Pakistan Journal of Intensive Care Medicine
eISSN: 2708-2261; pISSN: 2958-4728
www.pjicm.com
DOI: https://doi.org/10.54112/pjicm.v5i02.142
*Pak. J. Inten. Care Med., volume 5(2), **2025**: 142*
Original Research Article

FUNCTIONAL OUTCOME OF ACETABULUM FRACTURE MANAGED WITH OPEN REDUCTION AND INTERNAL FIXATION

KHAN MT, RAHMAN N*

Department of Orthopaedic Surgery, Hayatabad Medical Complex, Peshawar, Pakistan
**Corresponding author email address: noor_elum@yahoo.com*

(Received, 24th May 2025, Revised 10th June 2025, Accepted 06th July Published 17th July 2025)

ABSTRACT

Background: *Acetabular fractures represent a complex orthopedic challenge due to their association with high-energy trauma and potential for long-term disability. Open reduction and internal fixation (ORIF) remain the standard treatment, aiming to restore joint congruency and optimize functional outcomes.* ***Objective:*** *To determine the functional outcome of acetabular fractures managed with open reduction and internal fixation (ORIF).* ***Study Design:*** *Descriptive study.* ***Setting:*** *The Department of Orthopedic Surgery at Hayatabad Medical Complex in Peshawar, Pakistan.* ***Duration of Study:*** *22-12-2024 to 22-05-2025.****Methods:*** *A total of 65 patients aged 18–65 years with radiologically and clinically confirmed acetabular fractures were included. All patients underwent ORIF via surgical approaches tailored to their fracture pattern. Functional outcome was assessed three months postoperatively using the Oxford Hip Score (OHS)****,*** *categorizing results as excellent (41–48), good (34–40), fair (27–33), or poor (0–26). Data were analyzed to determine the distribution of outcomes according to fracture type and patient demographics.* ***Results:*** *The mean age was 45.12 ± 13.99 years, with a male predominance (64.6%). The most frequent fracture type was both-column (38.5%), followed by posterior wall (36.9%). At three-month follow-up, outcomes were excellent in 44 patients (67.7%), good in 17 (26.2%), and fair in 4 (6.2%). No poor outcomes were observed.* ***Conclusion:*** *ORIF for acetabular fractures demonstrated favorable short-term functional outcomes, with 67.7% of patients achieving excellent and 26.2% good results at three months. These findings support ORIF as an effective strategy for restoring hip function in patients with acetabular fractures.*

Keywords: Acetabular Fracture, Open Reduction and Internal Fixation, Functional Outcome, Oxford Hip Score, Trauma Surgery

INTRODUCTION

Acetabular fractures are among most complex injuries in traumatology (1, 2). The incidence of acetabular fractures among people over 65 years of age is 14% (3). Trauma-derived energy affects the acetabulum as well as femoral head, possibly leading to post-traumatic changes which impact force distribution as well as biomechanics in hip joint (4). Rapid degenerative alterations to joint tissues need early hip arthroplasty, affecting 19% of individuals within first two years post-injury along with 38% after five years (5, 6). Acetabular fractures demonstrating displacements of less than 2 mm demonstrate effective healing and yield positive clinical outcomes. However, newly formed tissue displays structural characteristics resembling fibrocartilage rather than the physiological hyaline cartilage of the hip, which is associated with more instability of femoral head (7).

For stable fractures with displacement < 2 mm, conservative treatment is recommended. Recommended interventions consist of rest, and physiotherapy followed by lifestyle modifications. Surgical intervention is crucial for managing unstable fractures, which usually involves open reduction and internal fixation (ORIF) or total hip arthroplasty (THA). Despite the advancement of numerous surgical techniques, the Kocher–Langenbeck (K-L) and ilioinguinal approaches continue to be primary options (8-10).

Surgical intervention usually proves necessary for treatment of these fractures, with ORIF being the preferred approach, particularly for displaced fractures or those related to joint instability. The primary aim of ORIF is to achieve proper anatomical alignment of acetabulum, thus enabling optimal functional recovery as well as minimizing the risk of post-traumatic arthritis associated with misaligned joint surfaces (9, 10). Recent advancements in imaging methods as well as surgical instruments have improved the ORIF method, facilitating more precise reductions and enhanced stabilization of complex fracture patterns. A study evaluated the functional outcomes of acetabulum fractures, reporting excellent results in 69.5%, good in 21.5%, fair in 9%, and no poor outcomes (11).

Fractures of the acetabulum present significant challenges, particularly because they often occur in the context of high-energy trauma. ORIF is a commonly utilised surgical procedure designed to restore anatomical integrity and facilitate early functional recovery. Due to the scarcity of literature on this subject locally, the goal of this study is to determine the functional outcomes of acetabulum fractures managed with open reduction and internal fixation at our hospital. This study seeks to systematically analyse functional outcomes to identify best practices and potential predictive factors that can enhance clinical decision-making for our clinicians and improve patient prognoses. The increasing occurrence of acetabulum fractures among the ageing population, coupled with the growing need for evidence-based orthopaedic practices, underscores the importance of this study in progressing the field and facilitating optimal functional recovery for patients after such traumatic injuries.

METHODOLOGY

This descriptive study was carried out within the Department of Orthopedic Surgery at Hayatabad Medical Complex in Peshawar. Duration of our study was 22-12-2024 to 22-05-2025. Ethical approval was taken from the hospital before commencing the study. The sample comprised 65 participants, determined through the World Health Organization sample size calculator based on a reported fair functional outcome rate of 9% (11) for acetabular fractures treated via open reduction and internal fixation with 95% confidence level and 7% margin of error. Participants were selected using consecutive non-probability sampling. Eligible individuals included adults aged 18 to 65 years of either gender who were presented with acetabular fractures as defined by hip pain exceeding a visual analog scale score of 4, inability to bear weight, limited range of motion and radiographic evidence showing displacement or disruption of acetabular margins, a

horizontal fracture line through the acetabulum and altered acetabular contour. Exclusions encompassed those with severe osteoporosis, pathological fractures, open fractures, or pregnancy or lactation. All qualifying patients gave their consent. Demographic details such as age, gender, body mass index, socioeconomic status, place of residence, employment, and education level were documented at baseline. Confirmed cases underwent open reduction and internal fixation under general anesthesia, employing approaches like ilio-inguinal, extended ilio-inguinal, or modified Stoppa for anterior or both-column fractures and Kocher-Langenbeck or combined methods for posterior or T-type fractures. Plates and screws tailored to the fracture pattern were used for fixation, with spring plates applied to secure any detached medial wall segments. During the procedure, bone fragments were carefully repositioned to achieve anatomical alignment and then stabilized with screws or plates on the bone's outer surface. External rotators and the piriformis muscle were dissected with precision to safeguard the deep medial femoral circumflex artery, while a dedicated retractor protected the sciatic nerve. Joint inspection occurred through the posterior wall access, facilitated by limb traction and trochanteric hooking with a T-handle. Reduction involved pelvic clamps, and any marginal impaction of articular cartilage was corrected via elevation and bone grafting. Stabilization was completed with small-fragment reconstruction plates and lag screws. Before wound closure over suction drains, intraoperative imaging with an intensifier confirmed proper reduction and ruled out any hardware within the joint. Functional outcomes were assessed three months postoperatively using the Oxford Hip Score, a validated patient-reported tool comprising 12 items rated from 0 to 4, yielding a total score of 0 to 48, with higher values indicating superior function. Outcomes were categorized as excellent (41-48), good (34-40), fair (27-33), or poor (0-26). Evaluations were overseen by a consultant with at least five years of post-fellowship expertise, using a standardized proforma. We allowed partial weight bearing for the patients after 7 weeks, while full weight bearing and toe touching was allowed after fourth month post procedure.

Data were entered and analyzed with SPSS 21. Gender, functional outcome, injury mechanism, complications, socioeconomic status, residence, type of acetabulum fracture, complications, employment and literacy were assessed as frequencies and percentages. Age, postoperative hospital stay and body mass index were expressed as means with standard deviations. Demographics and clinical parameters were stratified with functional outcome using Chi Square test keeping P value notable at ≤ 0.05.

RESULTS

The mean age of the participants was 45.12 ± 13.99 years. Following surgery, the average duration of hospital stay was 7.51 ± 1.61 days and the mean Body Mass Index (BMI) was recorded at 24.62 ± 1.62 kg/m².

Analysis of demographic characteristics revealed the cohort had a male predominance with 42 male patients (64.6%) and 23 female patients (35.4%) (Table 1).

The most frequent mechanism of injury was road traffic accidents accounting for 39 cases (60.0%) followed by falls in 20 patients (30.8%) and other mechanisms were reported in 6 cases (9.2%). In terms of fracture pattern anterior column fractures were observed in 16 patients (24.6%). Posterior wall fractures were present in 24 individuals (36.9%) and both-column fractures were seen in 25 patients (38.5%). Postoperative complications were infrequent; limb length discrepancy was noted in 3 patients (4.6%) and avascular necrosis in 2 patients (3.1%). The vast majority of patients 60 (92.3%) experienced no complications (Table 2).

The functional outcome as measured by the Oxford Hip Score at three months post-operatively was excellent in 44 (67.7%), good in 17 (26.2%) and fair in 4 (6.2%) patients. No poor outcomes were recorded in this series (Table 3). Stratification of functional outcomes with demographics and clinical parameters can be viewed at table no 4 and 5.

Table 1: Demographics

Demographics		n	%
Gender	Male	42	64.6%
	Female	23	35.4%
Literacy status	Literate	29	44.6%
	Illiterate	36	55.4%
Employment status	Employed	30	46.2%
	Unemployed	35	53.8%
Residence	Urban	35	53.8%
	Rural	30	46.2%
Socioeconomic status	Lower class	21	32.3%
	Middle class	34	52.3%
	Upper class	10	15.4%

Table 2: Clinical parameters

Clinical parameters		n	%
Mechanism of injury	RTA	39	60.0%
	Fall	20	30.8%
	Other	6	9.2%
Type of acetabulum fractures	Anterior column fracture	16	24.6%
	Posterior wall fracture	24	36.9%
	Both column fracture	25	38.5%
Complications	Limb length discrepancy	3	4.6%
	Avascular necrosis	2	3.1%
	No complications	60	92.3%

Table 3: Functional outcome

Functional outcome	n	%
Excellent	44	67.7%
Good	17	26.2%
Fair	4	6.2%

Table 4: Stratification of functional outcome with demographics

Demographics		Functional outcome						P value
		Excellent		Good		Fair		
		n	%	n	%	n	%	
Age groups (Years)	18 to 35	14	31.8%	6	35.3%	1	25.0%	P > 0.05
	36 to 50	9	20.5%	3	17.6%	2	50.0%	
	51 to 65	21	47.7%	8	47.1%	1	25.0%	
BMI (Kg/m2)	18 to 24.9	29	65.9%	9	52.9%	1	25.0%	P > 0.05
	> 24.9	15	34.1%	8	47.1%	3	75.0%	
Gender	Male	32	72.7%	8	47.1%	2	50.0%	P > 0.05
	Female	12	27.3%	9	52.9%	2	50.0%	

[Citation: Khan, M.T., Rahman, N. (2025). Functional outcome of acetabulum fracture managed with open reduction and internal fixation. *Pak. J. Inten. Care Med. 5(2), **2025**: 142*. doi: https://doi.org/10.54112/pjicm.v5i02.142]

Literacy status	Literate	21	47.7%	7	41.2%	1	25.0%	P > 0.05
	Illiterate	23	52.3%	10	58.8%	3	75.0%	
Employment status	Employed	21	47.7%	7	41.2%	2	50.0%	P > 0.05
	Unemployed	23	52.3%	10	58.8%	2	50.0%	
Residence	Urban	21	47.7%	11	64.7%	3	75.0%	P > 0.05
	Rural	23	52.3%	6	35.3%	1	25.0%	
Socioeconomic status	Lower class	13	29.5%	7	41.2%	1	25.0%	P > 0.05
	Middle class	24	54.5%	9	52.9%	1	25.0%	
	Upper class	7	15.9%	1	5.9%	2	50.0%	

Table 5: Stratification of functional outcome with clinical parameters

Clinical parameters		Functional outcome						P value
		Excellent		Good		Fair		
		n	%	n	%	n	%	
Mechanism of injury	RTA	26	59.1%	11	64.7%	2	50.0%	P > 0.05
	Fall	13	29.5%	5	29.4%	2	50.0%	
	Other	5	11.4%	1	5.9%	0	0.0%	
Complications	Limb length discrepancy	2	4.5%	1	5.9%	0	0.0%	P > 0.05
	Avascular necrosis	1	2.3%	1	5.9%	0	0.0%	
	No complications	41	93.2%	15	88.2%	4	100.0%	
Type of acetabulum fractures	Anterior column fracture	9	20.5%	5	29.4%	2	50.0%	P > 0.05
	Posterior wall fracture	19	43.2%	4	23.5%	1	25.0%	
	Both column fracture	16	36.4%	8	47.1%	1	25.0%	
Postop hospital stays (Days)	5 to 7	17	38.6%	13	76.5%	2	50.0%	P < 0.05
	> 7	27	61.4%	4	23.5%	2	50.0%	

DISCUSSION

The management of acetabular fractures through open reduction and internal fixation (ORIF) remains a significant challenge in orthopaedic trauma with functional outcomes being the ultimate measure of success. The present study conducted adds to the literature by demonstrating that excellent and good functional outcomes as defined by the Oxford Hip Score can be achieved in a remarkable 93.9% of patients at a three-month follow-up. This finding is particularly encouraging and aligns with the core objective of surgical intervention which is to restore hip function and mitigate the risk of post-traumatic arthritis.

The mean age of our cohort was 45.12 years which is consistent with the demographic profiles reported in similar studies where the typical patient is a young to middle-aged adult involved in high-energy trauma (11, 12). The male predominance (64.6%) in our study is also a recurrent theme across the literature reflecting a higher incidence of such injuries among males likely due to occupational and social exposure to risk (12).

The distribution of fracture patterns in our series dominated by both column and posterior wall fractures offers a point of interesting contrast. While the Kocher-Langenbeck approach is often considered a workhorse for posterior injuries, our institution's experience with 24.6% anterior column fractures necessitated a versatile surgical strategy utilizing ilioinguinal or modified Stoppa approaches as required. This is consistent with the approach taken by Shon et al. who employed a variety of approaches including ilioinguinal (28.9%) and modified Stoppa (10.7%) to address different fracture geometries (13). The low complication rate in our study with only 4.6% limb length discrepancy and 3.1% avascular necrosis compares very favourably with other series. For instance, Mardanpour et al. reported a 3% rate of deep vein thrombosis and pulmonary embolism while Zaighum et al. observed an 8.3% rate of limb length discrepancy (11, 14). Our notably lower rate of complications particularly the absence of reported infections or heterotopic ossification may be attributable to meticulous surgical technique appropriate approach selection and perhaps the prophylactic measures employed perioperatively.

The cornerstone of a successful outcome in acetabular fracture surgery is widely accepted to be the quality of anatomical reduction (15). Although our study did not explicitly grade the reduction quality using Matta's criteria, the exceptional functional outcomes strongly imply that a satisfactory reduction was achieved in the vast majority of cases. This inferred correlation is powerfully supported by Kumar et al. who found postoperative reduction to be notably associated with superior results (12). Shon et al. demonstrated a statistically notable association between the quality of reduction and both radiological and functional outcomes (13). Mardanpour et al. achieved anatomical reduction in 96% of their 200 cases which directly translated to 91% excellent and good Harris Hip Scores (11). Our results showing 93.9% excellent/good outcomes on the Oxford Hip Score therefore fit neatly within the expected paradigm established by these larger studies, superior reduction begets superior function.

When comparing the functional outcome scores directly it is crucial to acknowledge the different measurement tools used across studies. Our use of the Oxford Hip Score a patient-reported outcome measure yielded a 67.7% excellent rate. Mardanpour et al. and Zaighum et al. both utilized the Harris Hip Score (HHS) reporting 91% and 86% excellent/good outcomes respectively (11, 14). Kumar et al. using the Merle d'Aubigné and Postel score reported 70% excellent/good rate.[12] While the percentages are not directly comparable due to different scoring scales and thresholds the consistent theme across all studies including ours is that ORIF provides a high rate of successful functional outcomes, typically exceeding 70-80% in experienced hands.

CONCLUSION

In conclusion, the functional outcome of acetabulum fracture managed with open reduction and internal fixation in our study were excellent in 67.7% patients and good in 26.2% patients. We observed lower rates of complications post procedure.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

[Citation: Khan, M.T., Rahman, N. (2025). Functional outcome of acetabulum fracture managed with open reduction and internal fixation. *Pak. J. Inten. Care Med. 5(2), **2025**: 142*. doi: https://doi.org/10.54112/pjicm.v5i02.142]

Ethics approval and consent to participate
Approved by the department Concerned. (IRB-2335-HMC-QAD-F)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

MUHAMMAD TAIMUR KHAN (Trainee Medical Officer)
Conception of Study, Development of Research Methodology Design, Data Collection, Manuscript Drafting, Review of Manuscript, and Final Approval of Manuscript.
NOOR RAHMAN (Associate Professor)
Study Design, Conception of Study, Critical Input, and Final Approval of Manuscript.

REFERENCES

1. Audretsch C, Trulson A, Höch A, Herath SC, Histing T, Küper MA. Evaluation of decision-making in the treatment of acetabular fractures. EFORT Open Rev. 2022;7(1):84-94. https://doi.org/10.1530/EOR-20-0149
2. Cimerman M, Kristan A, Jug M, Tomaževič M. Fractures of the acetabulum: from yesterday to tomorrow. Int Orthop. 2021;45(4):1057-64. https://doi.org/10.1007/s00264-020-04806-4
3. Firoozabadi R, Cross WW, Krieg JC, Milton L. Acetabular fractures in the senior population–epidemiology, mortality and treatments. Arch Bone Jt Surg. 2017;5(2):96-9. https://doi.org/10.22038/abjs.2016.7933
4. Mohan K, Broderick JM, Raza H, O'Daly B, Leonard M. Acetabular fractures in the elderly: modern challenges and the role of conservative management. Ir J Med Sci. 2022;191(3):1223-8. https://doi.org/10.1007/s11845-021-02711-2
5. Firoozabadi R, Hamilton B, Toogood P, Shearer D. Risk factors for conversion to total hip arthroplasty after acetabular fractures involving the posterior wall. J Orthop Trauma. 2018;32(12):607-11. https://doi.org/10.1097/BOT.0000000000001325
6. Pavelka T, Salášek M, Weisová D. Floating hip injuries: treatment outcomes and complications. Acta Chir Orthop Traumatol Cech. 2016;83(5):311-6. https://doi.org/10.55095/achot2016/049
7. Frank RM, Cotter EJ, Hannon CP, Harrast JJ, Cole BJ. Cartilage restoration surgery: incidence rates, complications, and trends as reported by the American Board of Orthopaedic Surgery Part II candidates. Arthroscopy. 2019;35(1):171-8. https://doi.org/10.1016/j.arthro.2018.08.028
8. McCormick BP, Serino J, Orman S, Webb AR, Wang DX, Mohamadi A, et al. Treatment modalities and outcomes following acetabular fractures in the elderly: a systematic review. Eur J Orthop Surg Traumatol. 2022;32(4):649-59. https://doi.org/10.1007/s00590-021-03002-3
9. Rommens PM, Schwab R, Handrich K, Arand C, Wagner D, Hofmann A. Open reduction and internal fixation of acetabular fractures in patients of old age. Int Orthop. 2020;44(10):2123-30. https://doi.org/10.1007/s00264-020-04672-0
10. Kelly J, Ladurner A, Rickman M. Surgical management of acetabular fractures–a contemporary literature review. Injury. 2020;51(10):2267-77. https://doi.org/10.1016/j.injury.2020.09.054
11. Mardanpour K, Rahbar M, Rahbar M, Mardanpour N, Mardanpour S. Functional outcomes of traumatic complex acetabulum fractures with open reduction and internal fixation: 200 cases. Open J Orthop. 2016;6(12):363-77. https://doi.org/10.4236/ojo.2016.612049
12. Kumar D, Kushwaha NS, Tiwari PG, Sharma Y, Srivastava RN, Sharma V. Outcome of acetabulum fractures treated with open reduction and internal fixation through Kocher-Langenbeck approach: a retrospective study. J Clin Orthop Trauma. 2021;23:101599. https://doi.org/10.1016/j.jcot.2021.101599
13. Shon HC, Lim EJ, Yang JY, Min CH. Outcomes of surgical treatment of acetabular fractures with a minimum of 1-year follow-up. Clin Orthop Surg. 2024;16(6):871-9. https://doi.org/10.4055/cios23359
14. Zaighum M, Aziz S, Ashraf N, Ali R, Shah SM, Khatoon MA, et al. Clinical and functional outcome of acetabular fracture fixation: 5-year follow up retrospective cohort study. J Pak Orthop Assoc. 2024;36(2).
15. Matta JM. Fractures of the acetabulum: accuracy of reduction and clinical results in patients managed operatively within three weeks after the injury. J Bone Joint Surg Am. 1996;78(11):1632-45. https://doi.org/10.2106/00004623-199611000-00002

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license unless indicated otherwise in a credit line to the material. Suppose material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use. In that case, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licen ses/by/4.0/. © The Author(s) 2025