

Postoperative Complications and Prognostic Factors in ORIF of Transverse Acetabular Fractures

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Abstract

Background: Transverse and associated acetabular fractures are complex injuries that require precise anatomical reduction and stable fixation to optimize outcomes and prevent complications. Open reduction and internal fixation (ORIF) via the Kocher-Langenbeck approach remains the standard treatment for such injuries. This study aimed to assess postoperative complications and identify prognostic factors influencing outcomes following ORIF in these fractures.

Methods: This prospective observational study was conducted at the Department of Orthopaedic Surgery, Dhaka Medical College Hospital, from July 2017 to June 2019. A total of 25 patients aged 21–80 years with transverse or associated acetabular fractures underwent ORIF through the Kocher-Langenbeck approach within three weeks of injury. Patients with open fractures, infections, or significant comorbidities were excluded. Data on occupation, associated injuries, and mechanism of injury, complications, and outcomes were recorded. Functional outcomes were assessed using the Merle d'Aubigné and Postel scoring system.

Results: Service holders comprised 52.0% of patients, with road traffic accidents being the leading cause (80.0%). Associated injuries were present in 40.0% of cases. Hip dislocation occurred in 32.0% of patients. Postoperative complications included wound infection (8.0%) and heterotopic ossification (4.0%). Early surgery was associated with better outcomes: 28.6% of patients operated within the first week achieved satisfactory results, compared to 14.3% in the third week.

Conclusion: Timely surgical intervention and early anatomical reduction are crucial for favorable outcomes in transverse and associated acetabular fractures. Complication rates were low but underscore the importance of meticulous surgical technique.

Keywords: Acetabular fracture, ORIF, Kocher-Langenbeck approach, postoperative complications, surgical timing, heterotopic ossification

1. INTRODUCTION

Acetabular fractures are complex intra-articular injuries that commonly result from high-energy trauma such as road traffic accidents or falls from height, particularly affecting young adults [1]. Among the various fracture types, transverse acetabular fractures and their associated variants—including T-type fractures, transverse with posterior wall involvement, and anterior column with posterior hemitransverse—pose significant challenges in terms of surgical

management and postoperative outcomes [2]. These injuries frequently disrupt the weight-bearing dome of the acetabulum, necessitating precise anatomical reduction and stable internal fixation to restore joint congruity and prevent long-term complications such as post-traumatic arthritis [3].

Open reduction and internal fixation (ORIF) remains the mainstay of treatment for displaced acetabular fractures [4]. The Kocher-Langenbeck approach is widely employed for posterior and

transverse patterns, offering satisfactory exposure for reduction and fixation [5]. Despite advancements in surgical technique, postoperative complications remain common and include infection, heterotopic ossification, sciatic nerve injury, thromboembolism, and implant-related issues [6]. Furthermore, the functional and radiological outcomes are influenced by multiple factors such as timing of surgery, fracture type, associated injuries, quality of reduction, and patient-specific variables like age and comorbidities [7].

The evaluation of these complications and their predictors is critical for improving patient outcomes and guiding surgical decision-making [8,9]. Several studies have examined the outcomes of acetabular fracture fixation, but data focusing specifically on transverse and associated fracture types, particularly in resource-limited settings, remain limited [10]. Understanding the frequency and nature of postoperative complications, as well as the prognostic factors that influence functional and radiological recovery, can help refine surgical strategies, optimize perioperative care, and inform patient counseling [11].

This study aimed to evaluate the postoperative complications and identify key prognostic factors influencing the outcome following ORIF of transverse and associated acetabular fractures performed via the Kocher-Langenbeck approach. By analyzing demographic variables, injury characteristics, surgical timing, and postoperative complications, this study seeks to contribute valuable insights into the management of these challenging injuries in a tertiary care setting in Bangladesh.

2. METHODOLOGY & MATERIALS

This prospective observational study was conducted at the Department of Orthopaedic Surgery, Dhaka Medical College Hospital, Dhaka, Bangladesh, over a period of 24 months from July 2017 to June 2019. A total of 25 patients aged between 21 and 80 years, of both sexes, with clinical and radiological evidence of transverse or associated acetabular fractures (including T-type, transverse with posterior wall, anterior column with posterior hemitransverse) were enrolled. Patients were selected using convenience sampling. Only those who underwent open reduction and internal fixation (ORIF) through the Kocher-Langenbeck approach within three weeks of injury were included. Patients with open fractures, active or

latent infection, age below 21 or above 80 years, or with significant comorbidities such as uncontrolled hypertension, diabetes mellitus, COPD, or left ventricular hypertrophy were excluded.

Informed written consent was obtained from each patient or their legal guardian after clearly explaining the study objectives, procedures, benefits, risks, costs, and confidentiality measures in a language they understood. Ethical approval was obtained from the Ethical Review Committee of Dhaka Medical College.

Each patient underwent a thorough clinical assessment, including history-taking and physical examination, along with radiographic evaluation using X-ray and CT scan of the pelvis. Surgery was performed following standard operative protocols, and postoperative care was uniformly maintained. Functional outcome was assessed using the Merle d'Aubigné and Postel scoring system, while radiological outcome was evaluated using Matta's criteria. Data regarding complications, reduction quality, and baseline demographic and clinical variables were recorded in a structured questionnaire. All data were analyzed using SPSS version 22, with results presented in tables and figures. Statistical significance was determined using appropriate tests as per the variable type.

3. RESULTS

Table I illustrates the occupational distribution of the study participants. The majority (52.0%) were service holders, followed by 32.0% businessmen and 8.0% students.

Regarding associated injuries (Table II), most patients (60.0%) had no additional injuries. Abdominal injury was noted in 12.0% of cases, while 8.0% had fracture of the femoral head. One patient (4.0%) presented with sciatic nerve injury.

As shown in Figure 1, road traffic accidents were the predominant mechanism of injury, accounting for 80.0% of cases, whereas 20.0% resulted from falls from height.

Figure 2 demonstrates that hip dislocation occurred in 32.0% of patients. Other findings included femoral head fracture, vertical shear injury, and pubic symphysis diastasis in 4.0% of cases each. No hip dislocation or related complications were observed in 64.0% of patients.

Postoperative complications (Figure 3) included wound infection in 2 patients (8.0%) and heterotopic ossification in 1 patient (4.0%). No cases of deep vein thrombosis or implant failure were observed during the follow-up period.

Table III shows the relationship between surgical timing and outcomes. Among those operated within the first week of injury, 6 patients (28.6%) achieved satisfactory outcomes. For patients who underwent surgery in the second week, 12 (57.1%) had satisfactory outcomes, while 3

(75.0%) experienced unsatisfactory results. Among patients operated in the third week, only 3 (14.3%) had satisfactory and 1 (25.0%) had unsatisfactory outcomes. These findings suggest a trend toward better outcomes with earlier surgical intervention.

Table 1. Distribution of the study subjects by occupation (n=25)

Occupation	Frequency	Percentage
Business	8	32.0
Student	2	8.0
Service	13	52.0
Farmer	1	4.0
Housewife	1	4.0
Total	25	100.0

Table 2. Distribution of the study subjects by associated injury (n=25)

Associated injury	Frequency	Percentage
Chest injury	1	4.0
Face injury	1	4.0
Patella fracture (L)	1	4.0
Sciatic nerve injury	1	4.0
Urethral injury, gut injury	1	4.0
Fracture head of femur	2	8.0
Abdominal injury	3	12.0
None	15	60.0
Total	25	100.0

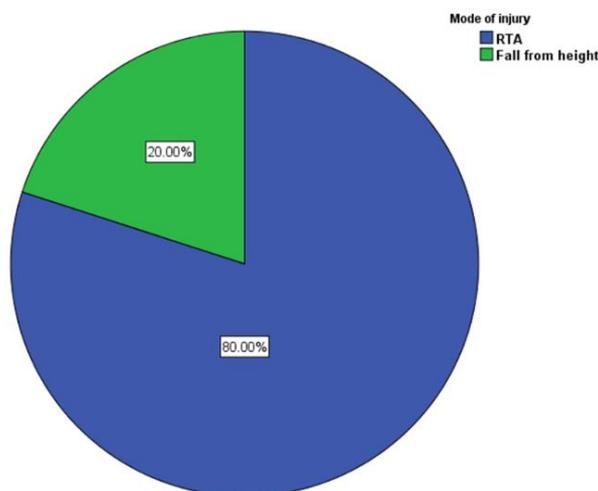


Figure 1. Pie chart showing the mechanism of injury of the study subjects

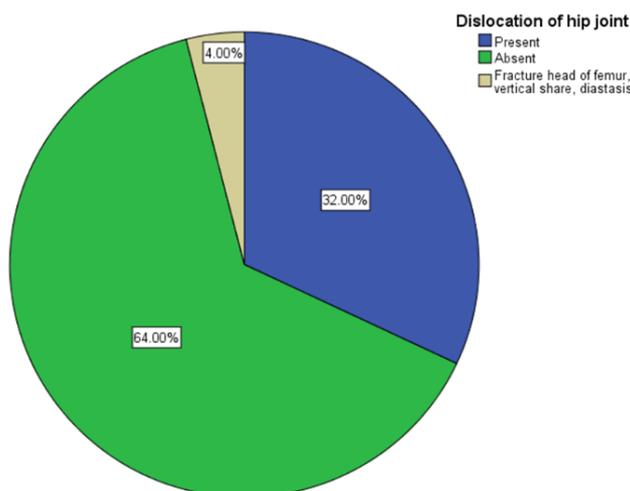


Figure 2. Pie diagram showing the dislocation of hip joint of the study subjects

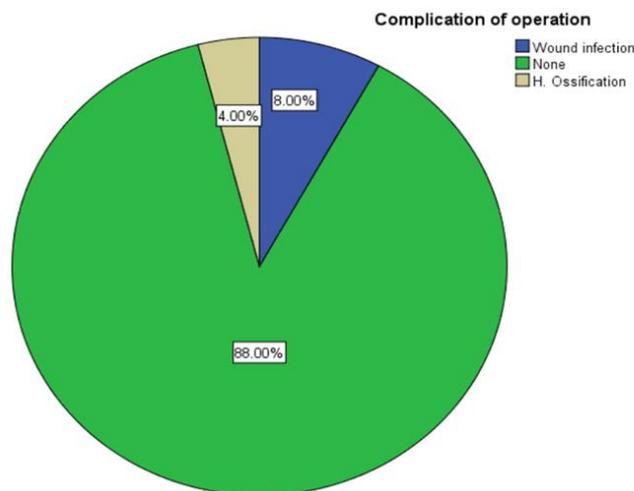


Figure 3. Pie diagram showing the complication of operation of the study subjects

Table 3. Difference in outcome from day of injury to surgery time (n=25)

Weeks	Satisfactory (n=21) No. (%)	Unsatisfactory (n=4) No. (%)	p-value
1 st week	6(28.6%)	0(0.0%)	0.458 ^{ns}
2 nd week	12(57.1%)	3(75.0%)	
3 rd week	3(14.3%)	1(25.0%)	
Total	21(100.0%)	4(100.0%)	

Chi-square test was done, ns= not significant

4. DISCUSSION

This prospective observational study investigated postoperative complications and prognostic factors in patients undergoing open reduction and internal fixation (ORIF) for transverse and associated acetabular fractures via the Kocher-Langenbeck approach. Our findings offer valuable insights into the clinical outcomes and challenges of managing such fractures in a tertiary care setting.

The majority of fractures in our study occurred due to road traffic accidents (80%), consistent with global trends in younger and middle-aged populations exposed to high-energy trauma [12]. A smaller proportion resulted from falls, typically seen in older adults [13, 14]. The predominance of male patients engaged in service and business occupations reflects demographic patterns observed in similar trauma populations in low- and middle-income countries.

Associated injuries were present in 40% of cases, with abdominal trauma, femoral head fractures, and sciatic nerve involvement being the most common. The presence of such injuries often complicates surgical planning and is known to affect functional outcomes and delay mobilization [12, 15].

One of the key findings of our study was the relationship between surgical timing and outcome. Patients who underwent ORIF within

the first week of injury had better functional outcomes compared to those operated on later. This is in agreement with Danford et al. [16], who reported that delays in surgical intervention among elderly patients with acetabular fractures significantly increased postoperative complications. Similarly, Xu [17] demonstrated that delayed fixation leads to poorer anatomical reduction and higher risk of joint degeneration.

Hip dislocation was noted in 32% of cases in our study. This finding aligns with Nicholson et al. [18], who reported that native hip dislocation at the time of acetabular fracture strongly predicts poor long-term outcomes due to chondral damage and increased risk of avascular necrosis. Therefore, timely reduction and stable fixation are critical in improving the prognosis for these patients.

Regarding postoperative complications, 8% of patients developed superficial wound infections, and 4% had heterotopic ossification (HO). Yeung et al. [19] identified male sex, delayed surgery, and high injury severity score as significant risk factors for HO development after acetabular fractures. Although the incidence in our cohort was low, it underscores the importance of early mobilization, prophylactic measures, and minimizing surgical trauma.

Functional outcomes in our study were evaluated using the Merle d’Aubigné and Postel scoring system. Most patients achieved satisfactory

scores when surgery was performed within two weeks of injury, highlighting the importance of early intervention. Clarke-Jenssen et al. [20] emphasized that anatomical reduction is a primary determinant of long-term hip joint survival. Poorly reduced fractures are at higher risk for post-traumatic osteoarthritis, necessitating total hip arthroplasty (THA) at a later stage.

Recent evidence by Chen and Tsai [21] supports our observation, identifying suboptimal reduction and intra-articular damage as key predictors for progression to osteoarthritis and subsequent THA. Preston et al. [22] also reported that residual displacement after fixation increases the risk of early joint degeneration.

Furthermore, in a long-term follow-up study, Busch et al. [23] noted that up to 30% of patients who initially underwent ORIF for acetabular fractures required conversion to THA. This conversion was more frequent in older adults and in cases where the initial fixation failed to restore congruent joint alignment. Although our study did not include long-term follow-up for THA, the recognition of such progression in literature highlights the need for vigilant postoperative monitoring. Our findings are also consistent with those of Dadura et al. [24], who demonstrated that timely and precise surgical management of acetabular fractures leads to good radiological alignment and favorable functional outcomes. Their study reinforces the significance of accurate reduction and stable fixation, especially in complex fracture patterns like transverse and T-type.

Mortality was not observed in our cohort, likely due to the younger age group and fewer comorbid conditions. However, as noted by Harrison et al. [25] and Ljungdahl et al. [26], patients aged ≥ 70 years with acetabular fractures have substantially higher mortality and complication rates, highlighting the need for tailored approaches in geriatric populations.

5. LIMITATIONS OF THE STUDY

While our study contributes to the understanding of complications and outcomes following ORIF of transverse acetabular fractures, it is not without limitations. The relatively small sample size and short-term follow-up may limit the generalizability of results. Additionally, lack of a comparative group (e.g., conservatively managed patients or those undergoing early THA) restricts our ability to contextualize the outcomes more broadly.

6. CONCLUSION

Our findings affirm that early surgical intervention, accurate fracture reduction, and

attention to associated injuries are pivotal in optimizing outcomes following ORIF of transverse and associated acetabular fractures. Postoperative complications, though infrequent, can impact recovery and must be proactively managed. Further multicenter studies with long-term follow-up are needed to validate prognostic indicators and refine treatment protocols.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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