

# Atypical Femoral Fractures With Long Term Bisphosphonates Use

- There has been an increase in the number of atypical femoral fractures in patients on long term bisphosphonate therapy (e.g Fosamax)
- Accordingly the FDA has recently released a warning regarding the risk of these fractures
- As radiologists we need to be aware of these fractures and:
  - Recognize the characteristic features of these fractures and report them as such
  - Recognize incomplete injuries
  - understand which patients are at risk

# Case

**Hx:** 80 yo woman with history of osteoporosis with prior fractures presented with persistent, anterior right thigh pain of 2-3 months duration worsened with weight bearing

**Pe:** Antalgic gait, non-radiating R thigh tenderness

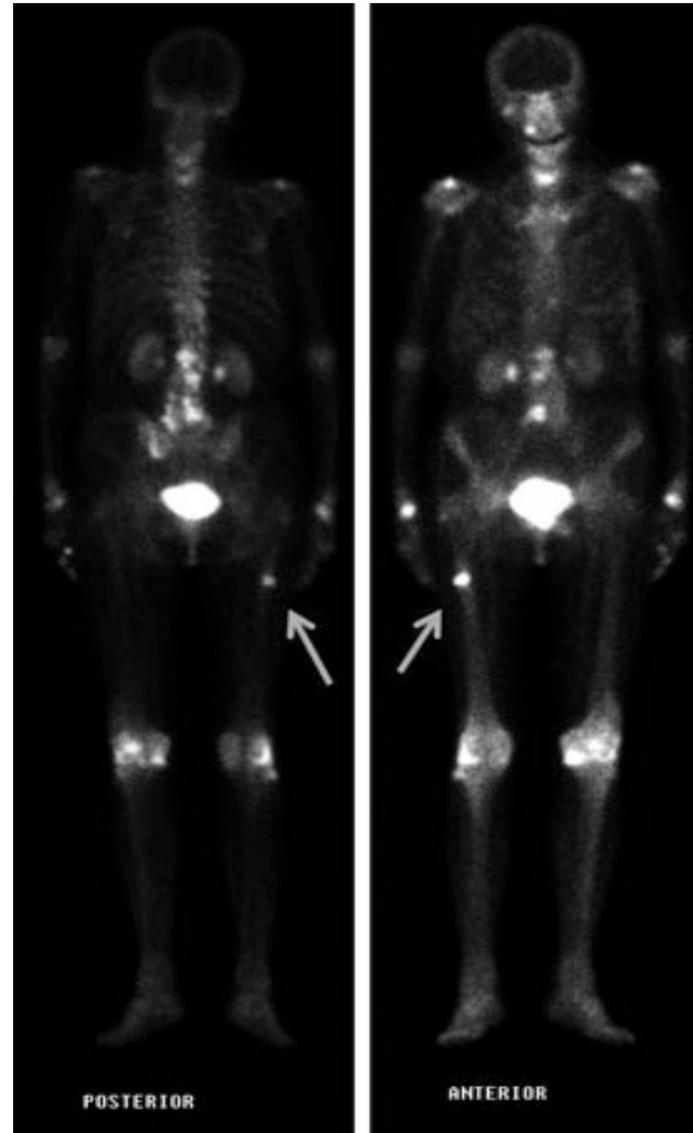
**Rx:** Actonel

## Diffuse cortical thickening and focal, conical projection along lateral cortex



Findings are similar to the periosteal callus observed in incomplete insufficiency fractures that represents an attempt at repair prior to overt fracture.

Moderately intense uptake at subtrochanteric region of right femur on bone scan



## 3D CT reconstruction of the lateral cortex projection



Lesion is dome shaped, pyramidal ridge. No fracture line was seen but the lesion was recognized as potential insufficiency fracture.



One month later, after sustaining minimal trauma (stumble), patient suffered a simple, transverse, subtrochanteric proximal femoral shaft fracture (this picture follows closed reduction of the marked angular deformity)

These fractures of the femoral shaft are not typical of femoral fractures usually seen in this population.

## **Atypical vs Typical Femoral Fracture Features**

### **Atypical**

- Subtrochanteric
- Transverse or short oblique configuration
- Non-communited
- Minimal to no trauma

### **Typical**

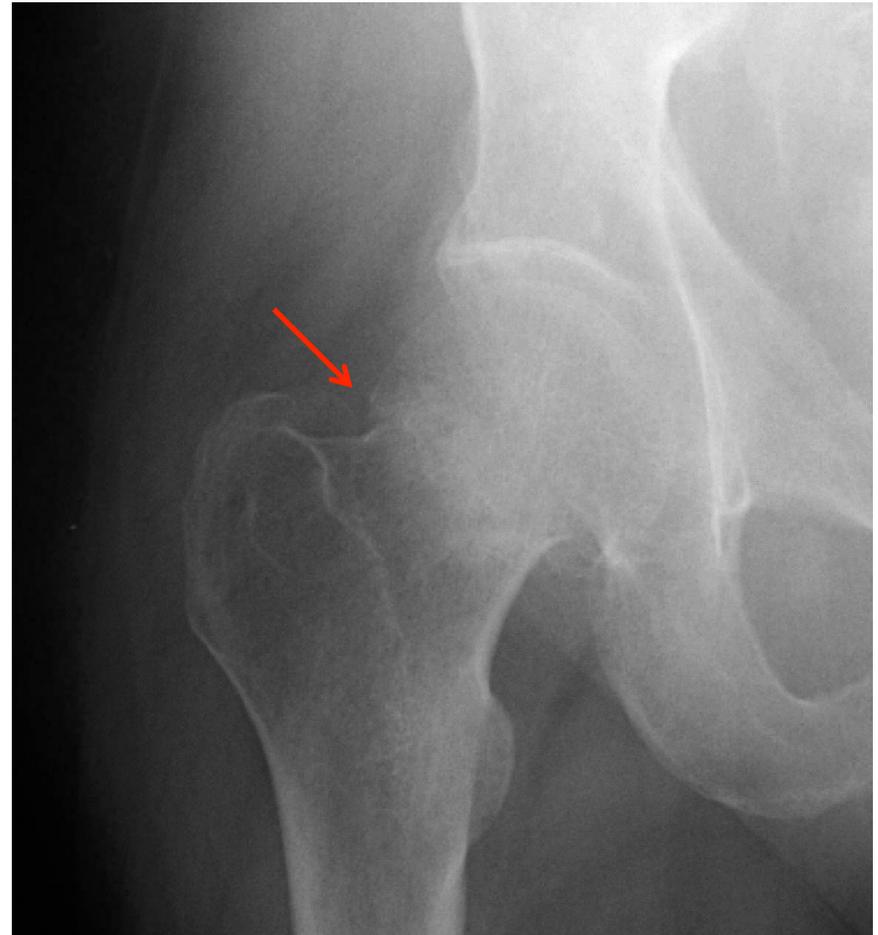
- Femoral neck, intertrochanteric
- Spiral configuration
- Comminuted
- Traumatic

Atypical location of fracture below lesser trochanter but proximal to supracondylar

**Subtrochanteric**



**Femoral neck**



# Atypical transverse or short oblique fracture configuration

## Transverse



## Spiral



# Atypical non-comminuted characteristic

**Non-comminuted**



**Comminuted**



Complete fractures extending through both cortices



# Major features required to satisfy definition of atypical fracture

- Subtrochanteric
- Transverse or short oblique configuration
- Non-communited
- Minimal to no trauma
- Complete fractures extending through both cortices

## Minor features are not required but have been associated with atypical fractures

- Generalized increase in cortical thickness of diaphysis
- Prodromal symptoms such as dull or aching pain in groin or thigh
- Use of bisphosphonates: Actonel, Boniva, Didronel, Aredia, Fosamax, Reclast, Zometa
- Localized periosteal reaction of lateral cortex: beaking
- Delayed healing

# Proposed pathogenetic mechanisms for atypical subtrochanteric fractures

- Alterations to normal collagen crosslinking
- Microdamage accumulation
- Increased mineralization
- Variations in rate of bone turnover
- Reduced vascularity and antiangiogenic effects
- **Bottom line: bone turnover is blocked by BPs and bone is not capable of routine repair leading to bone injury similar to a stress fracture.**

## Importance of increased awareness and recognition of these atypical fractures

- Atypical clinical presentation and radiologic findings compared to typical osteoporotic fracture
- Plain radiographs may be normal or equivocal; only clinical suspicion may prompt further tests
- Potential alteration in patient management: “Bisphosphonate holiday” after 5 years

# Atypical femoral fracture related to BP use prior to and following

