Quick Diagnosis of Non-displaced Fracture of the Femoral Neck: A Case Report

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Non-displaced fractures of the femoral neck in the elderly are serious injuries. They may not be evident on initial radiographs due to overlying soft tissue, osteopenia, or radiographic techniques. Delay in diagnosis can increase associated medical, economic, and legal implications in the changing health care environment, since displacement can lead to avascular necrosis of the femoral head, nonunion, or varus deformity. Early and accurate detection can enable physicians to perform relatively simple surgical fixations in situ. Refinements in diagnosis can improve outcomes and minimize the duration of hospital stays. Traditionally, bone scans and magnetic resonance imaging (MRI) have been used for early detection of non-displaced femoral neck fractures. The disadvantages of these examination techniques include exposure to radiation and high costs, respectively. Initial radiographs of elderly patients were equivocal, but clear fracture lines were demonstrated after retaking the films while keeping the ipsilateral foot internally rotated at 30 degrees. This simple radiographic technique can enhance radiographic diagnosis of this elusive entity.

Key words: Femoral neck, fractures, avascular necrosis, MRI

Early detection of hip fractures is increasingly important medically, economically, and legally in the changing health environment \cite{1}. In older osteoporotic patients, non-displaced femoral neck fractures are particularly difficult to diagnose \cite{2-6}. Accurate diagnosis is important, since prognosis is directly related to the degree of displacement, which can become worse without intervention \cite{3}. Bone scans and MRI are accepted and are the two most commonly used examination techniques when a non-displaced femoral neck is suggested \cite{7-12}. Both methods are indicated particularly when initial radiographs show negative or equivocal findings. Although both bone scans and magnetic resonance imaging (MRI) aid in early diagnosis of non-displaced fractures of the femoral neck, there are disadvantages. Matin \cite{13} reported that for patients older than 65 years, bone scan results may only be positive only after 72 hours after injury. Bone scans also emit radiation. MRI is expensive. In this report, we present a quick and simple method for the early diagnosis of non-displaced fracture of the femoral neck. This was achieved by placing the ipsilateral foot in a position of 30 degrees internal rotation while radiographic films were taken. This radiographic technique clearly showed the fracture lines of femoral neck fractures. This is a quick and easy method for diagnosing non-displaced femoral neck fractures, and can eliminate the need for further imaging studies such as bone scans or MRI.

CASE REPORT

A 78-year-old woman experienced a sliding injury at home, after which a painful right hip was noted. The patient could not stand on her right leg and was sent to our emergency department. Physical examination showed pain of the right hip during extension and internal rotation. The initial radiographic findings of the right hip were equivocal (Fig. 1). The radiograph had been made with the ipsilateral foot in an external rotation position. A radiograph was taken with the ipsilateral foot in an external rotation position of 30 degrees. The non-displaced fracture of the right femoral neck was obvious (Fig. 2). She underwent emergency treatment consisting of fixation by pinning in situ with three cannulated screws. The postoperative course was uneventful without complication. She was discharged 10 days after surgery. She could walk without the aid of a walker 12 weeks after discharge.

DISCUSSION

The diagnosis of non-displaced fractures of the femoral neck is important as the management is...
simple and effective when commenced early and the prognosis is better than for subsequently displaced fractures [14]. Early diagnosis of non-displaced femoral neck fracture permits early fixation in situ before displacement occurs [3]. Various authors have stressed the importance of early diagnosis of non-displaced fractures of the femoral neck since prognosis is dependent on the degree of displacement [2-4, 15]. Early diagnosis of these fractures is difficult because the history and physical examination may be equivocal and the injured leg usually will not show deformity or shortening. Some patients will even be able to stand on the affected leg. Radiographs of non-displaced fractures of the femoral neck are unremarkable even when retrospectively viewed.

The difficulties in detection are compounded by osteopenia, underlying soft tissue, and poor radiographic techniques [2, 4]. Bone scans and MRI continue to be the “gold standards” of imaging modalities for the detection of non-displaced femoral neck fractures, but both have some disadvantages [7, 9, 10, 13]. Bone scans emit radiation and may not generate positive findings until up to 72 hours after the injury when the patients are older than 65 years [13]. MRI is the most sensitive and specific investigation for the detection of occult hip fractures, but it is expensive and cannot be used in patients with pacemakers or various other metallic surgical implants [7, 9, 10].

Good radiographic techniques are crucial for early confirmation of suggested non-displaced fractures of the femoral neck. Bryan [16] reported that radiographs made with the ipsilateral foot at 30 degrees internal rotation clearly demonstrated the fracture line in routine antero-posterior radiographs of the hip. In our patient, the fracture was not found on the original radiograph. As the femoral neck was directed postero-inferiorly, it appeared foreshortened on the antero-posterior radiographs when the ipsilateral lower leg was in the position of external rotation or rest. It was overlapped by the posterior border of the greater trochanter, which may have obscured the fracture line. The fracture line became obvious when the ipsilateral foot was placed at 30 degrees internal rotation.

Some analgesia will typically be required to achieve this position. An intramuscular merperidine, 50 mg of Demerol, was used for pain relief. We were able to achieve a rapid diagnosis and commence treatment soon after. This case demonstrated the ease and utility of this method, which eliminates the need for further imaging studies such as bone scans or MRI.

Non-displaced femoral neck fractures can be difficult to diagnose. Careful attention to radiographic techniques can minimize the number of equivocal cases. The technique used in this paper had a high specificity but was not 100% sensitive. Thus it is important to note that every physician confronted with equivocal radiographs when using the technique described must proceed to either a bone scan (after 72 hours to after injury) or MRI for a definitive diagnosis.

REFERENCES
快速診斷未移位性股骨頸骨折：病例報告

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未移位性股骨頸骨折在老年人是一嚴重的問題，通常在初時的X光片會因軟組織、骨質疏鬆、或放射線照相技術而沒有被發現。延誤診斷常增加罹病率甚至醫療糾紛，若是發生股骨頸移位性骨折更有高比率的股骨頭缺血性壞死、未癒合、或內翻變形等之合併症。早期診斷可以簡單及正確的處理，且可以得到較好的結果及縮短住院天數。傳統上另外可以用核磁共振或核磁共振來早期診斷未移位性股骨頸骨折，但前者有放射性曝露，後者有檢查費用成本很高的缺點。本文中另有一位老年短骨疼痛的病例，初時X光並沒有顯示出病灶，後我們將患側下肢內旋30度照相後得到清晰的X光片來幫助診斷未移位性股骨頸骨折的案例。

關鍵詞：股骨頸，骨折，缺血性壞死，核磁共振