Occult hip fracture diagnosed by MRI scan after inconclusive X-ray and CT scan

Bogdan Deleanu, Radu Prejbeanu, Florin Birsasteanu, Dinu Vermesan, Liviu-Ionut Micle, Eleftherios Tsiridis, Vlad Predescu

ABSTRACT

Introduction: Hip fractures are common, most of them being easily diagnosed with the clinical examination and X-ray. Few cases need a computed tomography (CT) scan and even fewer an magnetic resonance imaging (MRI) scan. Here we report a case that was diagnosed with occult femoral neck fracture only after undergoing a pelvic MRI scan.

Case Report: The patient has presented a normal X-ray at the first exam with minimal clinical signs. The emergency CT scan shown no injury and the patient was left home. Three days after, the patient returned to hospital with increased pain and limited mobility to the left hip. Following the emergency MRI scan a femoral neck fracture has been revealed. The patient was soon operated and we used a total hip cemented prosthesis on the affected hip considering the age and the condition of the patient.

Conclusion: Occult hip fractures should be suspicioned in all elderly patients who have a history of hip trauma even if X-ray and CT scan do not reveal a fracture. If it's available, the use of MRI scan is the best option for diagnose of occult hip fractures.

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CASE REPORT

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prosthesis on the affected hip considering the age and the condition of the patient. **Conclusion:** Occult hip fractures should be suspicious in all elderly patients who have a history of hip trauma even if X-ray and CT scan do not reveal a fracture. If it's available, the use of MRI scan is the best option for diagnose of occult hip fractures.

Keywords: CT-scan, MRI-scan, Occult hip fractures

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INTRODUCTION

Hip fractures are one of the most frequent types of fractures seen in orthopedic practice [1, 2]. Considering that life expectancy increased more and more in the past few decades the elderly population increased too [3], so much more attention is needed to properly diagnose hip fractures which occur more often in this segment of population [4]. Standard anterior-posterior X-ray may help us to diagnose displaced fractures but in non-displaced fractures a CT scan or an MRI scan is recommended [5, 6]. Studies show that occult hip fractures represent 2–10% of total hip fractures [5, 7], and the MRI scan has the best accuracy in detecting these fractures [5–9]. It is considered that late diagnose of occult hip fractures occur in 2–9% of the cases [10]. Holder et al. showed that CT scan performed in less than 3 days after trauma has 93% sensitivity and 95% specificity, so there is a significant percent of occult hip fractures missed by CT scan [11, 12].

Here we report a case of occult femoral fracture that was diagnosed using a pelvic MRI scan 3 days after an X-ray and a CT scan shown no injury. The purpose is to show the importance of MRI scan in diagnosing occult hip fractures.

CASE REPORT

A 72-year-old female had a history of left hip trauma after tripping and falling at home. She was brought immediately to the emergency department and an anterior-posterior hip X-ray was done (Figure 1). As seen in the X-ray there was no sign of fracture but the clinical examination revealed pain at the left hip and limited mobility. Thus, considering the age of the patient, a pelvic CT scan was requested which also revealed no injury to the left hip (Figure 2). The patient was discharged and left home with anti-inflammatory and pain medication, being programmed to return after 7 days for a follow-up.

After three days the patient returned to emergency department with increased pain to the left hip and almost no active mobility possible to the affected hip. We decided to do a pelvic MRI scan which revealed an occult left femoral neck fracture (Figure 3).

The second day the patient was operated. We have chosen a hip direct lateral approach (Hardinge) with the patient in supine position. Considering the age of the patient and her associated conditions we opted for a cemented total hip arthroplasty in order to have the best results (Figure 4). The second day postoperative the patient started rehabilitation with bed side exercises and at third day postoperatively weight bearing walk was possible. Follow-up at 45th day, the patient had an overall good recovery with a hip Harris score of 78.

DISCUSSION

The best imaging option for diagnosing hip fractures is still a subject of discussion. Obviously this discussion applies to the undisplaced and occult fractures.

X-ray exam is a primary investigation used in pre-operative planning but by definition an occult hip fracture is not visible on X-ray exam so using only this exam is not helpful in diagnosing such cases. Due to increased cost and limited availability in some hospitals the MRI-scan is not a primary imaging option, as seen in this case.

Studies show that MRI scan has the best sensitivity and it should be used as a primary choice for diagnosing this type of fractures [6–9, 13]. Both orthopedic surgeons and radiologists agree that MRI scan is the gold standard in diagnosing occult hip fractures [5–9, 13]. It is recommended that MRI scan to be done in the first 24 hours after the hip trauma. If not available, a 72-hour CT scan or MRI scan is recommended.

CT scan is another imaging option which can be helpful but as seen in this case the results may be

Figure 1: X-ray at the first presentation showing no fracture.

Figure 2: Computed tomography scan at the first presentation showing no fracture

inconclusive or can give false-negative results. The CT scan has the advantages to be widely available with a lower cost comparative to MRI scan [5, 14], but even so the MRI is preferable. The advantages of MRI scan over CT scan are the better sensitivity (100%) and no exposure to harmful radiation [15]. The literature also mentions the bone scintigraphy using technetium polyphosphate with

Figure 3: Magnetic resonance imaging scan at 3rd day after trauma showing femoral neck fracture.

Figure 4: The postoperative recovery was good and at sixth day the patient was discharged.

a high sensitivity in detecting occult fractures (98%) but this technique is less available and with limited reliability [16]. Another useful option is the sonography which is mentioned to have 100% sensibility and 60% specificity compared to MRI [17].

CONCLUSION

Occult hip fractures can easily be under-diagnosed or missed using X-ray and even a CT scan. The best option

available remains the MRI scan and it should be the first to be used in cases with hip trauma and no X-ray signs, especially in the elderly population. Preferably the MRI should be performed in the first 24 hours after trauma to decrease the complications and obtain the best curative results.

Author Contributions

Bogdan Deleanu – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Radu Prejbeanu – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Florin Birsasteanu – Analysis and interpretation of data, Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

Dinu Vermesan – Analysis and interpretation of data, Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

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Eleftherios Tsiridis – Analysis and interpretation of data, Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

Vlad Predescu – Analysis and interpretation of data, Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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