

OUTCOMES OF SURGICAL TREATMENT IN ACETABULAR FRACTURES

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✉: aamirgandapur998@gmail.com**ABSTRACT****OBJECTIVES**

This study aimed to determine the outcomes of surgical treatment in acetabular fractures at Hayatabad Medical Complex, Peshawar.

METHODOLOGY

This prospective observational study was conducted at the Department of Orthopaedics and Spine at Hayatabad Medical Complex, Peshawar, Pakistan, from 1st January 2025 to 15th October 2025. The hospital's ethics committee approved the study. All adult patients of either sex aged 18 to 75 years, with an acetabular fracture with > 2 mm displacement of the articular surface, <45° of Matta's roof arc angle, or a fracture with instability affecting more than 20% of the posterior wall, were included in the study. The mean Harris hip score was compared between Group A and Group B using a paired-samples t-test, and structural outcomes were compared between the groups using Matta's criteria.

RESULTS

Of the 12 patients included in our study, 10 (83%) were men, and 2 (17%) were women. 9(75%) patients had age <45 years & 3(25%) patients had age >45 years to 75years. Both structural and functional outcomes were compared using a paired-samples t-test, and the results were statistically significant (p-value < 0.05), indicating the effectiveness of acetabular fracture fixation.

CONCLUSION

A favourable structural and functional outcome can be obtained with surgical therapy for displaced acetabular fractures. Properly diagnose the fracture pattern, and plan and perform the appropriate surgical approach with careful procedural planning.

KEYWORDS: Acetabular Fracture, Harris Hip Score, Matta's Criteria

INTRODUCTION

Acetabular fractures are complex injuries, following Road traffic accidents, falls from height, and pediatric accidents.¹ The annual incidence of acetabular fractures is 3 per 100,000 population/year.² Currently, 12-14% of acetabular fractures occur in the elderly population, i.e., age > 65 years.³ In young patients, acetabular fractures are caused by strong axial force acting through the femoral shaft or directly exerted force through the greater trochanter, while in old age, bones are osteoporotic, and low-energy trauma can cause acetabular fractures.⁴ The poor outcomes of acetabular fractures with conservative treatment in the 1950s led Letournel and Judet to develop a classification for acetabular fractures.⁵ There are 5 elemental types, i.e., Posterior wall, Posterior column, Anterior wall, Anterior column, and Transverse. The associated patterns are Posterior column with posterior wall, Transverse posterior wall, T-style, Anterior column-posterior hemi-transverse, and Both columns fracture.⁶ Among these types, both column fractures are most common (26.4-28%), followed by the anterior column

with posterior hemi transverse (14.9-24%).⁷ A fracture that is displaced, i.e., >2mm displacement (articular step), is an indication for surgery. Further indications include intact roof-arc angle < 30° and Intra-Articular fragmentation or impaction. The goal of surgery is stable internal fixation and restoration of anatomical articular congruity by precise reconstruction of the acetabular dome with acetabular screws or plates, to achieve the best functional outcome in terms of painless range of motion.^{8,9} The complications that accompany acetabular fractures and surgery are numerous, e.g., Sciatic nerve injury, infection, DVT, femoral head osteonecrosis, and secondary osteoarthritis. Some of the above complications demand later revision surgery in the form of Total hip replacement. So, for acetabular surgeries, continuous education for surgeons and surgical experience are mandatory for better outcomes.^{10,11} Faizi et al.¹² from Kuala Lumpur, Malaysia, in their study, found that after ORIF of acetabular fractures, 66.7% (20/30) of patients showed excellent/good results, i.e., Harris Hip score ≥80. Postoperative complications were degenerative changes

in the hip joint (43.3%), Avascular necrosis (16.7%), iatrogenic sciatic nerve injury (10%), deep infection (6.7%), and loss of reduction (3.3%). Shon et al.¹³ from Cheongju, Korea in their study conducted on 149 patients, in whom acetabular fixation was done & found that according to Matta's radiological outcome scale, the radiological results were outstanding in 69 patients (46.3%), good in 62 (41.6%), fair in 8 (5.4%), and bad in 10 (6.7%). The Judet and Letournel classification and the quality of reduction ($p < 0.001$) had an impact on the functional result, with 121 patients (81.2%) achieving excellent or good outcomes and 28 patients (18.8%) achieving fair or poor outcomes. A lack of awareness about the surgical outcomes of acetabular fractures in patients presenting to Hayatabad Medical Complex, Peshawar, was our research problem. Our research will help surgeons understand the outcomes following fixation of acetabular fractures. The objective of this study was to determine the outcomes of surgical treatment in acetabular fractures.

METHODOLOGY

This prospective observational study was conducted at the Department of Orthopedics and Spine at Hayatabad Medical Complex, Peshawar, Pakistan, from 1st January 2025 to 15th October 2025. The hospital's ethical committee granted study approval, Ref No. HMC-QAD-F-00/1971, dated: 11-07-2024, and informed consent was obtained from patients or their attendants. Sample size was calculated using the Rao-soft sample size calculator, and the consecutive non-probability sampling technique was utilized. All adult patients of either sex aged 18 to 75 years, with an acetabular fracture with > 2 mm displacement of the articular surface, $<45^\circ$ of Matta's roof arc angle, or a fracture with instability affecting more than 20% of the posterior wall, were included in the study. Patients unfit for surgery, having preoperative ipsilateral sciatic nerve injury, hemiplegia, or acetabular fractures associated with femoral head fractures were excluded from the study. Structural outcomes were assessed on radiographs using Matta's criteria for reduction of acetabulum fracture on Anteroposterior and Judet views postoperatively. Separation up to 1mm was considered excellent, 1-3mm as fair, and >3 mm as poor reduction. All preoperative patients with acetabular fractures who met our inclusion criteria were assigned to Group A, and all postoperative patients were assigned to Group B. Functional outcome was assessed using the Harris Hip Score, which includes pain and function (i.e., gait and activities). Harris' hip score was graded as follows: 90-100 as Excellent, 80-90 as Good, 70-80 as Fair, and <70 as a poor outcome. All patients in the study underwent surgery using different approaches. For

posterior fractures (i.e., Posterior wall, transverse, or Posterior column fractures), the Kocher-Langenbeck approach was used; for anterior fractures (i.e., Anterior wall or Anterior column fractures), the Ilioinguinal approach was used, which is technically demanding. For both column fractures, the modified Stoppa was utilized. A professor of Orthopedics performed all surgical procedures with at least 20 years of post-fellowship experience. Matta's criteria for reduction of acetabular fractures were used to assess structural outcomes on the immediate postoperative day, using plain radiographs AP & Judet views). Patients were followed at 6 weeks, 3 months, and 6 months postoperatively to assess functional outcomes using the Harris Hip score. We included all patients who met the inclusion criteria in our research. The patient's age (less than 45 years, 45-75 years, or older) and gender (male or female) were our demographic factors, while the presence of an acetabular fracture was our research variable. All patients included in the study were assessed by counts and percentages. Functional outcome was assessed using the Harris Hip Score grading system, and postoperatively, radiographs were evaluated according to Matta's criteria. Three standard radiographs were taken, i.e., AP pelvis, Obturator oblique, and Iliac oblique for Matta's criteria. Every collection technique was carried out under the guidance of an orthopaedic professor and a qualified staff nurse. IBM-SPSS-V.25 was utilized for data analysis. The mean Harris hip score was compared between Group A and Group B using a paired-samples t-test, and structural outcomes were compared using Matta's score between the groups using a paired-samples t-test. Data is presented in tables and diagrams.

RESULTS

Out of 12 patients included in our study, 10 were men, and 2 were women. 9 patients had an age of <45 years, and 3 patients had an age of >45 years to 75 years. 5 patients had anterior column fracture, 2 patients had posterior wall & posterior column fracture, 2 had transverse & posterior wall fracture, 2 patients had bicolumnar fracture, 1 had anterior column & posterior hemi-transverse. 12 patients included in the study underwent surgery using an anterior or posterior approach, depending on the type of fracture. Matta's criteria were used to assess the structural outcomes post-acetabulum fracture fixation. Of 12 patients, 9 had excellent reduction, i.e., separation in acetabular fractures was <1 mm or none, while 2 had fair reduction, i.e., separation was 1-3 mm, and 1 had poor reduction, i.e., separation in acetabular fractures was >3 mm. All preoperative patients were included in Group A, and postoperative patients in Group B. Structural

outcomes between the groups were compared using a paired-samples t-test to assess mean reductions; the results were statistically significant (p -value < 0.05).

Table 1: Paired sample t-test to compare the mean Matta's score at 6 weeks of follow-up

	N	Mean	Standard Deviation	95% confidence interval of the difference		t-Value	Degree of freedom	P-value
				Lower	Upper			
Group A	12	6.00	1.1832	-4.81723	-1.12822	-3.591	10	0.005
Group B	12	1.0273	0.79258					

Harris Hip Score was assessed postoperatively at 6 weeks, 3 months, and 6 months. Patients were divided into two groups: Group A, preoperative patients & Group B, postoperative patients. The mean Harris Hip Score between the two groups was compared using an independent-samples t-test at 6 weeks, 3 months, and 6 months. The results were statistically significant (p -value $<$), indicating the effectiveness of surgical therapy in the treatment of acetabular fractures at 6 weeks, 3 months, and 6 months.

Table 2: Paired sample t-test to compare the mean Harris-hip score at 6 weeks of follow-up

	N	Mean	Standard Deviation	95% confidence interval of the difference		t-value	Degree of freedom	p-value
				Lower	Upper			
Group A	12	26.2500	8.01277	-57.66097	-32.00569	-7.693	11	0.000
Group B	12	71.0833	17.25456					

Table 3: Paired sample t-test to compare the mean Harris-hip score at 3 months of follow-up

	N	Mean	Standard Deviation	95% confidence interval of the difference		t-value	Degree of freedom	p-value
				Lower	Upper			
Group A	12	26.2500	8.01277	-62.82494	35.00839	-7.741	11	0.000
Group B	12	75.1667	18.61003					

Table 4: Paired sample t-test to compare the mean Harris-hip score at 6 months of follow-up

	N	Mean	Standard Deviation	95% confidence interval of the difference		t-value	Degree of freedom	p-value
				Lower	Upper			
Group A	12	26.2500	8.01277	-65.90074	-36.09926	-7.533	11	0.000
Group B	12	77.2500	20.59623					

Out of 12 patients included in our study 1 patient developed hip AVN and required conversion to secondary Total hip arthroplasty, two patients had serous discharge from the wound site for which IV antibiotics were given. No cases were reported having sciatic nerve palsy or DVT.

DISCUSSION

In our study, it was found that surgical modality is the treatment of choice for patients with acetabular fractures who are candidates for surgical treatment, i.e., >2 mm displacement of the articular surface, $<45^\circ$ of Matta's roof arc angle, or a fracture with instability affecting more than 20% of the posterior wall. Treatment for acetabular fractures must respect the pelvic ring, since the acetabulum is a component of the pelvis and its stability depends on the pelvic ring.^{14,15} While primary repair is typically the initial surgical option for young patients, this has not been established for acetabular fractures in older individuals. For the elderly, conservative treatment or ORIF plus primary arthroplasty is often considered the treatment of choice.^{16,17} Our study used Matta's Criteria and the Harris Hip Score to determine functional outcomes. Of 12 patients, 9 had excellent reduction, i.e., separation in acetabular fractures was <1 mm or none, while 2 had fair reduction, i.e., separation was 1-3 mm, and 1 had poor reduction, i.e., separation in acetabular fractures was >3 mm. The results for acceptable structural outcomes were statistically significant (p -value < 0.05), indicating effective surgical reduction. Harris Hip Score was assessed at 6 weeks, 3 months, and 6 months postoperatively to evaluate functional outcomes. Paired-samples t-test showed satisfactory functional outcomes, which were statistically significant (p -value < 0.05), indicating the effectiveness of surgical therapy in the treatment of acetabular fractures at 6 weeks, 3 months, and 6 months. Similar to our study, Faizi et al.¹² from Kuala Lumpur, Malaysia, found that after ORIF of acetabular fractures, 66.7% (20/30) of patients showed excellent/good results, i.e., Harris Hip score ≥ 80 . Shon et al.¹³ from Cheongju, Korea in their study conducted on 149 patients, in whom acetabular fixation was done & found that according to Matta's radiological outcome scale, the radiological results were outstanding in 69 patients (46.3%), good in 62 (41.6%), fair in 8 (5.4%), and bad in 10 (6.7%). The Judet and Letournel classification and the quality of reduction ($p < 0.001$) had an impact on the functional result, with 121 patients (81.2%) achieving excellent or good outcomes and 28 patients (18.8%) achieving fair or poor outcomes. Contrary to our study, McCormick et al.¹⁸ found that, in the elderly population, older patients treated with ORIF alone had a much greater risk of complications than those treated with ORIF +

THA, THA alone, CRPP, or nonoperative treatment. Elderly patients with acetabular fractures usually have satisfactory functional outcomes despite having high rates of mortality and morbidity. People undergoing internal or percutaneous fixation are frequently converted to THA. Nonoperative therapy was associated with the lowest risk of non-fatal consequences and is still a viable option.

LIMITATIONS

This study has several important limitations.

CONCLUSIONS

A favourable structural and functional outcome can be obtained with surgical therapy for displaced acetabular fractures. Properly diagnose the fracture pattern, and plan and perform the appropriate surgical approach with careful procedural planning. Additionally, the surgeon must inform patients about the risks and potential outcomes of the procedure, especially if the waiting time exceeds 2 weeks.

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AUTHORS CONTRIBUTION

Muhammad Aamir - Concept & Design; Data Acquisition; Drafting Manuscript; Critical Revision; Final Approval

Israr Ahmad - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Critical Revision; Supervision; Final Approval

Waseem Khan - Concept & Design; Data Acquisition; Drafting Manuscript; Critical Revision; Final Approval

Shah Hassan - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Final Approval

The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.



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