CASE REPORT

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Fracture of the acetabulum in a 14-year-old patient: 20-year review

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Abstract A case report of 14-year old female with an acetabular fracture involving the anterior column and posterior column-posterior wall is presented here and the findings on 20-year follow-up are described.

Résumé Présentation de l'observation d'une fille de 14 ans ayant eu une fracture du cotyle concernant les colonnes antérieure et postérieure. Le recul est de vingt ans.

Case report

In 1977 a 14-year-old female was a passenger on a motorcycle that was struck on its left side by a truck. She sustained fractures of the left ilium, bilateral superior and inferior pubic rami, and the left acetabulum (Fig. 1).

Radiographically the pelvis appeared mature with closed triradiate cartilage. The only other injury was a laceration of the right thigh. No neurological deficit was found and the cystogram was normal. The initial treatment was skeletal traction. Judet radiographic views (Fig. 2) revealed an incongruent acetabular joint with step-off, a computerized tomography scanner was not available in the community at that time.

Eight days post-injury the left acetabulum was approached through a Kocher-Langebeck incision. The two major fragments of the posterior column were stabilized with an AO semitubular plate and four 4.5 mm screws and the posterior wall with a 6.5 mm cancellous screw. Left-sided weight-bearing was permitted at 12 weeks following surgery.

Twenty years post-injury the patient's left hip was rated fair (4+5) by using the D'Aubigne and Postel [2] hip scale. Using the Letrounel-Judet modified D'Aubigne and Postel hip scale [6] the rating was good (4+6+5). Her left hip was rated as fair (71) on the Harris hip scale. The patient could walk 1 mile easily and did not require a cane. The 20-year radiographs reveal that the left hip joint space is preserved with osteophyte on the femoral head (Fig. 3), and the pelvic deformity persists (Fig. 4).

Fig. 1 AP radiograph on day of injury

Fig. 2 Position after skeletal traction

Discussion

This injury is uncommon in patients under 17 years of age. In a report from 3 hospitals in major metropolitan areas during the period 1972 to 1995 only 34 patients under the age of 17 with a closed triradiate cartilage were treated for acetabular fractures [3]. None of the 34 patients had fractures of both columns.

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Fig. 3 Hip 20 years post-injury. Arrow indicating osteophyte formation

Fig. 4 AP radiograph of pelvis 20 years post-injury

The goal of articular fracture surgery is restoration of the articular surface to a congruent state without a step-off. Acetabular fracture treatment should bring about a congruent relationship between the femoral head and the weight-bearing dome of the acetabulum. In 1977 there was no consensus among American surgeons that complex acetabular fractures should be routinely treated by open reduction and internal stabilization [1, 7, 8]. By the early 1980s Emil Letrounel had greatly influenced surgeons in the principles of pelvic surgery. The first report in the English literature by Judet et al. [5] of the classification and treatment of acetabular fractures appeared in 1964. With their report as a guide the coauthor was enlisted to help with the surgical treatment.

Letrounel and Judet [6] determined a perfect reduction to be one in which the articular congruence was restored and all radiological landmarks are reestablished in the AP and the two 45° oblique views. In patients whose fractures were perfectly reduced osteoarthritic changes were not diagnosed until 10 to 25 years later in 50% of the patients, but when the reduction was imperfect 80% of the osteoarthritic changes occurred within 10 years of injury. Letrounel [6] with experience improved his perfect reduction rate from 68% to 90%. In a much smaller

series Helfet and Schmelring [4] accomplished similar improved reductions with experience when treating 2-column fractures. Matta [11] in a study of 494 displaced acetabular fractures found the rate of anatomical reduction to decrease with the complexity of the fracture, but the hip joint can be preserved and post-traumatic osteoarthritis can be avoided if an anatomical reduction can be achieved.

A perfect reduction was not achieved in this patient. In retrospect the fair to good result after 20 years is probably related to the fact that the femoral head was not dislocated posteriorly; thus, reducing the risk of avascular necrosis, and the weight-bearing articular surface was restored to a relatively congruent state. The surgical planning process, instrumentation, and implants for stabilization have greatly improved since 1977 [6, 9, 10, 12].

Letrounel and Judet [7] found that a noticeable proportion of hips rapidly developed a collar of osteophytes around the periphery of the femoral head. These collars can be stable for a long time and may coexist with an otherwise perfect result. They concluded that the prognosis for the osteophytes was unpredictable.

In the 20 years since this patient was treated pelvic surgery performed by experienced surgeons has resulted in greatly improved outcomes. Nonoperative treatment often results in lack of parallelism between the femoral head and the acetabular roof and/or an articular step-off greater than 2 mm. These factors lead to a poor result with the need for hip replacement in a very young patient.

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