



Original Article

Posterior ilioileal pedicle screw fixation alone versus anterior and posterior pelvic ring fixation in type 2 anteroposterior compression pelvis ring injuries: A retrospective comparative study

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ABSTRACT

Objectives: Type II anteroposterior compression (APC) pelvic ring injuries (PRIs) are typically managed with combined anterior and posterior fixation, though this approach can increase operative time, blood loss, and recovery delay. Posterior ilioiliac fixation offers a less invasive alternative. This study compares its clinical and radiological outcomes with those of combined fixation in APC type II injuries.

Methods: This retrospective comparative study included 80 adult cases with type II APC PRIs. Cases were classified into two equal groups: Group A received posterior-only fixation, while Group B underwent combined fixation. Outcomes assessed included operative time, intraoperative blood loss, time to weight-bearing, post-operative pain (as measured by the visual analog scale [VAS]), symphyseal gap, fixation failure, infection, and functional outcome (as measured by the Majeed score).

Results: The posterior-only group showed significantly shorter operative times (40 ± 4 vs. 93 ± 8 min, $P < 0.001$) and lower blood loss (89 ± 19 vs. 187 ± 38 mL, $P < 0.001$). Early weight-bearing was more frequent (85% vs. 55%, $P = 0.003$), and 1-month VAS scores were lower (Median 1 vs. 2, $P = 0.001$). However, the combined group demonstrated a smaller 6-month symphyseal gap (Median, 1 cm vs. 2 cm; $P = 0.011$). Other outcomes, including fixation failure and infection rates, were comparable.

Conclusion: Posterior ilioiliac fixation alone offers an effective, safe, and minimally invasive alternative to combined fixation in selected APC type II PRIs, with favorable perioperative and early functional outcomes.

Keywords: Anteroposterior compression type II, Ilioiliac fixation, Minimally invasive surgery, Orthopedic trauma, Pelvic ring injuries

INTRODUCTION

Although relatively infrequent, unstable injuries of the pelvic ring are typically the consequence of high-energy trauma and are frequently characterized by complex anatomical disruption. These injuries pose significant diagnostic and therapeutic challenges, ranking among the most demanding cases encountered in orthopedic trauma practice.^[1,2]

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Anterior stabilization remains the cornerstone of treatment for type II anteroposterior (AP) pelvic ring disruptions, especially in cases marked by pubic symphysis diastasis. When anterior injuries are comminuted or surgically complex, rendering conventional plating impractical, external fixation (ExFix) presents a dependable alternative.^[3]

Recent literature highlights the adoption of minimally invasive modalities, such as the anterior subcutaneous pelvic internal fixator (ASPIF) and the anterior internal fixator (AIFix). These techniques involve the subcutaneous insertion of titanium rods anchored with pedicle screws into the supra-acetabular region, offering robust anterior ring stabilization with reduced soft-tissue disruption.^[4]

Compared to ExFix, the AIFix technique offers superior biomechanical stability, improved patient mobility and comfort, and avoids complications associated with pin tract infections.^[5,6]

Iliosacral screw fixation is generally regarded as the primary method for stabilizing posterior pelvic ring disruptions. However, in cases involving significant sacral comminution, the stability provided by these screws may be insufficient. Under such circumstances, especially in bilateral sacral fractures, alternative fixation strategies such as transiliac plating, transiliac bar placement, or lumbopelvic fixation may be more appropriate to achieve adequate biomechanical support.^[3] A novel technique, conceptually resembling the sacral bar method but with enhanced biomechanical performance, has recently emerged. This method is characterized by its simplicity, safety, minimal invasiveness, and rapid application, with minimal reliance on fluoroscopy.^[7]

Given the limitations of conventional fixation methods in polytrauma cases, there has been growing support for minimally invasive solutions to treat AP fracture-dislocations.

AQ4 Inspired by the AIFix technique, *Saoud et al.*, developed an innovative approach tailored to this clinical scenario,^[8,9] having the advantage of minimal radiation exposure, with one fluoroscopy image taken before the reduction, and AP, inlet, and outlet views to ensure anatomical reduction after pelvic belt application, with correction of the rotational instability. Furthermore, the pelvic binder was adjusted if the reduction was inadequate, with repetition of the three views until an adequate reduction was achieved. The whole process, compared to the extensive radiological hazards of sacroiliac (SI) screw insertion (10–15 images), to ensure robust screw purchase, was much more advantageous. The study selected the posterior superior iliac spine (PSIS) as the entry point. Two iliac screws are inserted from the PSIS toward the supra-acetabular region and connected through a short rod, effectively stabilizing the AP fracture-dislocation.^[6]

The purpose of this work is to compare functional, radiological outcomes of posterior ilioileal pedicle screw

fixation alone versus posterior iliosacral screw fixation combined with anterior fixation in type 2 AP compression (APC) pelvis ring injuries.

MATERIALS AND METHODS

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Study design and setting

This study is a retrospective comparative analysis conducted at the Department of Orthopedic Surgery, Ain Shams University Hospitals. Data were collected from operative and follow-up records of cases who underwent surgical intervention between January 2022 and July 2023.

Study population

The study population consisted of adult cases aged between 18 and 65 years who sustained APC type II pelvic ring injuries (PRIs). Cases were included if they had open pelvic fractures or associated internal organ injuries that required definitive surgical intervention. Those with associated acetabular fractures were excluded from the study. All eligible cases that met the eligibility criteria within the defined study period were included in the analysis.

Data collection

Data were collected from patient medical records, operative notes, imaging studies, and follow-up reports. Collected variables included demographic information such as age, sex, smoking status, presence of osteoporosis, mechanism of trauma, and the presence of polytrauma.

Fracture classification was recorded according to the Arbeitsgemeinschaft für Osteosynthesefragen (AO)/Orthopedic Trauma Association System, and the presence of open fractures was noted. Operative details, such as the type of fixation performed, the number of screws used, operative time in minutes, and intraoperative blood loss in milliliters, were documented. Post-operative data included the incidence of implant failure, screw loosening, plate or screw breakage, infection, the need for reoperation or re-fixation, and the time to initiation of weight-bearing. Functional outcomes were assessed at follow-up visits using the Majeed pelvic score, and the visual analog scale (VAS) was used to assess the pain at 1 and 6 months postoperatively.^[10]

Radiographic assessments were performed using standard AP, inlet, and outlet pelvic views at follow-up intervals of 2 weeks, 6 weeks, 3 months, and 6 months. The quality of reduction and the presence of residual or recurrent diastasis were assessed based on Matta and Tornetta's radiological criteria [Figures 1-4].^[11]

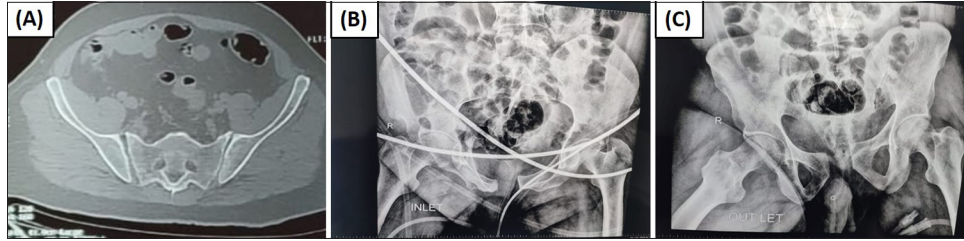


Figure 1: Pre-operative radiography (a) anteroposterior (AP), (b) inlet, and (c) outlet showing AP compression type II fracture pelvis with the right sacroiliac dislocation.



Figure 2: Post-operative (a) anteroposterior, (b) inlet, and (c) outlet radiography showing anterior ring fixation through symphyseal plate and posterior sacroiliac screw fixation.

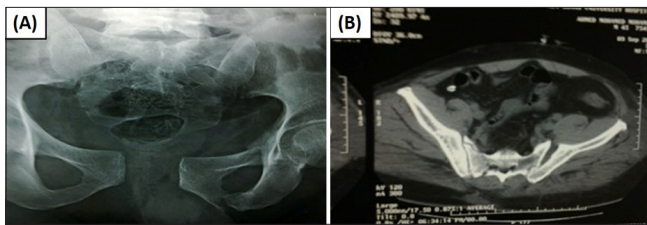


Figure 3: Pre-operative (a) radiographs and (b) computed tomography scan showing anteroposterior compression type II fracture pelvis with sacroiliac dislocation.

Surgical techniques

Cases were divided into two groups regarding the type of surgical fixation received. In the posterior-only fixation group, indirect reduction was achieved through application of a pelvic belt first just below the PSIS in the supine position, checked by three fluoroscopy images (AP, inlet, and outlet views) to ensure anatomical reduction, and manipulation of the pelvic binder was applied if the reduction was not satisfactory, till reaching anatomical reduction. Followed by prone positioning of the patient, all cases underwent the insertion of two titanium polyaxial iliac screws, each measuring 60 mm in length and 7 mm in diameter. These were inserted through the PSIS and directed toward the supra-acetabular region. The screws were connected by a short transverse rod, achieving stabilization of the posterior pelvic ring. In the combined fixation group, anatomical reduction was achieved through a sequential approach, starting with anterior ring reduction and fixation using one of several techniques, including symphyseal plating, AIFix, ASPIF, or ExFix, depending on individual case characteristics

and surgeon preference, followed by posterior iliosacral screw fixation.

Outcome measures

The primary outcomes assessed were the final radiological result, functional outcome at 6 months, implant-related complications including failure and recurrence of diastasis, and the need for reoperation or re-fixation. Secondary outcomes included operative time, intraoperative blood loss, time to weight-bearing, post-operative infection, and VAS scores at 1 and 6 months. The width of the symphyseal gap was also assessed at the final follow-up visit to determine the degree of residual or recurrent diastasis.

Sample size calculation

The sample size was calculated using G*Power software (version 3.1.9.7) based on a pilot study, as no similar studies have compared posterior iliotibial pedicle screw fixation alone with combined anterior and posterior pelvic ring fixation. The pilot study reported a large effect size for operative time between the two groups. To detect a large effect size ($d = 0.8$) in operative time between the two groups, a total sample size of 70 patients (35 per group) was required. This was increased to 80 patients (40 per group) to account for potential loss to follow-up.

Statistical methods

Data processing and statistical analyses were conducted using IBM Statistical Package for the Social Sciences Statistics, version 27 (Armonk, NY, USA). Normality of quantitative

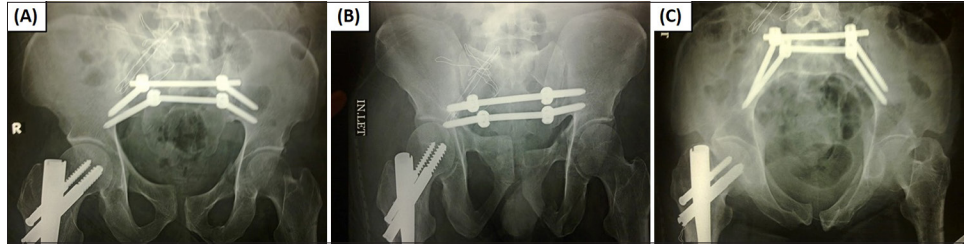


Figure 4: Post-operative (a) anteroposterior, (b) inlet, and (c) outlet radiography showing posterior ring fixation by pedicular ilioileal fixation.

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variables was assessed through the Shapiro-Wilk test complemented by visual inspection techniques. Depending on the distribution, continuous variables were expressed either as mean $\pm$ standard deviation for normally distributed data or as median and range for non-normally distributed data. Categorical variables were presented as frequencies and percentages. Between-group comparisons for continuous data were carried out using the Independent *t*-test for parametric data and the Mann-Whitney U-test for non-parametric data. Categorical variables were compared using either the Chi-square test or Fisher's exact test, as appropriate. To identify predictors of operative time, intraoperative blood loss, VAS at 1 and 6 months, and the 6-month symphyseal gap, multivariate linear regression analyses were employed, with regression coefficients and 95% confidence intervals (CIs) reported. In addition, multivariate logistic regression was used to assess predictors of post-operative weight-bearing capability, and the results were presented as odds ratios (OR) with 95% CIs. All statistical analyses were two-tailed, and $P < 0.05$ was considered statistically significant.

RESULTS

Baseline demographic and clinical characteristics

There were no notable variations between the combined fixation and posterior-only groups in terms of age ($P = 0.885$), sex ($P = 1$), smoking status ($P = 0.371$), osteoporosis ($P = 0.154$), polytrauma ($P = 0.762$), AO fracture type ($P = 0.962$), presence of open fracture ($P = 1$), mode of trauma ($P = 1$), and pre-operative diastasis ($P = 0.071$) [Table 1].

Intraoperative parameters and early post-operative outcomes

Cases in the posterior-only fixation group had significantly shorter operative time (40 ± 4 vs. 93 ± 8 min, $P < 0.001$), significantly less intraoperative bleeding (89 ± 19 vs. 187 ± 38 mL, $P < 0.001$), and a significantly higher rate of earlier post-operative weight-bearing (85% vs. 55%, $P = 0.003$) compared to the combined fixation group [Table 2 and Figure 5].

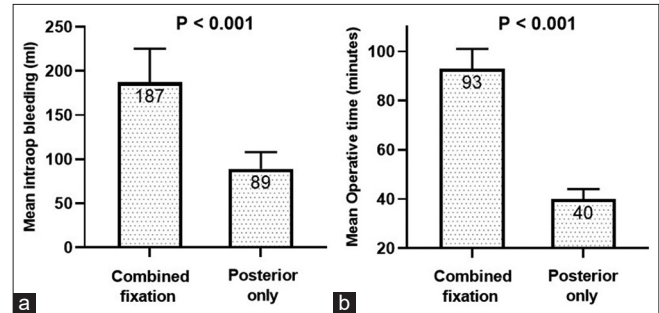


Figure 5: (a) Operative time (min) between the studied groups and (b) intraoperative bleeding between the studied groups.

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Fixation outcomes, complications, and follow-up results

Cases in the posterior-only fixation group reported significantly lower 1-month VAS scores compared to the combined fixation group (1 [1–4] vs. 2 [1–5], $P = 0.001$). In contrast, the combined fixation group had a significantly smaller 6-month symphyseal gap (1 [0–4] cm vs. 2 [0–5] cm, $P = 0.011$). Fixation failure ($P = 0.762$), failure time ($P = 0.687$), infection ($P = 1$), reoperation ($P = 0.432$), re-fixation ($P = 1$), and 6-month VAS ($P = 0.081$) did not show notable differences which did not show notable differences [Table 3].

Multivariate linear regression analyses for the prediction of operative time and intraoperative bleeding

Multivariate linear regression analysis revealed that the posterior-only approach was substantially associated with reduced operative time and intraoperative bleeding, controlling for age, gender, smoking, and osteoporosis. The posterior-only approach reduced operative time by 52.85 min (95% CI: -55.899 to -49.802 ; $P < 0.001$) and intraoperative bleeding by 98.18 mL (95% CI: -112.221 to -84.132 ; $P < 0.001$) compared to the combined fixation group, controlling for age, female gender, smoking, and osteoporosis [Table 4].

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Table 1: Baseline demographic and clinical characteristics between the studied groups.				
???		Combined fixation (n=40)	Posterior only (n=40)	P-value
Age (years)	Median (range)	48 (20–65)	44 (20–65)	0.885
Sex				
Males	n (%)	29 (72.5)	29 (72.5)	1
Females	n (%)	11 (27.5)	11 (27.5)	
Smoking	n (%)	22 (55)	18 (45)	0.371
Osteoporosis	n (%)	2 (5)	7 (17.5)	0.154
Polytrauma	n (%)	7 (17.5)	6 (15)	0.762
AO fracture type				
B1	n (%)	20 (50)	22 (55)	0.962
B2	n (%)	6 (15)	6 (15)	
B3	n (%)	3 (7.5)	3 (7.5)	
C1	n (%)	6 (15)	7 (17.5)	
C2	n (%)	4 (10)	2 (5)	
C3	n (%)	1 (2.5)	0 (0)	
Open fracture	n (%)	2 (5)	3 (7.5)	1
Mode of trauma				
Road traffic accident	n (%)	39 (97.5)	38 (95)	1
Fall from height	n (%)	1 (2.5)	2 (5)	
Preop diastasis (cm)	Mean±SD	4.5±1.4	4±1	0.071
n: Number, AO: Arbeitsgemeinschaft für osteosynthesefragen classification, cm: Centimeter, SD: Standard deviation				

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Table 2: Intraoperative parameters and early post-operative outcomes between the studied groups.				
???		Combined fixation (n=40)	Posterior only (n=40)	P-value
Intraoperative				
Number of screws on each side				
Two	n (%)	6 (15)	-	-
Three	n (%)	22 (55)	-	-
Four	n (%)	12 (30)	-	-
Operative time (min)	Mean±SD	93±8	40±4	<0.001*
Bleeding (mL)	Mean±SD	187±38	89±19	<0.001*
Post-operative				
Screw loosening	n (%)	5 (12.5)	-	-
Screw loosening time (months)	Median (range)	2 (1–3)	-	-
Plate break	n (%)	3 (7.5)	-	-
Screw break	n (%)	1 (2.5)	-	-
Weight-bearing	n (%)	22 (55)	34 (85)	0.003*
n: Number, SD: Standard deviation, mL: Milliliter, *: Significant P-value				

Multivariate linear regression analyses for the prediction of 1-month VAS, 6-month VAS, and 6-month symphyseal gap

Multivariate linear regression analysis revealed that the posterior-only approach was significantly associated with lower 1-month VAS scores, with a reduction of 0.78 points (95% CI: −1.256 to −0.312; *P* = 0.001), after controlling for

age, gender, smoking, and osteoporosis. In addition, it was associated with lower 6-month VAS scores by 0.44 points (95% CI: −0.882 to 0.003; *P* = 0.051) and with a wider 6-month symphyseal gap by 0.51 cm (95% CI: −0.023 to 1.051; *P* = 0.06), both showing borderline statistical significance [Table 5].

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Table 3: Fixation outcomes, complications, and follow-up results between the studied groups.

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???		Combined fixation (n=40)	Posterior only (n=40)	P-value
Outcomes				
Fixation failure	n (%)	7 (17.5)	6 (15)	0.762
Failure time (months)	Mean±SD	11±3	11±3	0.687
Failure cause				
Pullout	n (%)	2 (28.6)	-	-
Plate break	n (%)	2 (28.6)	-	-
Loosening	n (%)	2 (28.6)	-	-
Screw break	n (%)	1 (14.3)	-	-
Complications and follow-up				
Infection	n (%)	4 (10)	3 (7.5)	1
Reoperation	n (%)	5 (12.5)	2 (5)	0.432
Re-fixation	n (%)	2 (5)	1 (2.5)	1
VAS				
1-month	Median (range)	2 (1–5)	1 (1–4)	0.001*
6-month	Median (range)	1 (0–3)	0 (0–4)	0.081
6-month symphyseal gap (cm)	Median (range)	1 (0–4)	2 (0–5)	0.011*

n: Number, VAS: Visual analog scale, cm: Centimeter, SD: Standard deviation, *: Significant P-value

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Table 4: Multivariate linear regression analyses for prediction of operative time and intraoperative bleeding.

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???	Operative time (min)		Intraoperative bleeding (mL)	
	B (95% CI)	P-value	B (95% CI)	P-value
Age (years)	−0.057 (−0.157–0.044)	0.265	0.13 (−0.333–0.593)	0.577
Female sex	−0.679 (−4.822–3.464)	0.745	2.852 (−16.234–21.937)	0.767
Smoking	−2.356 (−6.108–1.397)	0.215	0.886 (−16.401–18.174)	0.919
Osteoporosis	−1.628 (−6.431–3.176)	0.502	9.462 (−12.666–31.59)	0.397
Posterior-only approach	−52.851 (−55.899–−49.802)	<0.001*	−98.177 (−112.221–−84.132)	<0.001*

B: Regression coefficient, CI: Confidence interval, mL: Milliliter, *: Significant P-value

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Table 5: Multivariate linear regression analyses for prediction of 1-month VAS, 6-month VAS, and 6-month symphyseal gap.

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???	1-month VAS		6-month VAS		6-month symphyseal gap (cm)	
	B (95% CI)	P-value	B (95% CI)	P-value	B (95% CI)	P-value
Age (years)	−0.009 (−0.024–0.007)	0.267	−0.012 (−0.027–0.003)	0.104	−0.002 (−0.02–0.015)	0.784
Female sex	−0.184 (−0.826–0.457)	0.569	−0.415 (−1.016–0.186)	0.173	−0.795 (−1.525–−0.065)	0.033
Smoking	0.011 (−0.57–0.592)	0.97	0.157 (−0.387–0.701)	0.567	−0.267 (−0.928–0.394)	0.423
Osteoporosis	1.057 (0.313–1.801)	0.006	0.811 (0.114–1.507)	0.023*	1.164 (0.318–2.01)	0.008*
Posterior-only approach	−0.784 (−1.256–−0.312)	0.001*	−0.44 (−0.882–0.003)	0.051	0.514 (−0.023–1.051)	0.06

B: Regression coefficient, CI: Confidence interval, VAS: Visual analog scale, cm: Centimeter, *: Significant P-value

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Multivariate logistic regression analysis for the prediction of post-operative weight-bearing

The posterior-only approach was associated with a 391% increased likelihood of early post-operative weight-bearing

compared to the combined fixation approach (OR = 4.909, 95% CI = 1.574–15.312, P = 0.006), controlling for age (P = 0.635), female gender (P = 0.137), smoking (P = 0.244), and osteoporosis (P = 0.358) [Table 6].

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Table 6: Multivariate logistic regression analysis for prediction of post-operative weight bearing.

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???	Weight-bearing	
	OR (95% CI)	P-value
Age (years)	1.009 (0.974–1.045)	0.635
Female sex	3.278 (0.686–15.672)	0.137
Smoking	2.23 (0.579–8.596)	0.244
Osteoporosis	2.842 (0.307–26.346)	0.358
Posterior-only approach	4.909 (1.574–15.312)	0.006*

OR: Odds ratio, CI: Confidence interval, *: Significant P-value

DISCUSSION

Type II APC PRIs present a surgical challenge due to their instability and the need to balance adequate fixation with surgical invasiveness.^[12] In this study, we compared posterior ilioiliac fixation alone with the conventional combined fixation approach. We found that the posterior-only method was associated with reduced operative time, blood loss, and earlier weight-bearing, without an increase in complication rates.

Another important parameter was the radiation exposure, although cannot be measured on quantitative basis; however, it was much more evident during SI screw insertion and exposing the medical personnel to much more morbidity and radiation hazards (10–15 images), compared to just one fluoroscopy image before reduction in the ilioileal fixation group, and pelvic views post reduction to ensure anatomical reduction after application of the pelvic belt in the supine position.

In the present study, the posterior-only fixation group demonstrated clear perioperative advantages, including a significantly shorter operative time. It reduced intraoperative blood loss, making it particularly suitable for hemodynamically unstable cases or those with multiple injuries. In addition, cases in this group were more likely to bear weight earlier. They reported lower early post-operative pain levels, indicating a more favorable early recovery profile, as early ambulation not only facilitates rehabilitation but also reduces the risks of thromboembolic complications and hospital-associated morbidity.

Conforming to our results, Wang *et al.*, reported that minimally invasive posterior pelvic ring stabilization using bilateral pedicle screws connected to a transverse rod achieved favorable outcomes in cases with APC-type PRIs.^[13] The posterior-only fixation technique resulted in a short operative time (mean, 28.2 min), minimal intraoperative blood loss (mean, 46.7 mL), and excellent or good fracture reduction in 89.7% of 29 cases, according to the Tornetta Matta criteria. Functional outcomes at final follow-

up were similarly favorable, with 89.7% of cases achieving excellent or good Majeed scores. No cases of infection, neurovascular injury, screw loosening, or non-union were reported.

Huang *et al.*, demonstrated that using a minimally invasive screw-rod system for posterior pelvic ring fractures achieved excellent clinical outcomes, with 92.6% of 27 cases rated as excellent or good based on Matta criteria and 88.8% based on the Majeed score at 6 months postoperatively.^[14] The procedure resulted in satisfactory limb function, an average fracture healing time of 8.4 months, and no cases of deep infection.

Hosny *et al.*, retrospectively evaluated 26 cases of unstable PRIs treated with isolated posterior SI screw fixation, achieving favorable outcomes.^[15] They reported excellent functional recovery in 84.6% of cases based on the Majeed score, with no implant failures, infections, or non-unions. Their cases also experienced low post-operative pain, with a mean VAS score of 1.3 ± 2 at long-term follow-up. Early mobilization was initiated the day after surgery. Similarly, our posterior-only group demonstrated significantly lower operative time, reduced blood loss, earlier weight-bearing, and lower 1-month VAS scores, without an increase in complication rates.

However, while Hosny *et al.*,^[15] used single iliosacral screws, our posterior-only technique employed bilateral iliac screws connected by a rod, which may offer greater biomechanical stability and resistance to rotational forces.

El-Hamalawy *et al.*, prospectively compared transiliac internal fixator (TIFI) for posterior ring fixation and iliosacral screw fixation in sacral fractures using minimally invasive approaches.^[16] They showed a notably shorter operative time in the TIFI group. However, while their ISS group demonstrated less intraoperative blood loss, we observed the opposite in our cohort, with posterior-only fixation resulting in significantly reduced bleeding compared to combined anterior and posterior fixation. This discrepancy may be attributed to the addition of anterior ring procedures in our combined group, which inherently increases surgical exposure and blood loss.

In line with this study, Wu *et al.*,^[17] found that adding posterior fixation to anterior pelvic ring stabilization significantly increased both operative time and intraoperative blood loss in cases with unstable PRIs. Specifically, the combined anterior and posterior fixation group had an average operative time of 50.6 min and blood loss of 56.8 mL, compared to 26.6 min and 29.1 mL in the anterior-only group. These findings support the concept that posterior fixation alone may offer a less invasive alternative in selected cases, avoiding the added surgical burden of combined procedures.

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Interestingly, the combined fixation group demonstrated superior anatomical reduction of the anterior pelvic ring, as evidenced by a significantly smaller 6-month symphyseal gap. This suggests that combined fixation may provide better anterior ring stability, which could be important in specific fracture patterns or high-demand cases. However, this radiological advantage did not translate into significant differences in fixation failure, infection, or reoperation rates.

Multivariate analyses confirmed the independent association of the posterior-only approach with favorable outcomes, including reduced operative time, decreased bleeding, lower early post-operative pain, and an increased likelihood of early weight-bearing. While the 6-month VAS and symphyseal gap showed borderline statistical significance, they suggest that while the posterior approach is sufficient for many cases, anterior stabilization may still be warranted in select cases with substantial symphyseal disruption.

This study is subject to several limitations that warrant consideration. Primarily, its retrospective design introduces the potential for selection bias and limits the ability to make causal inferences. The relatively small sample size and the single-center setting may also restrict the external validity and generalizability of the results. Moreover, heterogeneity in surgical expertise and fixation techniques, particularly within the combined fixation cohort, could have influenced clinical outcomes. The follow-up period, confined to 6 months, may be insufficient to detect delayed complications or assess long-term implant performance. Future research should focus on prospective, multicenter studies with extended follow-up durations to corroborate and expand on these findings.

CONCLUSION

Posterior ilioiliac pedicle screw fixation alone appears to be a safe and effective replacement for combined anterior and posterior fixation in selected cases of APC type II PRIs. It offers significant advantages in terms of reduced operative time, lower intraoperative blood loss, and earlier weight-bearing, less radiation exposure, without increasing complication or failure rates. While combined fixation may provide slightly better radiological alignment of the symphysis, the overall functional and perioperative outcomes support the use of posterior-only fixation in appropriate clinical settings.

Authors' contributions: AMS conceived and designed the study, conducted the research, provided research materials, and collected and organized data. AMFS analyzed and interpreted the data. ISM wrote the initial and final drafts of the article and provided logistical support. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

AQ12 Ethical approval: This research was approved by the Institutional Ethics Committee (Approval code: FMASU R124/2025, Date: May

17, 2025). Although the study involved cases operated between January 2022 and July 2023, no patient data were accessed or analyzed before obtaining ethical approval on May 17, 2025. Informed consent was obtained from all participants or their legal guardians before data usage, as per institutional policy.

Declaration of patient's consent: Informed written agreement was obtained from all participants for the utilization of their clinical data and photos in this investigation and publication, ensuring confidentiality and anonymity.

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