Are occult fractures of the hip and pelvic ring mutually exclusive?

We have evaluated retrospectively the relationship of bony injuries seen on 106 consecutive MR scans in elderly patients of a mean age of 81.4 years (67 to 101) who were unable to bear weight after a low-energy injury.

There were no visible fractures on plain radiographs of the hip but eight patients (7.5%) had fractures of the pubic ramus. In 43 patients (40.5%) MRI revealed a fracture of the femoral neck and in 26 (24.5%) there was a fracture of a pubic ramus. In 17 patients (16%) MRI showed an occult sacral fracture and all of these had a fracture of the pubic ramus. No patient with a fracture of the femoral neck had an associated fracture of the pelvic ring or vice versa. Occult fracture of the hip and of the pelvic ring appear to be mutually exclusive and if an acute fracture of the pubic ramus is diagnosed radiologically further investigations are not needed to rule out an occult fracture of the hip.

Pain in the hip with inability to bear weight is a common problem in elderly patients after low-energy trauma.1 Plain radiographs are often normal, but there may be an occult fracture of the hip, pelvis or both. It is important to know whether there is such a fracture of the hip since this will change the management of the patient.2-4 Patients with a fracture of the hip usually require surgical fixation, while those with fractures of the pelvic ring or soft-tissue injuries need non-operative treatment with early mobilisation.

Therefore, further investigation may be required to detect or exclude bony injury in non-weight-bearing elderly patients after a minor fall. Many studies have shown the value of MRI in such patients.5-7 However, the number of elderly patients with associated low-energy falls is increasing thereby incurring considerable extra cost in further investigations such as MRI.

The relationship between fractures of the hip and pelvis after a low-energy fall is not clearly defined. Is it common for both to occur together? Is there a subset of the elderly population in which MRI may not be indicated even though they may be non-weight-bearing after a fall, since the chance of them having an occult fracture of the hip is relatively very small or negligible?

Our aim was to define the relationship between occult fractures of the hip and fractures of the pelvic ring after low-energy trauma in the elderly, and to discover whether there may be a subset of these patients who may not require MRI to exclude an occult fracture of the femoral neck.

Patients and Methods

This retrospective study involved 106 consecutive patients over the age of 65 years who presented between January 2000 and February 2004. All were non-weight bearing with pain in the hip following a low-energy fall. They had all undergone an MR scan to exclude fracture of the femoral neck. There were 60 women and 46 men with a mean age of 81.4 years (67 to 101). Pelvic radiographs showed no evidence of fracture in 98 (92.5%) and fracture of pubic ramus in eight (7.5%). Patients without a history of a fall and those with a history of more than six weeks of pain were excluded. Those with a history of trauma were also excluded.

MRI was performed using a 1.5T Excite HD (High Definition) (Signa; GE Medical Systems, Milwaukee, Wisconsin) with an eight-channel body coil. Each patient had a three-plane equaliser localising scan and coronal TI-weighted and STIR images of the pelvis and the hip.

Each scan was reviewed to identify a fracture of the hip, pelvic ring or both. Any fracture of the hip was classified as either intra- or extra-capsular. The location of a fracture of the pelvic ring was noted and, the posterior pelvic ring and sacrum were reviewed. The side of a sacral fracture was noted as ipsilateral or contralateral in relation to a fracture of the hip.
Results
In 37 patients (35%), MRI showed no occult fracture whereas in 43 (40.5%) there was an occult fracture of the neck of femur. Further subclassification of these fractures showed that 17 (16%) were intracapsular and 26 (24.5%) extracapsular.

In 26 patients (24.5%), MRI showed an occult fracture of the pelvic ring. All involved the pubic rami, with a fracture of the superior and inferior pubic rami on the injured side in 22, of the superior pubic ramus in two, and of the inferior pubic ramus in two. The eight who had fractures of the pubic rami identified radiologically had the diagnosis confirmed by MRI which showed an acute fracture, haematoma and oedema. Occult sacral fractures were seen in only 17 (16%) scans. Any occult sacral fracture was always associated with a fracture of the pubic ramus. A total of 16 occult sacral fractures were associated with an ipsilateral fracture of the pubic ramus and only one with a contralateral fracture. The sacral fracture in all cases was stable with no disruption of the pelvic ring.

Of the 43 patients with an occult fracture of the neck of the femur, there was no associated occult or radiological fracture of the pubic ramus or sacrum. Similarly, of the 26 patients with a fracture of the pubic ramus including both occult and radiological fractures there was no associated occult fracture of the neck of the femur (Figs 1 and 2).

Discussion
Patients with clinical suspicion of a fracture of the neck of the femur and negative radiographs warrant further investigation to rule out occult fracture. Although bone scanning and CT have been used to diagnose occult fractures,8-10 we preferred MRI since it is more accurate, readily available, non-invasive and highly sensitive.3,9,10

To our knowledge there has been no previous study which has related occult fractures of the femoral neck to fractures of the pelvic ring. Various authors have reviewed the usefulness of MRI in diagnosing occult fractures of the hip, and have pointed out the incidental diagnosis of an isolated fracture of the pelvic ring or an occult acetabular fracture but never in association with an occult fracture of the hip.3,4,11-13 Therefore, fractures of the pelvic ring and occult fractures of the femoral neck appear to be mutually exclusive in the elderly after a low-velocity injury.

There are two logical explanations for this. First, a low energy injury can produce a fracture at only one site as mechanically all the energy will be spent on one site. Secondly, since all occult sacral fractures are associated with fractures of the pubic ramus and none with a fracture of the femoral neck, it could be postulated that there are two different mechanisms involved in the occurrence of each fracture.

None of the patients with acute fractures of the pubic rami detected radiologically had an occult fracture of the femoral neck. Their MR scans confirmed the fracture of the pubic ramus alone. Therefore if such a fracture is identified by plain radiography in an elderly non-weight-bearing patient after a trivial fall, MRI is not indicated. There is the possibility of an old fracture of the pubic ramus being associated with an occult fracture of the neck of the femur but this did not occur in our study. If the surgeon is satisfied that the fracture of the pubic ramus is acute there appears to be no need for further investigations to rule out an occult fracture of the femoral neck.

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References


