

An Atypical Fracture

Maricel Dela Cruz, DO, MPH, FAWM & Robert Danoff, DO, MS, FACOFP, FAAFP

Aria Jefferson Health, Department of Family Medicine, Langhorne, PA

An 81-year-old female with a past medical history of osteoporosis, hypertension, hypercholesterolemia, and gastroesophageal reflux disease presented to her family practice office in hospital follow-up of a right leg injury she sustained six weeks prior. She had a mechanical fall at home and was taken to the emergency department by ambulance, and underwent x-ray imaging (See Figure 1, 2). Her medications included daily carvedilol, lisinopril, ranitidine, and simvastatin, as well as an eight-year use of weekly oral alendronate. The patient suffered a right diaphyseal (mid-shaft) fracture of the femur and subsequently underwent orthopedic repair with open reduction and internal fixation. The patient was diagnosed with fragility fracture secondary to a history of osteoporosis and fall from standing. Upon discharge, she was kept on alendronate. The patient completed inpatient rehabilitation and later brought the following images to her primary care physician.

QUESTIONS

1. What is the mechanism of action of the medication that may have contributed to the patient's injury?
 - A) Non-selective beta-adrenergic receptor blocker (B1, B2) and an alpha adrenergic receptor blocker (alpha-1)
 - B) Inhibition of angiotensin-converting enzyme (ACT)
 - C) Blocks the production of acid by acid-producing cells in the stomach.
 - D) Competitive inhibition of HMG-CoA reductase, the first and key rate-limiting enzyme of the cholesterol biosynthetic pathway.
 - E) An intermediate in the mevalonate pathway prevents inhibition of osteoclast formation, bone resorption, and kinase activation in vitro.
2. What is NOT a common site for fragility fractures?
 - A) Lumbar vertebral compression fracture
 - B) Fracture of the neck of the femur
 - C) Diaphyseal fracture of the femur
 - D) Colles fracture of the wrist
 - E) Thoracic vertebral compression fracture

CORRESPONDENCE:

Maricel Dela Cruz, DO, MPH, FAWM | mdelacruz78@gmail.com

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FIGURE 1:

X-Ray image of pathologic fracture



FIGURE 2:

X-Ray image of pathologic fracture



ANSWERS

1. What is the mechanism of action of the medication that may have contributed to the patient's injury?

Correct answer: E) An intermediate in the mevalonate pathway, prevents inhibition of osteoclast formation, bone resorption, and kinase activation in vitro

Oral bisphosphonates are a mainstay pharmacologic treatment for osteoporosis.^{1,2} Bisphosphonates work by inhibiting osteoclast activity and reducing bone resorption and turnover.³ These medications are primarily used for treating osteoporosis in post-menopausal women, and to help prevent hip and vertebral bone fractures.^{4,5} Due to unwanted side effects of decreased bone resorption and unsatisfactory repair of the bony matrix, including osteonecrosis of the jaw and atypical fractures, recommendations have been made to limit oral bisphosphonate use to five or less years.¹

2. What is NOT a common site for fragility fractures?

Correct answer: C) Diaphyseal fracture of the femur

Fragility fractures are a subtype of pathologic fractures that occur as a result of normal activity or falls from standing height or less.^{6,7} The most common fracture sites of fragility fractures include vertebral compression fractures, fractures of the neck of the femur and Colles fractures of the wrist.^{6,7} Pathologic fractures are typically caused by secondary etiologies that lead to weakness in bone structure, including osteoporosis, cancer, infection or bone cysts.^{6,7} The remainder of femur fractures are pathologic and atypical, including subtrochanteric and diaphyseal.⁸⁻¹¹

DISCUSSION

This case exhibits the paradoxical adverse effect of atypical femur fracture with long-term use of the bisphosphonate alendronate. Though rare, several cases have been documented in the literature displaying subtrochanteric and diaphyseal femur fractures with prolonged alendronate use.¹²⁻¹⁵ This patient continued alendronate upon discharge from the hospital even after sustaining a fragility fracture. A diaphyseal (mid-shaft) fracture of the femur was documented and it was not until her primary care outpatient follow-up that the patient discontinued the bisphosphonate. Because of these concerns, it is important for family physicians to instruct patients taking oral bisphosphonates to discontinue use within five years as per the recommended guidelines in preventing associated atypical fractures.¹ Family physicians should also be cognizant of the difference between simple fragility fractures versus the wider spectrum of pathologic fractures. Family physicians should also stay up to date on the current United States Preventive Service Task Force screening recommendations regarding DEXA scans and dietary recommendations.¹⁶

AUTHOR DISCLOSURES:

No relevant financial affiliations.

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