

# CLINICAL AND RADIOLOGICAL OUTCOMES OF Iliosacral Screw Fixation in Posterior Pelvic Ring Injuries

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## ABSTRACT

**Background:** Posterior pelvic ring injuries are serious orthopedic trauma conditions commonly associated with high-energy mechanisms such as road traffic accidents and falls from height. Iliosacral screw fixation has become a preferred minimally invasive technique for stabilizing these injuries and restoring pelvic stability.

**Aim:** To evaluate the clinical and radiological outcomes of iliosacral screw fixation in posterior pelvic ring injuries.

**Materials and Methods:** This prospective observational study was conducted in the Department of Orthopaedics at Maharishi Markandeshwar Institute of Medical Sciences and Research over a period of 18 months. A total of 30 patients with posterior pelvic ring injuries managed with iliosacral screw fixation were included. Clinical evaluation and radiological assessment were performed during follow-up. Functional outcomes were assessed using the Majeed pelvic score. Statistical analysis was performed using SPSS version 27.0 and GraphPad Prism version 5, with  $p < 0.05$  considered statistically significant.

**Results:** The majority of patients belonged to the 31–40 years age group, and males constituted 73.3% of cases. Road traffic accidents were the most common mechanism of injury (63.3%). Sacroiliac joint disruption was the predominant injury pattern (46.7%). Excellent or good radiological outcomes were achieved in 80% of patients, while excellent or good functional outcomes based on the Majeed pelvic score were observed in 76.6% of patients. Statistical significance was noted in age distribution, injury pattern, radiological outcome, and functional recovery.

**Conclusion:** Iliosacral screw fixation is a safe, effective, and minimally invasive technique for posterior pelvic ring injuries, providing satisfactory radiological reduction, stable fixation, early mobilization, and favorable functional outcomes with minimal complications.

**Keywords:** Posterior pelvic ring injury, Iliosacral screw fixation, Pelvic fractures, Sacroiliac joint disruption, Radiological outcome, Functional outcome, Majeed pelvic score.

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## INTRODUCTION

Posterior pelvic ring injuries represent a significant challenge in orthopedic trauma due to their association with high-energy mechanisms, complex anatomy, and substantial morbidity. These injuries commonly occur following road traffic accidents, falls from height, and crush injuries, particularly among young and economically productive individuals. The posterior pelvic ring contributes nearly 60% of the structural stability of the pelvis; therefore, disruption of this region can lead to severe instability, chronic pain, gait disturbances, neurological deficits, and impaired quality of life if not managed appropriately.[1] Advances in imaging techniques and fixation methods have considerably

improved the understanding and treatment of these injuries over the past few decades.

The management of posterior pelvic ring injuries has evolved from prolonged conservative treatment to minimally invasive surgical stabilization. Earlier treatment modalities involving bed rest, traction, and external fixation were associated with prolonged immobilization, malunion, and poor functional outcomes.[2] With the development of fluoroscopy-guided percutaneous fixation techniques, iliosacral screw fixation has emerged as a preferred method for stabilizing sacroiliac joint disruptions and sacral fractures. This technique provides stable fixation while minimizing soft tissue dissection, blood loss, operative time, and postoperative complications.[3]

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Iliosacral screw fixation was first popularized by Matta and Saucedo, who demonstrated its effectiveness in restoring pelvic stability with minimal invasiveness.[4] Since then, the technique has gained widespread acceptance in trauma centers worldwide. Accurate placement of iliosacral screws is essential because of the complex anatomy of the sacrum and the proximity of neurovascular structures. Misplacement may result in neurological injury, vascular complications, or inadequate stabilization.[5] Therefore, detailed preoperative planning and intraoperative imaging guidance play crucial roles in achieving successful outcomes.

Radiological assessment forms an integral part of the evaluation and management of posterior pelvic ring injuries. Standard pelvic radiographs, including inlet and outlet views, along with computed tomography (CT), help classify injuries, assess displacement, and guide surgical planning.[6] Postoperative radiological evaluation is equally important to determine the adequacy of reduction, screw positioning, fracture healing, and maintenance of pelvic alignment. Several studies have shown that satisfactory radiological reduction correlates with improved functional and clinical outcomes.[7]

Clinical outcomes following iliosacral screw fixation are generally favorable, with many patients achieving pain relief, early mobilization, and return to daily activities. Functional assessment is commonly performed using scoring systems such as the Majeed pelvic score and Hannover pelvic outcome score.[8] Despite the advantages of iliosacral screw fixation, complications such as screw loosening, infection, nerve injury, and persistent pain may still occur in some cases.[9] Furthermore, outcomes may vary depending on fracture pattern, timing of surgery, associated injuries, and surgeon expertise.

Given the increasing use of minimally invasive fixation techniques, it is important to evaluate both the clinical and radiological outcomes associated with iliosacral screw fixation in posterior pelvic ring injuries. Understanding the effectiveness, safety profile, and long-term functional results of this procedure can help optimize patient care and improve treatment strategies.[10]

The aim of this study was to evaluate the clinical and radiological outcomes of iliosacral screw fixation in posterior pelvic ring injuries. The objectives included assessment of fracture union, quality of reduction, postoperative functional recovery, pain relief, complications, and overall

effectiveness of minimally invasive iliosacral screw fixation in restoring pelvic stability.

### MATERIALS AND METHODS

**Study Design:** Prospective observational study.

**Study Population:** Patients presenting with posterior pelvic ring injuries requiring iliosacral screw fixation and admitted to the Department of Orthopaedics.

**Sample Size:** Total of 30 patients were included in the study.

**Study Duration:** The study was conducted over a period of 18 months.

**Study Place:** Department of Orthopaedics, Maharishi Markandeshwar Institute of Medical Sciences and Research.

#### **Inclusion Criteria:**

- Patients aged above 18 years.
- Patients with posterior pelvic ring injuries involving sacroiliac joint disruption or sacral fractures.
- Hemodynamically stable patients fit for surgery.
- Patients managed with iliosacral screw fixation.
- Patients willing to participate and provide informed consent.

#### **Exclusion Criteria:**

- Patients below 18 years of age.
- Open pelvic fractures with severe contamination.
- Pathological fractures of the pelvis.
- Patients with associated severe head injury or spinal cord injury affecting rehabilitation.
- Patients medically unfit for surgery.
- Patients unwilling to participate or lost to follow-up.

**Statistical Analysis:** The collected data were entered into Microsoft Excel and analyzed using SPSS software version 27.0 (SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Continuous variables were expressed as mean  $\pm$  standard deviation (SD), while categorical variables were presented as frequencies and percentages. The unpaired t-test was used for comparison of continuous variables between independent groups, whereas the paired t-test was applied for comparisons within the same group. Categorical variables were analyzed using the Chi-square test or Fisher's exact test, wherever appropriate. A p-value of  $<0.05$  was considered statistically significant.

## RESULT

**Table 1: Age-wise Distribution of Patients**

Age Group (Years)	Number of Patients	Percentage (%)	P-value
18–30	6	20	0.041
31–40	9	30	
41–50	8	26.7	

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51-60	5	16.7
>60	2	6.6
<b>Total</b>	<b>30</b>	<b>100%</b>

**Table 2: Gender Distribution of Patients**

Gender	Number of Patients	Percentage (%)	P-value
Male	22	73.3	0.018
Female	8	26.7	
<b>Total</b>	<b>30</b>	<b>100%</b>	

**Table 3: Mode of Injury among Patients**

Mode of Injury	Number of Patients	Percentage (%)	P-value
Road Traffic Accident	19	63.3	0.009
Fall from Height	7	23.3	
Crush Injury	4	13.4	
<b>Total</b>	<b>30</b>	<b>100%</b>	

**Table 4: Type of Posterior Pelvic Ring Injury**

Type of Injury	Number of Patients	Percentage (%)	P-value
Sacroiliac Joint Disruption	14	46.7	0.027
Sacral Fracture	11	36.7	
Combined Injury	5	16.6	
<b>Total</b>	<b>30</b>	<b>100%</b>	

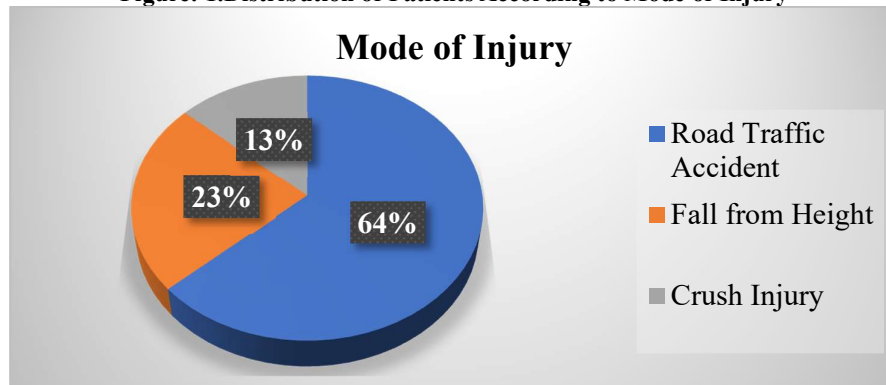
**Table 5: Radiological Outcome after Iliosacral Screw Fixation**

Radiological Outcome	Number of Patients	Percentage (%)	P-value
Excellent Reduction	15	50	0.012
Good Reduction	9	30	
Fair Reduction	4	13.3	
Poor Reduction	2	6.7	
<b>Total</b>	<b>30</b>	<b>100%</b>	

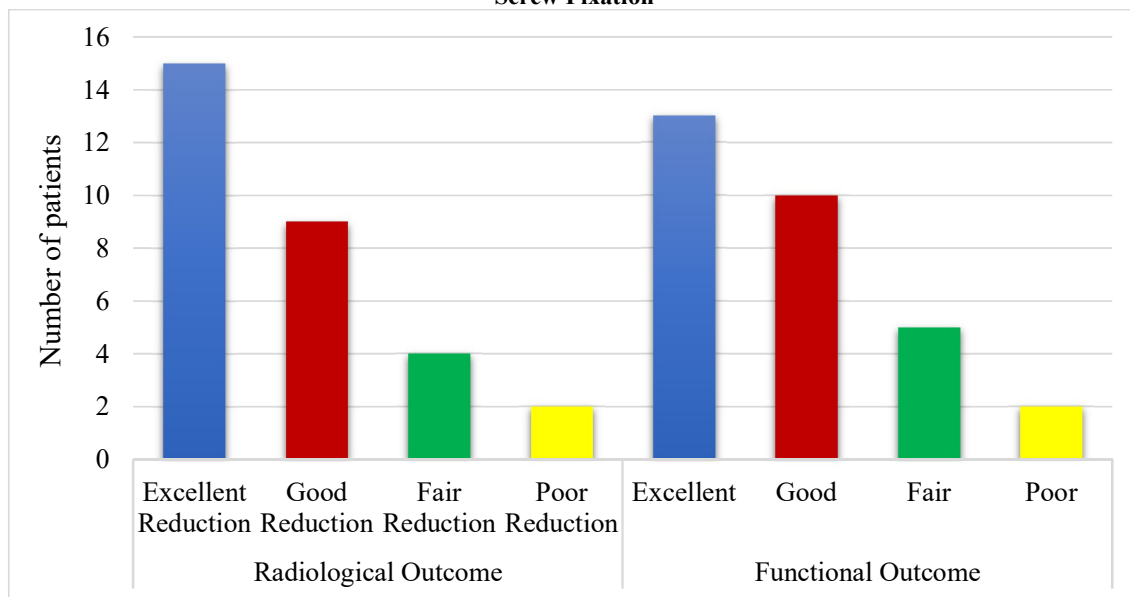
**Table 6: Functional Outcome Based on Majeed Pelvic Score**

Functional Outcome	Number of Patients	Percentage (%)	P-value
Excellent	13	43.3	0.015
Good	10	33.3	
Fair	5	16.7	
Poor	2	6.7	
<b>Total</b>	<b>30</b>	<b>100%</b>	

**Figure 1: Distribution of Patients According to Mode of Injury**



**Figure 2. Distribution of Radiological and Functional Outcomes among Patients Following Iliosacral Screw Fixation**



The majority of patients belonged to the 31–40 years age group, accounting for 9 cases (30.0%), followed by the 41–50 years age group with 8 patients (26.7%). Patients aged 18–30 years constituted 20.0% of the study population, while 16.7% were in the 51–60 years age group. Only 2 patients (6.6%) were older than 60 years. The age distribution was found to be statistically significant ( $p=0.041$ ), indicating a higher incidence of posterior pelvic ring injuries among the active middle-aged population.

Among the 30 patients included in the study, males predominated with 22 cases (73.3%), whereas females accounted for 8 cases (26.7%). The male predominance was statistically significant ( $p=0.018$ ). This finding suggests that posterior pelvic ring injuries are more common among males, likely due to greater exposure to high-energy trauma and outdoor activities.

Road traffic accidents were the most common mode of injury, observed in 19 patients (63.3%), followed by falls from height in 7 patients (23.3%). Crush injuries accounted for 4 cases (13.4%). The association between mode of injury and occurrence of posterior pelvic ring injuries was statistically significant ( $p=0.009$ ). These findings indicate that high-energy trauma is the predominant cause of posterior pelvic ring injuries.

Sacroiliac joint disruption was the most common injury pattern, seen in 14 patients (46.7%), followed by sacral fractures in 11 patients (36.7%). Combined injuries involving both sacroiliac disruption and sacral fractures were noted in 5 patients (16.6%). The distribution of injury patterns was statistically significant ( $p=0.027$ ), demonstrating that sacroiliac joint injuries constituted the major proportion of posterior pelvic ring injuries in the study.

Excellent radiological reduction was achieved in 15 patients (50.0%), while good reduction was observed in 9 patients (30.0%). Fair and poor reduction outcomes were seen in 4 patients (13.3%) and 2 patients (6.7%), respectively. The radiological outcomes were statistically significant ( $p=0.012$ ), indicating that iliosacral screw fixation provided satisfactory anatomical reduction and stabilization in the majority of patients.

Functional assessment using the Majeed pelvic score revealed excellent outcomes in 13 patients (43.3%) and good outcomes in 10 patients (33.3%). Fair and poor functional outcomes were observed in 5 patients (16.7%) and 2 patients (6.7%), respectively. The overall functional improvement following iliosacral screw fixation was statistically significant ( $p=0.015$ ), suggesting favorable postoperative recovery and restoration of functional mobility in most patients.

#### DISCUSSION

In the present study, the majority of patients belonged to the 31–40 years age group, followed by the 41–50 years age group. This finding highlights that posterior pelvic ring injuries commonly affect the economically productive and active adult population, mainly due to exposure to high-energy trauma such as road traffic accidents and falls from height. Similar observations were reported by Routt et al., who found that pelvic ring injuries predominantly occurred in younger and middle-aged adults because of increased involvement in vehicular accidents and occupational trauma.[11] Likewise, Lindahl et al. observed a higher incidence of unstable pelvic injuries among individuals in the third and fourth decades of life, attributing this pattern to greater participation in high-risk activities.[12] The statistically significant age distribution in the

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current study supports the existing literature regarding the epidemiology of pelvic trauma. Male patients constituted the majority of the study population, accounting for 73.3% of cases. This male predominance may be explained by greater outdoor activity, occupational exposure, and higher rates of vehicular travel among men. Similar findings were reported by Templeman et al., who demonstrated that pelvic fractures were significantly more common in males involved in high-energy trauma.[13] Additionally, Shuler et al. reported that males represented nearly three-fourths of patients undergoing iliosacral screw fixation for unstable posterior pelvic ring injuries.[14] The findings of the present study are therefore consistent with previously published literature. Road traffic accidents were identified as the most common mechanism of injury in the current study. This reflects the increasing burden of high-velocity trauma associated with modern transportation and urbanization. Similar results were documented by van den Bosch et al., who reported road traffic accidents as the leading cause of pelvic ring injuries in approximately 60–70% of patients.[15] Furthermore, König et al. observed that motor vehicle accidents accounted for the majority of unstable posterior pelvic injuries requiring operative stabilization.[16] The significant association between mechanism of injury and pelvic trauma in the present study further emphasizes the role of high-energy impact in causing disruption of the posterior pelvic ring. Regarding injury patterns, sacroiliac joint disruption was the most frequently encountered lesion, followed by sacral fractures. This observation is comparable to the study conducted by Comstock et al., who found sacroiliac disruptions to be the most common posterior pelvic lesion requiring iliosacral fixation.[17] Similarly, Gardner et al. reported that sacroiliac joint instability represented the predominant indication for percutaneous iliosacral screw stabilization in pelvic trauma patients.[18] The high frequency of sacroiliac injuries observed in the present study may be attributed to the transmission of axial and rotational forces across the posterior pelvic ring during trauma. Radiological outcomes in the present study were satisfactory in the majority of patients, with excellent or good reduction achieved in 80% of cases. Accurate reduction and proper screw placement are critical determinants of successful outcomes in posterior pelvic fixation. Similar findings were reported by Zwingmann et al., who demonstrated excellent radiological reduction in most patients treated with percutaneous iliosacral screw fixation.[19] They emphasized that minimally invasive fixation techniques provide stable anatomical reduction while reducing operative morbidity. Likewise, Schweitzer et al.

observed that fluoroscopy-guided iliosacral screw fixation resulted in reliable maintenance of pelvic alignment and satisfactory fracture union rates.[20] The statistically significant radiological improvement observed in the present study supports the effectiveness of iliosacral screw fixation in restoring posterior pelvic stability. Functional assessment using the Majeed pelvic score revealed predominantly excellent and good outcomes following surgery. Early mobilization, stable fixation, and minimal soft tissue disruption associated with percutaneous techniques may contribute to improved postoperative recovery. Similar functional outcomes were described by Routt et al., who reported high rates of return to daily activities and satisfactory functional recovery after iliosacral screw fixation.[11] Lindahl et al. also observed favorable long-term functional outcomes in patients with well-reduced posterior pelvic injuries managed surgically.[12] The present study therefore confirms that iliosacral screw fixation is an effective treatment modality for achieving both radiological stability and functional restoration in posterior pelvic ring injuries.

### CONCLUSION

Iliosacral screw fixation is an effective and reliable method for the management of posterior pelvic ring injuries. The procedure provides stable fixation with minimal soft tissue disruption, allowing early mobilization and satisfactory functional recovery. In the present study, the majority of patients achieved excellent to good radiological and functional outcomes, demonstrating the efficacy of minimally invasive percutaneous fixation techniques. Proper patient selection, accurate preoperative planning, and meticulous intraoperative fluoroscopic guidance played important roles in achieving favorable results and minimizing complications. The study also highlighted that posterior pelvic ring injuries are commonly associated with high-energy trauma, particularly among young and middle-aged males. Radiological reduction showed a significant correlation with postoperative functional improvement. Although a few patients experienced fair or poor outcomes, the overall complication rate remained low. Therefore, iliosacral screw fixation can be considered a safe, minimally invasive, and dependable treatment option for restoring pelvic stability and improving quality of life in patients with posterior pelvic ring injuries.

### REFERENCES

1. Tile M. Pelvic ring fractures: should they be fixed? *J Bone Joint Surg Br.* 1988;70(1):1-12.
2. Pennal GF, Tile M, Waddell JP, Garside H. Pelvic disruption: assessment and classification. *Clin OrthopRelat Res.* 1980;(151):12-21.
3. Routt ML Jr, Simonian PT, Mills WJ. Iliosacral screw fixation: early complications of the

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- percutaneous technique. *J Orthop Trauma.* 1997;11(8):584-589.
4. Matta JM, Saucedo T. Internal fixation of pelvic ring fractures. *Clin OrthopRelat Res.* 1989;(242):83-97.
  5. Ebraheim NA, Xu R, Biyani A, Yeasting RA. Anatomic considerations of iliosacral screw placement. *Spine (Phila Pa 1976).* 1997;22(8):841-844.
  6. Burgess AR, Eastridge BJ, Young JW, Ellison TS, Ellison PS Jr, Poka A, et al. Pelvic ring disruptions: effective classification system and treatment protocols. *J Trauma.* 1990;30(7):848-856.
  7. Lindahl J, Hirvensalo E, Böstman O, Törnkvist H. Failure of reduction with an external fixator in the management of injuries of the pelvic ring. *J Bone Joint Surg Br.* 1999;81(6):955-962.
  8. Majeed SA. Grading the outcome of pelvic fractures. *J Bone Joint Surg Br.* 1989;71(2):304-306.
  9. Templeman D, Schmidt A, Freese J, Weisman I. Proximity of iliosacral screws to neurovascular structures after internal fixation. *Clin OrthopRelat Res.* 1996;(329):194-198.
  10. Routt ML Jr, Simonian PT. Closed reduction and percutaneous skeletal fixation of sacral fractures. *Clin OrthopRelat Res.* 1996;(329):121-128.
  11. Routt ML Jr, Nork SE, Mills WJ. Percutaneous fixation of pelvic ring disruptions. *Clin OrthopRelat Res.* 2000;(375):15-29.
  12. Lindahl J, Hirvensalo E, Böstman O, Törnkvist H. Failure of reduction with an external fixator in the management of injuries of the pelvic ring. *J Bone Joint Surg Br.* 1999;81(6):955-962.
  13. Templeman D, Schmidt A, Freese J, Weisman I. Proximity of iliosacral screws to neurovascular structures after internal fixation. *Clin OrthopRelat Res.* 1996;(329):194-198.
  14. Shuler FD, Boone DC, Gruen GS, Peitzman AB. Percutaneous iliosacral screw fixation: early treatment for unstable posterior pelvic ring disruptions. *J Trauma.* 1995;38(3):453-458.
  15. van den Bosch EW, van Zwielen CM, van Vugt AB. Sacroiliac screw fixation for tile B fractures. *J Trauma.* 2003;55(5):962-965.
  16. König MA, Jehan S, Boszczyk AA. Management of pelvic ring injuries. *Orthop Trauma.* 2012;26(1):1-12.
  17. Comstock CP, van der Meulen MC, Goodman SB. Biomechanical comparison of posterior pelvic ring fixation. *J Orthop Trauma.* 1996;10(8):517-522.
  18. Gardner MJ, Routt ML Jr. Transiliac-transsacral screws for posterior pelvic stabilization. *J Orthop Trauma.* 2011;25(6):378-384.
  19. Zwingmann J, Hauschild O, Bode G, Südkamp NP, Schmal H. Malposition and revision rates of different imaging modalities for percutaneous iliosacral screw fixation. *Arch Orthop Trauma Surg.* 2013;133(9):1257-1265.
  20. Schweitzer D, Zylberberg A, Córdova M, Gonzalez J. Closed reduction and iliosacral percutaneous fixation of unstable pelvic ring fractures. *Injury.* 2008;39(8):869-874.