

Acetabular posterior wall fracture

38 cases followed for 5 years

Thirty-eight patients with a fracture of the posterior wall of the acetabulum were reviewed after 5 (2-12) years. Of 18 patients with successful manual reduction of a femoral head dislocation, a small fracture fragment, no sciatic nerve injury and who were not operated on, 17 had a good result. Of 20 patients who were operated on either because of the large size of the fracture fragment or because of a persistent dislocation of the femoral head, 6 had a poor result due to femoral head necrosis. In these 6 patients the reduction had been delayed and the acetabular osteochondral lesion was more severe than in the other patients. Skeletal traction seems unnecessary in the treatment of acetabular posterior wall fracture.

Allan J. Aho
Ulle K. Isberg
V. Kalevi Katevuo

Departments of Surgery and Radiology, University Central Hospital of Turku, SF-20520 Turku 52, Finland

Correspondence: Allan J. Aho, M.D., Associate Professor, Department of Surgery, University Central Hospital, SF-20520 Turku 52, Finland.

Posterior wall fractures are the largest group of acetabular fractures and account for about a third of the cases (Nerubay et al. 1973, Solheim & Skrede 1973, Epstein 1974, Lansinger 1977, Jungbluth et al. 1979, Letournel 1980). The results of treatment of these fractures have been good in the majority of cases. But the results naturally depend on the severity of the lesion, such as the degree of dislocation of the femoral head, which has been the basis of various classifications (e.g., Stewart & Milford 1954, Waller 1955). However, the degree of dislocation of the femoral head alone is not an adequate criterion for the prognosis of femoral head necrosis and arthrosis (Letournel 1980, 1981).

Since the early 1970s, we have increasingly operated acetabular fractures giving with special attention to the fragment torn from the

posterior wall. Because posterior wall fractures are an entity with some specific features, we wanted to find out the major prognostic signs, which could also be used to define the indications for operation.

Patients and methods

Forty-four patients with fractures of the posterior wall of the acetabulum, and treated at our hospital, were studied from 1965 through 1979. Combined fractures of the posterior wall and column were excluded. The series included 39 men and 5 women, aged 41 (16-82) years. Dorsal displacement of the femoral head was seen in 37 patients and sciatic nerve injury in 6 patients (Table 1).

Table 1. Distribution of acetabular wall fractures according to Waller's (1955) classification

Type	Total	Femoral head displacement	Sciatic nerve lesion	Multilocated cartilage crush injury of acetabulum	Open treatment
I	11	4	-	-	-
II	20	20	1	-	11
III	13	13	5	7	10

Type I fracture of posterior superior part of acetabulum with no or moderate displacement. Type II fracture with single fragment of posterior superior part of acetabulum with extensive displacement and dislocation of the femoral head. Type III comminuted fractures. Type III had been complemented in this study with the concept of marginal impaction (Letournel 1980, 1981).



Figure 1. Posterior wall fracture with dislocated femoral head (Waller's Type II; Letournel's posterosuperior type).

A. Before reduction.

B. Oblique obturator view shows the large (4×2 cm) detached fragment.

C. Three years after surgery.

Classification. From the degree of dislocation, most of the fractures were Type II Waller's (1955) classification (Table 1). According to Letournel's (1980, 1981) anatomic classification, 24 were typical posterior, 12 posterosuperior, and 8 posteroinferior fractures.

Associated injuries. Seventeen patients had multiple injuries; viz. 6 had femoral fractures, 12 fractures in other extremities, 2 hemothorax and 4 had a cerebral concussion. Visceral abdominal injuries were not seen.

Treatment

The treatment was primary manual reduction of the femoral head immediately after admission. Afterwards, the treatment was closed (Group A) or open (Groups B and C).

Closed treatment (23 patients)

The indication for closed treatment was 1) successful manual reduction of the femoral head, 2) small size (< 3.5 cm \times 1.5 cm) of the detached fragment, except in 2 patients and 3) absence of sciatic nerve injury. Skeletal traction after reduction, usually through the tibial tuberosity, was used for varying periods. Weight bearing was started 3–6 weeks after traction had been discontinued.

Open treatment (21 patients)

In Group B manual primary reduction of the femoral head had been successful, and the indication for an operation was the large size of the detached solitary fragment (> 3.5 cm \times 1.5 cm) and a marked dislocation of the fragment from the acetabular wall (dis-

tance 5–10 mm), often seen only in oblique projections obtained after manual reduction (Figure 1).

In Group C the indication for surgery was persistent dislocation or subluxation of the femoral head and a large osteochondral lesion of the acetabular posterior wall; shattered small fragments were often seen in this group (Figures 2 and 3). The Kocher-Langenbecks' approach was used. Screws were normally used for fixing the fragments. Of the 6 patients with comminuted cartilage in Group C, the fragments were fixed in 5 patients and partly removed in 1. Postoperative traction was used in 3 patients. Weight bearing was started after 5–8 weeks in Group B and after 10–12 weeks in Group C.

Follow-up

A follow-up study was carried out after average period of 5 (2–12) years. Data were obtained in 38 patients (18 in Group A and 20 treated operatively); 33 of them were examined by us and 5 were examined by other doctors. The results were considered good if hip flexion was $> 110^\circ$ and/or less than 20° of that the opposite hip, if the rotations were not less than half of those of the opposite hip and if pain was absent or only mild pain occurred during exercise (running) or during quick movements. The result was considered *moderate* if extension-flexion was 70 – 110° , abduction $< 40^\circ$, if the limitation of rotation was more than half of that of the opposite hip, and if subjective symptoms were mild while walking or running and rapidly disappeared at rest. If the limitations of that movement were greater than described above and if the patients complained of pain that limited physical activity, the result was considered *poor*.

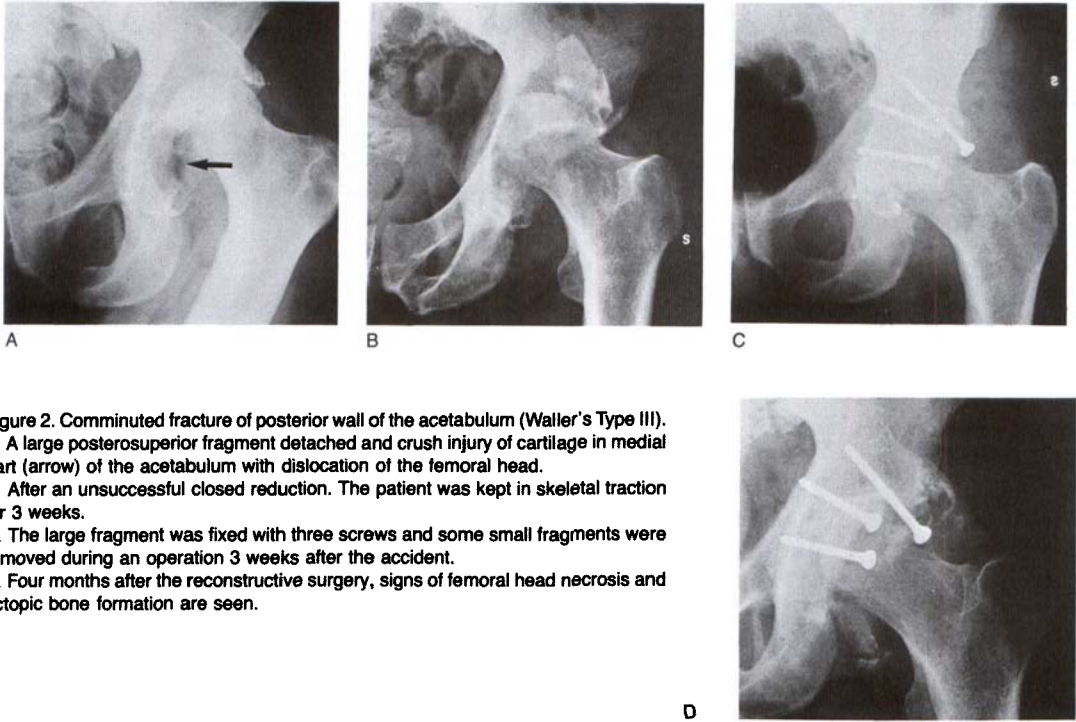


Figure 2. Comminuted fracture of posterior wall of the acetabulum (Waller's Type III).
 A. A large posterosuperior fragment detached and crush injury of cartilage in medial part (arrow) of the acetabulum with dislocation of the femoral head.
 B. After an unsuccessful closed reduction. The patient was kept in skeletal traction for 3 weeks.
 C. The large fragment was fixed with three screws and some small fragments were removed during an operation 3 weeks after the accident.
 D. Four months after the reconstructive surgery, signs of femoral head necrosis and ectopic bone formation are seen.

Results

Early complications occurred in 3 patients; an infection (healed), a thrombosis in one leg and a death.

Closed treatment. The results were good in 17 patients and moderate in 1. The duration of

traction after manual reduction of the femoral head or the length of the non-weight-bearing period had no effect on the results.

Open treatment. In 20 patients the result was good in 11, moderate in 3 and poor in 6 who all had femoral head necrosis. In Group B there was no difference in the follow-up results between the patients with a short and long pre-operative traction period. Ectopic bone formation occurred similarly in both subgroups. In Group C the reduction of the femoral head was delayed, with traction 6–22 days before the operation. Group C patients also had a longer traction period and a higher mean age than Group B patients (Table 2).

Non-weight-bearing period. There was no difference in the late results between patients with a non-weight-bearing period of 5 and 8 weeks provided that the manual reduction was successful on admission.

Discussion

The prognosis of acetabular posterior wall fracture with displacement of the femoral head



Figure 3. Cartilage crush injury (arrow) into the adjacent bone.
 B. Fracture surface showing cancellous bone in the posterosuperior part of the acetabulum.
 C. Dislocated femoral head.

Table 2. Results of open treatment of acetabular posterior wall fractures

Group	Patients (no.)	Traction		Mean age	Types classification Waller's II-III	Results					
		Pre-operative (days)	Mean (days)			Ectopic bone formation	Osteoarthrosis (group I)	Femoral head necrosis	Good	Moderate	Poor
B	8	≤ 6 (0-6)	4	30	8	3	-	-	7	1	-
B	6	> 6 (7-16)	10	32	6	3	2	-	4	2	-
C	6	> 6 (6-22)	13	55	6	4	1	6	-	-	6
					20	10	3	6	11	3	6

Group B, manual immediate reduction of the femoral head dislocation and subsequent operative reconstruction of the posterior wall; Group C, delayed operative reduction of the femoral head dislocation and reconstruction of the posterior wall. All fractures were Types II-III (Waller).

seems to be good if the primary closed reduction is successful and the fragment detached from the posterior wall is small. Simple fractures without displacement also have a good prognosis. Provided that the primary manual reduction of the femoral dislocation has been successful, the results of open treatment seem to be equally good even though the detached solitary fragment is large. If reduction is delayed more than 6 days, the results will be poorer. In our patients the delayed reduction was usually associated with failure of primary reduction of the femoral head. It was hoped that in some patients continued traction could gradually lead to reduction of the joint, but this delay may well have contributed to a poor result. On the other hand, Letournel (1981) concluded that the length of the dislocation period had no direct effect on, or correlation with prognosis; however, he felt that the best results would be obtained by reduction of a femoral head dislocation within 24 hours after trauma. In closed treatment of pure acetabular posterior wall fractures, we now favor only 2-5 days' bed rest after reduction of the dislocation. After finding that the number of complications is unaffected by the duration of traction in cases of successful primary reduction, we no longer use traction, and weightbearing is started after 3 weeks. After open treatment, also without traction, weightbearing should probably not be started earlier than 5-6 weeks

after the operation. In patients operated on after unsuccessful attempts at closed reduction, we recommend removal of the crushed devitalized cartilage.

References

- Böhler, L. (1954) *Die Technik der Knochenbruchbehandlung*. 12.-13. Auflage. 2. Band, 1. Teil. Verlag W. Maudrich, Wien.
- Epstein, H. C. (1974) Posterior fracture-dislocations of the hip. Long-term follow-up. *J. Bone Joint Surg.* **56-A**, 1103-1127.
- Jungbluth, K. H., Sauer, H.-D. & Schöttle, H. (1979) Ergebnisse der operativen Rekonstruktion verschobener Acetabulum-frakturen - Sammelstatistik der Internationalen Arbeitsgemeinschaft für Osteosynthesefragen - Sektion Deutschland. *Hefte Unfallheilkd.* **140**, 154-160.
- Lansinger, O. (1977) Fractures of the acetabulum. A clinical, radiological and experimental study. *Acta Orthop. Scand.* Suppl. 165.
- Letournel, E. (1980) Acetabulum fractures: classification and management. *Clin. Orthop.* **151**, 81-106.
- Letournel, E. & Judet, R. (1981) *Fractures of the acetabulum*. Springer-Verlag, Berlin-Heidelberg-New York.
- Nerubay, P. R., Galncz, G. & Katznelson, A. (1973) Fractures of the acetabulum. *J. Trauma* **13**, 1050-1062.
- Solheim, K. & Skrede, O. (1973) Acetabular fractures. *Acta Orthop. Scand.* **44**, 728-738.

- Stewart, M. J. & Milford, L. W. (1954) Fracture-dislocation of the hip. An end-result study. *J. Bone Joint Surg.* **36-A**, 315-342.
- Thompson, V. P. & Epstein, H. C. (1951) Traumatic dislocations of the hip. A survey of two hundred and four cases covering a period of twenty-one years. *J. Bone Joint Surg.* **33-A**, 746-778.
- Waller, Å. (1955) Dorsal acetabular fractures of the hip. (Dashboard fractures). *Acta Chir. Scand.* Suppl. 205.
- Watson-Jones, R. (1955) *Fractures and joint injuries*. Vol. 2, 4th ed., pp. 681-683. E. and S. Livingstone Ltd, Edinburgh.