Proceedings S.Z.P.G.M.I vol: 12(3-4) 1998, pp. 78-84.

Open Reduction and Internal Fixation of Displaced Acetabular Fractures

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SUMMARY

Twenty one cases of acetabular fractures treated between 1992-1996 in the Department of Orthopaedics, Shaikh Zayed Hospital were reviewed. Fifteen patients were male and majority of patients sustained injury in road traffic accident. Out of 21, fifteen patients were treated surgically and 6 patients by conservative method. Results were evaluated using new acetabular fracture scoring system and good to excellent results were found in 65% of cases. It is suggested that open reduction and internal fixation gives good functioning results in displaced acetabular fractures and minimizes the risks of later complications.

INTRODUCTION

Acetabular fractures have always presented a major challenge to orthopaedic surgeons. Treatment has remained controversial. Before 1960 acetabular fractures were traditionally managed with non operative methods. Earlier reports of Rowe and Lowel (1961)[1] showed good or excellent results in 89% of cases, treated non operatively with femoral head reduced under intact dome.

But all the articular fractures specially of lower extremity require anatomical or near anatomical reduction to obtain optimum results. If anatomical reduction can not be achieved by closed means, then open reduction and internal fixation becomes necessary. Difficulties encountered have been accurate delineation of fracture geometry on routine x-rays, difficult exposure, comminution of fracture, and difficulties of reduction and fixation of fractures. Several studies show that non operative treatment is preferred to surgical management of these fractures, but these studies lacked uniform classification criteria to evaluate results.

Improvement in imaging techniques, introduction of special x-ray views by Judet, C.T. imaging of pelvis and 3 dimensional reconstruction view are now very helpful to understand the fracture geometry for accurate diagnosis. Also with improvement in surgical techniques, open reduction and internal fixation of acetabular fractures has become the valid treatment option where joint congruency is not achieved by closed method.

PATIENTS AND METHODS

From 1992 to 1996, total 21 cases of acetabular fractures were managed in the Department of Orthopaedic Surgery, Shaikh Zayed Hospital, Lahore. Six cases were managed conservatively while 15 cases were managed by open reduction and internal fixation of these fractures. There were 15 male and 6 female patients. Majority of the patients sustained injury in road traffic accident. About 84% of cases were in middle age group (Table-1). Ninteen patients had associated hip dislocation. Patients with associated injury other than hip dislocation were excluded from the study.

As these fractures are usually the result of high energy trauma, most of the patients need initial intensive emergency management. All patients were initially managed in the A/E Department and when the general condition of patients stabilized, they were admitted with initial physical examination and x-rays series performed. Many of the patients had associated hip dislocation (Table-2) which was given priority and treated as an emergency. Posterior dislocation of the hip was reduced under general anaesthesia while central dislocation was reduced by applying continuous skeletal traction

longitudinally and lateral traction through sling. We were able to reduce all associated dislocations by closed method, except in one case who presented 3 weeks after injury. In this case dislocation was reduced at time of surgery.

Table 1: Age and sex distribution

Group	*No. of Cases*	*Percentage*
Age		
20-40 years	10	47.6%
40-60 years	8	38.4%
60-above years	3	14%
Sex		
Male	15	72.8%
Female	6	28.2%
Total	**21**	**100%**

Table 2: Associated hip dislocation. Total No. of Cases = 21. Hip dislocation = 19

Type of Dislocation	*No. of Patients*	*Percentage*
Central dislocation	7	37%
Posterior dislocation	12	63%
Ant. dislocation	0	0%
Total	19	100%

Pre-operative evaluation of injury was made by x-rays and CT scan of pelvis. X-rays included anteroposterior and 45° oblique views of pelvis. These x-rays were used to classify the fractures and taking decision of fracture management. All the fractures were classified according to Judet and Letournel classification[2] (Table-3). When the decision of open reduction and internal fixation was made, C.T. scan of pelvis was performed for better delineation of fracture configuration.

Criteria for open reduction and internal fixation of acetabular fractures varies with different authors but we followed strictly the following indication for operation; (Table 4).

i. Displacement of fragments more than 3.0mm.
ii. Primary or secondary incongruency.
iii. Any intraarticular loose body.
iv. Unstable posterior lip fragment.
v. Matta roof arc measurement less than 45° in all three standard x-ray views.
vi. Post traumatic sciatic nerve palsy

Table 3: Types of fractures (Based on Judet & Letournal Classification

Type of Fracture	*No. of Cases*	*Percentage*
Posterior lip fracture	8	38%
Posterior lip and column fracture	2	9.5%
Both column fracture	10	47%
Anterior column fracture	1	5%
Posterior column fracture	0	0
Total	**21**	**100%**

Table 4: Indications for operations (n=15).

Indication	*No. of Cases*	*Percentage*
Large posterior lip fragment	7	46.6%
Both column fracture	6	40%
Posterior lip and column fractures	2	13%
Total	**15**	**100%**

Contraindications to surgery included;

i. Marked osteoprosis and excessive comminution of fracture.
ii. Associated injury to bladder.
iii. An open fracture.

All the patients to be operated upon were given low molecular weight Heparin preoperatively and postoperatively for prophylaxis against deep vein thrombosis (DVT). Patients were operated under general anaesthesia by the surgeons skilled in pelvic surgery. Posterior lip and posterior column fractures were operated through Kockar - Lengback approach while fractures involving anterior column were approached through both Kockar - Lengback

and ilio inguinal approaches either in same sitting or with interval of 4-5 days (Tables 5, 6). Though some other approaches are also described in literature[3,4]. Wounds were closed over suction drains and IV antibiotics were discontinued with the removal of drains. Except in few patients in whom absolute stable fixation was achieved, other patients were placed in postoperative skeletal traction for 6 weeks and all the patients were kept non weight bearing till 6 weeks. But muscle strengthening exercises were instituted immediate postoperatively.

Table 5: Surgical approaches (n=15)

Approach	*No. of Cases*	*Percentage*
Anterior approach only	0	0
Posterior approach	13	87
Both approaches simultaneously	1	6.6
Both approaches with interval of few days	1	6.6
Total	**15**	**100**

Table 6: Implants used (n=15)

Types of Implants	*No. of Cases*	*Percentage*
Screws only 3.5mm reconstruction plates and screws	8	53
	7	47
Total	**15**	**100**

Patients were discharged with satisfactory wound condition with further follow up at 2 and 4 weeks, 2, 3, 6 months, 1 and 2 years postoperatively. Non weight bearing ambulation was started after 6 weeks and partial weight bearing started between 3-6 months with clinical and radiographic evidence of fracture union.

Six patients who were treated non operatively were manage by skeletal traction for 6 weeks with same rehabilitation programme as mentioned for patients who were managed surgically (Table 7).

Table 7: Indications for conservative management (n=6)

Indication	*No. of Cases*	*Percentage*
Posterior lip fragment less than 33% with stable hip	1	16.6%
Displacement of fragment less than 3.0mm	5	83.5%
Total	6	100%

RESULTS

Out of 15 patients who were treated by open reduction and internal fixation, one patient died on same day of operation due to massive pulmonary embolism. So 14 patients were available for follow up (6 months - 2 years) and evaluation of results.

Results were evaluated using new acetabular fracture scoring system[5] based on five variables i.e pain, function, range of movement at hip, need for salvage surgery, and x-ray evaluation (Table 8). Based on this scoring system, excellent results were obtained in 21.4%, good result in 42.8%, fair results in 21.4% and poor results in 14.2% of patiens (Table 9).

Radiological results of 3 out of 15 cases are presented. It includes pre-operative, post-operative and follow up x-rays upto 1 year are available.

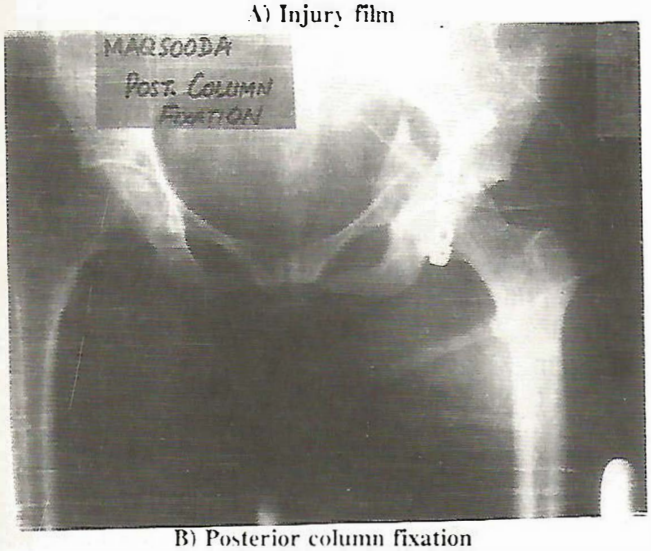
DISCUSSION

Complex anatomy of pelvis makes difficult for both surgeons and experienced radiologist to visualize the exact geometry of acetabular fractures. Full understanding of fracture classification is of paramount importance for the surgeon for planning the treatment and surgical approach.

Open reduction and internal fixation is now valid treatment of choice for displaced acetabular fractures where expertise is available. Non operative treatment of acetabular fractures has now been limited to few indications. In this study also, six patients were treated by skeletal traction only in which the initial displacement of fracture was less than 2.0mm and all these patient showed excellent to good results.

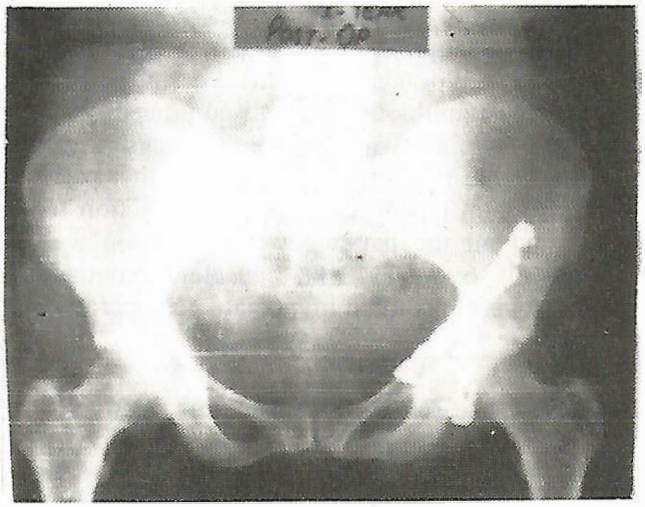
Case - 1: Both Column Fracture

A) Injury film



B) Posterior column fixation

C) Posterior column fixation after 4 days.



D) Post-operative x-ray after 1 year showing congruent joint without any osteoarthritic changes.

The complications encountered in our series (Table 10) are comparable to international studies. Only one patient had mild wound healing problem but no patient showed any sign of superficial or deep wound infection. Patient selection, antibiotic prophylaxis and proper intraoperative technique helped to control the infection rate. Heterotropic ossification is common problem in acetabular surgery. The reported incidence in literature is 10-50% in different series[6,7]. In our series only one patient had heterotropic ossification which was visible at 6 months follow up. Various methods are described to reduce the incidence of heterotopic ossification;

i. Oral administration of diphosphonates.
ii. Oral NSAIDS as indomethacin.
iii. Low dose radiation therapy

One patient 70 years old male died of pulmonary embolism on the same day of surgery. No other patient showed any sign of D.V.T.

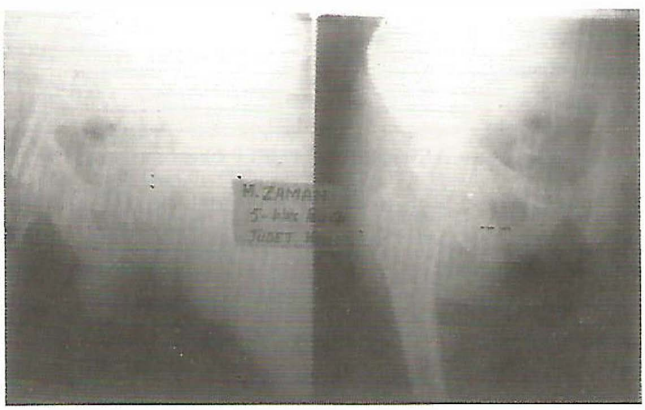
Postoperative sciatic nerve injury occurred in one patient. It was traction type injury which recovered fully later on.

One patient had collapse of head of femur and acetabular fragment and later on developed avascular necrosis (AVN) of head of femur. This complication was seen in a patient who presented late and was operated about 4 weeks after injury. Excessive soft tissue stripping in these old untreated cases lead to failure of procedure.

Case - 2 Posterior column and posterior wall fracture

A) Injury film

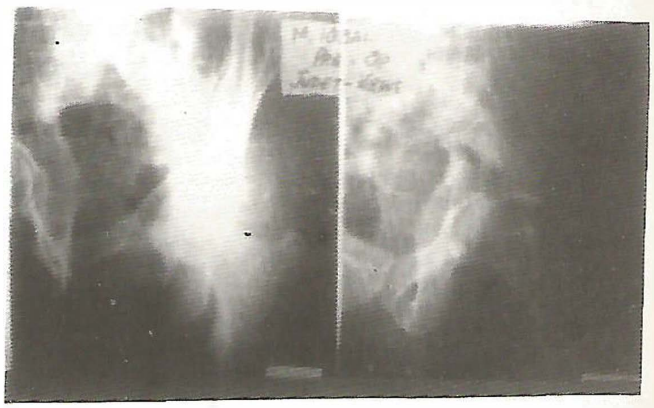
B) Post-operative x-ray.



C) Five weeks post-operative x-ray.

Case - 3 Both column fracture

A) Injury film



B) Judet view

C) Two months post-operative.

Table 8: New acetabular fracture score system

Variable	*Points*
Pain	30
None	30
Occasional	20
Moderate	10
Severe	0
Function	30
1. Work status	**10**
Full time same job	10
Full time other job	8
Part time	2
2. Walking	**10**
30 minutes	10
20 minutes	8
10 minutes	5
Indoor	0
3. Limping	**5**
None	5
Occasional	3
Constant	0
4. Walking aid	**5**
None	5
Occasional cane	3
Full time cane	0
5. Range of Movement	**10**
Full range	10
75%	8
50%	5
Less than 50%	0
6. Salvage Surgery	**10**
None	10
Any	0
7. X-ray Findings	**20**
Normal	20
Minimal arthritis	15
Moderate arthritis	10
Severe arthritis	0

Though Row and Lowell reported 89% good results by non-operative treatment, the work of Judet and Letournel in 1964 showed marked contrast to other Orthopaedic literature. They proposed open reduction and internal fixation for all the displaced acetabular fractures to prevent later degenerative changes[8].

Hoffman Dahl and Wayalt[9] showed that functional outcome of displaced acetabular fractures was related to quality of reduction.

Table 9: Results (Based on acetabular fracture score system) Total cases operated = 15. One patient died same day of operation (n=15).

Results	*No. of Patients*	*Percentage*
Excellent	3	21.4%
Good	6	42.8%
Fair	3	21.4%
Poor	2	14.2%
Total	14	100%

Table 10: Number of patients who developed post-operative complications (n=6).

Results	*No. of Patients*	*Percentage*
Sciatic nerve injury	1	6.6%
Failure of fixation with Collapse of head and acetabular fragment	1	6.6%
Heterotopic ossification	1	6.6%
Wound problem	1	6.6%
Massive pulmonary embolism & moetality	1	6.6%
A.V.N	1	6.6%

Mata[10,11] showed that acetabular fracture displacement more than 3.0 mm reduces the chances of satisfactory results. Similarly Heeg[12] reported that if congruency is not maintained by conservative treatment, poor prognosis should be expected and operative treatment is indicated.

In a series of 116 patients, Goulet et al.[13] reported 77% satisfactory results of internal fixation of displaced acetabular fractures.

CONCLUSION

Patients with displaced acetabular fractures should be referred to and treated in centres where expertise are available to treat these complex fractures. Good anatomic reduction and stable fixation definitly improves the clinical results in displaced acetablar fractures. Operative treatment markedly reduces the hospital stay and is consistent with better clinical results.

Although this modality is still in developing stage in this country but with continuous effort to improve our skills to manage this problem and to make the experts available at various centres, we can hope to produce the results of international standards with long term follow up.

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