

AMSER Case of the Month

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Occult intertrochanteric fracture

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Patient Presentation

- HPI: The patient is an 80F who presented after a mechanical fall. She endorsed severe left hip pain and inability to bear weight.
- PMH:
 - Osteoporosis
 - Recurrent falls attributed to BPPV

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 1. Acute hip pain. Fall or minor trauma. Suspect fracture. Initial imaging.		
Procedure	Appropriateness Category	Relative Radiation Level
Radiography hip	Usually Appropriate	☼☼☼
Radiography pelvis	Usually Appropriate	☼☼
Radiography pelvis and hips	Usually Appropriate	☼☼☼
CT pelvis and hips with IV contrast	Usually Not Appropriate	☼☼☼
CT pelvis and hips without and with IV contrast	Usually Not Appropriate	☼☼☼☼
CT pelvis and hips without IV contrast	Usually Not Appropriate	☼☼☼
MRI pelvis and affected hip without and with IV contrast	Usually Not Appropriate	0
MRI pelvis and affected hip without IV contrast	Usually Not Appropriate	0
Tc-99m bone scan hips	Usually Not Appropriate	☼☼☼
US hip	Usually Not Appropriate	0

This imaging modality was ordered by the ER physician

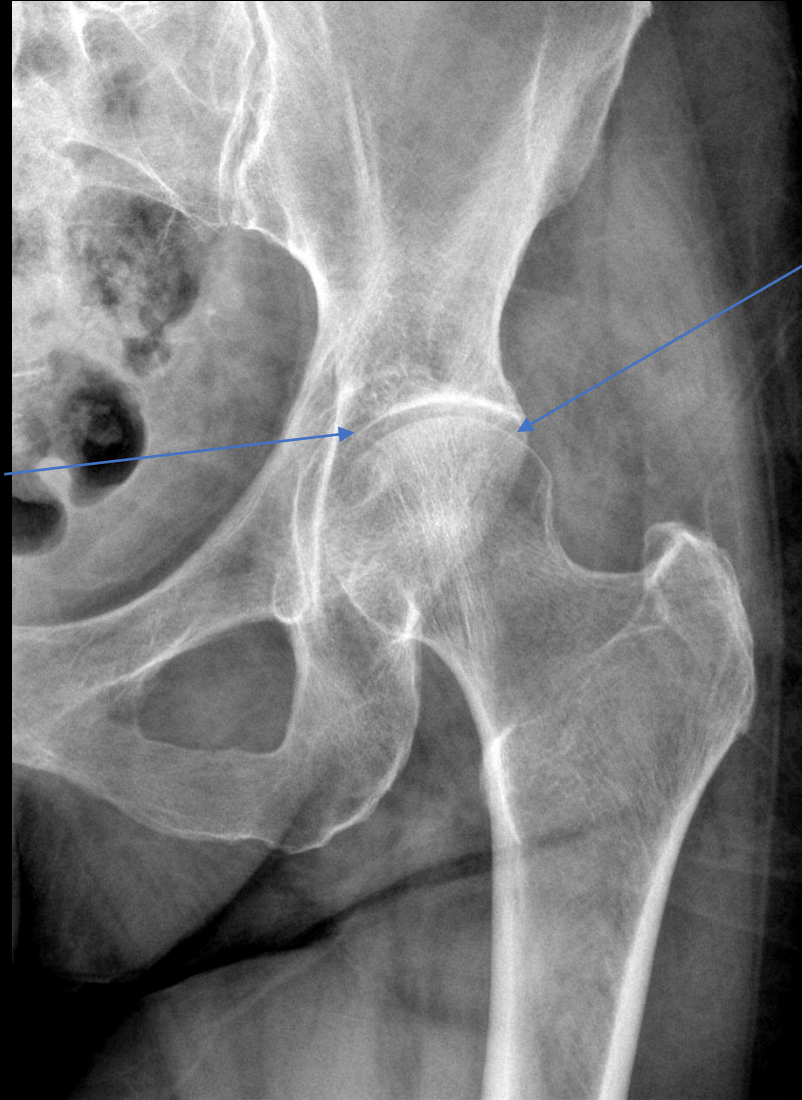
XR Findings



XR Findings (labeled)

- Degenerative changes consistent with osteoarthritis
 - Hip joint space narrowing
 - Subchondral sclerosis
- **No evidence of an acute fracture or dislocation**

Subchondral
sclerosis



Mild left hip joint-
space narrowing

Select the applicable ACR Appropriateness Criteria

Variant 2. Acute hip pain. Fall or minor trauma. Negative radiographs. Suspect fracture. Next imaging study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI pelvis and affected hip without IV contrast	Usually Appropriate	0
CT pelvis and hips without IV contrast	Usually Appropriate	☼☼☼
CT pelvis and hips with IV contrast	Usually Not Appropriate	☼☼☼
CT pelvis and hips without and with IV contrast	Usually Not Appropriate	☼☼☼☼
MRI pelvis and affected hip without and with IV contrast	Usually Not Appropriate	0
Tc-99m bone scan hips	Usually Not Appropriate	☼☼☼
US hip	Usually Not Appropriate	0

This imaging modality was ordered by the ER physician

CT Findings



CT Findings (labeled)

- Diffuse osseous demineralization
- **No acute fracture identified**



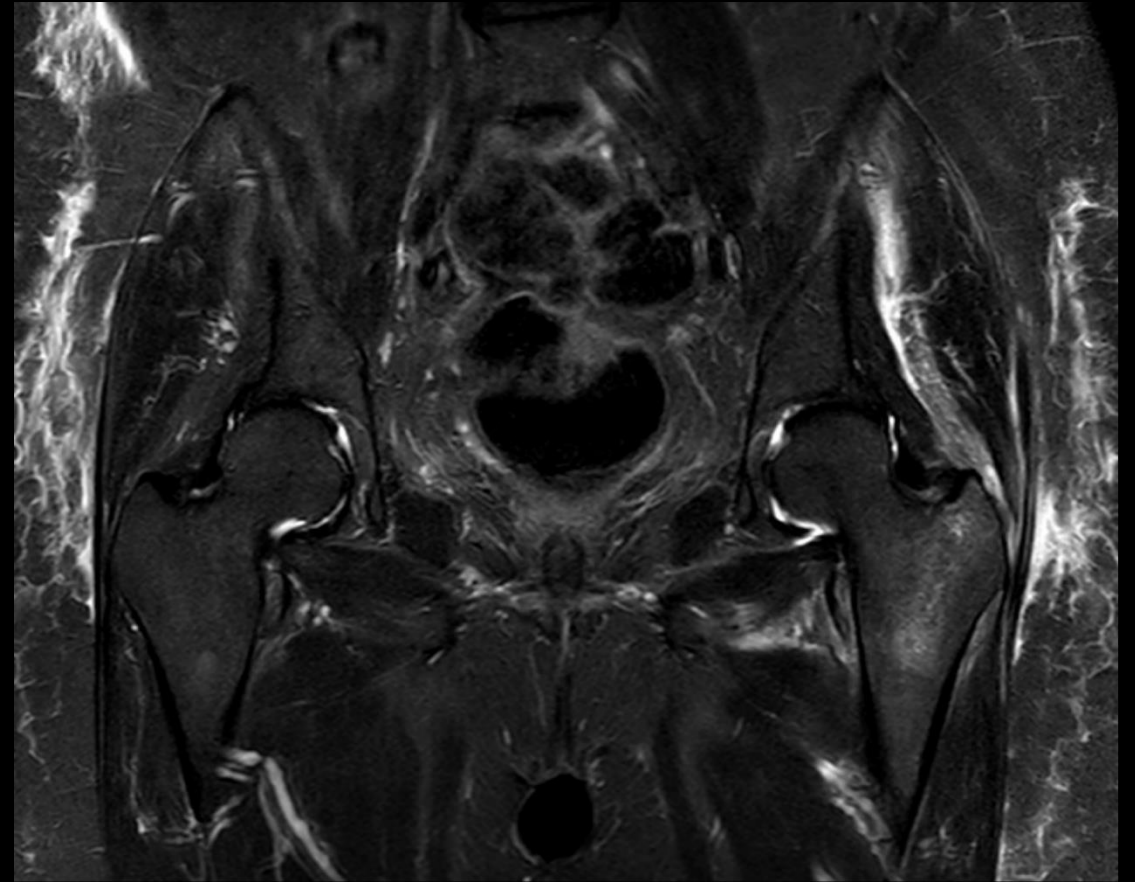
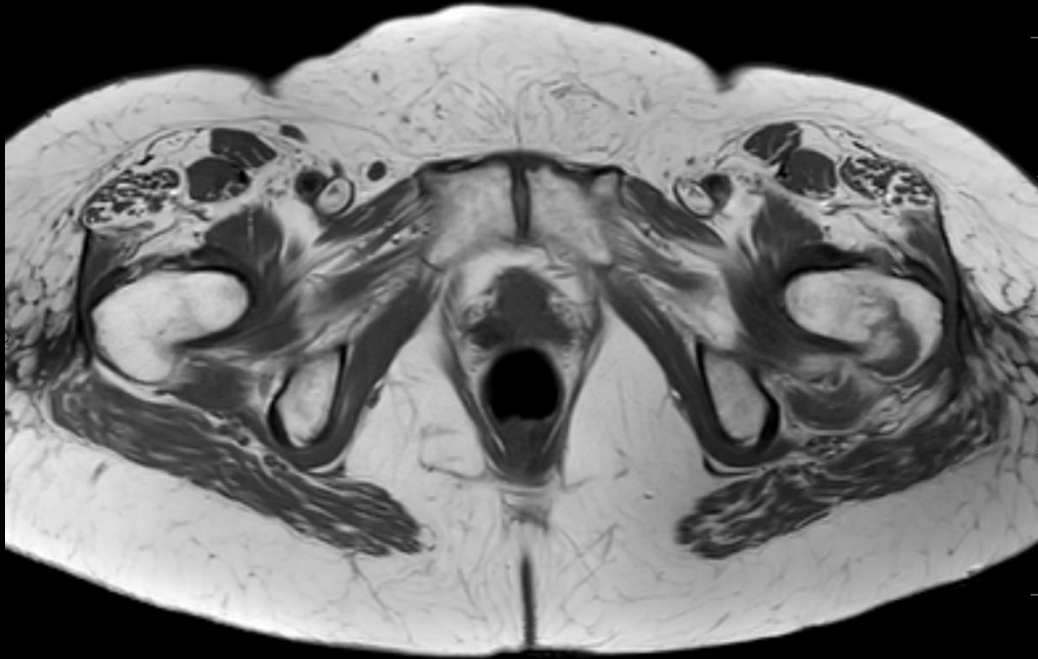
Select the applicable ACR Appropriateness Criteria

Variant 2. Acute hip pain. Fall or minor trauma. Negative radiographs. Suspect fracture. Next imaging study.		
Procedure	Appropriateness Category	Relative Radiation Level
MRI pelvis and affected hip without IV contrast	Usually Appropriate	0
CT pelvis and hips without IV contrast	Usually Appropriate	⚠⚠⚠
CT pelvis and hips with IV contrast	Usually Not Appropriate	⚠⚠⚠
CT pelvis and hips without and with IV contrast	Usually Not Appropriate	⚠⚠⚠⚠
MRI pelvis and affected hip without and with IV contrast	Usually Not Appropriate	0
Tc-99m bone scan hips	Usually Not Appropriate	⚠⚠⚠
US hip	Usually Not Appropriate	0

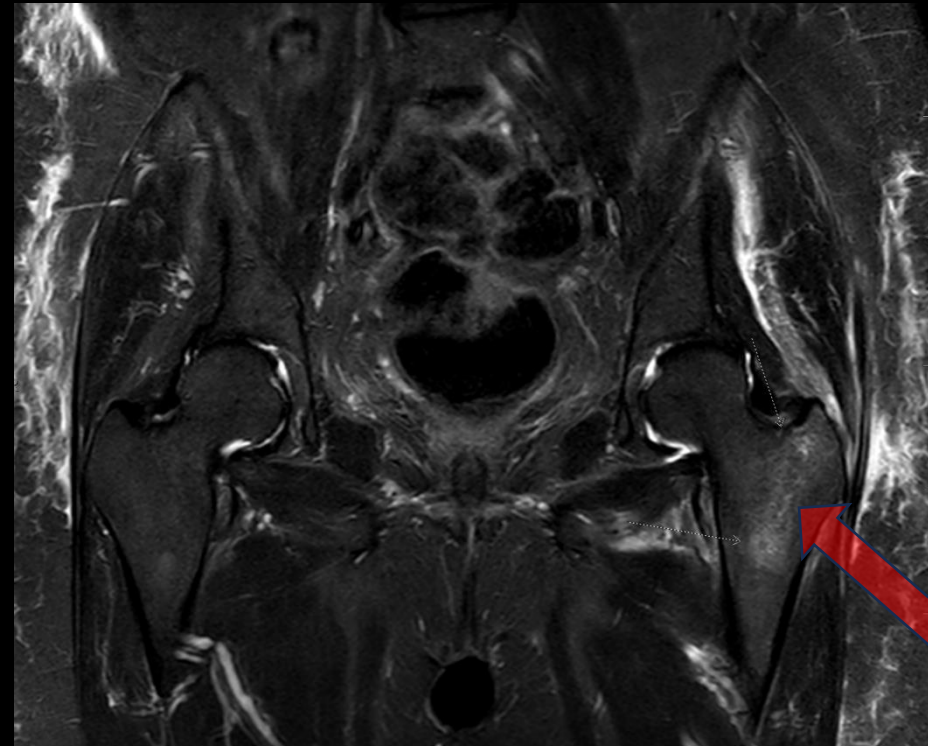
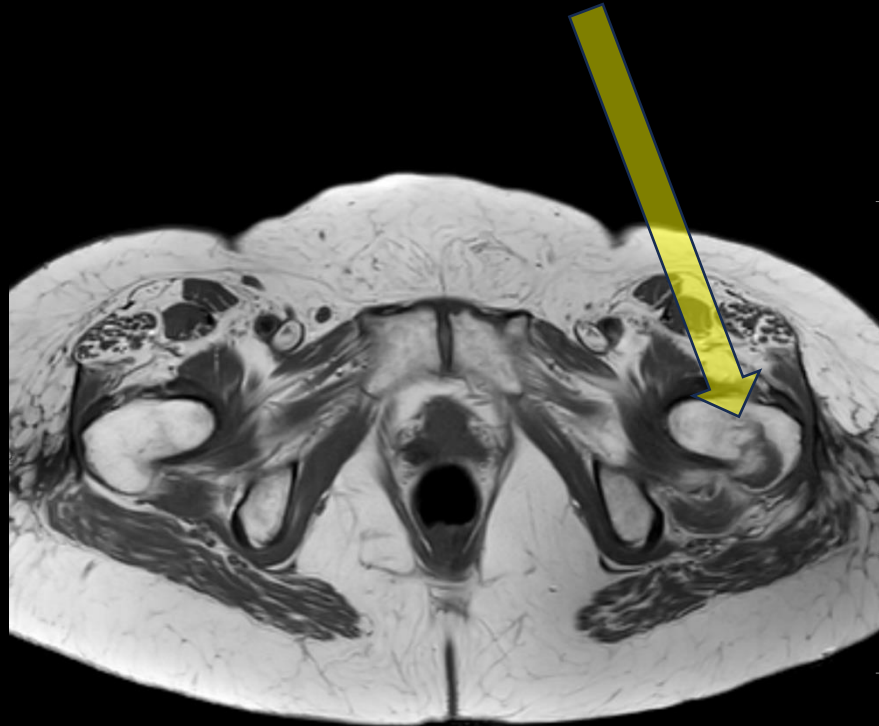
This imaging modality was ordered by the physician

Persistent concern for fracture due to inability to bear weight → **MRI recommended**

MRI Findings



Findings: (labeled)



Axial T1 MRI demonstrates linear hypointense signal within the proximal left femur, consistent with a fracture line. An associated sagittal STIR sequence shows hyperintense bone marrow edema most consistent with an acute, non-displaced fracture.

Final Dx:

Occult nondisplaced left intertrochanteric
femur fracture

Case Discussion

- **Occult proximal femur fractures** are fractures that are not visible or are equivocal on initial radiographs but are subsequently identified on advanced imaging.
- Mechanism often involves low-energy trauma/fall in an elderly individual with osteoporosis¹
- Clinical signs include persistent hip or groin pain after trauma and inability to bear weight¹
- Early diagnosis is important because an initially nondisplaced fracture may progress to displacement and associated complications².

Case Discussion

- Imaging algorithm
 - Radiographs remain the appropriate first-line examination for acute traumatic hip pain³
 - Approximately 2-10% of proximal femur fractures are missed on initial radiographs⁴
 - If clinical suspicion for fracture (i.e. inability to bear weight) persists despite negative or indeterminate radiographs, CT without contrast and MRI without contrast are recommended as the next imaging study³.
- Typical MRI findings include⁵:
 - Linear hypointense signal on T1-weighted imaging
 - Surrounding bone marrow edema, which is hyperintense on fluid-sensitive sequences such as STIR or fat-suppressed T2-weighted imaging.
- Management often includes operative intervention

References:

1. Schroeder JD, Turner SP, Buck E. Hip fractures: diagnosis and management. Am Fam Physician. 2022;106(6):675-683.
2. Chatha HA, Ullah S, Cheema ZZ. Review Article: Magnetic Resonance Imaging and Computed Tomography in the Diagnosis of Occult Proximal Femur Fractures. Journal of Orthopaedic Surgery. 2011;19(1):99-103. doi:10.1177/230949901101900123
3. Ross AB, Lee KS, Chang EY, et al. ACR Appropriateness Criteria® Acute Hip Pain-Suspected Fracture. Journal of the American College of Radiology. 2019;16(5):S18-S25. doi:10.1016/j.jacr.2019.02.028
4. Gill SK, Smith J, Fox R, Chesser TJS. Investigation of Occult Hip Fractures: The Use of CT and MRI. The Scientific World Journal. 2013;2013:1-4. doi:10.1155/2013/830319
5. Nachtrab O, Cassar-Pullicino VN, Lalam R, Tins B, Tyrrell PNM, Singh J. Role of MRI in hip fractures, including stress fractures, occult fractures, avulsion fractures. European Radiology. 2012;81(12):3813-3823. doi:10.1016/j.ejrad.2011.04.003