RESEARCH PAPER

A Study Examining Short-Term Functional Outcomes in Unstable Pelvic Injuries

[1]Anmar Hamid Abdulmajeed, [2]Sarmad muhamad muttasem and [3]Mohammed Mahdi Hadi

[1]Cabs Ficms Ortho Spine Endoscopy M.B. Ch.B.
[2]College Of Medicine, Al Iraqia University,
[3]baghdad Medical City_ Ghazi Al-Hariri Teaching Hospital

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ABSTRACT
Background: Unstable pelvic ring Injuries may arise from various forms of trauma, including motor vehicle collisions, motorbike accidents, people being injured by cars, and falls from elevated surfaces. (Abdelrahman et al., 2020). Unstable pelvic ring injuries may be correlated. with hemodynamic disturbance and pelvic organ damage that require appropriate primary care and selection of definitive treatment (Gänsslen et al., 2012; Watkins & Hsu, 2020)
The objective of the study is to evaluate the short-term functional outcomes following surgical intervention for unstable pelvic ring injuries.
Subjects and Methodology Between January 2012 and January 2014, 10 patients with unstable pelvic ring fractures were treated and followed both clinically and radiologically. Seven of our 10 patients had anterior-posterior compression, and three patients had vertical shear. All patients underwent plating of symphyseal pubic diastasis and posterior fixation with iliosacral screws.
Results: All patients were assessed one year after treatment, functionally and radiologically, using the Majeed score. The results were excellent in 4 patients, good in 4, fair in 1, and poor in 1. Radiologically, all fractures were well aligned, with satisfactory healing and stability. No complications were reported.
Conclusion Stabilization of Unstable pelvic ring fractures treated with anterior plating and posterior stabilization. percutaneous iliosacral fixation yields favorable functional and radiographic outcomes.
Keywords: *Unstable pelvic ring fracture, open reduction and internal fixation, Majeed score.*
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INTRODUCTION

The pelvic ring consists of two innominate bones and the sacrum, connecting anteriorly at the pubic symphysis and posteriorly at the sacroiliac joints. This basin-shaped structure transmits weight from the torso to the lower limbs and protects the pelvic organs, vessels, and nerves.

The primary modes of pelvic ring injury encompass anteroposterior compression, lateral compression, vertical shear, and their combinations. Road traffic injuries account for approximately 59.8% of pelvic fractures, while falls from heights cause approximately 35.4%(Efendiyeva et al., 2021). The main objective of pelvic fracture management is to Stabilize and rehabilitate the oval-shaped osseoligamentous configuration of the pelvis. (Coccolini et al., 2017). (Smith et al., 2005),(Rommens & Hessmann, 2002).

The surgical management of Rotationally unstable pelvic fractures may be treated either with anterior external fixation for definitive management or with open reduction and internal fixation. Open Reduction and Internal Fixation (ORIF) employing anterior plating. A retrograde pubic ramus screw, inserted either percutaneously or by an open method, has been documented for anterior fixation..(Zoccola et al., 2023) External fixation alone is not recommended as a definitive treatment for vertically unstable pelvic fractures due to its ineffectiveness in addressing posterior instability. (Grechenig et al., 2025) In In instances of fracture dislocation of the sacroiliac joint, the fracture can be reduced and stabilized either anteriorly or posteriorly, with or without the application of hardware fixation. (Özdeş et al., 2025)Good results have been reported with percutaneous iliosacral fixation in type C fractures(Kim et al., 2022). Achieving a The closed reduction of a pure sacroiliac joint dislocation may be difficult, requiring prior open reduction. to percutaneous screw insertion.(Chien et al., 2024).

Patients and Methods

From January 2012 to January 2014, 10 patients aged 20 to 50 years (8 males vs. 2 females) presented with unstable pelvic ring injuries, which included both Diastasis of the

**Author for Correspondence: joshi.sumit.97@gmail.com*

pubic symphysis beyond 2.5 cm and posterior sacroiliac joint disruption. Patient data are shown in the table below:

NO.	Age	Sex	Mechanism of injury	Classification	Classification (Young and Burgess)	Type of surgery	Time between Injury and Surgery
1	35	Male	RTA	APCIII	Neck and intertrochanteric femur fracture	Anterior plate fixation and posterior iliosacral screw	10 days
2	36	Female	RTA	APCIII	No associated injury	Anterior plate fixation and posterior iliosacral screw	12 days
3	20	male	FFH	VS	Urethral injury	Anterior plate fixation and posterior iliosacral screw	14 days
4	38	female	RTA	VS	No associated injury	As above	15 days
5	36	male	FFH	VS	Acetabular fracture	As above	13 days
6	34	male	RTA	APCIII	Femoral and tibial fracture	As above	11 days
7	32	Male	RTA	APCIII	Humeral fracture and sciatic nerve injury	As above	10 days
8	21	male	RTA	APCIII	No injury	As above	13 days
9	38	male	RTA	APCIII	No injury	Anterior plating and posterior ilio-ilial plating	12 days
10	30	male	RTA	APCIII	No injury	The same as above	15 days

Treatment methods:

After initial treatment and stabilization of general condition, skeletal traction was applied to all patients.

The definitive treatment was performed within 10 to 15 days of injury, because all patients were referred from other hospitals due to delays. Blood had been prepared for all patients. All patients underwent a one-stage retraction of the rectus abdominis muscle to reach the pubic symphysis. Reduction of symphyseal diastasis was performed by manual and instrumental means, followed by fixation with a 3.5 mm reconstructive plate. A single superior or double superior and anterior plate was used in all patients. After completion of anterior During fixation, the patients were positioned prone, and percutaneous posterior iliosacral screws were inserted under image intensifier guidance. were inserted. These 7 mm cannulated screws were inserted over a guide K-Wire extending from the lateral ilium to the body of the first sacral vertebra. Reduction was accomplished through screw compression. This procedure was performed in eight patients the other two individuals received treatment with a posterior ilioilial plate. Patients with femoral neck, intertrochanteric, tibial, femoral, and acetabular fractures were fixed internally.

Postoperative Care:

All patients had been on anticoagulant therapy (enoxaparin) for 4 to 6 weeks before and after surgery. Profuse bleeding was avoided during surgery because the therapy was stopped six hours prior to surgery and resumed six hours postoperatively at the same dose (4000 IU).

Postoperative care included evaluating radiographs scans to assess reduction and fixation. Early mobilization depended on the stability of fixation, where the patient could sit on the 2nd or 3rd postoperative day. Non-weight-bearing on crutches was maintained for 8-12 weeks. Following bearing.

The patients were followed clinically and radiologically every 3, 6, and 12 months, respectively. One patient experienced a superficial infection at the anterior surgery site, which had subsided completely after conservative treatment with antibiotics.

RESULT:

All the patients were assessed at the end of one year after treatment functionally and radiologically using the Majeed score; the final results are shown in the table below:

Table explaining the functional and radiological results in Majeed score:

No. of patients	Functional results	Radiological results
1	Good (84)	Good
2	Excellent (90)	Good
3	Excellent (88)	Good
4	Excellent (90)	Good
5	Excellent (90)	Good
6	Poor (50)	Good
7	Good (82)	Good
8	Fair (65)	Good
9	Good (80)	Good
10	Good (80)	Good

DISCUSSION

Conservative management of unstable pelvic ring injuries necessitates prolonged hospitalization and may result in improper reduction and elevated death rates; thus, surgical interventions are advised, as they facilitate early rehabilitation and mitigate numerous consequences.(Hosny et al., 2021; Mennen et al., 2023)

External fixation can be an effective intervention for pelvic ring injuries that implemented swiftly and promptly in cases of ring interruption. Nonetheless, Ex-fix alone cannot adequately stabilize this lesion., necessitating an alternative approach. (Grechenig et al., 2025). Open reduction and internal fixation, a superior technique, can yield favorable results. (Ma et al., 2019). In cases of unstable pelvic ring injuries, anterior fixation alone may be inadequate to address the posterior injury; thus, supplementary fixation of the posterior lesion is advised, particularly for vertical shear injuries. (Benders & Leenen, 2020; Hosny et al., 2021). Sacral bars offer several benefits for the management of sacral fractures and sacroiliac joint dislocations (Choy et al., 2012). Furthermore, the bar's ends are so prominent that they can cause discomfort for patients (Choy et al., 2012). Anteroposterior plating of the sacroiliac joint can provide stabilization; however, the surgical technique is constrained and may damage the fifth lumbar nerve root. (Dienstknecht et al., 2011; Esenkaya, 2014). Posterior plating of the sacroiliac joint offers biomechanical stability akin to that of sacral bars; however, it may result in negative outcomes hemorrhage, surgical site problems, and post-surgical infection.

Sacroiliac screw fixation is appropriate for sacral fractures and disturbances of the sacroiliac joint. This is a minimally invasive method employing percutaneous fixation, leading to fewer postoperative complications.

Anatomical reduction of rotationally unstable pelvic ring injuries can be effectively achieved with anterior plating as a surgical alternative. Anatomical reduction of rotationally unstable pelvic ring injuries can be effectively achieved with anterior plating as a surgical alternative. Anterior plating is also important in vertically unstable pelvic ring injuries, since a reduction of the posterior ring is the first step toward accurate fixation of the sacroiliac screw(Chen et al., 2025). Anatomical reduction and proper anterior plating are believed to facilitate sacroiliac joint screw fixation considerably. Unstable pelvic ring injuries are prone to re-displacement if only the posterior ring is stabilized.(Tsai et al., 2019). Anterior plate fixation is recognized to reduce the incidence of malunion.(Oh et al., 2016). Anteroposterior plating for the vertically unstable pelvis enhances structural stability, with no instances of further displacement following initial fixation and a high incidence of positive outcomes.. Sagi et al

Reports suggest that the severity of initial injuries is strongly linked with radiologic and clinical outcomes. (Yousefzadeh-Chabok et al., 2022). Researchers have posited that persistent neurologic symptoms constitute an additional factor influencing clinical outcomes. (Kang et al., 2016).

In our study, we used the C-arm in all cases to assess intraoperative reduction and fixation Pelvic ring interruptions were suitable for (ORIF). as described by Tornetta (14) and Mahi et al. In our study, skeletal traction was applied prior to internal fixation, which significantly facilitated anatomical reduction and the insertion of percutaneously placed transiliac and iliosacral screws. These screws did not decompress the intrapelvic hematoma because they were inserted percutaneously under fluoroscopic control. Single four-hole plate fixation for symphyseal pubic disruption anteriorly(Rojas et al., 2021). This was considered insufficient, so we used a double plate (anterior and superior) to prevent fatigue and loosening in symphyseal joint disruption. Another study by Shapiro and Bellabarba et al. [CITE_16] (16) recommended double plate fixation for symphyseal disruption, as implant fatigue is minimized when combined anterior and posterior stabilization is used.

In our study, all patients had less severe pain and a good functional outcome due to a significant reduction in posterior pelvic disruption, with less than 4mm displacement after fixation, resulting in a good radiological outcome. Posterior pelvic disruption more than 4mm, even after fixation, is more likely to lead to severe pain and a poor functional outcome (Dienstknecht et al., 2011).

Only one patient (10%) had difficulty sitting due to lower limb injuries, including a non-union fracture of the femur and tibia.

Nine patients (90%) experienced no sitting difficulties.

In our study, only one patient (10%) had sexual dysfunction due to urethral injury; this dysfunction was therefore not attributable to the pelvic ring injury. Nine. Patients (90%) had no sexual problems.

In our study, 8 patients (80%) returned to their original jobs, whereas 2 patients (20%) did not due to associated lower limb injuries.

In our study, 9 patients (90%) had no difficulty walking; 1 patient (10%) could not walk due to a lower-limb fracture nonunion, not due to a pelvic ring injury.

Anterior and posterior internal fixation provides biomechanically sufficient stability(Liu et al., 2020). Authors D. Hakt [19], Ziran et al. [20], and Griffen [15] reported that early ORIF reduces mortality, systemic infection rate, and later morbidity.

In our study, there was no mortality or deep infection.

Several authors have investigated the risk of neurological injury during SIJ fixation and have reported risks ranging from 0.22% to 8.82%(Ghaddaf et al., 2024; Kancherla et al., 2017).

In our study, no patient sustained such an injury postoperatively; only one patient had an injury preoperatively, which recovered completely after 6 months.

In our investigation, a single patient experienced a surgical infection at the anterior aperture fixation site, which fully cleared, while no infections occurred at the posterior ring fixation site.

CONCLUSION

In conclusion, anterior pelvic plating coupled with percutaneous sacroiliac joint screw fixation constitutes an appropriate treatment modality for unstable pelvic ring injuries, as it has shown favorable functional outcomes with a minimal complication rate.

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