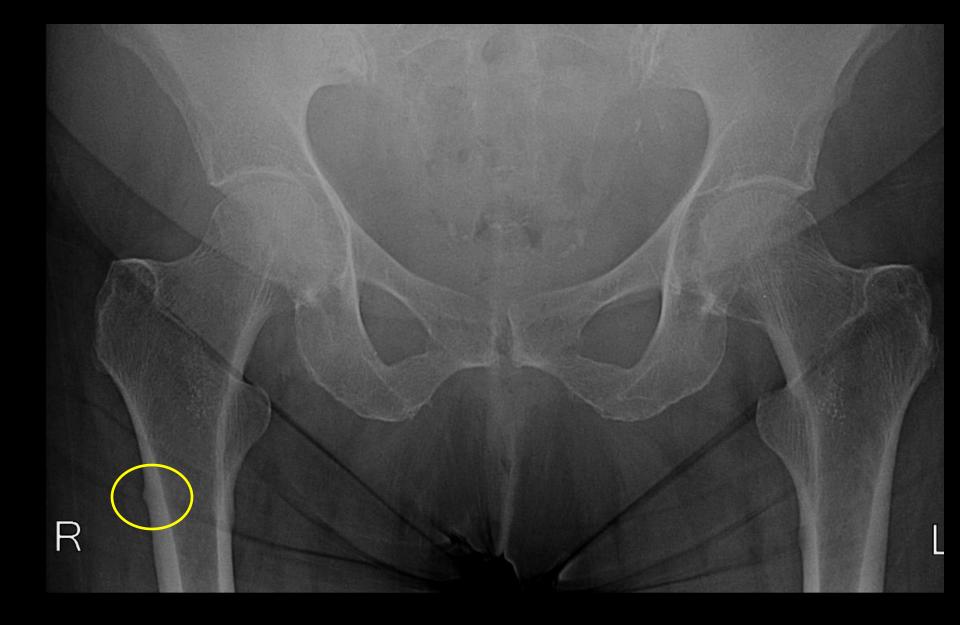
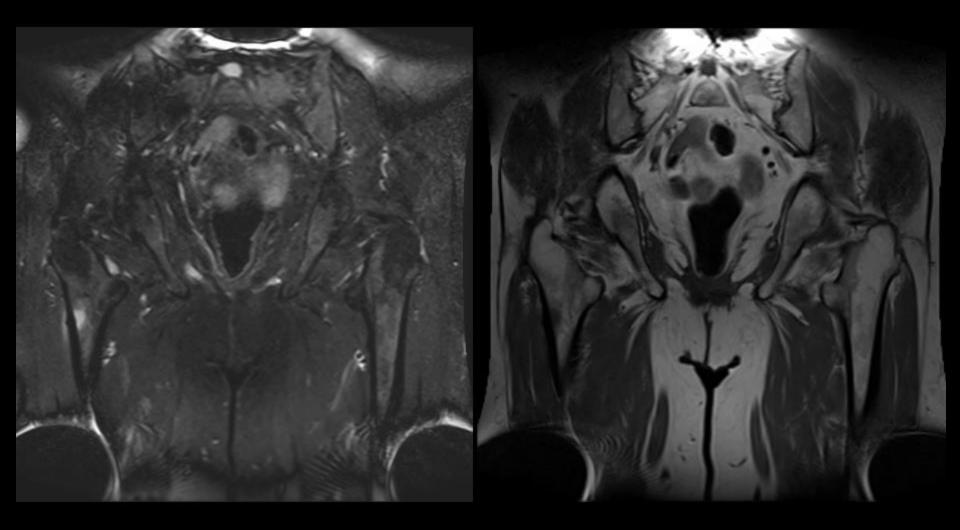
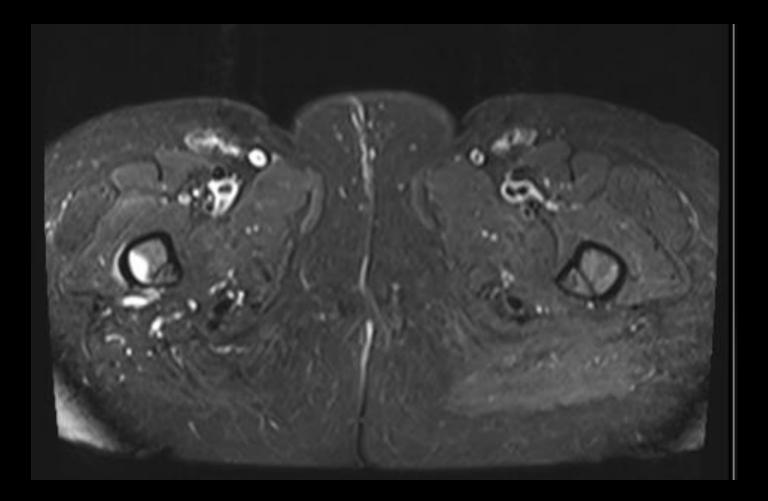
Woman with history of osteoporosis. Hip pain for the past couple weeks.







### Atypical subtrochanteric insufficiency fracture

Associated with longterm (> 5 yrs) bisphosphonate use

- Atypical
  - Subtrochanteric
  - Low energy mechanism of injury
  - Bilateral

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#### Severely Suppressed Bone Turnover: A Potential **Complication of Alendronate Therapy**

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Alendronate, an inhibitor of bone resorption, is widely used in osteoporosis treatment. However, concerns have been raised about potential oversuppression of bone turnover during long-term use. We report on nine patients who sustained spontaneous nonspinal fractures while on alendronate therapy, six of whom displayed either delayed or absent fracture healing for 3 months to 2 yr during therapy.

Histomorphometric analysis of the cancellous bone showed

duced single-tetracycline label in all patients. The same trend was seen in the intracortical and endocortical surfaces.

Our findings raise the possibility that severe suppression of bone turnover may develop during long-term alendronate therapy, resulting in increased susceptibility to, and delayed healing of, nonspinal fractures. Although coadministration of estrogen or glucocorticoids appears to be a predisposing factor, this apparent complication can also occur with mono-

markedly sup osteoblastic s low or low-no decreased in t with absence

A LENDR

Atypical Fractures of the Femoral Diaphysis in Postmenopausal Women Taking Alendronate

phonates for the treatment of osteoporosis has been questioned. Two case series have suggested a link between prolonged bisphosphonate therapy and atypical fractures. In one series, a small number of patients sustained low-energy nonvertebral fractures while receiving long-term alendronate therapy; three were fractures of the femoral shaft.1 Bone biopsies in these patients showed evidence of severely suppressed bone turnover and fracture healing that was delayed or absent. In the other series, low-energy subtrochanteric fractures were found in nine women who had been receiving long-term alendronate therapy.2 Theoretically, bisphosphonates suppress bone turnover and thus might be associated with accumulated microdamage in bone. To our knowledge, no study has demonstrated microdamage accumulation in patients treated with bisphosphonates, and data from studies in animals remain difficult to interpret be-

TO THE EDITOR: The long-term safety of bisphos- cause supranormal doses of bisphosphonates are used. Nevertheless, the possibility that bisphosphonates alter bone strength with prolonged use appears to exist.

We identified 15 postmenopausal women who had been receiving alendronate for a mean (±SD) of 5.4±2.7 years and who presented with atypical low-energy fractures, defined as fractures occurring in a fall from a standing height or less. All patients sustained subtrochanteric or proximal diaphyseal fractures. Bisphosphonate use was observed in 37% of all patients presenting with lowenergy subtrochanteric or diaphyseal fractures. Fractures of the subtrochanteric or diaphyseal regions are relatively rare in postmenopausal women, representing 6% of all osteoporotic hip fractures in our patient population (unpublished data).

Ten of the 15 patients were found to share a unique radiographic pattern, defined as a simple transverse or oblique (≤30°) fracture with beaking

### Atypical subtrochanteric insufficiency fracture: Mechanism

• Bisphosphonates induces osteoclast apoptosis

Inhibits osteoclast mediated bone resorption

Accumulation of microdamage and increased risk of insufficiency fractures

# Atypical subtrochanteric insufficiency fracture: Imaging

- Transverse fracture
- Cortical hypertrophy of lateral cortex
- Medial beak
- Varus alignment at fracture site



arrow), medial beak (long arrow), superior displacement of distal fracture fragment, and

varus angulation at fracture site.

Chan et al AJR 2010: 1581-6

## Atypical subtrochanteric insufficiency fracture: Management

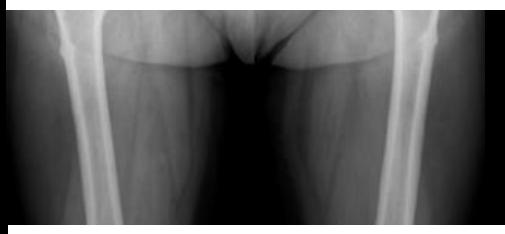
- Prodromal thigh pain
- Screen the contralateral femur
- Seldom heal with conservative management
- High rate of progression to fracture completion
- Prophylactic rod

Clin Orthop Relat Res (2011) 469:2028–2034 DOI 10.1007/s11999-011-1828-8

CLINICAL RESEARCH

Nonoperative versus Prophylactic Treatment of Bisphosphonate-associated Femoral Stress Fractures

Michael B. Banffy MD, Mark S. Vrahas MD, John E. Ready MD, John A. Abraham MD



Clin Orthop Relat Res (2010) 468:3393–3398 DOI 10.1007/s11999-010-1583-2

CLINICAL RESEARCH

Is Surgery Necessary for Femoral Insufficiency Fractures after Long-term Bisphosphonate Therapy?

Yong-Chan Ha MD, Myung-Rae Cho MD, Ki Hong Park MD, Shin-Yoon Kim MD, Kyung-Hoi Koo MD