Don’t Stress: Typical vs Atypical Femoral Stress Fractures

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Learning Objectives

• Understand underlying pathology associated with different types of femoral stress fractures

• Describe key imaging findings related to typical vs atypical femoral stress fractures

• Case Examples
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Femoral Stress Fractures

- Insufficiency Fractures
  - Repeated stress on abnormal bone
  - Demineralization

- Fatigue Injury
  - Repeated stress on normal bone
  - Compression vs Tensile

- Atypical (Drug Related)
  - Bisphosphonate Example
Femoral Stress Fracture Background

Mechanism of Action?

- Insufficiency
- Drug Related Therapy

Fatigue Injury
Femoral Stress Fracture Background

Mechanism of Action?

- Insufficiency
- Drug Related Therapy

Fatigue Injury
Case 1

77 Year old female with history of HTN, iron deficiency, GERD and osteopenia who presents to the ER with “generalized weakness”.

![Bone fracture X-rays](image-url)
Demineralized Stress Management

- Prompt operative stabilization
- Operative delay of > 24-48 hours increases one-year mortality rates (after medical stabilization)
- Early mobilization
Femoral Stress Fracture Background

Mechanism of Action?

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Fatigue Injury
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Fatigue Injury

- Compression
- Tensile
Fatigue Injury

- Compression: Inferior aspect of the femoral neck
- Tensile: Superior aspect of femoral neck

Case 2

50 year old female active runner with a past medical history of hypothyroidism, who presented to the orthopedic clinic with 1 month of groin pain and the following MRI findings.
Fatigue Injury Management

- Compression: Non-weight bearing until pain-free with radiographic evidence of healing, then slow activity progression
- Tensile: Likely will need ORIF to prevent further complications.
Femoral Stress Fracture Background

Mechanism of Action?

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Fatigue Injury
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Fatigue Injury
Bisphosphonates

• Regarded as safe for primary and secondary treatment of osteoporosis in post-menopausal women.

• Long term therapy should be monitored carefully

Figure 1. Classes of bisphosphonates, nitrogen containing and non-nitrogen containing compounds. Adapted from Reska (2003), used with permission, Sept. 2014. Perez (2006).
Case 3

64 year old female with a past medical history of hyperparathyroidism (s/p resection 2007), and ulcerative colitis, who presented to her primary care physician with persistent left hip pain. Bisphosphonate use for 9-10 years.
Case 4
69 year-old female with a past medical history of SLE, and HTN presented to the ER for left hip pain for two months. Med history of ibandronate use for 4 years.
Atypical Stress Fractures (Bisphosphonates)

- Mechanism of action theorized to be related to increased bony remodeling and microfracture
- Further investigation is still needed
- Preliminary data suggests conservative management is difficult
- Prophylactic surgical fixation is a reasonable option given a large majority of these fracture types progress to completion.
Take Home Points

• Important to gather clinical history (demographics, level of activity, medications)

• Determine mechanism of action after stress fracture has been identified

• Several key imaging findings can help distinguish typical vs atypical stress fractures

• Related risk-benefit ratio should be continually assessed for any patient taking long-term bisphosphonate therapy (especially with multiple comorbidities)
References


