Bisphosphonates & The Femur... What Should I Do?

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Disclosures

• None

• The opinions or assertions contained herein are the private views of the author and are not to be construed as official or reflecting the views of the United States Air Force or the Department of Defense. The author is an employee of the United States Government.

The Problem

63 yo F
Turned on carpet at home
PMHx: Osteoporosis
Medic: Alendronate
Bisphosphonates

• Epidemiologic Problem
  • Osteoporosis & Fractures
  • Resultant increased death, morbidity, cost, effects on independence & quality of life

• Epidemiologic Solution
  • Bisphosphonates
    • Alendronate, Residronate, Ibandronate, Zoledronate

Bisphosphonates

• Alendronate...How it works
  • Target...Osteoclasts
    • Binds to inorganic component of bone
    • Bound alendronate released during resorption
    • Endocytosed by osteoclasts
    • Inhibits mevalonate pathway for cholesterol synthesis
    • Induced osteoclast apoptosis
  • Result...Increased BMD
Bisphosphonates

• Increased BMD...at what cost?

• Decreased bone resorption, remodeling, microdamage repair, mechanical integrity, etc.
  • Allen et al. Bone 2010
  • Mashiba et al Bone 2001
  • Odvina et al J Clin Endocrinol Metab 2005
  • Mashiba et al J Bone Miner Metab 2005
  • Burr et al J Bone Miner Res 1997
  • Cao et al J Bone Miner Res 2002

• Femoral Insufficiency Fracture?

Low Energy Femur Fractures Associated with Alendronate Use

Bisphosphonates and the Femur

• A growing problem
  
  • Pubmed Search
  
  • "bisphosphonate femur" = 1114 citations
  • "bisphosphonate femur fracture" = 874 citations
Bisphosphonates and the Femur

- Nevaizer et al. *J Orthop Trauma* 2008
  - 70 low-energy femur fractures
  - 36% treated with Alendronate
    - 35% demonstrated characteristic fracture pattern
  - Only 1 patient not on alendronate showed this same pattern (dx multiple myeloma)
  - Fracture pattern & duration of alendronate use: 6.9 yrs vs 2.5 yrs

- Goh et al. *JBJS Br* 2007
  - 13 low-energy subtrochanteric fractures
    - 9 on alendronate (mean 4.2yrs)
    - 5 with prodromal pain
    - 3 with contralateral stress reaction
Bisphosphonates and the Femur

• Kweck et al. Injury 2008
  • 17 low-energy fractures
  • Alendronate 4.8 yrs
  • 53% with contralateral stress reaction
  • 76% with prodromal pain
  • Similar fracture patterns

• Isaacs et al. CORR 2010
  • 100 low-energy fractures
  • 21 pre-bisphosphonate (1997)
    • None “insufficiency-type”
  • 79 post-bisphosphonate
    • 41 on alendronate
    • 73% prodromal pain
    • 44% bilateral
  • Alendronate use + fracture = mean 7.1 yrs
  • vs 3.2 yrs without fracture

Bisphosphonates and the Femur

• 72 year-old female with lateral thigh pain on weight bearing. On Alendronate for last 5 years.

What should I do?
What is the likelihood of a nonoperatively treated bisphosphonate-associated femoral stress fracture progressing to completion and in what time period?

Banffy et al. *CORR* 2011
- 34 patients with 40 fractures
- Average bisphosphonate use 6.4 years
- 70% (28/40) completed, displaced fractures treated with IMN

Bisphosphonates and the Femur
Bisphosphonates and the Femur

- Banffy et al. CORR 2011
- 6 of 12 nondisplaced stress fractures treated with prophylactic IMN
- 6 of 12 treated non-operatively
  - PWB with assist device

- Bisphosphonates and the Femur

  - Banffy et al. CORR 2011
  - 6 nonoperative fractures
    - Time to fracture completion...10 months (3-18)
      - 2 stress fracture did not complete after 2 year
  - Hospital stay
    - Prophylactic IMN... **3.7 days** (100% union)
    - IMN acute fracture... **6 days** (95% union)
    - IMN acute fracture after previous non-op management... **6 days** (100% union)

71 year-old fall from standing after 6 years of bisphosphonate therapy
Left femur? No problem
Right femur?
Bisphosphonates and the Femur

• Fix the broken femur
• Image the other side & strongly consider prophylactic fixation if any changes seen
• Bisphosphonates for 5 yr max then holiday for 2-3 yrs
  • Some advocate shorter duration
• Some evidence to support rPTH administration during post-op period to augment healing

Bisphosphonates and the Femur

Thanks Very Much & Good Luck

Questions, Comments...

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