ORIGINAL RESEARCH

Conservative vs sacroiliac screw fixation for pelvis fractures

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Received: 04July, 2022 Accepted: 05August, 2022

ABSTRACT
This study prospectively analyzes the outcomes of 30 patients with unstable posterior pelvic ring injuries who underwent either percutaneous iliosacral screw fixation or conservative management from 2016 to 2018 at trauma care center (level 1). The effectiveness of these two approaches is evaluated by comparing functional, clinical, and radiographic outcomes.
Comparative Analysis of Percutaneous Iliosacral Fixation for Unstable Posterior Pelvic Ring Injuries This retrospective cohort study evaluates the effectiveness of percutaneous iliosacral screw fixation versus conservative management for treating unstable posterior pelvic ring injuries. Patient cohorts were assessed using the Majeed grading system for functional outcomes, the 36-Item Short Form Health Status Survey (SF-36) for general and mental health status, and radiographic analysis to determine residual displacement at 1 year. Furthermore, pain relief was evaluated at 1-month and 1-year post-operative intervals.Findings indicate that surgical intervention achieves significantly better functional outcomes than conservative treatment. Percutaneous iliosacral fixation demonstrably reduces residual displacement at medium-term follow-up and provides superior pain management at both short- and medium-term follow-up assessments.
Conclusion: Percutaneous iliosacral screw fixation represents a valuable therapeutic option for managing unstable posterior pelvic ring injuries, offering superior functional results and mitigating long-term sequelae compared to conservative management strategies.

Key words: Diabetic retinopathy, Diabetes mellitus, screening

INTRODUCTION

Recent advancements in orthopedic care have demonstrated the efficacy of conservative management for specific pelvic injuries, including those involving posterior ring instability without sacroiliac (SI) diastasis[1, 2].These minimally invasive approaches have yielded acceptable clinical results, minimizing the need for extensive surgical intervention [5,6].However, more complex cases involving joint and sacral fractures continue to pose significant challenges for pelvic surgeons, and optimal treatment strategies remain the subject of ongoing debate.

Conservative management of unstable posterior ring injuries is generally associated with poor long-term outcomes, including delayed recovery and chronic pain[1,2,3].These limitations underscore the critical need for effective surgical stabilization techniques. Percutaneous iliosacral screw fixation represents a promising minimally invasive approach that offers biomechanically stable and clinically effective management of complex pelvic fractures [7,8]. This technique facilitates early weightbearing, promotes fracture union, and significantly improves pain management and functional recovery [7,8].

"Percutaneous iliosacral screwing" represents a less invasive technique compared to traditional open procedures while also offering a lower risk of post-operative wound infections[7,8]. The stability of the sacroiliac joint (SI joint) relies on a complex interplay of bony anatomy and ligamentous support. This critical articulation fulfills several vital roles including shock absorption for the spine, the transmission of rotational forces from the lower extremities to the vertebral column, and a crucial locking function that ensures stability during gait. Although a limited number of research efforts have investigated the functional consequences of unstable posterior pelvic

ring injuries treated with either percutaneous iliosacral screw fixation or conservative management, this study aims to fill that gap by analyzing the outcomes of both approaches[9,10].

METHODS

Emergency department patients with evidence of traumatic unstable posterior pelvic ring injury were included in the study if they met specific eligibility criteria.

INCLUSION CRITERIA

They had to be over 18years and present with lateral compression (LC) type II or III injury, anteroposterior compression (APC) type II or III injury, vertical shear (VS) injury, or a combined-mechanism injury classified as unstable based on the Young-Burgess classification system [13]. All participants required a minimum of 1 year of follow up.

EXCLUSION CRITERIA

Included less than 18 years, sacroiliac joint disruption bilateral,anybone disease, neurological injuries of the lumbosacral plexus, urological injuries, and/or posterior fixation methods other than iliosacral screws.

There were 30 patients all patients matched the inclusion criteria, patients completed the follow up. No patients were lost to follow up.

Group 1 consisted of 15 patients with a mean age of 45 years (range, 18-83 years) who were treated using percutaneous iliosacral screw fixation. Group 2 consisted of 15 patients with a mean age of 51 years (range, 18-72 years) who were treated by conservative means. The groups did not differ significantly in terms of gender, age, injury side, trauma mechanism, and classification [Table 1].

The patients were divided into two groups: those treated surgically with fluoroscopy-assisted percutaneous iliosacral screw placement and those treated conservatively without posterior construct. Surgical intervention was performed after clinical preanesthetic fitness was obtained and aimed to achieve better anatomical position through fluoroscopically controlled closed reduction technique and percutaneous iliosacral screwing. In cases associated with anterior pelvic ring disruption, osteosynthesis with anterior plating was performed".

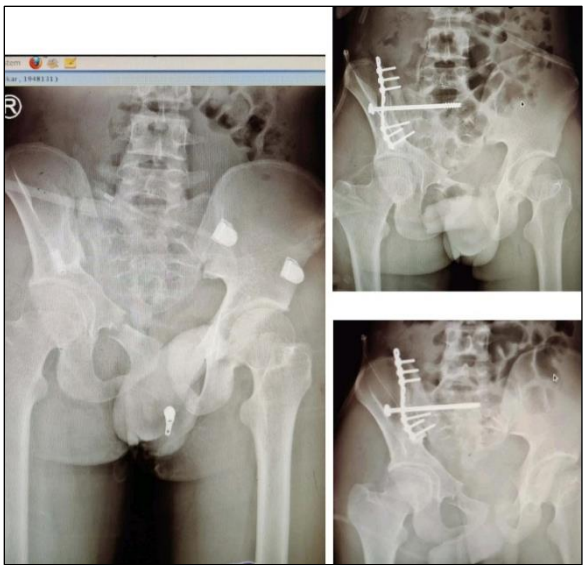

Figure 1:Typical patient of open book pelvic injury stablised with plate n iliosacral screw follow-up of 1year

"TO EVALUATE THE EFFECTIVENESS OF SURGICAL TREATMENT FOR PELVIC INJURIES, WE EXAMINED SERIAL RADIOGRAPHS TO MEASURE THE VERTICAL PROXIMAL DISPLACEMENT OF THE HEMI-PELVIS. PAIN LEVELS WERE ASSESSED USING THE VISUAL ANALOGUE SCALE (VAS), AND FUNCTIONAL OUTCOMES WERE MEASURED WITH THE 36-ITEM SHORT FORM HEALTH STATUS SURVEY (SF-36) AND THE MAJEED GRADING SYSTEM [14]

SF36 EVALUATES EIGHT HEALTH CONCEPTS: Physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. Functional results assessed by the Majeed system include subscale scores for pain, work, sitting, sexual intercourse, and standing. Outcomes for patient groups were compared using the Wilcoxon rank sum test while proportions of patients with various Majeed pelvis grades were compared using Fisher's exact test. The level of statistical significance was set at 0.05. Complications associated with sciatic nerve injury, dislocation or infection were also recorded.

In group 1, non-weightbearing mobilization with 2 crutches was the standard for 6 weeks. Physiotherapy interventions focused on gait pattern improvement,

particularly for hip extensor and abductor strengthening. In contrast, group 2 adhered to a 3-month course of skin traction and passive assisted abduction with physiotherapist. Partial-weight bearing with 2 crutches was permitted at the 6-month mark.

RESULTS

Findings Regarding Hemi-Pelvic Displacement This report presents a comparative analysis of patients with orthopedic injuries. The initial presentation revealed similar mean vertical proximal displacement of the hemi-pelvis for both cohorts (4 mm). However, at the 1-year mark, substantial discrepancies emerged. Cohort 2 demonstrated an additional 3 mm of displacement, while Cohort 1 exhibited a reduction. This difference was statistically significant ($p = 0.015$).Further analysis reveals a marked difference in residual displacement. Cohort 1 showed only 3 of 15 patients with greater than 5 mm, compared with 13 of 15 in Cohort 2 ($p = 0.004$). Moreover, Cohort 2 had 2 patients with residual displacement less than 5 mm, whereas Cohort 1 had 12 ($p = 0.004$).Pain assessment, measured using the VAS scale, indicates significant variations between the two groups over time. Cohort 1 reported substantial pain reduction at follow-up visits, while Cohort 2 demonstrated more persistent pain levels. These findings suggest distinct recovery trajectories for the two groups.

This analysis reveals statistically significant differences in VAS scores between groups both at 1-month ($p < 0.001$, respectively) and 1-year ($p = 0.001$, respectively) follow-up. Similarly, significant differences in improvement in VAS scores were observed between groups at both time points. These findings are summarized in Table 4.

One-year follow-up assessments revealed statistically significant differences in patient outcomes between groups. On the SF-36 evaluation, group 1 demonstrated superior general health and mental health scores compared to group 2 ($p = 0.029$ and 0.039, respectively). Additionally, the Majeed functional assessment showed significantly better mean scores for group 1 across several domains including pain, work, and sitting ($p = 0.03$, 0.004, and 0.039 respectively). While no significant differences were observed for sexual intercourse and standing, the overall distribution of functional classifications clearly demonstrated a more favorable outcome for group 1 ($p = 0.043$). These findings indicate clinically meaningful improvements in health status and functional capacity for group 1 at the 12-month mark.

Summary of Clinical Findings.

This report summarizes the one-year follow-up results for two patient groups. Group 1 consistently demonstrated superior health-related quality of life and functional capacity compared to group 2 as assessed by standard medical tools. Statistically significant improvements were observed in general health, mental health, pain management, work ability, and sitting tolerance among group 1 participants. While no meaningful differences emerged for sexual function or standing tolerance, the overall distribution of functional classifications clearly favors group 1. These findings suggest clinically significant benefits in medical outcomes for this particular cohort.

Table1

Gender	Group 1	Group 2	P value
Male	8	5	0.474
Female Injury side	7	10	
Left	7	5	0.281
Right Trauma mechanism	8	10	
Fall	5	2	0.322
MVA* Classification of Young-Burgess	10	13	
LC*2	2	3	0.984
LC3	2	1	
APC*2	3	2	
APC3	1	2	
VS*	7	7	

Table 2: Vertical proximal displacement a comparison

	Group 1	Group 2	P-value
	(*n*=15)	(*n*=15)	Mean ± SD (mm)
Prior displacement	4.23±1.9	3.61±2.13	0.45
Residual displacement	3.63±2.72	5.94±4.95	0.015*
Progress in displacement	–0.41±1.99	2.42±3.74	0.7
Abbreviation: SD: Standard deviation; *p<0.05			

Table 3: Residual displacement

	Group 1 (*n*=15)	Group 2 (*n*=15)	*p* value
Residual displacement			0.004*
>5 mm	3	13	
<5 mm	12	2	

Table 4: Visual analogue scale follow up over time

	Group 1	Group 2	P-value
	(*n*=15)	(*n*=15)	
	Mean ± SD (mm)		
Initial	8.0±0.5	8.05±0.62	0.95
1 month	3.52±1.32	5.95±0.75	<0.001***
12 months	2.49±0.98	4.3±0.63	0.001**
Improve after 1 month	6.01±1.09	2.85±1.08	<0.001***
Improve after 12 months	5.88±0.98	4.75±0.93	0.001**

Abbreviations: VAS: Visual analogue scale; SD: Standard deviation; ***p*<0.01; ****p* value<0.001

Table 5: Short form health status survey (SF-36)

	Group 1	Group 2	P-value
	(*n*=15)	(*n*=15)	
	Mean±SD		
Physical functioning	51.33±30.25	48.88±21.90	0.51
Role-physical	29.66±35.16	16.54±22.22	0.49
Bodily pain	47.90±24.01	42.92±11.66	0.34
General health	51.27±23.53	33.53±14.62	0.029*
Vitality	45.34±17.81	41.53±11.62	0.162
Social functioning	51.52±29.42	53.62±11.86	0.669
Role-emotional	63.00±48.47	42.23±45.52	0.32
Mental health	57.64±14.33	49.21±6.94	0.039*
Physical component summary	38.11±12.61	35.31±5.69	0.72
Mental component summary	44.82±11.13	41.82±9.01	0.21

Abbreviation: SD: Standard deviation; **p*<0.05

Table 6: Majeed functional scoring system

	Group 1	Group 2	P-value
	(*n*=15)	(*n*=15)	
	Mean ± SD (mm)		
Pain	25.52±6.44	21.69±5.92	0.03
Work	17.32±4.21	9.51±4.32	0.004**
Sitting	7.95±1.68	5.91±1.23	0.039*
Sexual intercourse	3.42±0.98	2.75±0.83	0.48
Standing	25.27±5.65	23.00±7.23	0.52

Abbreviation: SD: Standard deviation; **p*<0.05; ***p* value<0.0

Table 7: Results of Majeed pelvis grading

	Group 1	Group 2	*p* value
Excellent	8	1	0.043*
Good	3	4	
Fair	2	6	
Poor	2	4	
Total	15	15	

**p*<0.05

Abbreviation: SD: Standard deviation; **p*<0.05; ***p* value<0.01

DISCUSSION

Analysis of Functional Outcomes Following Iliosacral Screw Fixation in Management of Pelvic Fractures Formal CommunicationThe purpose of this study was to compare the functional outcomes of patients treated with iliosacral screw fixation for pelvic fractures with those treated conservatively. Our findings demonstrate that surgical intervention results in significant improvements in functional status. Radiographically, patients in the surgical group (group 1) exhibited less proximal vertical displacement compared to the conservative group (group 2), mirroring the clinical observations of enhanced functional recovery. These findings are consistent with previous research, notably the systematic review by Papakostidis*et al.*[15], which highlighted the superiority of posterior pelvis internal fixation in achieving favorable radiological results. The concept of minimizing hemi-pelvic displacement forms the basis for our observations, as literature suggests that less than 5 mm of residual displacement is associated with satisfactory outcomes. Our study further supports this notion, demonstrating that group 1 achieved mean displacement values below this critical threshold and experienced significantly better functional outcomes. Pain assessment using the Visual Analog Scale (VAS) revealed lower levels of discomfort in the surgical group at both 1-month and 1-year follow-up periods, further supporting the efficacy of operative intervention.

PELVIC FRACTURE MANAGEMENT: Minimally Invasive ApproachesI propose percutaneous iliosacral screw placement for early and medium-term pain management. Conservative management, particularly in cases with residual displacement exceeding 10 mm, demonstrates suboptimal outcomes. Current evidence suggests that early stabilization may facilitate rehabilitation and mitigate postoperative morbidity [18, 19].

In the present study, we assessed functional outcomes using the SF-36 and Majeed functional grading systems. The SF-36 demonstrated better results in group 1 on general health ($p = 0.029$) and mental health ($p = 0.039$) at 1-year follow up. However, its broad scope limits its ability to focus specifically on pelvic ring injury. The Majeed system showed superior outcomes for group 1 on pain ($p = 0.03$), work ($p = 0.004$), and sitting ($p = 0.039$), with a higher proportion of patients reporting excellent or good functional status.

While previous research has documented rates of sexual dysfunction among patients recovering from pelvic ring injuries (29% to 39%)[16],our current investigation reports no instances of sexual or excretory impairment. This difference can be attributed to the exclusion of patients with pre-existing neurological or urological conditions. Using the Majeed functional scoring system, we assessed discomfort during sexual intercourse, finding that a substantial majority of participants reported difficulty regardless of surgical intervention. The purpose of the Majeed evaluation was to assess discomfort and pain levels, rather than defining functional impairment.

The Young-Burgess system categorizes pelvic fractures based on stability. Stable fractures (APC1, LC1) have favorable conservative outcomes while unstable fractures (APC2, APC3, LC2, LC3, VS) require more specialized management. Achieving adequate reduction and stabilization in these cases generally leads to good functional results. Internal fixation of the posterior pelvic ring with iliosacral screws represents an effective treatment option minimizing soft tissue damage and perioperative complications.

This review acknowledges the relatively small sample size due to the infrequent occurrence of isolated posterior pelvic ring injuries.

This prospective study identified statistically significant differences in a small group of patients with isolated pelvic posterior ring injuries. However, it lacked a comprehensive assessment of long-term functional outcomes and relied on fluoroscopic guidance for iliosacral screw fixation. Future research should address these limitations and explore the potential benefits of navigation systems based on intraoperative computed tomography for enhanced accuracy in screw placement.

This analysis demonstrates that percutaneous placement of iliosacral screws provides superior clinical outcomes for unstable posterior pelvic ring injuries compared to conservative treatment. Patients experience reduced residual displacement, improved pain management, and enhanced functional recovery at one-year post-intervention.

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