BONE SCANNING FOR SUSPECTED HIP FRACTURES

A PROSPECTIVE STUDY IN ELDERLY PATIENTS

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Of 693 elderly patients admitted with suspected hip fractures, 43 had normal radiographs and were investigated by isotope bone scan. The 30 patients (70%) with normal scans were mobilised and none developed a fracture. All 13 of the patients with specific bone scan abnormalities were subsequently proved to have fractures, five of which became displaced. Clearly conventional radiography does not exclude fracture of the femoral neck in elderly patients; bone scanning is advisable in doubtful cases.

A common problem in orthopaedic trauma units is presented by the elderly patient with a hip which is acutely painful after a fall. In most cases standard anteroposterior and lateral radiographs show a fracture and there is little diagnostic difficulty, but some patients with persistent pain and reluctance to bear weight, have no radiographic fracture line. A fracture of the femoral neck will later become apparent in a proportion of these patients, but conventional radiography is of limited value in determining those "at risk".

Radionuclide bone imaging will allow the detection of some pathological processes in bone before radiographic changes are seen (Johnson et al. 1963; Geslien et al. 1976; Prather et al. 1977; Batillas et al. 1981; Deutsch and Gandsman 1983). We have undertaken a prospective study to determine whether an early isotope bone scan could detect those patients at risk of fracture.

PATIENTS AND METHODS

Between March 1983 and June 1985, 693 elderly patients with a suspected femoral neck fracture presented at the Cardiff Royal Infirmary. Standard radiographs were taken in all cases and reviewed by the surgeon in charge of the case and independently by a radiologist. Bone scans were performed within 48 hours of admission on all 43 patients whose radiographs showed no evidence of a fracture.

Scans were performed two hours after the injection of 500 MBq of ^{99m}Tc -methylene diphosphonate, and

images were obtained using an IGE400 T gamma-camera with a high-resolution, low-energy, parallel-hole collimator and a Link Systems Dyanne computer. Anterior and posterior views of both hips were obtained and when indicated a pinhole collimator was used to obtain local anterior views.

At the beginning of the study patients were allowed to mobilise within the limits of comfort before the result of the scan was available, but later experience of displacement of fractures led us to maintain skin traction in all cases until the scan result was known. Standard anteroposterior and lateral radiographs were repeated after the bone scan, and all films were later reviewed in the light of the bone-scan result and the subsequent clinical course.

RESULTS

Of the 693 patients admitted with an acutely painful hip and suspected to have a fracture, 650 (94%) had initial radiographs which confirmed the diagnosis. The remaining 43 patients, with a mean age of 77 years (range 61 to 92 years), had initial radiographs of satisfactory quality which showed no evidence of fracture.

Each of these 43 patients had an isotope scan and in 30 cases this also showed no evidence of a fracture although in three patients a slight increase in uptake was seen at the acetabulum, associated with mild osteoarthritis. These 30 patients were mobilised and given physiotherapy. They have been followed-up for a mean period of 11 months (range 3 to 26 months) with repeated radiographs and clinical assessment. No patient in this group has developed any evidence of fracture.

The remaining 13 patients of the 43 with negative radiographs (30%) had isotope scans which did show evidence of fracture. In 10 of these 13 patients there was a zone of increased uptake in the subcapital region, and in all 10 a fracture was later confirmed: in three cases

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Fig. 1a

Fig. 1b

Fig. 1c

Radiographs and scan of an 82-year-old woman with pain in the left hip. On admission there was no evidence of fracture (a). Bone scan 48 hours later (b) was positive and four days after admission the fracture had become displaced (c).

Fig. 2a

Fig. 2b

Fig. 2c

Radiographs and scan of an 86-year-old woman with pain in the right hip. The radiograph on admission (a) was normal, but a bone scan at 48 hours (b) was positive and there was a sclerotic line on the radiograph (c) taken four days later.

Fig. 3a

Fig. 3b

Fig. 3c

Radiographs and scan of a 72-year-old woman with pain in the right hip. At presentation the radiograph (a) was normal. Bone scan at three days (b) was positive and the diagnosis of trochanteric fracture was confirmed by the radiograph (c) at seven days.

there was complete displacement (Fig. 1), in two mild displacement and in five repeat radiographs showed a sclerotic line in the subcapital region with no displacement (Fig. 2).

In two patients the scan revealed intertrochanteric fractures which later became radiographically apparent (Fig. 3), and in one case increased activity in the superior pubic ramus led to the identification of an undisplaced pelvic fracture which had been missed earlier.

There were no false-positive bone-scan results and, as reported above, no false negatives after a minimum three-month follow-up.

DISCUSSION

The problem of the elderly patient who, after negative investigation for a suspected fracture of the neck of the femur, is discharged and later presents with displacement, is known to most orthopaedic surgeons; a reliable method of identifying such cases is of therapeutic and economic importance.

In our series 30 patients with acute hip pain, normal radiographs and normal scans were mobilised without complication; none developed a fracture of the femoral neck. This suggests that a normal bone-scan indicates that it is very unlikely that a femoral neck fracture was responsible for the episode of hip pain.

Of the 13 patients with abnormal scans, all had a confirmed fracture and five developed displacement. Of these the three patients early in the trial had not been immobilised; they showed complete displacement within five days of admission. The two cases diagnosed later in the study had mild displacement despite skin traction. Displacement of a subcapital fracture must be avoided

where possible because of the risk of non-union and avascular necrosis (Garden 1964).

This study shows that isotope bone-scanning is highly reliable in the identification of "occult" fractures of the hip and may allow the surgeon to operate before displacement occurs, thus improving the prognosis (Barnes et al. 1976).

It would seem that a proportion of femoral neck fractures go through a stage where no fracture line can be seen on standard radiographs but a specific abnormality can be demonstrated on bone scanning; if weight-bearing is allowed to continue, displacement may result. An elderly patient with a persistently painful hip may have an occult or stress fracture of the femoral neck and should not be allowed to mobilise until a normal scan has been obtained.

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