

INTERTROCHANTERIC FRACTURES OF THE FEMUR AND OSTEOARTHRITIS OF THE IPSILATERAL HIP

A. BIYANI¹, A. J. M. SIMISON¹, L. KLENERMAN²

We retrospectively reviewed the radiographs of 255 patients with intertrochanteric fractures over a 2 year period. The incidence of osteoarthritis of the hip joint in these patients was 12.16%, which is less than that reported in the general population, and which confirms the protective effect of osteoarthritis against intertrochanteric fractures. Osteoarthritis was mild in 14, moderate in 19, and severe in 4 hips. Seventeen of the 33 patients had died or were too ill to attend a review clinic. The remaining 16 patients (18 hips) were followed up clinically and radiographically 1 to 5.5 years (mean 2.25 years) after internal fixation of the hip fracture. Three patients with severe osteoarthritis, who were waiting for a total hip replacement before the hip fracture occurred became asymptomatic. There was no significant clinical or radiographic progression of mild and moderate hip osteoarthritis in the remaining 13 patients (15 hips). Intertrochanteric fractures appear to have a beneficial "osteotomy-like" effect on hip osteoarthritis in symptomatic patients.

Keywords : intertrochanteric ; fracture ; osteoarthritis.
Mots-clés : petrochantérienne ; fracture ; coxarthrose.

INTRODUCTION

Osteoarthritis and fractures of the hip are very common in the elderly, but rarely occur together. The protective effect of osteoarthritis against intracapsular fractures of the neck of femur has previously been established (1, 3, 5, 6, 8). However, whether osteoarthritis reduces the incidence of intertrochanteric fractures or not, remains controversial. Some authors (3, 8) have reported a decreased incidence of intertrochanteric fracture in the presence of osteoarthritis, but others (2, 7) found no significant difference in the incidence of

intertrochanteric fracture in patients with and without preexisting osteoarthritis of the hip. It is well known that an osteotomy often relieves symptoms in osteoarthritic hips (4). However, there are no published studies, to our knowledge, on the outcome of intertrochanteric fractures in the patients with osteoarthritic hips. The present study analyzes the incidence of hip osteoarthritis in patients who suffered intertrochanteric fracture and the results of operative treatment, and investigates the possible beneficial "osteotomy-like" effect of intertrochanteric fractures on hip osteoarthritis.

MATERIAL AND METHODS

Two hundred ninety-two patients with intertrochanteric fractures of the femur were admitted to Arrowe Park Hospital between April 1, 1991 and March 31, 1993. Three patients with pathological fractures and 34 patients whose relevant radiographs could not be traced were excluded. Thus, radiographs of a total of 255 patients were reviewed. Radiographic evidence of osteoarthritis was noted in 31 fractured hips in 30 patients, including one patient who had sustained fractures of both osteoarthritic hips in one month in 1991. In addition, 3 other patients with bilateral osteoarthritis had fractured their first hip 3, 4 and 10 years prior to injuring the opposite hip. Three patients with intertrochanteric fractures of non-arthritic hips who had fractured the opposite osteoarthritic hip 4, 6 and

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7 years ago were also included. Thus there was a total of 33 patients (27 females and 6 males), with a mean age of 82.7 years (range 56-100 years) at the time of injury. The left hip was affected in 20 patients, the right in 9, and both hips in 4.

The grading system described by Weintraub *et al.* (8) was modified, and osteoarthritis was classified as mild, moderate and severe. It was considered to be mild in the presence of localized joint space narrowing and small osteophytes; moderate when radiographs revealed significant joint space narrowing and osteophytes, with early cyst formation and sclerosis; and severe in the presence of large osteophytes, cysts, marked sclerosis and deformity of the head. Osteoarthritis was mild in 14, moderate in 19 and severe in 4 hips (table I). Three patients with severe osteoarthritis were awaiting total hip replacement. The remaining 30 patients either had no symptoms or were minimally symptomatic.

Table I. — Details of the patients followed up

| | Severity of osteoarthritis | | |
|-----------------------------|----------------------------|----------|--------|
| | mild | moderate | severe |
| n patients (hips) : | 12 (14) | 17 (19) | 4 (4) |
| Patients (hips) followed up | 5 (6) | 8 (9) | 3 (3) |
| Mean age at injury (years) | 80.6 | 76.5 | 69.3 |
| Accommodation at review | | | |
| own home | 2 | 7 | 3 |
| supervised | 1 | — | — |
| nursing home | 2 | 1 | — |
| Mobilization at review | | | |
| unaided | 2 | 4 | 3 |
| cane(s) | 2 | 2 | — |
| Zimmer frame | — | 1 | — |
| therapeutic/non walker | 1 | 1 | — |

The opposite hip in 8 of the 29 unilateral cases was mild to moderately osteoarthritic. Four patients had been treated by hemiarthroplasty and one by internal fixation for contralateral intracapsular femoral neck fractures. Three patients had undergone dynamic hip screw fixation for intertrochanteric fracture of the non-arthritic opposite hip. In 10 uninjured hips, there was no osteoarthritis, and radiographs of the opposite hips of the remaining three patients were either not available or were not done. One patient with an ipsilateral above-knee amputation performed 45 years ago for war injuries, had minimal symptoms from moderate osteoarthritis of the fractured hip, but he had significant

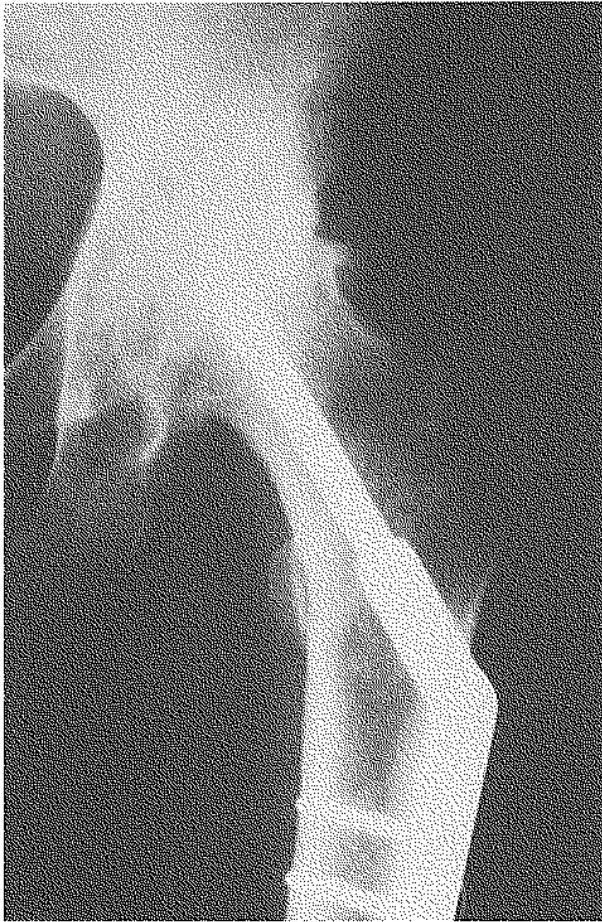
back pain due to advanced degenerative changes in the lumbar spine.

Thirty-five fractures in 31 patients were fixed internally with a dynamic hip screw. The remaining 2 patients were treated by a fixed-angle nail-plate (one patient was operated on in 1982, and the other had been operated on abroad, having sustained an intertrochanteric fracture while on holiday). Seventeen of the 33 patients have since died or were too ill to come for review. Two of the deceased patients, however, had been reviewed 18 months and 11 years after the injury, and adequate clinical information as well as pelvic radiographs including both hips were available. The remaining 16 patients came for clinical and radiographic review 2.25 years after the injury (range 1-5.5 years)

RESULTS

The overall incidence of hip osteoarthritis in patients with intertrochanteric fractures was 12.16% (31/255). Sixteen patients (18 hips) who attended follow-up were younger (mean age 76.4 years) than those who could not be reviewed (mean age 88.7 years). The fractures had united uneventfully, and there were no wound infections or other complications. Follow-up radiographs revealed negligible backing out of the sliding hip screw, which is indicative of the denser bone of osteoarthritic hips.

Three patients with severe osteoarthritis were younger (aged 56, 72 and 80 years) than patients with mild to moderate osteoarthritis, who had a mean age of 78.1 years with a range of 69-95 years (table I). They were severely troubled before the hip fracture, and were awaiting total hip replacement (figs. 1 and 2). Chart reviews after internal fixation of the hip fracture showed some relief of hip pain had occurred soon after the surgery. The maximum improvement in the symptoms due to arthritis took place 3 to 6 months after the operation. At follow-up 2, 4 and 4.5 years respectively after the fractures, they all lived in their own homes, had satisfactory hip function, and considered total hip replacement unnecessary. Their hip pain had been considerably relieved, and they walked without a cane. Occasional discomfort in the hip was felt after walking for half an hour or more. Their hip movements were moderately restricted. Hip abductors were grade 3 in one



1a



1b

Fig. 1. — Immediate postoperative (a), and one-year follow-up (b) radiographs of an 80-year-old woman with severe osteoarthritis. This patient was awaiting a total hip replacement prior to the hip fracture. At follow-up, the hip was asymptomatic and painless, but the stiffness had persisted.

patient, but grade 4 and 4+ in the other two patients. Radiographically the fractures had united with a normal neck shaft angle, and without any medial displacement of the distal fragment. The cystic changes had become less prominent in one patient within 6 months after the fracture (fig. 2). Measurement of the width of the joint space was found to be unreliable because it depended on the position of the lower limb and inclination of the x ray tube. This discrepancy was quite obvious in the radiographs of two patients taken on two consecutive (intraoperative and first postoperative) days.

The remaining 13 patients who were followed had mild to moderate osteoarthritis at the time

of sustaining the hip fracture. Nine of these patients lived in their own homes, and they remained asymptomatic or minimally symptomatic at final review. There was no significant change in their hip function. Five patients walked without restriction, and the remaining four walked with one cane before and after the hip fracture. Their follow-up radiographs did not show any further progression of osteoarthritis (figs. 3 and 4).

Three patients lived in nursing homes, two of whom were residents there prior to the hip fracture (a 74-year-old independent walker was admitted due to dementia, and the other patient was a wheelchair-bound 95-year-old woman). Their functional status had remained unchanged and their



2a



2b

Fig. 2. — Preoperative (a) radiographs of a 56-year-old woman with an intertrochanteric fracture who was awaiting total hip replacement prior to the hip fracture. Six months after the internal fixation (b) she had become asymptomatic, and the cysts were less prominent.

hips were asymptomatic at review. The third patient was admitted to the nursing home 2 months after the hip fracture due to increased dependence. She walked very little. She had no pain and had a good range of hip motion.

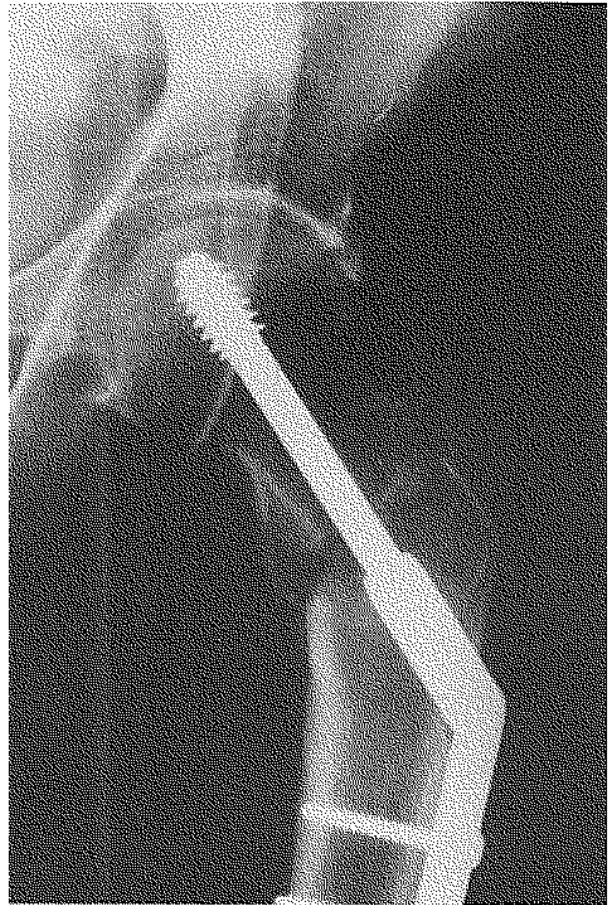
The last patient, an 84-year-old woman, lived on her own in supervised accommodation. Her moderately osteoarthritic right hip remained asymptomatic at follow-up 5.5 years after the intertrochanteric fracture (fig. 4). She had walked with a cane for 4 years, until she sustained a contralateral basal cervical fracture, which became avascular and painful. At follow-up she was walking with a Zimmer frame.

Of the two deceased patients with adequate radiological information, one was a 90-year-old

man with a moderately osteoarthritic hip. A radiograph at 18 months did not show any progression of the osteoarthritis. Radiographs of another 85-year-old woman with bilateral intertrochanteric fractures and moderate hip osteoarthritis (nail-plate on the left side in 1982, and hip-screw fixation on the right side in 1992) showed slight progression on the left side after 11 years, but no change on the right side. Of the three other patients with bilateral hip involvement, one with moderate osteoarthritis of both hips had died. Two remaining patients, one with moderate osteoarthritis on the right side and mild on the left, and the other with bilateral mild hip osteoarthritis, were asymptomatic at review.



3a

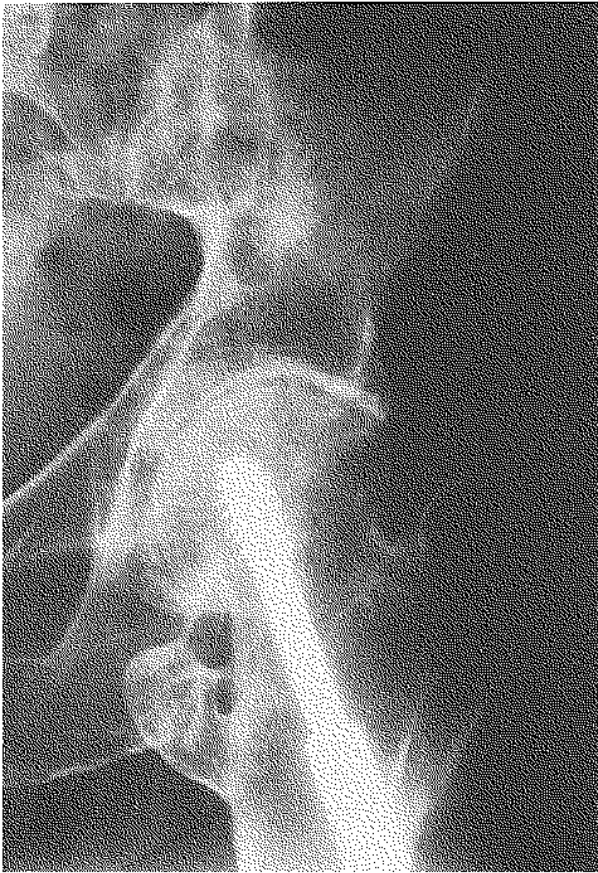


3b

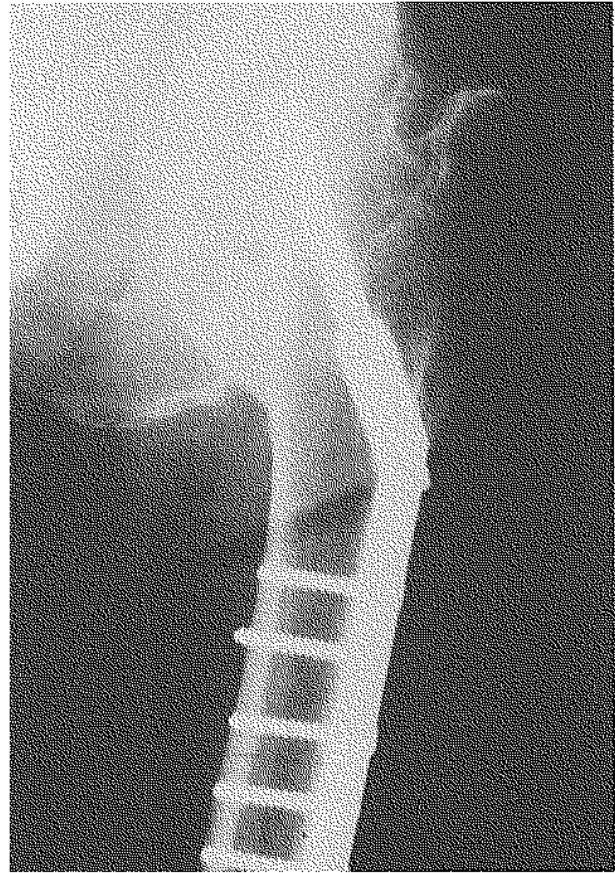


3c

Fig. 3. ... Preoperative (a), immediate postoperative (b), and 3-year follow-up (c) radiographs of a 69-year-old woman showing no further progression of moderate osteoarthritis. The patient remained asymptomatic.



4a



4b

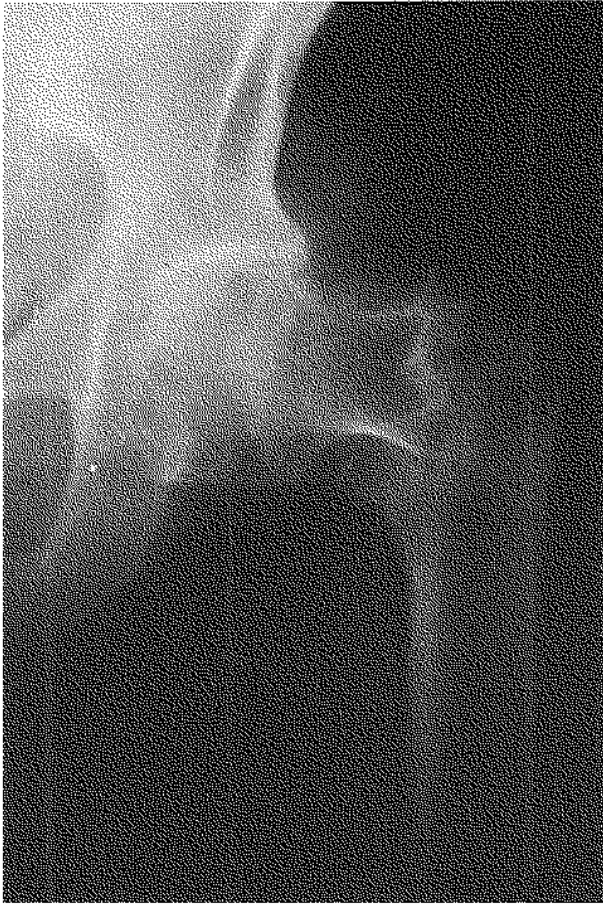
Fig. 4. — Follow-up radiographs at 1.5 and 5.5 years (a and b) of an 84-year-old woman showing no further progression of osteoarthrosis. The patient remained asymptomatic.

DISCUSSION

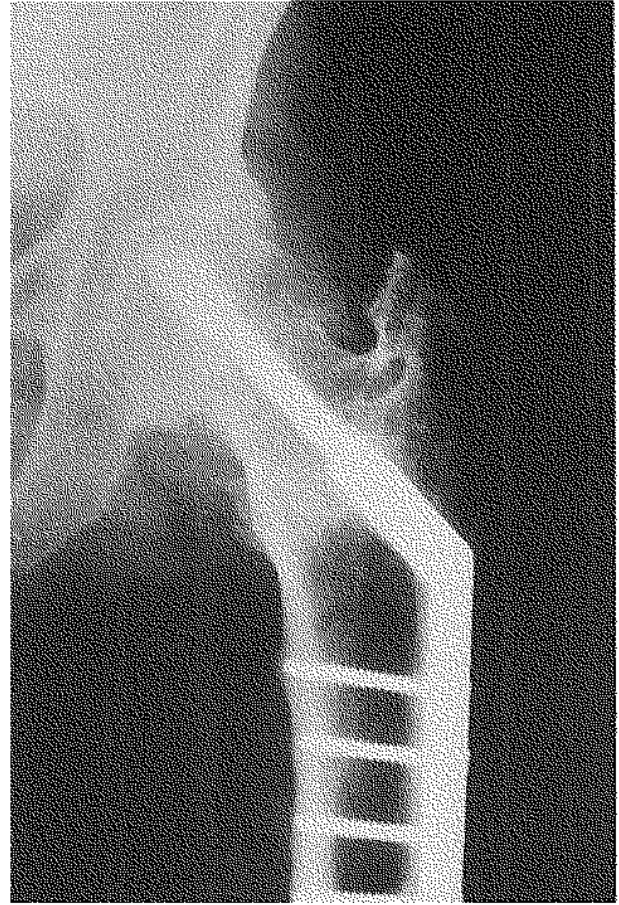
Previously published reports have confirmed the clinical impression that the presence of osteoarthrosis significantly decreases the incidence of intracapsular femoral neck fractures (1, 3, 5, 6, 8). One of the reasons fracture occurs infrequently in the presence of osteoarthrosis is the sclerosis of subarticular bone in the osteoarthrotic joint. The protective effect of osteoarthrosis on the incidence of intertrochanteric fractures is less clear. Weintraub *et al.* reported a 12% incidence of osteoarthrosis of the hip in patients with intertrochanteric fractures, which is significantly less than that in the general population. However, Colhoun *et al.* noted a similar incidence of osteoarthrosis in the

patients with or without intertrochanteric fractures (26% in the fracture group and 29% in the control group). More recently, Wand *et al.* reported the presence of osteoarthrosis in 24.6% and 25.3% of the radiographs of patients with intertrochanteric fractures and controls respectively. The reasons for these two differing conclusions are not clear, but may result from the difficulty in accurately defining mild osteoarthrosis, which may be the source of incorrect data. Moreover, Colhoun *et al.* and Wand *et al.* combined all grades of osteoarthrosis as one, but moderate or severe osteoarthrosis is more likely to be protective against intertrochanteric fractures than mild osteoarthrosis.

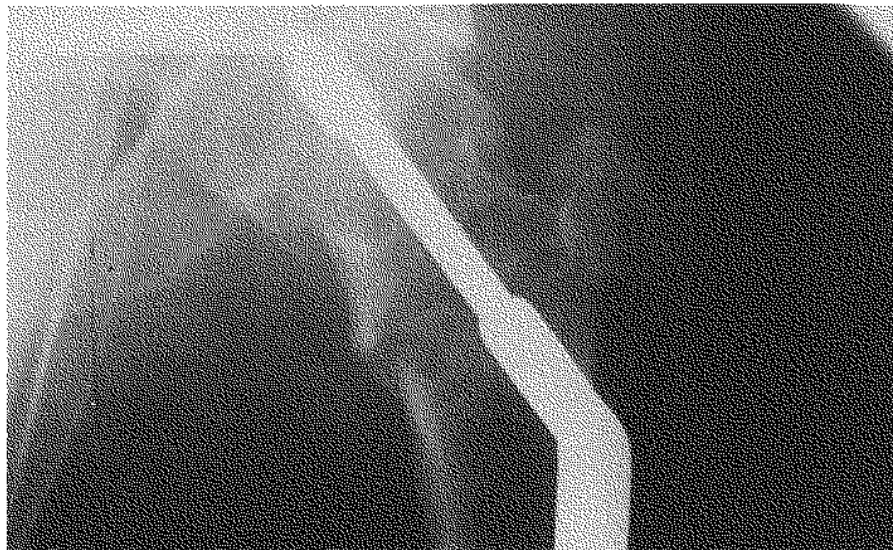
The incidence of osteoarthrosis in our patients with intertrochanteric fractures is similar to that



5a



5c



5b

Fig. 5. — Preoperative (a), immediate postoperative (b), and final (c) radiographs of an 80-year-old woman with moderate osteoarthritis of the hip. Preoperative radiographs alone may be misleading, and may not show the exact extent of the osteoarthritic changes. The occasional symptoms before the hip fracture had resolved at follow-up 2 years after the injury.

reported by Weintraub *et al.* (8), but the protective effect of osteoarthritis against intertrochanteric fractures was much less than that reported for intracapsular fractures. The fractures of the osteoarthritic left hips were twice as common compared to the right side, but we could not find any obvious explanation for this previously unreported finding.

Preoperative radiographs alone were poor indicators of the severity and location of the osteoarthritic changes, because a small reduction in the joint space and small osteophytes were often not readily evident on these radiographs (fig. 5). We therefore utilized the first postoperative anteroposterior and lateral radiographs in addition to the initial radiographs to determine the degree of involvement of the hip.

More than half the patients could not be followed up in the present study, which comprised an elderly population, and many of the patients were 80 years or older at the time of the hip fracture. However, these patients were only included in the first part of the study to calculate the overall incidence and severity of osteoarthritis.

The second part of the study, which analyzed the short-to-intermediate-term results of internal fixation of intertrochanteric fractures in 16 patients with osteoarthritis of the hip shows the beneficial "osteotomy-like" effect on the underlying osteoarthritis. There was a prolonged remission of symptoms in 3 patients with severe osteoarthritis, and no clinical or radiographic evidence of progression in the patients with mild and moderate osteoarthritis. It may take 3-6 months to achieve maximum clinical improvement. No significant improvement (or deterioration) was noted at the follow-up on radiographs, except in one patient with severe osteoarthritis, whose radiographs revealed some reduction in the degree of sclerosis and cystic changes. The joint space measurement was found to be highly unreliable, as it depends on the position of the extremity and inclination of the xray tube, and standardization of the radiographic techniques may not be possible or practical.

The fracture appears to act as an osteotomy, reducing the intraosseous pressure and thereby relieving the symptoms of osteoarthritis. Bio-

mechanical factors do not seem to play a significant role in the symptomatic improvement: 135°-angled dynamic hip screws or nail-plates were used in all patients except one, and significant medial displacement of the distal fragment or varus/valgus angulation was not found. However, it is difficult to comment on the possibility of an improved and more congruent relationship of the articular surfaces due to the rotation of the femoral head within the acetabulum along the axis of the head or the neck of the femur.

We conclude that osteoarthritis and intertrochanteric fractures have a mutually beneficial relationship. Osteoarthritis reduces the incidence of intertrochanteric fractures. The protective effect is less than that previously reported for intracapsular fractures. The fracture has the same effect as an osteotomy on osteoarthritis, and relieves pain in patients with painful hips.

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SAMENVATTING

A. BIYANI, A. J. M. SIMISON, L. KLENERMAN.
Intertrochantaire femurfractuur en coxarthrose van de homolaterale heup.

De auteurs hebben de röntgenopnamen van 255 patiënten, behandeld wegens intertrochantaire fractuur tijdens een periode van 2 jaar, onderzocht. De incidentie van een latere coxarthrose was 12,16%, dus minder dan de frequentie in de algemene bevolking, wat bevestigt dat er minder intertrochantaire fracturen gebeuren bij patiënten met coxarthrosis. De arthrosis was licht in 15 heupen, matig in 19 en ernstig in 4. Zeventien van de 33 patiënten waren overleden of mochten zich niet meer aanmelden. De 16 andere gekwetsten (18 heupen) werden klinisch en radiologisch gevolgd gedurende 1 à 5,5 jaar (gemiddeld : 2,25 jaar), na osteosynthese van de heupfractuur. Drie patiënten die reeds aan een ernstige coxarthrose leden en op de wachtlijst voor een totaalprothese waren, werden asymptomatisch na de osteosynthese. Dertien patiënten (15 heupen) met een matige of lichte coxarthrose hadden geen relevante evolutie op klinisch of radiologisch vlak. De intertrochantaire fracturen hebben, zoals de osteotomieën, een gunstige invloed op de coxarthrose bij symptomatische patiënten.

RÉSUMÉ

A. BIYANI, A. J. M. SIMISON, L. KLENERMAN.
Fracture pertrochantérienne du fémur et coxarthrose homolatérale.

Les auteurs ont étudié rétrospectivement les radiographies de 255 patients traités pour fracture pertrochantérienne pendant une période de deux ans. L'incidence de la coxarthrose chez ces patients était de 12,16%, ce qui est inférieur à l'incidence relevée dans la population générale et confirme l'effet protecteur de la coxarthrose vis-à-vis des fractures pertrochantériennes. L'arthrose était discrète dans 14 hanches, modérée dans 19 et sévère dans 4. Dix-sept des 33 patients étaient décédés ou n'étaient plus en état de se présenter à la consultation. Les 16 autres patients (18 hanches) ont été suivis cliniquement et radiologiquement pendant 1 à 5,5 ans (moyenne : 2,25 ans) après ostéosynthèse de leur fracture de hanche. Trois patients qui présentaient une coxarthrose sévère et étaient en attente d'une arthroplastie prothétique avant leur fracture sont devenus asymptomatiques. Les 13 patients restants (15 hanches) présentaient une arthrose discrète ou modérée qui n'a montré aucune progression significative au plan clinique ou radiologique. Les fractures pertrochantériennes semblent avoir un effet bénéfique, comparable à celui d'une ostéotomie, sur la coxarthrose chez des patients symptomatiques.