Outcomes of Atypical Femur Fractures in Geriatric Patients Treated with Reamed Intramedullary Nailing and Anabolic Osteoporotic Medications

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RESEARCH QUESTION

In geriatric patients with osteoporosis experiencing an atypical femur fracture (associated with long-term use of anti-resorptive therapy), will standardized treatment including treatment with an intramedullary nail and a post-operative regimen of parathyroid hormone (PTH) analogs allow for fracture healing and improved bone density over time?

BACKGROUND

Our retrospective study evaluated fracture healing and bone density after an atypical femur fracture in geriatric patients treated with a protocol of intramedullary nailing and a change of osteoporosis therapy to an anabolic osteoporosis medication (PTH analogs). Specifically, these medications included Forteo® (teriparatide) and Tymlos® (abaloparatide). The aim of our study is to use the large patient population suffering from osteoporosis who were followed up at a busy osteoporosis clinic, the BHC and analyze outcomes of fracture healing and bone density to determine the efficacy of such medications. Currently, treatment with such medications for fracture healing is limited due to cost-effectiveness and lack of clear evidence. Conclusive evidence through a large study would provide further direction and treatment options for patients and physicians seeking nonsurgical and less invasive treatment options.

METHODS

We retrospectively initially reviewed records of 133 patients with a femur fracture treated in the Texas Health Fort Worth (THFW) fracture database with an intramedullary nail from 2017 to 2021 and followed up at the BHC for osteoporosis. Records and radiographs were evaluated to determine atypical femur fractures (AFFs). Nine patients had AFFs and met criteria (mean age 77.1 years). Of the 9 patients studied, 9 were female. All nine patients used oral bisphosphonate therapy before femur fracture, and all were prescribed a course of PTH analog therapy after surgical treatment with a femoral nail.

Secondary prevention in geriatric osteoporotic femur fracture patients implemented by a fracture-liaison service plays an important role in fracture healing, bone density, and decreases chance of subsequent fractures.

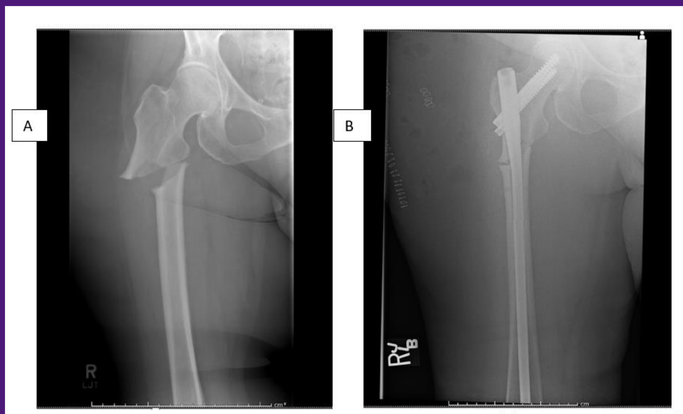

Fig.1: Patient suffered a R subtrochanteric atypical femur fracture (A). Fixation with nail (B).

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RESULTS

Table 1

Preoperative Patient Demographics

Variables	Values
Number of fracture patients (n)	9
Female (n, %)	9 (100.0)
Average age (yrs)	77.1 (70-84)
Average BMI (kg/m^2)	28.20
Medical history of bisphosphonate (n, %)	9 (100.0)
Alendronate only	6 (66.7)
Risendronate only	1 (11.1)
Combination (Alendronate/Ibandronate/Denosumab)	2 (22.2)
Duration of Bisphosphonate Therapy (yrs)	9.4 (3-18)
Injury type (%)	
Ground Level Fall	100.0
Fracture Type (%)	
Atypical Femur	100.0
Location (n, %)	
Subtrochanteric	4 (44.4)
Shaft	5 (55.6)
Surgery type (n, %)	
Nail	9 (100.0)

Table 2

Treatment Outcomes and Follow Up

Variables	Values
Percent Healed (%)	100.0
Average Time to Healed (mos)	9 (5-20)
Percent Follow Up at BHC	100.0
Average Follow Up Duration (mos)	52 (43-57)
Initial Anabolic Treatment? (Y/N, %)	Yes (100.0)
Initial Anabolic Medication (n, %)	
Abaloparatide 80 mcg daily	4 (44.4)
Teriparatide 20 mcg daily	5 (55.6)
Average Duration of Treatment (mos)	17.64 (8-24)
Post Anabolic Treatment (%)	100.0
Post Anabolic Medications (n, %)	
Fosteum	2 (22.2)
Zoledronic Acid	1 (11.1)
Denosumab	6 (66.7)
Average T Scores	
Initial	-0.986
Repeat	-0.157
Improve/Declined (%)	Improved (100.0)
Average Trabecular Bone Scores	
Initial	1.321
Repeat	1.329
Improved/Stable/Declined (%)	
Improved	71.4
Stable	14.2
Declined	14.2
Vitamin D Supplementation (Y/N, %)	Yes (100.0)
Average Vitamin D levels (ng/mL)	
Initial	44.564 (26.1-67)
Repeat	74.973 (26.6-95)
Duration of Supplementation (yrs)	3.43
Subsequent Fractures (Y/N, %)	No (100.0)

FUTURE DIRECTIONS

- **Multicenter study**
- **Looking at other vertebral and nonvertebral fractures**
- **Cost-effectiveness analysis**
- **Study comparing teriparatide to abaloparatide**