

A Case Series of Occult Femoral Neck Fracture, Why Plain Radiograph is not Enough?

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Abstract

Background: About 10% of hip fractures are missed on initial presentation and potentially expose patients to increased morbidity and unnecessary complex surgeries. 2,3 CT-scan and MRI in the emergency settings have been proposed to avoid a misdiagnosis. 3,6,7

Case Series: three cases (two female and one male patient) patients with hip pain were presented with normal x-ray on initial presentation. Further investigation using CT-scan and MRI revealed femoral neck fractures.

Case 1 : A 77 years-old female presented with right hip pain after a ground-level fall. Plain radiograph was normal and the patient was discharged from emergency. One week later, her hip pain worsened and a follow up x-ray showed a displaced femoral neck fracture. The fracture then treated with bipolar hemiarthroplasty.

Case 2 : An 87 years-old female presented with left hip pain after a fall in the bathroom. She was able to bear weight. Initial hip x-ray appeared normal. Further investigation with a pelvic CT scan revealed a displaced femoral neck fracture.

Case 3 : A 49 years-old male presented with worsening right hip pain since more than a week. The patient was physically active and has no history of trauma or associated hip injury. Initial x-ray showed a normal hip but further imaging study using MRI revealed an undisplaced femoral neck fracture. The patient was treated conservatively as he refused to do surgery.

Conclusion: Traumatic hip pain with negative plain radiograph should be followed by MRI or CT -scan to avoid misdiagnosis.

Keywords: Occult hip fracture, Missed hip fracture, Femoral Neck Fracture, Elderly patient

Background

Occult femoral neck fractures are challenging to diagnose. The risk of hip fractures increases exponentially with advancing age and the incidence projected to increase by nearly 4-fold by 2050[1]. About 10% of hip fractures are missed on initial presentation and potentially exposes patients to increased morbidity and unnecessary complex surgeries[2][3]. Additionally, a delay in the diagnosis and surgery delay of more than 48 hours has been associated with increased mortality[4]. Once misdiagnosed, the non-displaced fracture may become displaced and may need hip arthroplasty rather than more simple osteosynthesis procedure[5]. Plain radiograph have an estimated sensitivity of 90%-98% for hip fractures, means an occult hip fracture still a possibility in patients presented with hip pain with negative x-ray.[3] Further investigation using magnetic resonance imaging (MRI) or computed tomography (CT) scan in emergency settings have been proposed to avoid a misdiagnosis[6][3][7]. We present three cases with normal x-ray on initial presentation and later diagnosed as hip fracture.

Case Series

Case 1: A 77 years-old female presented with right hip pain after a ground-level fall. Plain radiograph was normal (fig.1) and the patient was discharged from emergency. One week later, her hip pain worsened and a follow up x-ray showed a displaced femoral neck fracture. The fracture then treated with bipolar hemiarthroplasty.

Case 2: An 87 years-old female presented with left hip pain after a fall in the bathroom. She was able to bear weight. Initial hip x-ray appeared normal (Fig.2). Further investigation with a pelvic CT scan revealed a displaced femoral neck fracture.

Case 3: a 49 years-old male presented with worsening right hip pain since more than 1 week. The patient was physically active and has no history of trauma or associated hip injury. Initial x-ray showed a normal hip (Fig. 3) but further imaging study using MRI revealed an undisplaced femoral neck fracture. The patient was treated conservatively as he refused to do surgery.

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Figure 1: a & b) Initial plain radiograph. c) Plain radiograph 1 week later showed a displaced femoral neck fracture. c) Bipolar hemiarthroplasty was done for treatment.



Figure 2: a) Initial x-ray showed no sign of fracture. b&c) Further investigation using CT-scan revealed a femoral neck fracture with displacement.

simple multiple screws femoral neck fixation. As proposed by many authors, early use of MRI or CT scan to detect occult hip fracture are necessary[2][3][9].

The second case showed that ability to walk with their affected hip is not an absolute sign to exclude hip fracture. Study by Frihagen revealed, in some cases the patient has severe pain, but no fracture is visible on plain radiograph. In this type of scenario, MRI investigation will be a great value[10]. Meticulous history and careful physical examination, aggressive

Discussion

All patients in this series presented with normal hip x-ray at initial, according to both radiologist and on duty physician. in agreement with study by Wei et al , only 64-66% of initially missed fractures can be detected even by radiologist specialized in emergency or musculoskeletal radiology [8]. Missing hip fracture has gained special attention because of consequences of morbidity, delayed and complex surgery[4][3][5].

The first case revealed traumatic nature, and painful hip rotation the hip should prompt physician of possible hip fracture. Had the patient proceed with MRI or CT scan, it might have been possible to identify the fracture before it was displaced, and treated the patient with more

investigation should be done to exclude hip fracture in patient with tight and pelvic pain.

The third case showed another diagnostic challenge as the patient was relatively young, with no history of obvious trauma but suffered from worsening hip pain with normal plain radiograph. MRI was done and detected an undisplaced femoral neck fracture. Some study showed MRI were able to diagnose fractures in two thirds of patients who also had negative radiograph[11]. The high accuracy of MRI to detect occult fracture can be the answer to this challenge.

Compared to CT-scan, MRI is more superior in detecting occult hip fracture[11][12]. CT-scan read by senior radiologist was found to have a sensitivity of 87% in detecting occult hip fracture. Some study showed MRI has a sensitivity of 100% in detection of fractures and leads to a change in management for many patients when performed after CT [12]. MRI is the most sensitive modality to detect hip fractures but the availability, cost, and time consumed are drawbacks[9]. Emergency CT-scan should be considered in places where MRI is unavailable.

Conclusion

Diagnosing occult femoral neck fracture is challenging especially when the clinical sign and initial radiograph are unremarkable. Traumatic hip pain with negative plain radiograph should be followed by MRI or CT-scan to avoid misdiagnosis.

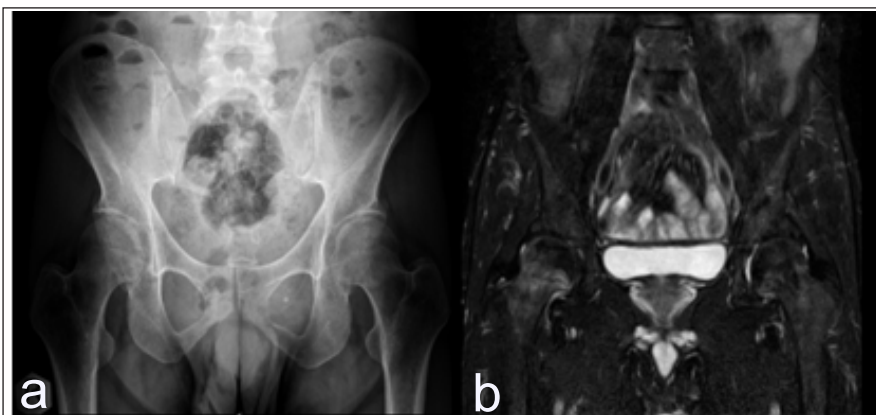


Figure 3: a) Plain radiograph appear to be normal. b) Coronal T1 sequence on MRI showed a fracture line and marked bone edema at the neck of femur.

Clinical Message

Although rare, occult hip fracture has taken a special place because of increased morbidity and mortality. Diagnosing occult hip fracture is challenging, especially if the initial radiograph is found to be negative. Further investigation using MRI or CT-scan is crucial.

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