

Acetabular Fractures A Study of Operatively Treated 85 Cases

Dr. Parag Sancheti M.S.(Ortho.)

Dr. Atul Patil

Sancheti Institute for Orthopaedics & Rehabilitation, Pune.

❖ Abstract ❖

This is a study of 85 cases of fractures of acetabulum treated operatively between 1999 to 2003 giving a minimum follow up of 2 yrs (average, 3.5 years; range, 2-6 years). Sixty four patients had isolated acetabular fractures and twenty one were associated with other additional fractures. There were 69 men and 16 women in the study (average age, 44 years; range, 19 to 72 years).

The indications for surgery were: (1) Displacement of the fracture of > 3 mm; (2) An intraarticular fragment giving incongruity and interfering with joint movement; (3) Posterior instability of the joint with a subluxating femoral head; (4) Roof arc $< 45^\circ$. The patients were classified according to Letournel and Judet classification. 12 patients had posterior dislocation. Out of these 7 patients reported in 6 hrs and were reduced immediately. 5 patients came more than 24 hrs late. Out of these 3 were reducible but two could not be reduced and had to be taken for surgery immediately.

The surgical approaches used were: the Kocher-Langenbeck (46); the ilioinguinal (17); and the Reinerts T approach (4). Single stage KL and IL approach was used in 18 patients. All patients received prophylactic treatment of indomethacin post operatively. 5 patients developed Heterotopic ossification Preoperative footdrop was seen in 8 patients out of which 5 recovered after surgery. Post-op sciatic nerve palsy occurred in 3 patients from which 2 recovered. 7 patients developed AVN out of which 2 required a total hip replacement. The results were good to excellent according to the d'Aubigne scale in 51, fair in 22 & poor in 12 patients.

Introduction

Acetabular fractures are an enigma and pose a major challenge to the treating orthopaedic surgeon. Pioneering work was done by Letournel & Judet in acetabular fractures and they popularized the operative treatment of these fractures. They created a classification system to understand the fracture morphology in a better way. Surgical reduction of acetabular fractures requires specific operative skills and expertise.

Long term results, no matter which operative approach is used or fracture type is involved, are directly related to the quality of fracture reduction achieved. The results of the 85 patients with acetabular fractures treated at the authors' institution, are analyzed in this report.

The indications for surgery were: (1) Fracture displacement > 3 mm; (2) An intraarticular fragment making the joint in congruous & interfering with joint movement, (3) Posterior instability of the joint with subluxating femoral head, (4) Roof arc $< 45^\circ$.

Material and Methods

Between 1999 and 2003, 85 patients with an acetabulum fracture were treated operatively. Follow up was for a minimum of 2 years with an average of 3.5 years (range, 2-6 years). Sixty four patients had an isolated acetabular fracture, and 21 had other associated fractures.

There were 69 male and 16 female patients. The average age of the group treated operatively was 44 years (range, 19-72 years). Fractures were treated following the diagnostic and therapeutic criteria of Judet and Letournel.

In 35 cases the mechanism of injury was a motor vehicle accident, in 21 a motorcycle accident,

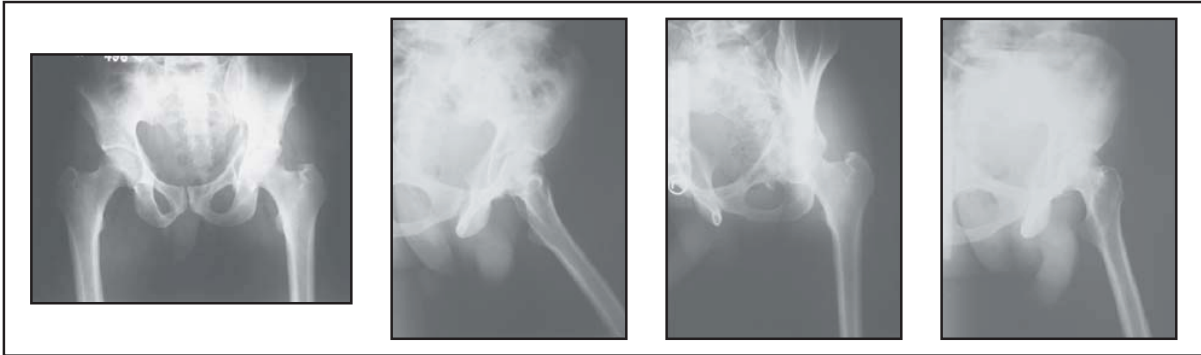
in 14 a fall from height, and 9 were pedestrians who were hit directly by other vehicles and 6 had a fall.

In all patients anteroposterior (AP) and Judet views of the pelvis were taken. In 46 cases a CT

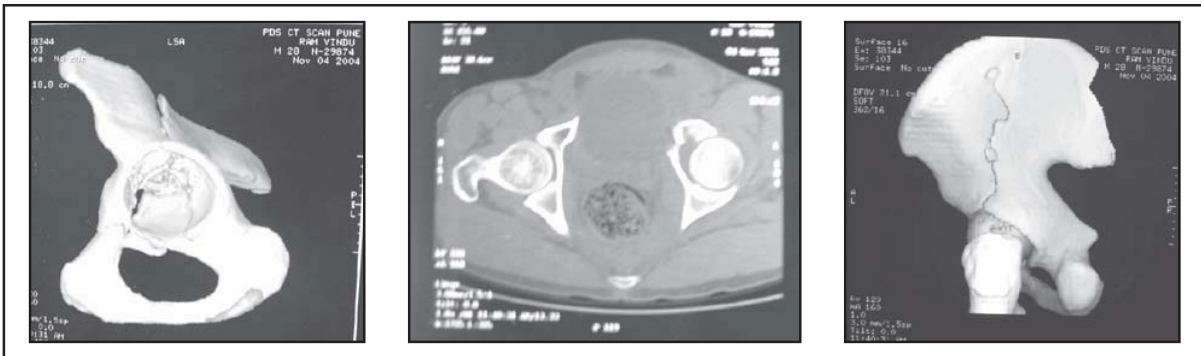
scan with 3D reconstructive images were obtained preoperatively.

Immediate post op AP Xrays and Judet views were taken.

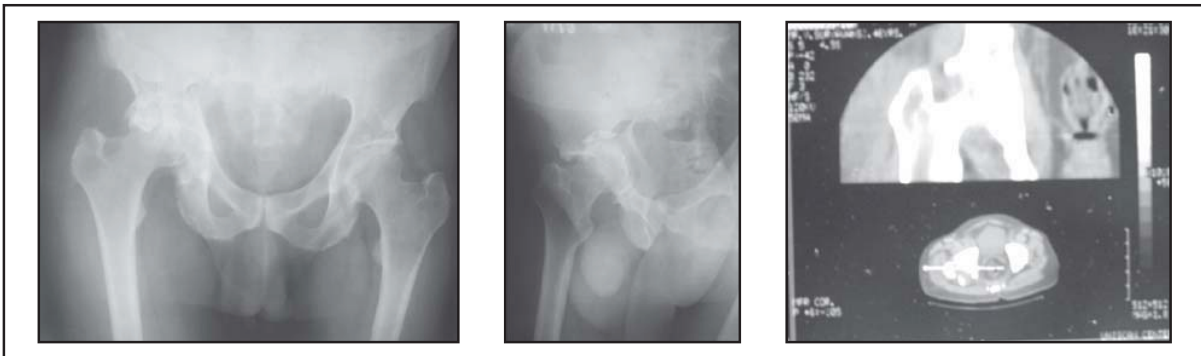
(1) Anterior Column X-Rays



Anterior Column CT Scan

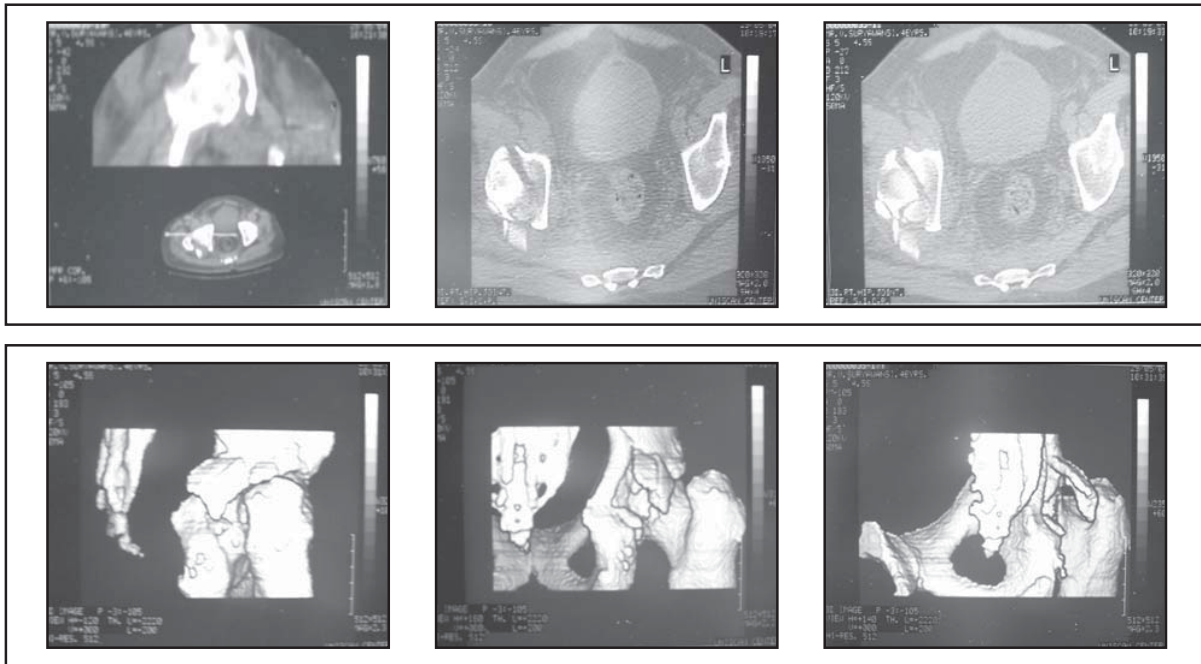


(2) Posterior Column X-Rays



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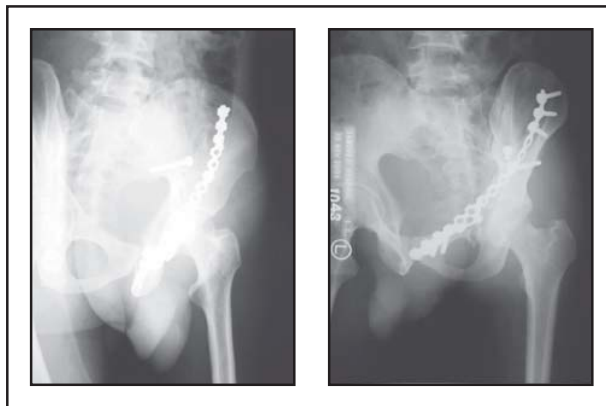
Posterior Column CT Scan



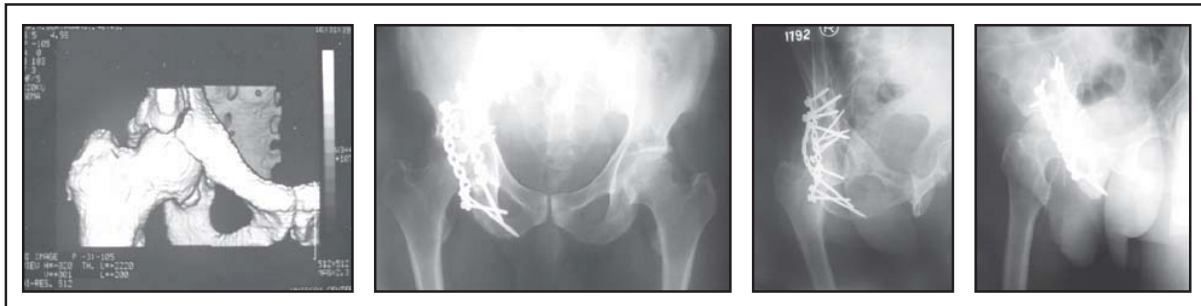
All patients were reviewed clinically and radiographically at 1, 3, 6, 12 & 18 months. After that, they were reviewed every 12 months.

Fractures were classified according to Judet and Letournel. 52 fractures were elementary and 33 were combined: 20 posterior wall, 11 posterior

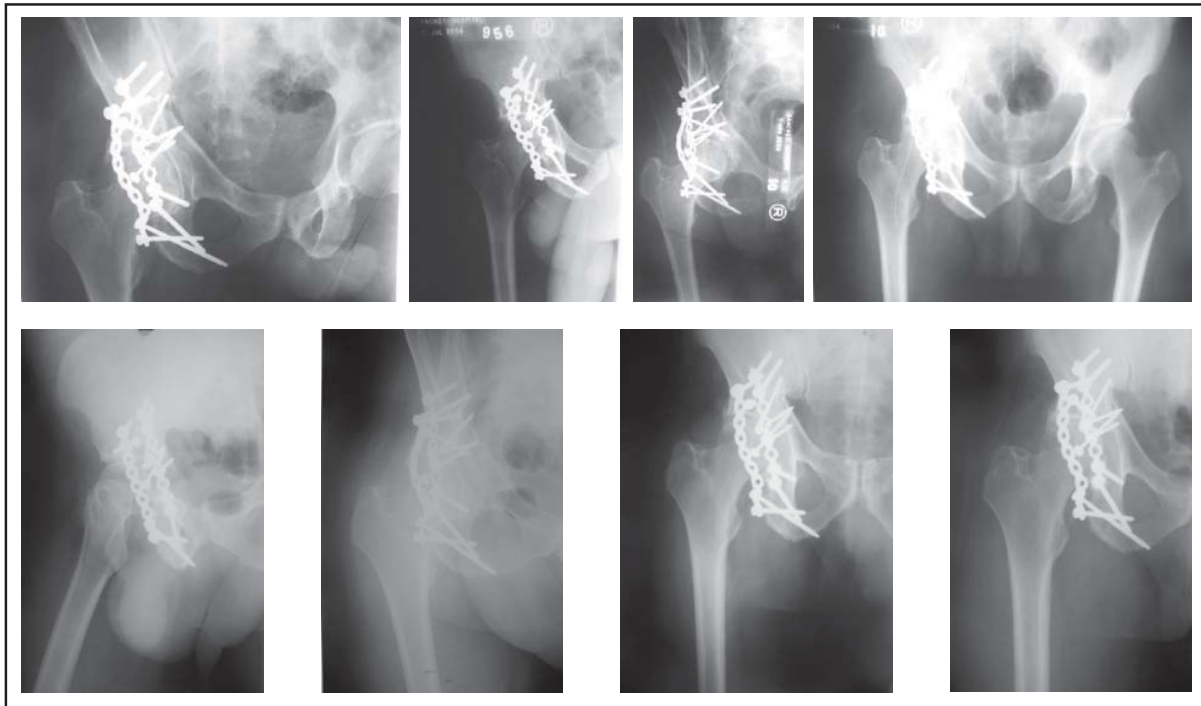
Post-op X-Rays Anterior Column



Post-operative X-Rays Posterior Column



(3) Both Columns Post-op X-Rays



column, 10 transverse, 5 anterior wall, 6 anterior column, 12 both columns, 8 posterior wall/posterior column, 7 transverse/posterior wall, 7 T- shape, and 9 anterior wall or anterior column plus posterior hemitransverse. All patients were operated on within 4 weeks of trauma.

The Kocher-Langenbeck approach was used 46 times, the Reinerts T approach 4 times, and the ilioinguinal 17 times. Combined KL and IL approach in one sitting, one after the other was used on 18 cases. The Kocher-Langenbeck approach was performed with the patient in a lateral position on a table with a radiolucent top. The Reinerts T approach was also used in the lateral position. In both these approaches the knee was flexed at least 60 degree and hip extended to relax the sciatic nerve. The ilioinguinal approach was performed with the patient in a supine position with a slightly elevated ipsilateral half of the pelvis and the hip and knee flexed to 30 to 40 degree to relax the neurovascular structures under the inguinal ligament.

Patients Position on Table



All operations were performed jointly by the two authors. Cefuroxime was used as prophylactic antibiotic. Postoperatively 75 mg of Indomethacin in divided doses daily was given for three weeks.

5 had a posterior subluxation of the femoral head. In 2 patients it could not be realigned with closed reduction and required open reduction. Closed reduction was achieved in the other, but the reduction was incomplete due to the presence of major incarcerated fragments which blocked reduction of

the femoral head. 2 patients had femoral head lesions, 1 fracture and 1 local head grindings caused by fracture.

Intraarticular incarcerated fragments < 1 cm were observed on radiographs and confirmed by CT scan in 10 patients. Marginal impaction of large acetabular rim fragments was also seen on radiographs and CT scans in 4 patients.

Sciatic nerve paralysis was observed in 8 patients, all of which had a posterior column fracture. 3 patients had complete and lasting paralysis. Postoperatively, there was a temporary femoral nerve paralysis in one patient.

21 patients had associated fractures : 8 pubic symphysis diastasis, 3 sacroiliac joint disruptions, 2 sacroiliac joint fracture, and 1 nondisplaced sacral fractures. Associated trauma was found in many cases. Extremity trauma found in 14 cases, spinal trauma in 2 cases, abdominal injuries in 4 cases, thoracic trauma in 5 cases.

Follow up included ongoing evaluation with radiographic films and assessment of range of motion of both hip joints, degree of pain, and degree of ambulation according to the d'Aubigne scale (Excellent–18 points). The presence of ectopic bone, sclerosis, spur formation of the femoral head, congruence of the femoral head with acetabulum, and signs of degeneration of the femoral head and acetabulum were assessed from radiographs.

Results

The quality of reduction was measured peri or postoperatively on radiographs and was anatomic (< 1mm displacement) in 51 patients, satisfactory in 22, and poor in 12. In the associated acetabular fractures group 15 were reduced anatomically. The clinical results were excellent in 15 patients who had normal hips at follow up both radiographically and clinically. 8 patients had good result.

The average operating time including positioning of the patient was 3 hours; the average blood loss was 275 ml. (range 150 ml – 1 liter) Heterotopic bone developed in 5 patients. Of 3

Post-op Clinical



Post of Clinical



patients operated on through a Kocher- Langenbeck approach, 2 had Brooker Grade II and 1 Brooker Grade III heterotopic ossification. No patients with heterotopic ossification were found in the ilioinguinal approach group, while 2 in the Reinerts approach group had Brooker Grade II heterotopic ossification.

Functional impairment occurred only in 1 patient in the Kocher – Langenbeck approach group, who had Brooker Grade II heterotopic ossification. The fracture was not recognized for 24 hours; there was an unreduced posterior dislocated femoral head and a dorsal wall fracture.

Osteonecrosis of the femoral head was seen in 7 patients between 3 and 28 months after trauma. All were posterior dislocations, 2 after a posterior wall fracture and 5 after a both column fracture. One complete loss of reduction was noted in an otherwise perfect reduction and fixation of an anterior column and posterior hemitransverse fracture in a 62 year old man. One other patient, a 55 years old woman,

showed a complete loss of reduction and fixation in a simple anterior column fracture; the screws were torn out of the pubic superior ramus.

Additional complications included 2 wound infections and 3 hematomas without further problems. One vascular lesion occurred in a patient with an ilioinguinal approach, also with no further problems following vascular correction. The operative reduction was incomplete in 5 patients. 3 of these had either a complex posterior wall fracture or a transverse fracture. In the complex posterior wall fractures there was impaction of the dorsal part of the joint and notching of the femoral head. Reconstruction with bone grafting and strutting with K wires and 1/3 prebended tubular plates was required. The rotation of the transverse fractures was difficult to reduce through 1 approach, and 18 times a Kocher – Langenbeck plus an ilioinguinal approach was used one after the other in the same sitting.

An intraarticular screw or K wire was not found to be the cause of complication in any patient.

7 patients developed AVN out of which 2 total hip replacements were required.

Discussion

The quality of the functional and clinical results was directly related to the exact operative reduction in the operative group. 51 of the 85 patients operated on had an excellent or good result, 51 had an anatomic reduction. These results are comparable to other authors

In 7 patients, the fracture differed from the preoperative diagnosis and in 5 patients should have been operated on through an other approach. Comminution, impaction loss of fragments, and notching of the femoral head present difficulties. Of the 85 patients in the present study, 45 were straightforward cases and 11 required special modified osteosynthesis or bone grafting. At follow up, 5 of those showed narrowing of the joint space and 2 had undergone total hip replacement.

Through the years use of the ilioinguinal approach was emphasized because of the good results it usually provided, including non-development of

heterotopic ossification and quick rehabilitation. However, reduction of the posterior column can be a problem with this approach, especially if there is also a rotation of the posterior column. There were 4 fracture patterns for which the Reinerts T approach was used and the complications reported with this approach indicated it's use only when essential.

A minimum follow up of 2 years was chosen as an acetabular fracture is intraarticular and osteoarthritis will usually occur within the first 2 years. No major changes were found in clinical, functional and radiographic results between 1 and 2 years postoperatively. It appears that if the result is clinically and radiographically good or excellent and stable from the time of operation, without any signs of degenerative disease after 1 year, the long term outcome will not usually change.

22 of 85 patients had a fair result 11 had a poor result.

Conclusions

The understanding and treatment of acetabular fractures has considerably progressed in the last decade. The pioneering work done by Letournel and Judet has been popularized by David Helfet, Tim Pohleman, Allan Jones, Steve Harris and others.

Clearly the surgical outcome depends on many factors; the ability of the surgeon to classify the fracture; choose the appropriate approach, to have adequate and proper instruments, theatre facilities and to employ a proper surgical techniques so as to get a near anatomic reduction. In spite of clearing these hurdles there are other factors which are not in the surgeons control and can give a poor outcome like unreduced dislocations with late presentation, gross comminution and osteoporosis.

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