Ulster Med J 2008; **77 (3)** 181-184

Paper

Full-Length Radiographs Of The Femur In Patients With A Femoral Neck Fracture and Co-Existent Malignancy- Are They Of Benefit?

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Accepted 25 April 2008

ABSTRACT

It is recommended that full-length femoral radiographs should be obtained in patients presenting with a femoral neck fracture and a co-existent history of malignancy. Over a two-year period, we identified 133 (47 males, 86 females) patients admitted with a femoral neck fracture and a co-existent history of malignant disease, representing 6.5% of all femoral neck fractures admitted within this time frame. None of the patients had previously diagnosed bone metastases.

The mean patient age was 80 years (range, 30-97 years). In 114 cases the fracture was traumatic in origin, most commonly a simple fall (86%). In 19 cases the fracture was atraumatic with histopathological analysis demonstrating the presence of bony metastases. Overall, breast (35%), lower gastrointestinal (22%), prostatic (18%) and bronchogenic carcinomas (7%) were the most common associated malignancies.

On reviewing the full-length anteroposterior and lateral femoral radiographs, none of the patients had demonstrable pathology in the remainder of the femur. Furthermore, none of the patients to date have required readmission with a secondary fracture relating to disease in the middle or distal thirds of their femur.

We conclude that full-length views of the femur are of limited value in patients presenting with a femoral neck fracture and a co-existent history of malignant disease.

Keywords: Neck of femur, Hip fracture, Malignancy

INTRODUCTION

Fragility fractures of the femoral neck are common. Approximately 86,000 femoral neck fractures occur in the UK each year, representing the commonest reason for admission to an acute orthopaedic ward[1].

Due to ageing population demographics coupled with osteoporosis, many studies have predicted that the number of hip fracture patients will rise exponentially with time. For example, the number of hip fractures in the UK for the year 2030 is estimated to be 230,000 almost 2.5 times the current figure[2].

The incidence of malignancy, in general, also tends to increase with advancing age. Screening, earlier presentation and better treatment modalities has resulted in an increase in patient life expectancy. As a result, patients with a history of malignancy may be more likely to suffer a fracture of the femoral neck, which may be due to either osteoporosis or bone metastases related to the associated malignant disease process.

It is regarded as good practice that any patient presenting with a femoral neck fracture and a co-existent history of malignancy, should have a full-length anteroposterior (AP) and lateral view of their femur on the ipsilateral side of the fracture as part of surgical preoperative planning[3]. These radiographs are obtained to help exclude the presence of bony disease distal to the fracture site and thus reduce the risk of subprosthetic fracture. However, despite advocating this practice in our unit, it has been observed that in many of these patients, full-length femoral radiographs do not reveal any additional pathology in the remainder of the femur.

Therefore, the purpose of this study was to review all patients presenting with a femoral neck fracture and a co-existent history of malignant disease over a two-year period to determine what proportion of this group had additional pathology noted on their full-length femoral radiographs. Furthermore, of this patient group, what proportion were re-admitted, with complications relating to distal disease that had either developed or progressed since the index procedure.

PATIENTS AND METHODS

Using the Fracture Outcomes Research Database, we

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Fig 1. Fracture occurring through a lytic lesion within the femoral neck (histology confirmed the presence of secondary metastases in a patient with a known history of breast cancer).

identified all patients who were admitted with a femoral neck fracture and a co-existent history of malignant disease between January 2004 and January 2006. None of the patients had previously diagnosed bone metastases. All patients had full-length ipsilateral femoral radiographs on admission.

From the charts the following data was recorded for each patient: age, gender, presenting symptoms or mechanism of injury, site of co-existent malignancy, method of treatment and the histopathology reports for any submitted bone specimens at the time of surgery. It was also noted whether or not the patient had been re-admitted for a secondary procedure relating to distal disease in the ipsilateral femur or as a result of a complication related to the index procedure.

All of the admission radiographs were reviewed by an independent, Consultant Radiologist (PKE). From the X-rays, the type of femoral neck fracture and the presence of any suspicious abnormalities either relating to the neck fracture or in the remainder of the femur was recorded.

RESULTS

One hundred and thirty-three patients (47 males, 86 females) with a history of a femoral neck fracture and co-existent malignancy were identified from the database over this two-year period. This represented 6.5% of all femoral neck fractures admitted over this time frame.

The mean age was 80 years (range, 30-97 years). The right side was affected in 78 cases and the left in 55 cases. In 114 cases the fracture was traumatic in origin, most commonly resulting from a simple fall (86%). Nineteen cases (14%) presented with no history of a fall or traumatic event. In 5 of these cases (4%) the fracture occurred through a lytic lesion within the femoral neck, which was evident on the admission radiographs (Fig. 1). In all 19 cases where there was no history of a traumatic injury, bony specimens were submitted for histology at the time of surgery. Histopathological analysis confirmed the presence of metastatic deposits from the primary lesion in all of these cases.

When considering all of the patients, breast (35%), lower gastrointestinal (22%), prostatic (18%) and lung carcinomas (7%) were the most common co-existent malignancies (Fig. 2).

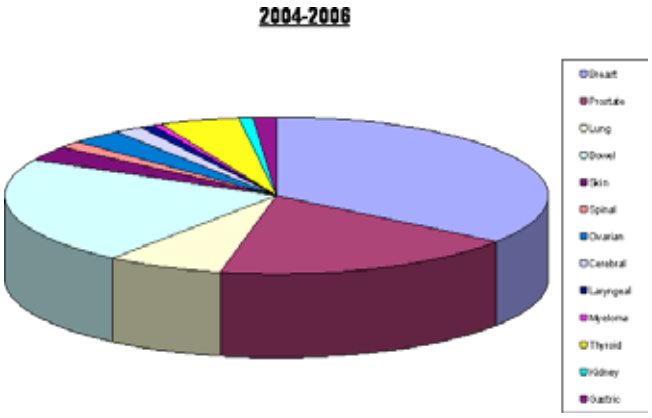

Fig 2. Pie chart demonstrating the anatomical distribution of the primary site of malignant disease.

From the radiographs, there were 75 intracapsular fractures and 58 extracapsular fractures. Sixty-two (83%) of the intracapsular fractures were treated using a standard cemented hemiarthroplasty. Seven cases (9%) were managed with cannulated screws and 5 cases (7%) were treated by total hip replacement. With regard to the extracapsular fractures, 45 cases (78%) were stabilised using a dynamic hip screw and 14 cases (24%) were treated using an intramedullary nail device.

On reviewing the full-length AP and lateral radiographs of the ipsilateral femur, none of the patients in this study had evidence of additional pathology in the remainder of the femur. With regard to re-admission, none of the patients in this group had a secondary fracture relating to the development of disease in the middle or distal thirds of their femur. There were no complications relating to the initial method of fixation.

DISCUSSION

Fractures of the femoral neck are the second most common fracture in elderly patients[4]. In the majority of cases they are related to the presence of osteoporotic bone disease coupled with a history of a simple fall[5]. However, in a proportion of these patients a pathological fracture is suspected because of the absence of a history of trauma, suspicious radiological appearances or the presence of a previously diagnosed malignancy[6].

In recent years the incidence of metastatic bone disease has increased because of the longer survival of patients with

bone "seeking" cancers such as breast, lung and prostatic carcinomas. It is also estimated that two-thirds of cancer patients will have metastases at some time during their course of treatment[3]. The proximal femur is the most common site in the appendicular skeleton for metastatic deposits, with involvement of the femoral neck representing a significant proportion of such lesions[7,8].

Ramisetty *et al.*[6] in a recent study identified 90 patients out of total of 2223 patients presenting to their unit with a femoral neck fracture with features suspicious of serious underlying pathology. They classified the patients into four groups: group I, no history of a fall or traumatic event; group II, suspicious abnormalities on admission radiographs; group III, past history of malignancy without previously diagnosed bone metastases or disease in remission in haematological malignancies; and group IV, past history of malignancy with diagnosed bone metastases. All of the 90 patients had bone samples submitted for histological analysis at the time of surgery. Of note, 4 out of 27 patients (15%) in group III and 6 out of 8 patients (75%) in group IV, had evidence of metastases. None of the patients in groups I or II displayed any additional pathology other than osteoporosis. In essence, only 10 out of the 90 patients (11%) suspected of having serious underlying pathology actually demonstrated histological evidence of malignant disease in the submitted bone specimen. Of those patients with a known history of malignancy but no previous bony metastases, 15% were found to have histological evidence of bone metastases at the time of surgery.

Nineteen patients in our study presented with a femoral neck fracture with no history of trauma. Five of this group sustained a fracture through a lytic lesion, which was evident on the admission radiographs. Interestingly, in all of these patients, histological analysis of either the femoral head or bone reamings revealed evidence of metastases from the primary lesion. Thus, in those patients with a history of malignancy presenting with an atraumatic fracture of the femoral neck, one should have a high index of suspicion that bony metastases are present even if the radiographs are 'normal'. Since bone specimens were not submitted from any of those patients where the fracture was traumatic in origin, we therefore cannot comment regarding this group. It is however probable that some of the patients in this group would have displayed positive findings on histological analysis. We acknowledge this fact as a shortcoming of this study.

With regard to the site of the co-existent malignancy, the figures we observed simply reflect the commonest carcinomas in our society, namely breast, gastrointestinal, bronchogenic, and prostatic carcinomas, which are also some of the commonest tumours that metastasise to bone[9].

In concordance with the BOA guidelines[3], a patient suspected of having a pathological fracture should have a radiograph of the entire affected bone as a minimum requirement. In this study all patients presenting with a femoral neck fracture and a history of malignant disease had full-length views of their femur even if there was a definite history of trauma to account for the fracture. Following review of all of these radiographs by a Consultant Radiologist, none of the patients were found to have radiological evidence of additional pathology in the remainder of the femur. This was the case even for those patients with evidence of metastases on histological analysis of the submitted bone specimens. Furthermore, even if those patients treated by intramedullary nailing where the whole femur is protected are excluded, none of the patients to date have been re-admitted with complications relating to fracture through unsupported distal disease or a subprosthetic fracture.

These findings may be due to a number of reasons. Firstly, the patient may not have any bony metastases despite having a history of malignancy, for example, only 4 of the 27 patients (group III) with a history of malignancy in the study by Ramisetty *et al.*[6] had sinister pathology on histological analysis. Secondly, for a destructive lesion to be recognised on a plain radiograph, it must be greater than 1cm in diameter, with loss of at least 50% of the bone mineral content[10]. Of the cases in this study, the disease may have been present but has not resulted in sufficient bony destruction to permit detection on a plain radiograph. As a rule, radiographs do not assess tumours directly but simply reflect skeletal reaction to the metastases. Thirdly, not all patients with bony metastases will sustain a pathological fracture. Aaron[11] reported that between 9 and 29% of patients with bony metastases sustain a pathological fracture, with the risk of fracture also being dependent on the location of the lesion. Finally, many of this particular group of patients may not survive long enough following their neck of femur fracture to have complications relating to distal disease or disease progression. Many studies report an overall one-year mortality for patients sustaining a femoral neck fracture of between 25 and 40%[12-15].

With regard to alternative radiodiagnostic measures, isotope bone scanning can detect bone destruction before it can be seen on plain radiographs. Although useful in identifying early disease, bone scintigraphy has a number of potential drawbacks. Firstly, despite being sensitive in identifying bony metastases, isotope bone scanning is not particularly specific. In a study by McNeil[16] of those patients found to have metastatic disease on bone scanning, only 55% actually had metastases on biopsy. Secondly, the radiation dose is approximately 4mSV, which in comparative terms represents 200 chest radiographs, and thirdly there is the added cost and demand on clinical workload. Computerised tomography and magnetic resonance scanning on a routine basis are also impractical alternatives.

In summary, patients with a history of malignancy may present with a femoral neck fracture, which may or may not be related to the underlying disease process. Patients presenting with a fracture and no history of trauma should be suspected of having bony metastases.

Whilst we appreciate that this study is retrospective and the scientific implications that this implies, full-length femoral radiographs appear to be of limited value in the preoperative evaluation of this group of patients. It is however reasonable, that the decision to request these additional radiographs should therefore be at the discretion of the operating surgeon.

The authors have no conflict of interest

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