

A PROSPECTIVE STUDY TO ANALYSE THE SURGICAL OUTCOME OF POSTERIOR ACETABULAR FRACTURES.

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ABSTRACT

BACKGROUND:

Acetabular fractures incidence accounts for 3 patients / 100,000 / year during the last 2 decades. Among acetabular fractures posterior wall accounts for most common acetabular fracture type (25%). The aims and objectives of the study was to evaluate the functional and radiological outcome of posterior acetabular fractures treated with different surgical techniques and the possible post operative complications.

METHODS

A total of 27 patients who had a history of either motor vehicle accident or accidental fall and were radiologically diagnosed with posterior acetabular fracture as per Judet and Letournel classification and underwent surgery for the same. Radiographs were taken after each follow up and patients were evaluated for functional outcome by Modified Harris Hip Score and surgical complications. Statistical analyses were performed using the Statistical Package for the Social Sciences software A $p < 0.05$ was considered statistically significant.

RESULTS

In the present study, the age group range was between 20 and 71 years, and the mean age in the study was 41.9 years. Road traffic accident was the most common cause of fracture (80%) followed by accidental fall (20%) in our study. Right acetabular fracture was the most common (60%) followed by left (40%). Radiological union was achieved in thirteen cases (45%) by 4 months and in 12 cases (55%) by the end of 12 months whereas 2 patients developed non-union. Functional outcomes of all the cases were assessed in terms of Harris hip score grading. 60% of the cases had good, 15% excellent, 20% fair and 5% poor outcome in our study.

CONCLUSIONS

Operative treatment of displaced acetabular fractures gives satisfactory functional results. Functional outcome is better with patient operated within one week of injury than a delay of more than one week.

KEYWORDS:

Acetabular fracture , Letournel-Judet classification , Kocher-Langenbeck approach, Harris Hip Score

INTRODUCTION :

The incidence of acetabular fracture is not very common . Acetabular fractures incidence accounts for 3 patients / 100,000 / year during the last 2 decades. Among acetabular fractures posterior wall accounts for most common acetabular fracture type (25%). The mean age of patients sustaining acetabular fractures is increasing day by day. Most common mode of injury in elderly patients is fall from height, while in younger patient is motor vehicle accident. Both non operative and operative treatment regimens were purposed to be best^[1]. A study by Letournel , Judet and by Matta shown that to attain best results, hip joint congruity and stability must be accompanied by anatomical reduction of the displaced articular surface^[2]. Patients with stable undisplaced fracture or wall fracture not comprising hip stability were opted for non surgical management like traction and closed reduction along with percutaneous Schanz pin fixation whereas patients with unstable fracture with loss of congruity of hip joint were treated with open reduction and internal fixation with cancellous screws and reconstruction plate. A study by Gansslen and Krettek, concluded open anatomic reduction and stable internal fixation of acetabular fractures by screw and plate osteosynthesis results in excellent prognosis^[3]. Recent technologies like 3D CT Scan, Virtual assessment of the fracture, 3D print modelling of the fracture made it easy to treat complex fractures^[4]. The aims and objectives of the study was to evaluate the functional and radiological outcome of posterior acetabular fractures treated with different surgical techniques and the possible post operative complications.

METHODS AND MATERIALS:

It was a prospective observational study done in department of orthopaedics, Narayana Medical College and Hospital, Nellore, Andhra Pradesh. The study was conducted on patients who underwent surgery between July 2020 to January 2022.

Inclusion Criteria:

- 1 Patients with age group 20 to 75 years.
- 2 Patients with less than 10 days old fracture.
- 3 Patients with unstable isolated posterior wall fracture.
4. Patients agreed for informed consent and follow up.

Exclusion Criteria:

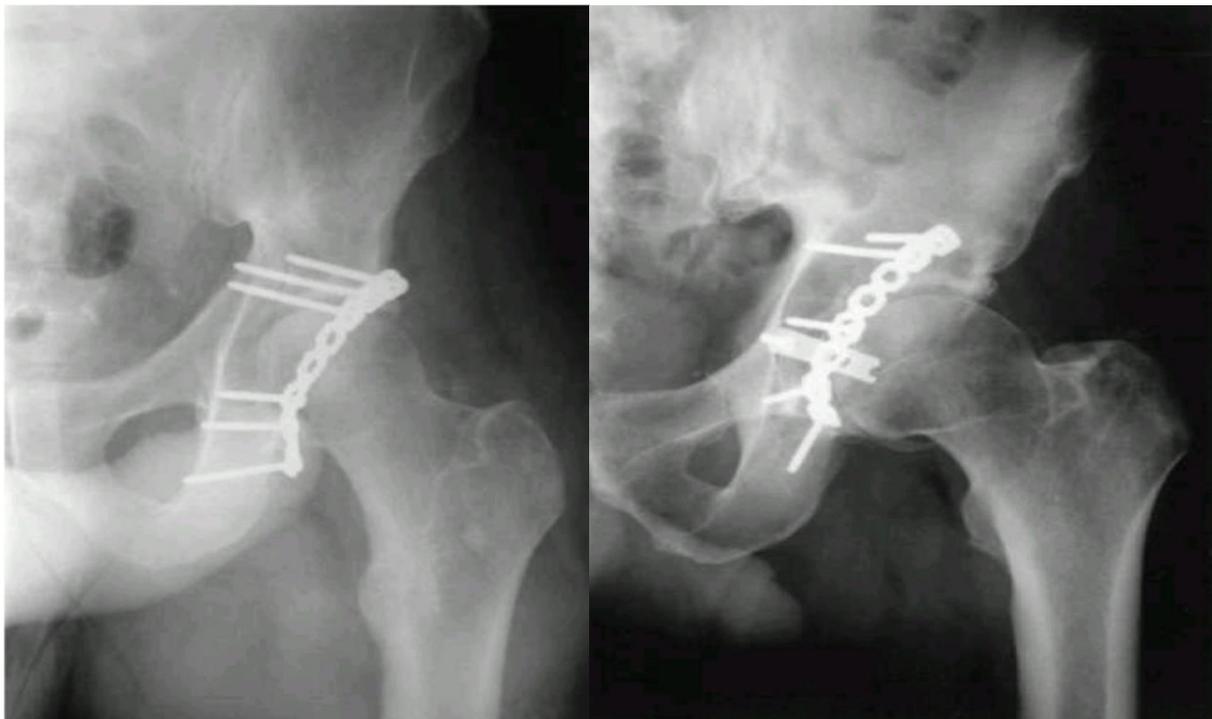
- 1 Patients with anterior wall fracture with other long bone fracture.
- 2 Patients who were not fit for surgery.
- 3 Patients not agreed for informed consent.

Ethical committee approval was taken and ethical committee guidelines were strictly followed .

A total of 27 patients who had a history of either motor vehicle accident or accidental fall and were radiologically diagnosed with posterior acetabular fracture as per Judet and Letournel classification and underwent surgery for the same.

Surgical Technique:

- * Patient in a supine or lateral position, Kocher- Langenbeck approach was used.
- * In all the patients the sciatic nerve was first identified and protected after tracing it proximally and medially towards the greater sciatic notch.
- * A Ganz trochanteric flip osteotomy was done in patients in which fracture line was extending superior to the dome of the acetabulum.
- * The fracture fragments were reduced and was first fixed by kirshner wires, Later on definitive fixation was done by using lag screws or contoured reconstruction plates.
- * In patients with comminuted fractures were treated using Spring plates.



Posterior acetabular Fracture fixation by Reconstruction plate

Posterior acetabular Fracture fixation with spring plate

Post operative care:

- * Postoperatively closed suction drainage was used, antibiotic therapy was continued for 48 hours.
- * Postoperative prophylaxis for deep vein thrombosis and heterotopic ossification was followed.
- * Abductor muscle strengthening exercise was performed and partial weight bearing was allowed for 8 weeks in simple fractures and 12 weeks in other fracture patterns.

Follow up was done every 2 weeks for 4 months then after 8th month, 12th month and 16th month. Radiographs were taken after each follow up and patients were evaluated for functional outcome by Modified Harris Hip Score and surgical complications.

Statistical analysis

Quantitative data were expressed as means±standard deviation. Statistical analyses were performed using the Statistical Package for the Social Sciences software (version 22, SPSS, Inc., Chicago, IL, USA). The independent test or chi-squared test was used for comparison. A $p < 0.05$ was considered statistically significant.

RESULTS

In the present observational cross-sectional study, 27 patients fulfilling the inclusion criteria were included. In the present study, the age group range was between 20 and 71 years, and the mean age in the study was 41.9 years. 5 cases were in the group of 61-70 years with three cases of male and two cases of female 10 cases were from 51-60 years with seven male and three female cases, followed by 5 in age group of 31-40 years with four male and one female cases. 3 cases were registered in age group of 41-50 years with two male and one female. and 4 cases with two male and two female were in 21-30 years group (Table 1).

Table 1. Age and Sex distribution of cases in the study

Age group (Years)	Male		Female		Total
	No	%	No	%	
20-30	2	7.4%	2	7.4%	4
31-40	4	14.4%	1	3.7%	5
41-50	2	7.4%	1	3.7%	3
51-60	7	25.9%	3	11.1%	10
61-71	3	11.1%	2	7.4%	5
Total	18		9		27

Males accounted for 66.66% (18/27) and females 33.33% (9/27) in the entire study with a predominance of males in the present study.

Road traffic accident was the most common cause of fracture (80%) followed by accidental fall (20%) in our study. Right acetabular fracture was the most common (60%) followed by left (40%). No associated injury was observed in 68% of cases in the present study, with 13% of cases having head injury, 9 % upper limb trauma and 5% (1/20) had chest injury (Table 2).

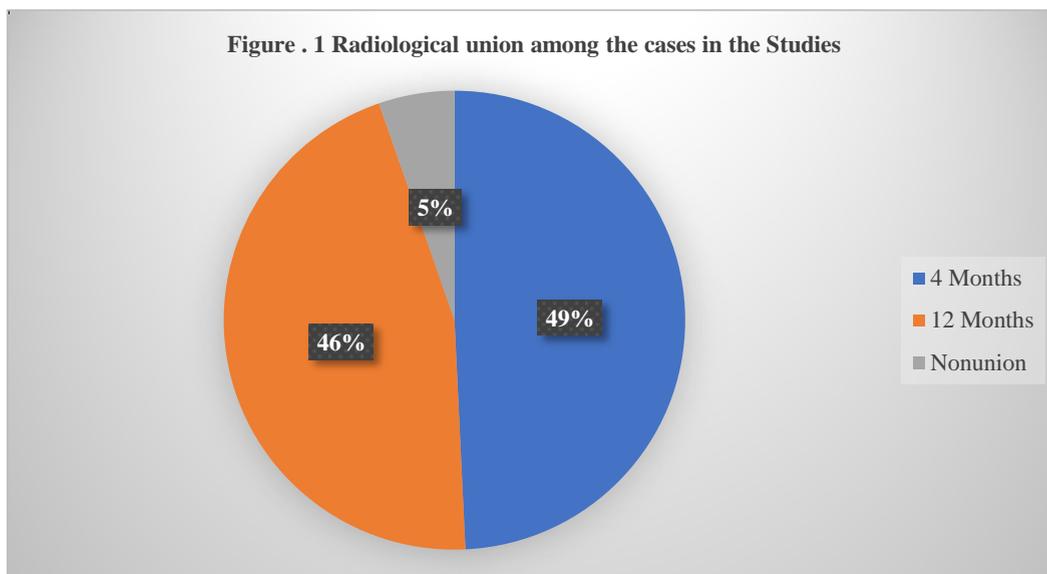
In our study operative intervention was done on or before 7 days of injury in half the cases and between 7 to 14 days in rest of the cases. Anatomical reduction was achieved in 23 cases accounting for 85% of cases and in 4 cases it was not possible (anatomical reduction defined as less than 2 mm displacement on postoperative check X-ray).

Table . 2 Data of Study cases

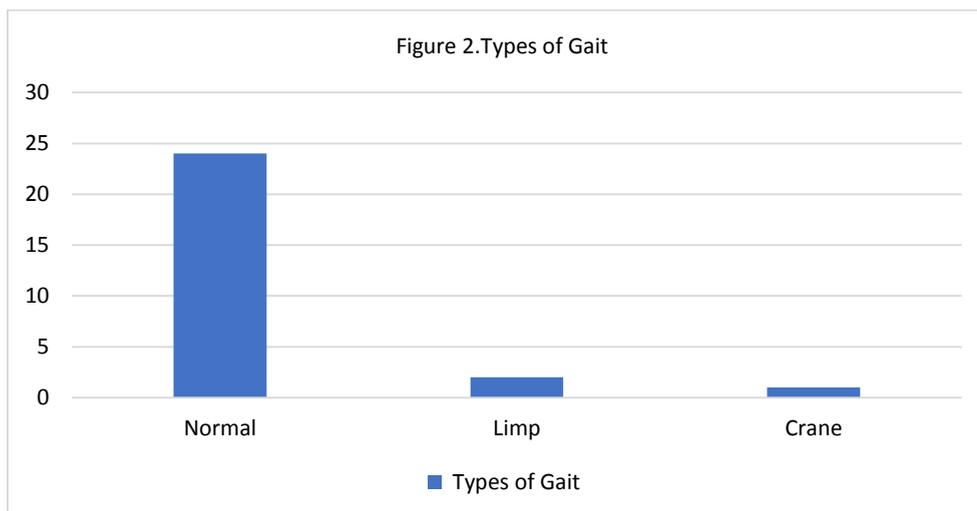
Variable	Number	Percentage
Mode of injury		
Road traffic accident	21	80
Fall	6	20
Affected side		
Right	16	60
Left	11	40

Time duration for intervention		
< 7 days	14	51.8
7-14 days	13	48.2
Anatomical Reduction		
Yes	23	85
NO	4	15

Radiological union was achieved in thirteen cases (45%) by 4 months and in 12 cases (55%) by the end of 12 months whereas 2 patients developed non union (Figure .1) .



Of the 27 cases in the study, 24 (85%) patients had normal gait, 2 patients walk with limp without any walking aid and one patient walks with the help of cane (Figure 2).



Functional outcomes of all the cases were assessed in terms of Harris hip score grading. 60% of the cases had good, 15% excellent, 20% fair and 5% poor outcome in our study (Figure 3).

In our study we had One case of surgical site infection. Iatrogenic sciatic nerve injury in one, two case of post traumatic osteoarthritis

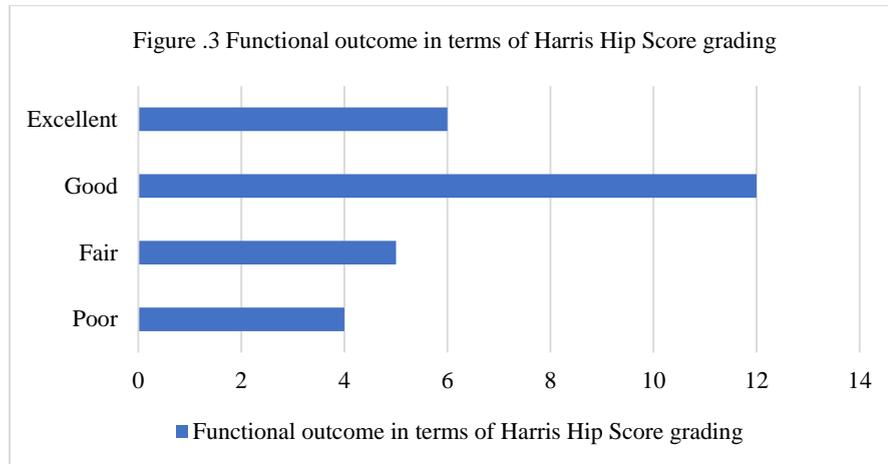


Table 3. Complications among the cases in the study

Complications	Numbers	Percentage
None	23	70
Post traumatic osteoarthritis	2	15
Surgical site infection	1	7.4
Iatrogenic Sciatic nerve injury	1	7.4

In our study, comparison of mean Harris hip score was done between age group <45 years (Group-1) and >45

Table .4 Comparison of mean Harris Hip Score between both age groups

years (Group 2), outcome was better in 1st group compared with 2nd group. P value was insignificant (0.07). In group age <45 years, we had 5 excellent, 6 good, 1 fair and 1 poor results. In group age >45 years we had 6 good, 4 fair, 3 poor and 1 excellent results (Table 4).

Age (in years)	Excellent	Good	Fair	Poor	MHHS
< 45	5	6	1	1	94.1
>45	1	6	4	3	81.7

DISCUSSION

Acetabular fractures are always challenging tasks for the orthopaedic surgeons to manage. They form one of the complex injuries to be managed effectively and require great skills. However the success of this is dependable upon multiple factors like type of fracture, level of injury, timing of open reduction and internal fixation and type of surgery performed. In our present study, male preponderance was clearly observed with 66.6% which is similar to the findings in the report of Heeg et al with 81.5% and Briffa et al with 76% in their studies^[4,5]. The mean age of cases in our study was 41.9 years which was similar to the findings in the study of Sahin et al who reported 42.8 years^[6]. The main cause of injury of the acetabulum in our study was road traffic

accident (80%) which is similar to the Amaravati et al who reported around 78% in their study, but our findings were contrary to the report of Dakin et al who reported accidental fall as a main cause of fracture in his study with 64% of the cause^[7,8]. This is due to the study population and place of study which was mainly rural setting traumatic care hospital in his study.

In our study left hip was affected in 11 (40%) patients and right in 16(60%) patients, Alonso reports right side affection in 21% and left in 79% cases which were almost similar to the results of our study finding^[9]. In our present study, 68% cases had no associated injury where as 32% of cases had associated injury, in the form of head injury in 3, upper limb trauma in 2 and chest trauma in 1 case. However the findings of our study were in contrary to the findings of Pape who reported a significant higher number of limb injuries, chest injuries with 38% in his study^[10]. The relative number of associated limb injury in our cases is significantly less because we excluded the patients with associated lower limb injury. In the present all the cases were operated within 3-11 days of injury (5.6 days on the average). The intervention ranged between 2nd to 13th day. The outcome was better in group with early intervention where fixation was performed within 7 days of injury when compared with that of late intervention. Yates chi square p value is 4.35 and p value is found to be insignificant. Lim et al reports in his study that, in the 23 cases the time duration for operative intervention as 1 week in 7 cases and more than 1weeks in rest of the cases^[11]. Fica et al reports in their study of the 84 patients 48 cases were operated within a week and 36 cases after a week^[12].

The Kocher-Langenbeck approach was used in all the operated cases in the study. Other approaches were excluded because in our study, cases with isolated anterior wall or column fractures were excluded from the study. The decision regarding fixation was made on CT scan findings preoperatively and also on peroperative findings of reduction and stability. Satisfactory anatomical reduction was achieved in 23 (85%) cases and in 4 cases it was not possible. When we compared the functional outcome with anatomical reduction, outcome was better in patients where anatomical reduction was achieved. Outcome was poor in 1 out of 3 cases where anatomical reduction was not obtained. On statistical analysis chi square p value is 2.67 and Yates p value is found to be insignificant (0.44). Giannoudis in a meta-analysis reports anatomical reduction in 85.6% cases and displacement of more than 2 mm in 14.4% cases and he also reported unfavourable outcome if initial reduction is unsatisfactory^[13]. In present study clinical union was assessed by pelvic compression test and pain free movements of hip. Radiological union was assessed by taking X-ray where union was achieved in 1 cases by 4 months, 12 cases by 12 months. Anizar-Faizi et al reported radiological union in 80 cases achieved fracture union at 10-24 weeks after operation (mean, 14 weeks) and 2 cases had fracture delayed union at 10 months and 12 months after operation in 82 cases^[14].

In present study we had 6(22%) excellent, 12(45%) good, 5 fair (18%) and 4 (14%) poor outcome according to modified Harris hip score. We had good to excellent results in 67% of cases which is comparable to good to excellent results in 72% and 68% of cases in reports of Ovre et al and Giordano respectively. We had poor results in 14% cases, which were significantly less compared to the other studies where they have reported >20% poor results^[15,16]. When mean Harris Hip score was compared between age group <45 and >45 years, outcome was better in 1st group compared with 2nd group. In 1st group 5 excellent, 6 good, 1 fair and 1 poor results. In 2nd group 1excellent,6 good, 4 fair and 3 poor results. On applying the Pearson's chi square test value found to be 6.42 and p value is found to be insignificant (0.093). The results were comparable with other studies^[17].

CONCLUSION

*Operative treatment of displaced acetabular fractures gives satisfactory functional results.

*Thorough evaluation of radiograph/ CT scan and a proper pre-operative planning is necessary for decision making regarding an appropriate surgical approach, the appropriate type of implant and fixation.

*Functional outcome is better with patient operated within one week of injury than a delay of more than one week.

*In most of acetabular fractures can be fixed by single approach; however some associated fractures require combined approach.

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