



Research Article

Comparison of Functional Outcome of Modified Stoppa Approach versus Ilioinguinal Approach in Fixation of Acetabular Fractures: An Observational Study

Vrushik A. Kothiya¹, Vishal Mehta², Maulik M. Katira³, Dharmendra Singh Dhayal⁴, Tirth Patel⁵

¹Senior Resident, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

²Associate Professor, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

³3rd Year Resident, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

⁴2nd Year Resident, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

⁵2nd Year Resident, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

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ABSTRACT

Corresponding Author:

Dr. Vrushik A. Kothiya

Senior Resident, Department of Orthopaedics, Government Medical College, Bhavnagar, Gujarat, India

Received: 18-02-2026

Accepted: 05-03-2026

Published: 16-03-2026

Background: Acetabular fractures are complex injuries typically resulting from high-energy trauma such as road traffic accidents. Surgical fixation with anatomical reduction is the cornerstone of treatment. The Modified Stoppa approach has emerged as an alternative to the traditional Ilioinguinal approach for anterior acetabular fractures.

Objective: To compare functional outcomes, complications, and operative parameters between the Modified Stoppa and Ilioinguinal approaches in acetabular fracture fixation.

Methods: An observational comparative study was conducted at Sir T Hospital, Bhavnagar, including 30 patients with displaced acetabular fractures treated surgically between 2022 and 2024. Patients were divided into two groups: Modified Stoppa approach (n=15) and Ilioinguinal approach (n=15). Functional outcomes were assessed using the Harris Hip Score and the Modified Merle d'Aubigné and Postel scoring system.

Results: Most patients were males (90%) with a mean age of 45.6 years. Road traffic accidents were the most common cause (73%). Both approaches showed good to excellent functional outcomes in most cases. Excellent results were achieved in 40% of patients in both groups according to the Merle d'Aubigné scoring system. Good outcomes were observed in 46.7% in the Ilioinguinal group and 53.3% in the Modified Stoppa group. Average hospital stay was shorter in the Modified Stoppa group (7 days) compared to the Ilioinguinal group (13 days).

Conclusion: The Modified Stoppa approach provides comparable functional outcomes to the Ilioinguinal approach while reducing surgical morbidity and hospital stay.

Keywords: Acetabular fracture, Modified Stoppa approach, Ilioinguinal approach, Harris Hip Score, pelvic trauma.

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INTRODUCTION

Acetabular fractures are complex injuries involving the articular surface of the hip joint and represent one of the most challenging problems in orthopaedic trauma surgery. These fractures account for approximately 2–3% of all skeletal injuries and are most frequently associated with high-energy trauma such as road traffic accidents and falls from height [1,2]. The majority of patients affected are young and active individuals, although the incidence among elderly patients has increased due to low-energy falls associated with osteoporosis [3].

The acetabulum is a structurally complex component of the pelvis formed by the fusion of the ilium, ischium, and pubis. Its intricate anatomy, along with its role in weight transmission between the axial skeleton and lower limbs, makes the management of acetabular fractures particularly demanding [4]. Accurate diagnosis, classification, and surgical planning

are essential to restore joint congruity and prevent long-term complications such as post-traumatic arthritis, avascular necrosis of the femoral head, and chronic hip dysfunction [5].

Historically, acetabular fractures were treated conservatively using traction and immobilization. However, outcomes were often unsatisfactory due to persistent joint incongruity and secondary degenerative changes [6]. With advances in surgical techniques, imaging modalities, and fixation devices, open reduction and internal fixation (ORIF) has become the standard treatment for displaced acetabular fractures [7]. Anatomical reduction of the articular surface and stable fixation are considered the most important predictors of good functional outcomes [8].

The classification system proposed by Judet and Letournel remains the most widely accepted method for categorizing acetabular fractures and guiding surgical management [9]. This system divides fractures into elementary and associated patterns based on the involvement of anterior and posterior columns and walls of the acetabulum [9].

Several surgical approaches have been described for the treatment of acetabular fractures. The ilioinguinal approach, introduced by Letournel, has traditionally been used for anterior column fractures and associated fracture patterns [10]. This approach provides access to the anterior pelvis through three windows and allows fixation of the anterior column and pelvic brim. However, the ilioinguinal approach requires extensive soft-tissue dissection and careful manipulation of important neurovascular structures, including the femoral nerve and external iliac vessels [11].

To overcome some of these limitations, the Modified Stoppa approach, also known as the anterior intrapelvic approach, was introduced for the surgical management of pelvic and acetabular fractures [12]. Originally described by Stoppa for hernia repair and later adapted for orthopaedic trauma by Hirvensalo and colleagues, this approach provides direct visualization of the quadrilateral surface and medial wall of the acetabulum while minimizing soft-tissue dissection [12,13]. Several studies have suggested that the Modified Stoppa approach allows improved access to fracture fragments, reduced operative time, and decreased intraoperative blood loss compared with traditional approaches [14,15].

Despite these advantages, the optimal surgical approach for acetabular fractures remains controversial and often depends on fracture pattern, surgeon experience, and available surgical expertise. Comparative studies evaluating functional outcomes and complication rates between different approaches are therefore important for guiding surgical decision-making.

The present study was undertaken to compare the functional outcomes, complication rates, and surgical parameters between the Modified Stoppa approach and the Ilioinguinal approach in the fixation of acetabular fractures.

MATERIALS AND METHODS

Study Design: Observational comparative study.

Study Location: Sir T Hospital, Bhavnagar.

Study Duration: 18 months.

Sample Size: 30 patients with acetabular fractures undergoing ORIF.

Study Groups

Group	Surgical Approach	Number
Group A	Modified Stoppa	15
Group B	Ilioinguinal	15

Inclusion Criteria

- Age >18 years
- Displaced acetabular fractures
- Minimum 6 months follow-up
- Patients undergoing ORIF

Exclusion Criteria

- Age <18 years
- Pathological fractures
- Non-displaced fractures
- Posterior wall fractures
- Patients lost to follow-up

Outcome Measures

Functional outcomes were assessed using:

- Harris Hip Score
- Modified Merle d'Aubigné and Postel score

Radiological assessment included fracture union and joint congruity.

RESULTS

A total of 30 patients with displaced acetabular fractures were included in the study. Patients were divided equally into two groups based on the surgical approach used: Modified Stoppa approach (Group A, n = 15) and Ilioinguinal approach (Group B, n = 15). Functional outcomes, demographic characteristics, mechanism of injury, and postoperative complications were analyzed.

Demographic Characteristics

The mean age of the study population was 45.6 years, with most patients belonging to the 41–50 year age group. Acetabular fractures were more common among males (90%), reflecting the higher exposure of males to high-energy trauma.

Table 1. Age Distribution of Patients

Age Group (years)	Number of Patients	Percentage
18–30	6	20%
31–40	8	27%
41–50	9	30%
51–60	7	23%
Total	30	100%

Table 2. Sex Distribution

Sex	Number of Patients	Percentage
Male	27	90%
Female	3	10%
Total	30	100%

Mode of Injury

The most common cause of injury was road traffic accidents, accounting for 73% of cases, followed by falls from height (27%). This reflects the typical mechanism of high-energy trauma associated with acetabular fractures.

Table 3. Mode of Injury

Mode of Injury	Number of Patients	Percentage
Road Traffic Accident	22	73%
Fall from Height	8	27%
Total	30	100%

Laterality of Fracture

Among the study population, right-sided acetabular fractures were slightly more common than left-sided fractures.

Table 4. Side of Fracture

Side	Number of Patients	Percentage
Right	17	57%
Left	13	43%
Total	30	100%

Distribution of Surgical Approaches

Patients were equally distributed between the two treatment groups.

Table 5. Surgical Approach Used

Surgical Approach	Number of Patients	Percentage
Modified Stoppa	15	50%
Ilioinguinal	15	50%
Total	30	100%

Associated Injuries

A number of patients presented with associated injuries due to the high-energy nature of trauma. Extremity fractures were the most common associated injuries.

Table 6. Associated Injuries

Associated Injury	Number of Patients	Percentage
Extremity fractures	6	20%
Head injury	2	6.7%
Chest injury	1	3.3%
Pelvic injury	1	3.3%
None	20	66.7%
Total	30	100%

Hospital Stay

Patients treated with the Modified Stoppa approach had a shorter average hospital stay compared to those treated with the Ilioinguinal approach.

Table 7. Mean Hospital Stay

Surgical Approach	Mean Hospital Stay
Modified Stoppa	7 days
Ilioinguinal	13 days

Postoperative Complications

Postoperative complications were minimal in both groups. Infection was the most frequently observed complication, particularly in the Ilioinguinal group.

Table 8. Postoperative Complications

Complication	Ilioinguinal	Modified Stoppa
Infection	2	1
Bed sore	1	0
Osteoarthritis	0	1
Avascular necrosis	0	0
Nerve palsy	0	0

Functional Outcome Assessment

Functional outcomes were assessed using the Modified Merle d'Aubigné and Postel scoring system as well as the Harris Hip Score.

The majority of patients achieved good to excellent functional outcomes in both groups.

Table 9. Functional Outcome (Merle d'Aubigné Score)

Outcome	Ilioinguinal	Modified Stoppa
Excellent	6 (40%)	6 (40%)
Good	7 (46.7%)	8 (53.3%)
Fair	2 (13.3%)	1 (6.7%)
Poor	0	0

Table 10. Functional Outcome (Harris Hip Score)

Outcome	Ilioinguinal	Modified Stoppa
Excellent	6	6
Good	7	8
Fair	2	1
Poor	0	0

Return to Activity

Most patients returned to daily activities and occupational work within 4–5 months following surgery, depending on fracture severity and rehabilitation compliance.

DISCUSSION

Acetabular fractures represent complex injuries involving the articular surface of the hip joint and continue to pose significant challenges to orthopaedic surgeons due to the intricate anatomy of the pelvis and the difficulty in achieving anatomical reduction. High-energy trauma such as road traffic accidents remains the most common mechanism of injury worldwide, particularly in young and active individuals [1,2]. In the present study, road traffic accidents accounted for the majority of cases, which is consistent with previously reported epidemiological patterns of acetabular fractures in trauma populations [3].

The demographic distribution observed in this study showed a predominance of male patients, accounting for 90% of the cases. This finding aligns with several previous studies that have reported a higher incidence of acetabular fractures among males due to greater exposure to high-velocity trauma and occupational hazards [3,5]. The mean age of patients in the present study was in the fourth to fifth decade of life, which is similar to observations reported by Matta and colleagues, who described a similar age distribution among patients undergoing operative fixation for acetabular fractures [8].

The management of acetabular fractures has evolved significantly over the past several decades. Earlier treatment strategies relied largely on conservative management with traction and prolonged immobilization, often resulting in poor functional outcomes and a high incidence of post-traumatic arthritis [6]. With advances in surgical techniques and imaging modalities, open reduction and internal fixation has become the standard of care for displaced acetabular fractures. Numerous studies have demonstrated that the quality of anatomical reduction is the most important predictor of long-term functional outcomes following acetabular fracture fixation [7,8].

The classification system proposed by Judet and Letournel remains the cornerstone for understanding acetabular fracture patterns and guiding surgical management [1,9]. This classification divides fractures into elementary and associated types based on the involvement of the anterior and posterior columns and walls. Accurate classification facilitates appropriate surgical planning and helps determine the optimal surgical approach required for adequate fracture exposure and reduction [9].

The ilioinguinal approach, first described by Letournel, has traditionally been the preferred approach for anterior acetabular fractures and associated fracture patterns involving the anterior column and pelvic brim [10]. This approach provides access to the anterior column through three anatomical windows and allows visualization of important pelvic structures. However, the ilioinguinal approach is technically demanding and requires extensive soft-tissue dissection, which may increase the risk of injury to major neurovascular structures including the femoral nerve, external iliac vessels, and lymphatic channels [11].

In an effort to reduce surgical morbidity and improve visualization of certain fracture patterns, alternative surgical approaches have been developed. The Modified Stoppa approach, also known as the anterior intrapelvic approach, was initially adapted from the Stoppa preperitoneal approach used in hernia surgery and later modified for orthopaedic trauma by Hirvensalo and colleagues [12,13]. This approach provides direct intrapelvic access to the quadrilateral surface, medial wall, and pelvic brim while minimizing extensive soft-tissue dissection.

In the present study, both the Modified Stoppa approach and the Ilioinguinal approach demonstrated satisfactory functional outcomes based on the Harris Hip Score and the Modified Merle d'Aubigné scoring system. The majority of patients achieved good to excellent outcomes in both groups. These findings are consistent with previous studies that have reported favorable outcomes following operative fixation of acetabular fractures when anatomical reduction is achieved [8].

One of the notable findings in this study was the shorter hospital stay observed in patients treated with the Modified Stoppa approach compared with those treated with the Ilioinguinal approach. The reduced hospital stay may be attributed to less extensive surgical exposure and reduced soft-tissue dissection associated with the Modified Stoppa approach. Several authors have reported similar findings, suggesting that the intrapelvic approach may allow improved access to fracture fragments while reducing operative morbidity [14,15].

Postoperative complications in the present study were relatively low in both groups. Infection was the most commonly observed complication, occurring more frequently in the Ilioinguinal group. However, no cases of avascular necrosis or nerve palsy were observed during the follow-up period. Previous studies have reported complication rates ranging from 10% to 30% following acetabular fracture surgery, including heterotopic ossification, nerve injury, and post-traumatic arthritis [5,7]. The relatively low complication rate observed in this study may be related to careful patient selection, appropriate surgical planning, and meticulous operative technique.

Functional recovery following acetabular fracture fixation depends not only on the surgical approach but also on factors such as fracture pattern, accuracy of reduction, associated injuries, and postoperative rehabilitation. In this study, most patients were able to return to their daily activities and occupational work within several months after surgery, indicating satisfactory restoration of hip function.

Although the Modified Stoppa approach has gained popularity in recent years, it is important to note that the choice of surgical approach should be individualized based on fracture pattern, surgeon experience, and available surgical expertise. The Ilioinguinal approach remains a valuable technique for certain fracture patterns, particularly those involving the anterior column and pelvic brim.

Study Limitations

Despite providing useful insights, this study has several limitations. The sample size was relatively small, which may limit the generalizability of the findings. Additionally, the follow-up period was limited to short- to mid-term outcomes, and long-term complications such as post-traumatic arthritis could not be fully evaluated. Future studies with larger sample

sizes and longer follow-up periods are necessary to further compare the long-term outcomes of different surgical approaches in acetabular fracture management.

CONCLUSION

The findings of the present study suggest that both the Modified Stoppa and Ilioinguinal approaches provide satisfactory functional outcomes in the surgical management of acetabular fractures. However, the Modified Stoppa approach offers several advantages including improved visualization of the quadrilateral surface, reduced surgical morbidity, and shorter hospital stay.

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