


Bisphosphonate-Related Atypical Femur Fractures



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Disclosures

- Associate Editor, JOT
- Reviewer TIO, JAAOS
- OTA/AAOS Committee Member

- NO FINANCIAL DISCLOSURES




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Identify the problem

- Bisphosphonates are a first line treatment for osteoporosis
- Osteoporosis diagnosis is increasing exponentially.....

SO.....

- THESE FRACTURES WILL CONTINUE TO INCREASE EXPONENTIALLY AS WELL



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Case Example

- 73yo independent female
 - drives, cooks, volunteers
 - 5 mos progressively worsening R hip/thigh pain



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Case Example

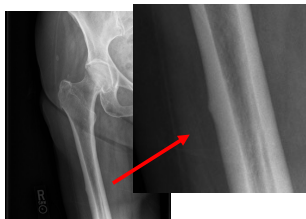
- Thoughts?
 - H&P?
 - ROS?
 - Treatment??



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Case Example


- Thoughts?
 - H&P?
 - ROS?
 - Treatment??



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Case Example

- Misdiagnosed, and two weeks later.....



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“It’s a femur- I’m going to transfer”

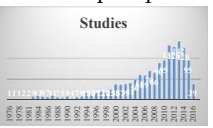
- Low energy, geriatric fractures
 - Can/should be managed by non-traumatologists at community/local hospitals and centers
- Treatment similar to other geriatric hip fractures
 - Nail them
- What’s important is identifying them early AND preventing fractures when possible
 - Obvious complete injuries
 - CONTRALATERAL stress reaction/fracture


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Scope of the problem

- Incidence ~ 3-50/100,000 person/years
- ~2% of all chronic bisphosphonate users





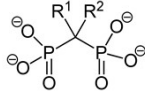
Shane E, et al. Atypical subtrochanteric femur and diaphyseal femoral fractures: Second report of a task force of the American Society for Bone and Mineral Research. *J Bone Miner Res.* 2014;29:1-23

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Bisphosphonates- what are they

- Been around for a long time
- Pyrophosphate analogs- inhibit prenylation *yawn*
 - All modern medications are nitrogen containing
 - *understand the dosing!! (PO vs IV)*
 - understand indications for use
- Work to block osteoclast function, preventing bone turnover
 - *But osteoclasts and osteoblasts are coupled.....*
 - High turnover areas seem to be most affected (SUBTROCH)



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Bisphosphonates- who should get them?

- OSTEOPOROSIS
 - T score <-2.5
 - Level 1 studies- reduce risk of subsequent vertebral/nonvertebral fractures in those with osteoporosis.
 - Benefit maximized at 3-5 years → thereafter little to no fracture reduction benefit.
- OSTEOPENIA *with* risk factors
 - Calculate FRAX score (10 year fracture risk)
 - treat if hip fx risk >3% OR any fx >20%



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FRAX Score



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Common Medications

TABLE 4. Available dosing forms of nitrogen-containing bisphosphonates in the United States

Drug	Oral Dosing			Intravenous
	Daily	Weekly	Monthly	
Alendronate (Fosamax)	5 and 10 mg	35 and 70 mg	150 mg	3 mg every 3 months 5 mg once a year
Risedronate (Actonel)	5 mg	35 mg	150 mg	
Ibandronate (Boniva)	2.5 mg			
Zoledronate (Reclast)				



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Take a thorough history on ALL your patients

- "I don't know the name of my medications"
- "ask my son/daughter, they have a list" (And they live 10 states away)
- "Isn't my medication list in the computer?"
- "Yes I take something for my bones"
 - Is it just OTC Vitamin D and Calcium?

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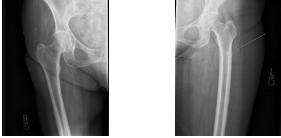
Best questions to ask- patient and family


- "Do you take a pill that requires you sit up for 30 minutes afterwards?"
 - ➔ Did you EVER take something like this?
- "Do you go to a doctor to get an IV of medication at the office once or twice a year?"
- These ??s WILL ferret out nearly all patients on bisphosphonates

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Bisphosphonate Patients

- In your office/ at hospital for ANY reason....
 - get in habit of asking about thigh pain at every visit (part of ROS)
 - Prodromal pain in 35-70% of patients before fracture





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Bisphosphonate Femur Workup

- No single algorithm
- Helpful to follow SOMETHING
- As General Rule.....

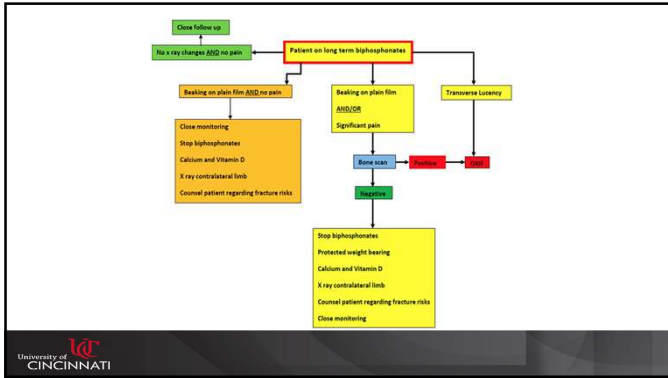
IF clinical AND radiographic features → NAIL

IF radiographic features only → OBSERVE CLOSELY





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Importance of Imaging

- Plain films- First line imaging- get BOTH femurs and AP pelvis
 - Cortical beaking (stress changes)- Classic finding
 - Transverse lucencies (stress fractures)
- Utility of MRI when plain films negative
 - if high index of suspicion
- Bone scans- blah
- CT- not indicated

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NOTICE THE CLASSIC FEATURES

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When to pull trigger on surgery

- “There is a fracture, I need to fix it” 
- Thigh Pain + Radiographic Features (any modality)



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Why not a trial of nonoperative management?

- Banffy et al CORR 2011
 - 5/6 treated nonop went on to complete fracture (84%)
- Egol et al JOT 2013
 - 49% failed nonop trial
- Operative Treatment
 - Faster time to union
 - More likely to be pain-free



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MANAGE THE UNDERLYING PROBLEM

- 1) Stop bisphosphonates immediately
- 2) Repeat DEXA as outpatient
 - still osteoporotic/osteopenic.....consider anabolic agent
 - Forteo (teriparatide)
 - Tymlos (abaloparatide)
 - Prolia (denosumab)
 - Romosozumab?

} THESE BUILD BONE!!



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Consult Specialists Early and Often

- Do you have a fracture liaison service (FLS)?
- Do you have a bone health program?
- Do you have a reliable endocrinologist?
- Think about Own the Bone



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Own The Bone

- Started in 2009
- 10 measures
- Goal to build FLS and improve preventative care
- >250 programs in 2019

Measure	1	2
1. Improve calcium intake	1	2
2. Increase vitamin D intake	2	3
3. Weight-bearing and muscle strengthening exercise	3	4
4. Fall prevention/education	4	5
5. Smoke cessation	5	6
6. Limiting excessive alcohol intake	6	7
7. Pharmacotherapy	7	8
8. Targeted medical therapy (DM, DM2, Energy & Ray, Absorption)	8	9
9. Patient education to report the patient's height, weight, and history of falls, and recommendations for treatment	9	10
10. Patient education letter to explain bone health risk factors and recommendations for treatment	10	



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Pearls

- Hard(er) reductions
 - It's still a subtroch.
 - Get it reduced before you ream and lock
 - Predictable deformity- Abd, ER, Flexion
 - Traction will not reduce for you
 - Poor technique → may DISPLACE a nondisplaced stress reaction



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Reduction Tricks

- Percutaneous ball spike pushers
- Bone Hooks
- Elevators
- Joysticks
 - can act as blocker medially
- OVERALL → start point AND trajectory drive your result



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Technical Pearls

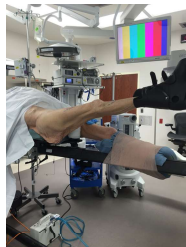
- THE BONE IS BRITTLE
 - Fracture propagation is common
 - prevented with correct start point and trajectory
- Isthmus may be narrowed, healing prolonged
 - Careful reaming up to accommodate larger diameter nail
 - 10mm sufficient? (in my practice, yes)
 - Don't settle for pediatric size nail (8.5mm, 9mm)
 - Early implant failure a concern (avg. healing time 7-11months)



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My set up

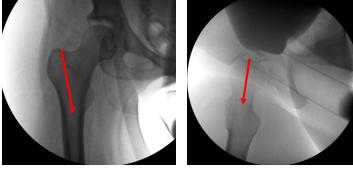
- Supine Scissored
 - Useful if alone/no assist
 - Easier use of perc adjuvants
 - Easier imaging
- Get Hips Over
 - Perineal post to contralateral ischium
 - "Nothing in your way"



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Technical Pearls

- ALWAYS ALWAYS ALWAYS.....
 - Protect the femoral neck
 - Use long nail
- Start Point and Trajectory




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Technical Pearls

- Any Benefit to Biologics?
 - No scientific evidence to support use of:
 - Acute bone graft
 - BMP2/7
 - Bone marrow aspirate/BMAC




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Technical Pearls

- What seems to matter?
 - Quality of reduction!!
 - Cho et al JOT 2013
- Spend the time to get it reduced and you'll be rewarded later



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Outcomes/Postop

Greater complication rates

- nonunion
- time to union higher
- mortality risk
- intraop Fracture



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Your Job in Postop period

- Return these people to independence
 - 88% independent BEFORE fracture (Bogdan et al JOT 2016)
- All pts WBAT (trust your implants)
 - 2/3 return to baseline @ 12 months
 - 98% fractures healed @ 12 months
- STOP bisphosphonates
- Optimize bone health
 - Calcium, Vitamin D
 - Consider anabolic agent

Consult Endocrinologist
 Bone Health Specialist
 Fracture Liaison Service



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Your Job in the Office- ALL Geriatric Patients


- Identify patients at risk BEFORE a fracture
 - thorough history and examination
 - consider early referral to endocrinologist if prolonged bisphosphonate use
 - >5 years....NEED TO STOP!!



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Your Job in the Office- ALL Geriatric Patients

- Pain and radiographic changes
 - Prophylactic NAIL
- No pain with/ without radiographic changes
 - Observe closely/ surveillance q3months → q6months
 - d/c Bisphosphonates
- Pain, negative radiographs.....case by case basis



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THANK YOU



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