SPONTANEOUS FRACTURES OF THE FEMORAL NECK

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Spontaneous fractures of the femoral neck occur through seemingly normal bone without specific injury. They can be divided into two distinct varieties. First, fatigue or stress fractures, which are found in young active adults after strenuous and prolonged physical activities; these have received considerable attention in medical literature (Mullard 1941, Watson and Berkman 1944, Branch 1944, Gibbens 1945, Miller 1950, Haggart and Eberle 1956, Blandy and Fuller 1956). And second, spontaneous fractures occurring in the elderly without a history of strenuous physical activity. It is this second type of fracture with which this paper is concerned.

Fig. 1
Case 1—Woman aged sixty-seven. Patient in a mental hospital. Pain in left hip, with limp. There is a fissure fracture on the superior aspect of the femoral neck with early callus on the inferior aspect.

Fig. 2
Figure 2—Six and a quarter years later. Note the triangle of sclerosis at the inferior aspect of the femoral neck.

MATERIAL

Eight patients have been studied who sustained spontaneous fractures of the femoral neck. There were six women and two men. Four of the fractures were seen in patients who had been subjected to radiotherapy for pelvic neoplasms. The remaining four patients had not received radiotherapy. There were three women and one man in each group. All the patients were followed for two years or more. In the group seen after radiotherapy the patients were sixty-nine, seventy-five, fifty-one and sixty-five years of age. The fractures occurred...
### TABLE I

**CLINICAL DETAILS IN PATIENTS WITH A SPONTANEOUS FRACTURE OF THE FEMORAL NECK**

<table>
<thead>
<tr>
<th>Case number</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Initial symptoms and signs</th>
<th>Radiographic appearance on admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>67</td>
<td>Pain and limp in left hip. No history of injury</td>
<td>Undisplaced transcervical fracture of femoral neck with early callus formation (Fig. 1)</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>72</td>
<td>Pain in thigh for two to three months. No history of injury</td>
<td>Displaced fracture of femoral neck. No rotational displacement in lateral view (Fig. 3)</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>70</td>
<td>Pain in hip for two and a half months. One inch of shortening and 30 degrees flexion deformity</td>
<td>Upward displacement of neck of femur</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>60</td>
<td>Pain in left buttock and thigh for seven weeks</td>
<td>Displaced fracture of neck of femur with varus deformity</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>69</td>
<td>Pain in hip for six weeks. Nothing abnormal found on examination. Re-examined five weeks later</td>
<td>Undisplaced fracture of neck of femur (Fig. 8). Displacement occurred before operation (Fig. 9)</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>75</td>
<td>Eight weeks’ history of pain in left hip and recent inability to walk</td>
<td>Displaced fracture of femoral neck</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>51</td>
<td>Pain in hip for three months</td>
<td>Displaced fracture of neck of femur (Fig. 11). No evidence of displacement in lateral view</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>65</td>
<td>Pain in right hip and thigh for five weeks</td>
<td>Moderately displaced subcapital fracture</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ten months after operation for fracture of right hip complained of pain in left hip</td>
<td>Immediate radiographs showed no evidence of fracture but films taken three weeks later showed a subcapital fracture</td>
</tr>
</tbody>
</table>

Twenty, twenty-two, twenty-four and twenty-six months after radiotherapy. The patients who had not been subjected to radiotherapy were sixty-seven, seventy-two, seventy and sixty years of age.

One patient in each group sustained a spontaneous fracture of the opposite femoral neck. In the patient who had had radiotherapy the second fracture occurred a year after the first fracture and three years after radiotherapy. In the patient who had not received radiotherapy the second fracture occurred seven and a half years after the original fracture. Clinical details of the eight patients are summarised in Table I, and illustrative radiographs are reproduced in Figures 1 to 11.

### CLINICAL FEATURES

As noted by Bonfiglio (1953), Kok (1953), Smith (1954) and Stephenson and Cohen (1956) in post-irradiation fractures, the presenting symptoms were pain in the thigh, hip or buttock, followed by limp and finally inability to bear weight on the limb. When displacement occurred there were shortening and restriction of hip movement, especially abduction. All the patients had noticed pain for five weeks or more before being seen; one patient had had pain for sixteen weeks. All were seen as out-patients and were ambulant. The pain was usually...
insidious in onset, and at first it might be felt only when weight was borne. Eventually it usually became incapacitating, either gradually or suddenly.

As might be expected, the two patients who sustained spontaneous fractures of the second femoral neck attended earlier at the clinic for the second lesion than any of the patients with first fractures. In one patient who developed a second fracture the radiographic appearances were normal at the initial examination, but when further radiographs were taken three weeks later the characteristic radiographic appearances of spontaneous fracture were present.

**RADIOGRAPHIC APPEARANCES**

The first abnormality that can be noted in the radiograph is the appearance of a subcapital or transcervical fissure fracture (Figs. 1 and 8). In the absence of treatment the fissure opens superiorly and quite a wide gap may develop (Figs. 3 and 6). Finally the neck slips upwards on the head till ultimately the lower part of the head comes to lie in contact with the inferior aspect of the femoral neck (Figs. 4, 9 and 11). The lateral radiograph shows the head normally centred on the neck (Figs. 3 and 11): there is no tendency for the head to roll backwards on the neck as it may after traumatic fractures with minimal displacement, such as those formerly described as “abduction fractures.”
Case 2—Woman aged seventy-two. Three months' pain in the thigh, with limp. There is a fracture of the femoral neck with considerable displacement and opening of a gap on the superior surface of the neck. The lateral radiograph shows little displacement.

Case 2. Figure 4—Two years later. The displacement has increased. Lowest part of femoral head at fracture site is now in contact with the inferior aspect of the femoral neck. Figure 5—Six and a half years after the original fracture. Two and a half years previously had a fracture of the shaft of the same femur. This was allowed to unite in valgus to reduce the shortening.
TREATMENT

The first patient encountered was an inmate of a mental hospital. She was not an especially active person. The fracture was undisplaced and was successfully treated by rest in bed for four months (Figs. 1 and 2). The next two patients were treated conservatively by weight-relieving caliper. In each the displacement of the femoral head became extreme (Fig. 4). In one patient the fracture united with an inch of shortening. She sustained a fracture of the proximal third of the same femur four years later, and the opportunity was taken to gain some abduction in order to reduce the shortening from the original fracture (Fig. 5). This patient, an active woman

* The medial end of the nail was considerably closer to the articular surface of the femoral head when inserted than is shown in the review films (Figs. 7, 10 and 13).

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Case 7—Woman aged fifty-one. Three months' pain in the left hip. Twenty-two months previously she had received radiotherapy after Wertheim's hysterectomy for carcinoma of the uterus. The radiographs show the characteristic appearance of a spontaneous fracture which has displaced.

Case 7. Figure 12—A radiograph taken two months earlier to exclude pelvic bone secondaries when she attended for follow-up examination. A fracture involving the inferior surface of left femoral neck just shows on the edge of the film. Figure 13—Two years after Smith-Petersen nailing. The fracture is united, and there is no evidence of avascular necrosis.
of eighty, later noticed pain in her other hip. She correctly diagnosed her complaint, and radiographic examination confirmed that a second spontaneous fracture with displacement had occurred. The fracture was treated by Smith-Petersen nailing. Radiographs twelve months later were satisfactory, and she is free from symptoms. The fracture in the other patient, who was treated by a caliper because she wished to avoid operation, failed to unite. The fractures in the remaining five patients were treated by reduction and Smith-Petersen nailing. All have united, and in no case was there radiographic evidence of avascular necrosis at the time of review two years or more after operation.

The slow development of the fracture suggests that the blood supply to the femoral head should be subjected to far less risk than after the ordinary traumatic displaced femoral neck fracture. This has proved to be true so far as this small series can indicate.

In a review of twenty-one post-irradiation fractures by Stephenson and Cohen (1956) no patient was treated by the simple method of Smith-Petersen nailing which in our cases proved so successful. Eighteen of their patients were treated conservatively, two were submitted to osteotomy and one to arthrodesis.

Osteoporosis was thought to be the main cause of fractures occurring after radiotherapy reported by Bonfiglio (1953) and by Stephenson and Cohen (1956). I believe that the fractures in patients who have not been subjected to radiotherapy are also due to osteoporosis. The four patients who had not been treated by radiotherapy were all followed for more than three and a half years. No other cause for the fractures became apparent.

CONCLUSION

1. Aching pain in the thigh, hip or buttock in an elderly person should lead to radiological examination of the hip region. In patients who have been subjected to irradiation for pelvic neoplasms a spontaneous fracture should be strongly suspected and the patient kept under close review, even if the first radiograph is negative.
2. Patients with spontaneous fractures of the femoral neck can be satisfactorily treated by Smith-Petersen nailing even when symptoms have been present for as long as sixteen weeks and displacement for eight weeks. Osteotomy is unnecessary if adequate reduction can be obtained.

It is a pleasure to record my thanks to my colleague Mr F. C. Durbin who has kindly allowed me to report two of his cases in this series.

REFERENCES


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