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Femoral head fractures

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Abstract This report includes six patients with femoral head fractures. Five were associated with posterior hip dislocation, of which one also had an ipsilateral trochanteric fracture. All were young adults who had been injured in automobile accidents. The protocol for management, indications for surgery and guidelines for evaluation of results are described.

Résumé Présentation de 6 cas de fracture de la tête fémorale. Cinq associaient à la fracture une luxation postérieure de la hanche et l'un d'eux associait aussi une fracture trochanterienne ipsilatérale. Tout les patients étaient de jeunes adultes blessés dans un accident de voiture. Le protocole de prise en charge, les indications de la chirurgie et les principes d'évaluation du résultat sont présentés.

Introduction

Thompson and Epstein [20] distinguished five types of traumatic posterior dislocation of the hip. In type V there was an associated fracture of the femoral head. Depending on the pattern of the femoral head fracture Pipkin [18] distinguished between four subtypes. The cases reported here were all type V injuries.

Materials and methods

Between 1991 and 1997, we treated six patients with fractures of the femoral head (Table 1). The average age was 33.5 (range: 20–50) years. All the fractures except one were associated with posterior hip dislocation (patient 3). In three patients (1, 4 and 5) closed reduction of the hip was performed within 6 h of injury. As the femoral head fragment was found to be unreduced and rotated an open reduction was performed.

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The hip was approached laterally without trochanteric osteotomy. In two patients (4 and 5) the head fragment was reduced and secured by 4 mm cancellous AO screws. In patient 1 the relatively small head fragment was removed, after hip dislocation, by sectioning the ligamentum teres and was then reattached with two 4 mm cancellous screws.

In two patients closed reduction was not possible due to associated injuries. One patient had an ipsilateral femoral neck fracture (patient 6). Open reduction and internal fixation was performed within 24 h of injury. The other patient had an ipsilateral trochanteric fracture in which an open reduction was performed on the third day after injury (patient 2). This patient had multiple associated skeletal injuries.

Postoperatively all patients were managed by skin traction for 4 weeks and after 6 weeks partial weight bearing was allowed. By 3 months, all were allowed to be fully weight bearing. Average follow-up time was 31 (range 12–48) months.

Results

We used the same criteria as Thompson and Epstein [20] for evaluating the clinical and radiological results.

In patient 3 the result was excellent. At follow up 3 years after injury the patient was free from symptoms and had resumed all his activities. Computerized tomography (CT) scanning showed a scar of the healed fracture with preserved joint congruency.

In four patients (patients 1, 2, 4 and 5) the results were good. In patient 6 the result was poor. One year after the accident avascular necrosis of the femoral head had developed. An arthrodesis was advised, which this young man refused and he was later lost to follow-up.

Discussion

Traumatic dislocation of the hip is a serious injury. Type V dislocations, which include femoral head fractures, have a low percentage of successful results [4], regardless of treatment. The majority of these injuries are results of automobile accidents and mandatory use of seat belts is the main priority in prevention of these injuries.

Table 1 Description of patients

Patient	Sex	Age (years)	Mechanism of injury	Type of dislocation	Treatment	Length of follow-up (months)	Results
1	Female	50	Auto	Posterior (Pipkin I)	ORIF, 4 days after injury	48	Good
2	Male	32	Auto	Posterior	ORIF, 3 days after injury	24	Good
3	Male	40	Auto	No dislocation	Traction	36	Excellent
4	Male	24	Auto	Posterior (Pipkin II)	ORIF, 2 days after injury	36	Good
5	Male	20	Auto	Posterior (Pipkin II)	ORIF, 3 days after injury	30	Good
6	Male	35	Auto	Posterior (Pipkin III)	ORIF, day of injury	12	Poor

ORIF, Open reduction internal fixation; Auto, automobile accident

Two-thirds of all traumatic dislocations occur in adolescence or early adult life, usually too young an age for total hip arthroplasty, if complications develop [4]. In our patients, the average age was lower than the patients treated by Weigand et al. [24] and Hougaard et al. [10], but similar to those of Epstein et al. [4].

Accurate diagnosis is essential, and it is our system to have CT scans of all injured hips after initial evaluation by X-ray. Information derived from the CT can influence the treatment plan. The presence of intraarticular fragments or large femoral head defects will indicate the need for surgery. Information on the position and size of the head fragment inside the acetabulum may help in surgical planning. If CT scanning reveals anatomic reduction of the femoral head fracture, surgery may be avoided. Also, the size of the fragment will influence the surgical procedures. In the series published by Epstein [5], many of the unsatisfactory results occurred when the detached head fragment was excised particularly when it included more than one third of the femoral head circumference. Excision of large fragments will cause too much stress in the hip joint to carry out its functions particularly in young active patients. We agree with this opinion, as did Vermeiren and Hoyer [23]. Thus, in young individuals every effort was made to keep the detached fragment as viable as possible by meticulous handling and preservation of its synovial attachment. Local avascular necrosis developed in patient 1 possibly because the fragment was detached from the ligamentum teres and delivered out of the joint. However, this did not influence the overall result as also found by Hougaard and Thomsen [10] and Treacy and Grigoris [21].

The lateral approach was used in four patients and the posterior approach only in patient 6. Anterior approaches for open reduction of posterior dislocation of the hip are contraindicated [5, 6, 7]. It is likely that most, if not all, of the blood supply to the hip joint is damaged when a posterior dislocation occurs. A surgical procedure that embarrasses whatever blood supply remains is therefore inadvisable [22]. Six patients in a series of Epstein et al. [4] were treated by anterior exposure for posterior dislocation, avascular necrosis developed in five patients. In our patients, reduction of dislocation by closed means was achieved easily, shortly after the injury, so, lateral approach was satisfactory after this to give direct access to the acetabulum and facilitates visualization of the

fracture fragments to get proper reduction. In the experience of Butler [3], standard posterior exposure failed to allow proper visualization of femoral head fracture when the hip was dislocated during open reduction, as flexion, adduction and internal rotation, which was needed to dislocate the hip hide the fracture site from view. However, Mowery and Gershuni [17] recommended posterior incisions for posterior dislocation and anterior for anterior dislocations, so as not to further damage the joint capsule.

In Pipkin type III the role of internal fixation compared with hemiarthroplasty has not been settled [2, 8, 9, 15]. The patients in this category are always young active individuals where hemi or total joint replacement is considered too early. Most authors recommend primary open reduction, rigid internal fixation of the neck fracture with debridement of the hip joint [5, 7, 12, 19]. On the contrary, Kelly and Lipscomb [11] recommend primary hip replacement to reduce hospitalization and to provide better hip function with less subsequent disability. Mehara et al. [14] and Fernandes [8] use the same protocol.

Four to twenty-five percent of all posterior dislocations of the hip are associated with a fracture of the femoral head [13]. Werken and Blankensteijn [25] and Mody et al. [16] have reported cases with fracture of the femoral head without hip dislocation similar to our patient 3. Such an injury highlights the importance of doing a CT scan for any injured hip as conventional X-ray can easily miss this fracture.

The extremely rare combination seen in patient 2 (Fig. 1) with fracture dislocation of the femoral head with associated ipsilateral trochanteric fracture has only been reported once [1] before. This patient had multiple skeletal injuries, on the side of the dislocation. A lateral approach was used and the femoral head fragment was removed from the acetabulum before reduction. In our patient we also used the lateral approach but did not remove the femoral head fragment from the acetabulum. In spite of a delay of more than 48 h before operative intervention avascular necrosis of the femoral head was not seen.

The successful outcome in most of these cases with femoral head fractures shows the importance of restoring the anatomy of the upper femur and preserving bony tissues to achieve satisfactory initial results and facilitate later reconstructive procedures if needed.

Fig. 1 **A** X-ray of the left hip showing hip dislocation, femoral head fracture and ipsilateral trochanteric fracture. **B** CT scan of the injured hip, the head fragment is displaced inside the acetabulum. **C** Anteroposterior and **D** lateral views after 2 years follow-up showing preserved spherical femoral head and maintained congruent joint space

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