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Lateral X-ray for proximal femoral fractures – Is it really necessary?

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ABSTRACT

Introduction: Historically routine work up of a patient with a proximal femoral fracture always included anterior-posterior (AP) and a lateral film of the hip. The aim was to define the role of the lateral X-ray in the assessment and surgical planning of proximal femur fractures.

Methods: Radiographs of 320 consecutive patients with proximal femoral fractures who were admitted over a 12 months period were divided into lateral and AP views. Two blinded reviewers independently assessed the AP view alone and then the AP plus the lateral view. Fracture classification was noted for each X-ray and then compared with intraoperative diagnosis which was our study's gold standard. A 2 × 2 contingency square table and Pearson's x^2 test were used for statistical analysis.

Results: The rate of correct classification by the reviewers enhanced by the assessment of the lateral X-ray in addition to the AP view for intracapsular fractures ($p = 0.018$) but not for extracapsular fractures ($p = 0.29$). Operative management did not change for intracapsular fractures which appeared displaced on initial AP view after reviewing the lateral X-ray. The only advantage of obtaining a lateral view in intracapsular fracture was the detection of displacement were the fracture appeared to be undisplaced on initial AP view.

Conclusions: This study provides statistical evidence that one view is adequate and safe for majority of proximal femoral fractures. The lateral radiograph should not be performed on a routine basis thus making considerable saving in time and money, and avoiding unnecessary radiation exposure and discomfort to the patient.

Introduction

Femoral neck fractures are one of the commonest trauma admissions to orthopaedic departments, accounting for approximately 100,000/year in the UK.[1] Early diagnosis and appropriate management significantly reduces the morbidity and mortality in these patients.[2] The majority of these fractures are relatively easily diagnosed based on clinical findings and plain radiographs. However some studies quote up to 4.4% of patients present with radiographically occult fractures.[3]

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Traditionally, radiographs in suspected neck of femur fractures have both included anterior-posterior (AP) and lateral views. An AP radiograph of the pelvis is the standard film employed to delineate the fracture pattern, the quality of the bone and the Garden Classification. The lateral view is useful to evaluate the degree of posterior comminution in these fractures.

Introduction of fast track protocols for patients with hip fractures from emergency departments[4] before being seen by an orthopaedic doctor can make further imaging logistically difficult once the patient is transferred to the ward. The lateral view requires movement of the contralateral leg into a flexed and abducted position; this may indirectly cause movement at the fracture site. Thus, an important balance must be achieved between adequate radiographs to ensure an accurate diagnosis, but also to avoid subjecting the patient to unnecessary radiation and discomfort.

This study was undertaken with the aim to assess the clinical need for routine lateral views of the injured hip and its significance in diagnosis and further management plan of these fractures.

Methods

The study was conducted in a busy district general hospital serving a population of 200,000. We compiled a list of all patients presenting with a proximal femoral fracture during the period January–December 2014. All patients that were treated surgically were included in our study.

Patients were excluded from this study if they had: 1) No surgery for any reason, 2) peri-prosthetic fracture, 3) pathological lesions in the ipsilateral femur, 4) occult fractures of the proximal femur.

The X-rays of all the patients included in the study were taken in the A&E department of our hospital. The X-rays were obtained from the hospital PACS system.

The lateral views of the X-ray was defined as a horizontal beam perpendicular to the affected femoral neck with the patient in supine and the non-affected hip flexed out of the way.

Intraoperative diagnosis of the position of the fracture was taken as the gold standard. The intraoperative diagnosis was made during screening by fluoroscopy for fixation choice or arthrotomy for implant replacement.

The X-rays were examined blindly by two of our authors who are experienced orthopaedic registrars. All of the X-rays were presented to the reviewers on a digital PACS viewing monitor so contrast, brightness and magnification could be adjusted to aid with the diagnosis. Each reviewer assessed the X-rays independently and classified the fractures into 5 subgroups:

a) Intertrochanteric Fractures
b) Displaced intracapsular fractures (Garden III and IV)
c) Undisplaced intracapsular fractures (Garden I and II)
d) Fracture with subtrochanteric extension
e) Basal cervical fractures

Each fracture type has a different surgical management plan therefore the differentiation of this fracture is imperative. The reviewers were first shown the AP view and asked to record the diagnosis before looking at the lateral view. After seeing the lateral view, the reviewer was allowed to modify the diagnosis if necessary.

The correlation between the radiological diagnoses before and after viewing the lateral X-ray and definitive intra-operative findings were calculated.

Statistical analysis was performed using Pearson's X^2 test. The value set at 0.05. A 2×2 contingency square table was created to assess the usefulness of the lateral X-ray in the positional diagnosis of these fractures. For the results which were statistically significant results, the sensitivity and specificity were presented with 95% confidence intervals.

Results

320 patients presented with a diagnosis of a proximal femur fracture between January 2014 and December 2014. 31 patients were excluded from the study. Of these 5 had no accurate diagnosis on the operative note, 16 were deemed too unfit for surgery and 10 had fractures that were not in the proximal femur. This left 289 patients who were operated on for proximal femoral fractures during the time period.

Mean age at operation was 81.5 (SD ± 9.3) years, with ages ranging from 38 to 102 years. 150 patients (51.9%) had fractures on the right side. The total number of females was 208 (71.0%). From the operative notes we established that 189 fractures were intracapsular, 67 were intertrochanteric, 9 were basal cervical and 24 had subtrochanteric extension. The method of fixation used to treat these types of fractures are shown in Fig. 1.

For intracapsular fractures, the addition of a lateral X-ray to the AP view significantly improved the rate of correct diagnosis, $p < 0.018$. The sensitivity of an AP X-ray alone was 54.3% (41.2–66.7%, 95% CI) with a specificity of 89.8% (87.3–92.1% 95% CI). Sensitivity improved to 92.1% (76.5–98.1%, 95% CI) and specificity to 91.4 (88.3–93.4%, 95% CI) after addition of the lateral X-ray. However the only additional advantage provided by the inclusion of the lateral X-ray was in detecting the displacement of intracapsular fracture when it appeared to be undisplaced on the initial AP X-ray. Operative management did not change for intracapsular fractures which appeared displaced on initial AP view after review of the lateral X-ray.

For extracapsular fracture, the correct diagnosis rates were not significantly improved by the addition of the lateral X-ray, $p = 0.29$.

Discussion

It is important to diagnose the fracture site of a neck of femur fracture correctly pre-operatively to expedite the surgical treatment of a patient. Otherwise attempts at intra-operative diagnosis will prolong anaesthetic time and increase the frequency of patient repositioning, therefore increasing risks to the patient. Intra-operative diagnosis also leads to using more theatre resources. If a misdiagnosis is not realised until after the skin incision, the subsequent difficulties can be greatly