorbidities, preoperative and discharge bone-protective medication, and presence of secondary fracture within a five-year period following surgery were collected from the electronic medical record which contains data from over 40 hospitals in the region. The primary analysis evaluated patients with the presence of a secondary fracture within the five-year period against those without secondary fracture. Time-to-event survival and secondary fracture outcomes were evaluated using Kaplan-Meier with *a priori* and empirically selected covariates. Continuous variables were analyzed via multiple independent two-sided t-tests, while categorical variables were analyzed with Chi-square or Fisher exact tests. A p-value of < 0.05 was considered statistically significant.

RESULTS: Two hundred eighty-six patients met inclusion criteria. The mean age was 76.3 ± 9.6, with 18.9% male. The mean BMI was 31.7 ± 7.9, the mean age-adjusted CCI was 5.1 ± 2.1, and the mean ASA score was 3.0 ± 0.6 (Table 1). One-year secondary fracture rate was 6.6%, three-year rate was 14.7%, and five-year secondary fracture rate was 20.6% (Figure 1). The average time until secondary fracture was 800 days (2.1 years). 33.9% of secondary fractures were treated operatively and 32.2% sustained a secondary fracture of the same or contralateral femur. There were no differences in age (p=0.65), CCI (p=0.67), or ASA score (p=0.43) between patients with secondary fracture and those without. While 46.5% of patients were started on calcium and vitamin D upon discharge, only 2.8% were started on antiresorptive or anabolic agents. There were no significant differences in secondary fracture rates between patients prescribed calcium and vitamin D post-index fracture and those who were not (p=0.58).

DISCUSSION AND CONCLUSION:

One in five geriatric patients experienced a secondary fracture within five years of a distal femur fracture, with almost one third of those sustaining a fracture of the hip or femur. Given the similarity to rates found following hip fractures, this underscores the importance of considering low energy fractures of the distal femur as diagnostic of clinically significant osteoporosis. The high rate of secondary fractures and low rate of pharmacologic treatment of osteoporosis in this population suggests a potentially modifiable risk factor and an opportunity to improve outcomes in an aging population.

Figure 1. Kaplan-Meier Survival Curve for Secondary Fracture Following Distal Femur Fracture Patients

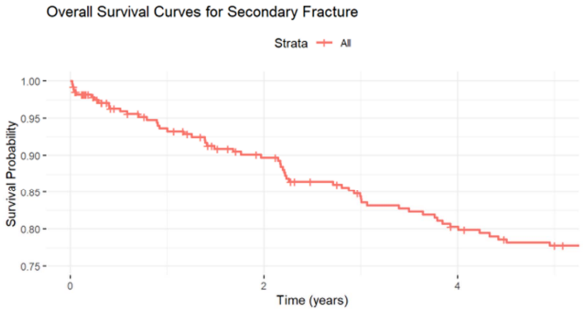

Table 1. Entire patient cohort demographics. Continuous variables described as mean ± standard deviation, while categorical variables defined as number (percentage).

Demographic (n = 286)	Mean ± Standard Deviation
Age (years)	76.3 ± 9.6
Sex (male/female)	54M (18.9%) 232F (81.1%)
Ipsilateral Total Knee Arthroplasty	58 (20.3%)
Bone Protective Medication*	15 (5.2%)
Calcium/Vitamin D	89 (31.1%)
BMI (kg/m^2)	31.0 ± 7.9
Age Adjusted CCI	5.1 ± 2.1
ASA Score	3.0 ± 0.6
ASA Score Groups	1: 2 2: 37 3: 201 4: 46 5: 0 6: 0

*Bisphosphonates, Calcitonin, Parathyroid hormone, Monoclonal antibody