ORIGINAL ARTICLE

Comparison of spinopelvic fixation and iliosacral screw fixation for posterior pelvic ring injuries

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ABSTRACT

BACKGROUND: There is no consensus in the literature regarding the optimal treatment method for posterior pelvic ring injuries. This study aims to compare the radiologic and clinical outcomes, as well as complications of spinopelvic fixation (SPF) and iliosacral screw fixation (ISF) in patients with posterior pelvic ring injuries.

METHODS: This retrospective study analyzed 54 patients (37 females, 17 males; mean age 38.9±18.7 years) with pelvic ring injuries classified as Tile type B and type C involving the posterior pelvic ring. These patients were treated with either SPF or ISF and followed for at least one year at two centers between 2016 and 2023. Of these, 28 patients comprised the SPF group, and 26 patients were in the ISF group. Comparisons were made regarding perioperative data (hemoglobin loss, blood product replacement, hospitalization duration, intensive care unit stay, surgery time, and fluoroscopy duration) and clinical outcomes (limb length discrepancy, Majeed score, visual analogue scale (VAS) score, and Short Form-36 (SF-36) score). Radiological outcomes were assessed using Matta outcome grading. Complications were also investigated.

RESULTS: Hemoglobin loss (median 2.2 vs. 1 g/dL; p=0.027) and surgery time (67±10.6 vs. 37.7±11.3 minutes; p<0.001) were higher in the SPF group, whereas fluoroscopy duration (median 2 vs. 51.5 seconds; p<0.001) was higher in the ISF group. Other perioperative parameters did not differ between the groups. At a minimum follow-up of one year, clinical scores (Majeed score, VAS, SF-36), limb length discrepancy, and Matta outcome grades were similar between the groups. The SPF group had higher total complication rates (46.4% vs. 19.2%; p=0.034) and infection rates (42.9% vs. 3.8%; p<0.001), while rates of neurological deficits, screw malposition, and other hospitalization complications (e.g., thromboembolic or cardiovascular events, pulmonary complications, sepsis) were not significantly different.

CONCLUSION: Both spinopelvic fixation and iliosacral screw fixation techniques are similarly effective in terms of clinical and radiological outcomes, with both methods demonstrating a low rate of complications. However, SPF was associated with higher infection rates and greater hemoglobin loss, while ISF required increased fluoroscopy exposure.

Keywords: Iliosacral screw fixation; posterior pelvic ring injury; spinopelvic fixation.

INTRODUCTION

Pelvic ring injuries are life-threatening conditions that often result from high-energy trauma.[1,2] The pelvic ring is inherently a stable structure, and the posterior sacroiliac ligament complex is the most important structure responsible for maintaining this stability.[1,3] Damage to the posterior pelvic ring signifies a severe injury.[3] However, there is no consensus in the literature regarding the optimal treatment approach for posterior pelvic ring injuries following acute stabilization of the patient.[2,4]

Tile type B injuries are rotationally unstable, whereas type C injuries are vertically unstable, both of which necessitate treatment of the posterior pelvic ring.[5] Open reduction and

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internal fixation (anterior plating), iliosacral screw fixation (ISF), spinopelvic fixation (SPF), and posterior tension band (plate-rod) techniques have all been recommended for managing posterior pelvic ring injuries.[6,7,8]

Iliosacral screw fixation offers advantages such as early application, being minimally invasive, minimal bleeding, and suitability for open fractures. However, its drawbacks include the technical difficulty of application, radiation exposure due to prolonged fluoroscopy, and limited ability to provide vertical stability.[6,9-11] Conversely, the primary advantage of SPF is its capacity to enable early mobilization by providing vertical stability. Nonetheless, SPF requires familiarity with spine surgery techniques and carries a higher risk of hematoma and infection due to soft tissue damage.[6,7,11]

In the existing literature, studies have compared ISF with plate application,[12] single and double sacroiliac (SI) screw application,[13] and ISF with posterior tension band application.[14] However, no studies have compared SPF with ISF. This study aimed to compare the radiologic and clinical outcomes, as well as postoperative complications, of SPF and ISF application in patients who underwent fixation of the posterior ring due to pelvic ring injuries classified as Tile type B and type C.

MATERIALS AND METHODS

This two-center, retrospective, clinical observational study analyzed patient data from hospital records after obtaining approval from the Ankara Etlik City Hospital Clinical Studies Ethics Committee (decision no: AEŞH-EK1-2023-283). Written informed consent was obtained from all participants, and the study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Patients aged 18 years and over who underwent SPF or ISF for pelvic ring injuries between April 2016 and March 2023 were identified from hospital records. Exclusion criteria included patients who declined participation, had a follow-up period of less than 12 months, or lacked adequate hospital records or imaging. A total of 54 patients were included in the study, with 28 patients in the SPF group and 26 in the SI screw group.

All patients were initially evaluated in the emergency department of our hospital. Measures included pelvic binding to control bleeding, interventional radiology assessments for embolization when necessary, and urgent application of a pelvic C-clamp, external or internal fixator (INFIX), along with close hemodynamic monitoring and fluid support. Definitive surgeries were performed once patients' general conditions were stabilized following these initial treatments.[2,17]

All surgeries were performed by six orthopedic trauma surgeons with specialized training. Surgical decisions were based

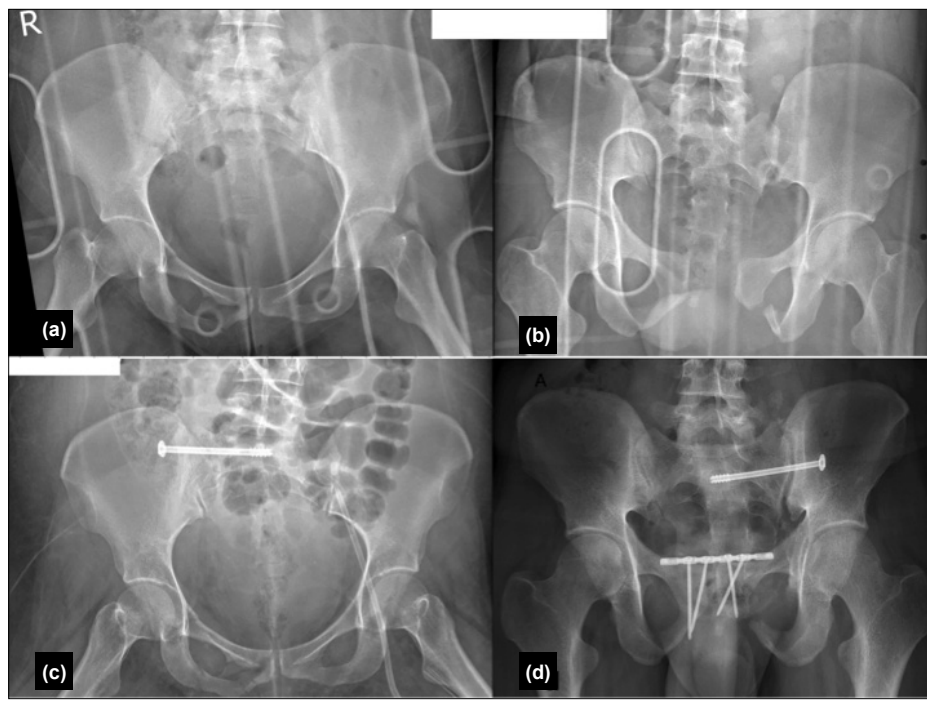

Figure 1. Case examples for spinopelvic fixation (SPF). Case 1: Preoperative **(a)** and postoperative **(b)** anteroposterior X-rays of a 47-year-old female patient following a motor vehicle accident. Case 2: Preoperative **(c)** and postoperative **(d)** anteroposterior X-rays of a 24-year-old female patient following a fall from height. Note the anterior internal anterior fixator (INFIX) application to improve stability.

on the surgeon's knowledge, discretion, and experience. Spinopelvic implants[15] (Fig. 1) and iliosacral screws[16] (Fig. 2) were placed following the guidelines described in the AO (Arbeitsgemeinschaft für Osteosynthesefragen) Surgery Reference (Fig. 2).

Spinopelvic Fixation (SPF) Surgical Technique

All patients were operated on using a radiolucent table under general anesthesia. Cefazolin sodium (1 gram) and tranexamic acid (1 gram) were administered intravenously during anesthesia induction. After appropriate skin preparation, a posterior midline incision targeting the L5-S1 spine was made. A vertical median incision was created over the L5 vertebra. The skin, subcutaneous tissue, and paraspinal muscles were dissected to expose the L5 vertebral pedicle and the posterior superior iliac process. Polyaxial screws with a 6 mm diameter were placed into the bilateral L5 vertebral pedicles in the correct anatomical position. Before placing the screws in the posterior superior iliac spine (PSIS), bone was excised using a rongeur to prevent skin irritation from the screws. Polyaxial screws with a 7 mm diameter and varying lengths, tailored to each patient, were inserted at an average angle of 40 degrees horizontally and 20-30 degrees caudally, directed toward the greater trochanter. These screws were connected to the screws in the L5 vertebral pedicle using rods. The rods were secured to each other using a transverse connector (Fig. 1).

Following hemostasis, the layers were closed appropriately, and suction drains were placed. The posterior wound was dressed, and the drains placed in the posterior wound line were activated 24 hours postoperatively. Drains were removed between 48 and 72 hours if the drainage amount was less than 100 cc/day. Wound dressings were changed every other day until suture removal. All patients received 1 gram of cefazolin sodium intravenously every six hours for the first 24 postoperative hours.[15]

Iliosacral Screw Fixation (ISF) Surgical Technique

All patients were operated on using a radiolucent table under general anesthesia. Cefazolin sodium (1 gram) was administered intravenously during anesthesia induction.

For ISF, true lateral, inlet, outlet, and anteroposterior views of the pelvis were obtained using a C-arm fluoroscopy. Images were captured to ensure the iliac cortical density (ICD) and the anterior margins of the S1 vertebra overlapped, and the vertebral canal was clearly identifiable. On the lateral view, the entry point for the iliosacral screw was determined at the inferoposterior aspect of the ICD on the S1 vertebra. The guide wire was then advanced 1 cm into the sacral ala. On the outlet radiograph, the guide wire's orientation was confirmed to be superior to the S1 foramen and inferior to the L5-S1 intervertebral disc. On the inlet radiograph, it was verified that the guidewire was positioned within the sacral ala, anterior to the neural foramen, before advancing it to the

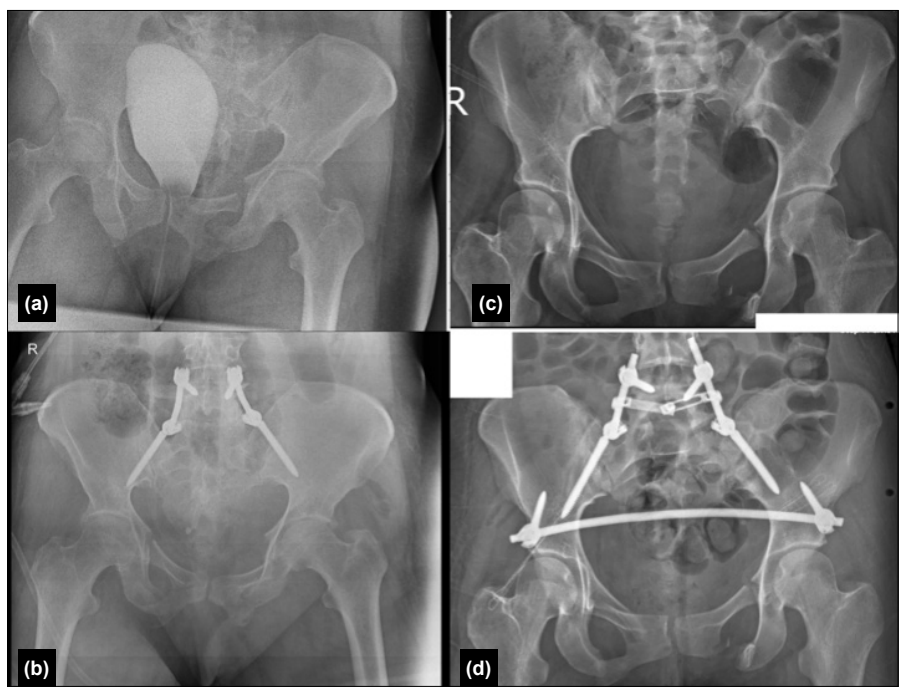

Figure 2. Case examples of iliosacral screw fixation (ISF). Case 1: Preoperative **(a)** and postoperative **(b)** anteroposterior X-rays of a 21-year-old female patient following a motor vehicle accident. Case 2: Preoperative **(c)** and postoperative **(d)** anteroposterior X-rays of a 25-year-old male patient following a motor vehicle accident. An anterior plate was also applied.

desired depth. A stab incision was made at the entry point of the guide wire. To determine the required length of the cannulated screw, the portion of the guide wire outside the bone was subtracted from the total length of the guide wire, yielding the remaining length. A 4.5 mm cannulated drill bit was advanced over the guide wire. After drilling, a 6 mm diameter cannulated screw was placed over the guide wire until its head reached the iliac cortex. After verifying the screw placement on inlet, outlet, and lateral radiographs, the guide wire was removed.[16] (Fig. 2)

Postoperatively, compression stockings and low molecular weight heparin were provided to all patients to prevent thrombosis. Patients who underwent SPF were not subjected to in-bed restrictions and were encouraged to bear weight as tolerated with the use of double crutches. For those who underwent ISF, no in-bed restrictions were imposed postoperatively; however, weight-bearing was prohibited for at least six weeks. Patients without wound site complications were discharged, and the total length of hospital stay was recorded.

Outcome Measures

Clinical outcomes were assessed using limb length discrepancy (measured as the difference between the distance from the anterior superior iliac spine to the medial malleolus), the Visual Analogue Scale (VAS) score, and the Short Form-36 (SF-36) health survey. Radiological outcomes were evaluated using the Matta outcome grading system (categorized as anatomical, congruent, or incongruent)[18] and the Majeed score.[19] Screws located in the intervertebral disc or outside the vertebral pedicle for SPF, and screws positioned in the sacral foramen, vertebral canal, or anterior sacrum for ISF, as observed on postoperative computed tomography and/or direct radiographs, were considered malpositioned.

Intraoperative and postoperative complications were investigated, including neurological deficits, screw malposition, and complications during hospitalization such as cardiovascular or thromboembolic events, pulmonary complications, sepsis, and infections (categorized as superficial or deep). Patients experiencing at least one complication were recorded.

Demographic data (age, sex, body mass index [BMI]), preoperative data (American Society of Anesthesiologists [ASA] score, mechanism of injury, Tile classification), perioperative data (surgical time, fluoroscopy time), and postoperative data (whether surgical intervention was performed on the anterior pelvic ring, hemoglobin drop, and need for blood product replacement) were collected. Length of hospitalization, length of intensive care unit stay, screw malposition, VAS score, SF-36 score, Matta outcome grade, Majeed score, limb length discrepancy, and complications (including implant failure, need for revision, neurological deficits, wound site problems, superficial or deep infections, other complications, and death) were compared between the two groups at a minimum one-year follow-up.

Statistical Analysis

Statistical analysis was conducted using Jamovi version 2.0 (Sydney, Australia).[20] The normality of numerical data was evaluated using the Kolmogorov-Smirnov test. The Independent Samples t-test was used to assess the mean difference between two independent groups with data conforming to a normal distribution, while the Mann-Whitney U test was applied for non-normally distributed data. Descriptive statistics were presented as counts and percentages for categorical variables; mean ± standard deviation and minimum-maximum values for numerical variables with normal distribution; and median (1st-3rd quartile) for numerical variables without normal distribution. Categorical variables were analyzed using the chi-square test if the assumptions were met; otherwise, Fisher's exact test was employed. Additionally, logistic regression analysis was performed to identify parameters that may have an impact on amputation outcomes. Data were analyzed at a 95% confidence level, with a p value of <0.05 considered statistically significant.

RESULTS

Among the patients included in our study, 37 (68.5%) were female, and 17 (31.5%) were male. The mean age was 38.9±18.7 years, and the mean BMI was 28.6±11.5. There were no significant differences between the two groups in terms of ASA scores, Tile classification, or anterior pelvic ring interventions (Table 1).

The median difference between preoperative and postoperative hemoglobin levels across both groups was 1.5 (0.5-2.7) g/dL. This difference was 2.2 (1-3.7) g/dL in the SPF group and 1 (0.2-2) g/dL in the ISF group (p=0.027). The mean duration of surgery was 52.9±18.3 minutes, with the SPF group averaging 67±10.6 minutes and the ISF group 37.7±11.3 minutes (p<0.001). The median fluoroscopy duration was 6.9 [1.9-51] seconds, with 2 (1.3-3.2) seconds in the SPF group and 51.5 (44-60.3) seconds in the ISF group (p<0.001) (Table 2).

The median number of intraoperative and postoperative blood transfusions was 2 (1-4) units. The median duration of hospitalization was 9.5 (6-15.8) days, and the mean length of intensive care unit stay was 3.9±4.0 days. No differences were observed between the groups in terms of blood transfusion requirements, hospitalization duration, or intensive care unit stay (p=0.124, p=0.122, p=0.668, respectively) (Table 2).

In terms of clinical and radiologic outcomes at a minimum of one year postoperatively, the mean Majeed score for the study cohort was 66.1±17.8, the median VAS score was 2 (1-3), and the median leg length discrepancy was 2 (1-3) mm. No significant differences were found between the two groups regarding the Majeed score (p=0.200), VAS score (p=0.326), leg length discrepancy (p=0.909), Matta score, or SF-36 scores (Table 2).

Table 1. Descriptive data

			Total (n=54)	SPF (n=28)	ISF (n=26)	p value
Sex		Male	17 (31.5%)	11 (39.3%)	6 (23.1%)	0.200[1]
		Female	37 (68.5%)	17 (60.7%)	20 (76.9%)	
Age			38.9±18.7	42±19.4	35.7±17.8	0.097[2]
Body Mass Index			28.6±11.5	27.9±12	29.1±10.9	0.458[2]
Cause of Injury		Pedestrian/ Motorcycle Injury	15 (27.8%)	8 (28.6%)	7 (26.9%)	–
		Motor Vehicle Collision	7 (12.9%)	1 (3.6%)	6 (23.0%)	
		Falling from Height	22 (40.8%)	10 (35.7%)	12 (46.3%)	
		Natural Disaster	10 (18.5%)	9 (32.1%)	1 (3.8%)	
ASA		ASA I	2 (3.7%)	0 (0%)	2 (7.6%)	0.316[3]
		ASA II	25 (46.3%)	13 (46.4%)	12 (46.2%)	
		ASA III	27 (50%)	15 (53.6%)	12 (46.2%)	
Tile classification	B	B1	13 (24.1%)	3 (10.7%)	10 (38.5%)	0.514[1]
		B2	32 (59.3%)	20 (71.5%)	12 (46.2%)	
		B3	1 (1.8%)	0 (0%)	1 (3.8%)	
	C	C1	4 (7.4%)	2 (7.1%)	2 (7.7%)	
		C2	3 (5.6%)	3 (10.7%)	0 (0%)	
		C3	1 (1.8%)	0 (0%)	1 (3.8%)	
Intervention to Anterior Pelvic Ring	Yes	ORIF	11 (20.4%)	4 (14.3%)	7 (26.9%)	0.382[2]
		INFIX	14 (25.9%)	9 (32.1%)	5 (19.2%)	
	No		29 (53.7%)	15 (53.6%)	14 (53.9%)	

Postoperative complications were reported in 18 (33.3%) patients overall, including 13 (46.4%) in the SPF group and 5 (19.2%) in the ISF group, with a statistically significant difference (p=0.034) (Table 3). Infections were observed in 13 (24.1%) patients, including 5 (9.2%) cases of deep infection that required debridement; all 5 cases occurred in the SPF group. One patient in the SPF group with a deep infection had their posterior implants removed after repeated debridement due to persistent wound site discharge. Additionally, 8 (14.8%) patients experienced superficial infections that resolved with prolonged antibiotic therapy and dressing changes. Among these, 7 patients were in the SPF group, and 1 was in the ISF group, with a statistically significant difference between the groups (p<0.001) (Table 3).

Screw malposition was identified on postoperative radiographs in 3 (5.6%) patients: 1 in the SPF group and 2 in the ISF group. There was no difference between the groups regarding screw malposition (p=0.604) (Table 3).

Postoperative complications during hospitalization occurred in 9 (16.7%) patients, with no differences between the groups (p=1) (Table 3).

In preoperative neurological evaluations, 2 patients presented with sciatic nerve impairment, and 2 had cauda equina syndrome. In the postoperative neurological evaluations, 1 patient in the SPF group developed cauda equina syndrome, and 1 patient in the ISF group developed femoral nerve impairment. However, all patients demonstrated improved neurological symptoms at the one-year postoperative follow-up (Table 3).

None of the patients in this study experienced implant failure, required revision surgery, or died during the follow-up period.

DISCUSSION

Pelvic ring injuries typically result from high-energy trauma and are often associated with concomitant injuries.[1-3] Pelvic

Table 2. Perioperative and postoperative data

		Total (n=54)	SPF (n=28)	ISF (n=26)	p value
Haemoglobin loss (g/dl)		1.5 [0.5-2.7]	2.2 [1-3.7]	1 [0.2-2]	0.027[1]
Blood products replaced (units)		2 [1-4]	2 [1-4.3]	1 [0-4]	0.124[1]
Hospitalization (days)		9.5 [6-15.8]	10.5 [7.8-16.3]	8.5 [5-13.8]	0.122[1]
Intensive care unit stay (days)		3.9±4.0	3.7±2.9	4.2±5	0.668[2]
Surgery time (minutes)		52.9±18.3	67±10.6	37.7±11.3	<0.001[2]
Fluoroscopy duration (seconds)		6.9 [1.9-51]	2 [1.3-3.2]	51.5 [44-60.3]	<0.001[1]
Matta score	Anatomical	38 (70.4%)	21 (75%)	17 (65.4%)	0.201[3]
	Congruent	14 (25.9%)	5 (17.9%)	9 (34.6%)	
	Incongruent	2 (3.7%)	2 (7.1%)	0 (0%)	
Majeed score		66.1±17.8	69.1±20.7	62.8±14.2	0.200[2]
VAS score		2 [1-3]	2 [1-3]	2 [1-3]	0.326[1]
Limb length discrepancy (mm)		2 [1-3]	2 [1-3]	2 [1-3]	0.909[1]
SF-36	Physical functioning	60 [55-65]	62.5 [45-66.3]	58.8 [55-65]	1[1]
	Role limitations due to physical health	37.5 [0-87.5]	37.5 [0-50]	37.5 [0-100]	0.564[1]
	Role limitations due to emotional problems	33.3 [33.3-66.7]	33.3 [33.3-66.7]	33.3 [33.3-66.7]	0.606[1]
	Energy/fatigue	45 [16.3-65]	50 [10-70]	40 [20-55]	0.227[1]
	Emotional well being	60 [40-84]	60 [48-86]	60 [40-80]	0.209[1]
	Social functioning	50 [37.5-62.5]	37.5 [37.5-62.5]	62.5 [37.5-71.9]	0.385[1]
	Pain	57.5 [32.5-67.5]	65 [12.5-70.6]	57.5 [35.6-65]	0.379[1]
	General health	52.5 [40-55]	55 [32.5-80]	50 [40-55]	0.317[1]
	Health change	75 [50-100]	50 [50-100]	75 [31.3-100]	0.598[1]

VAS: visual analogue scale, SF-36: Short Form 36 [1]: Mann-Whitney U test, [2]: independent samples t test, [3]: Fisher's exact test.

volume increases following pelvic ring injuries. Bleeding from fracture ends or venous and arterial lacerations cannot be controlled by the tamponade effect due to the increased pelvic volume, potentially leading to life-threatening hemorrhagic shock.[17] Initial treatment for patients with pelvic ring injuries should be conducted in emergency departments using a multidisciplinary approach with rapid treatment options.[17]

In more than half of pelvic ring injuries, the posterior pelvic ring is also compromised.[21,22] Recommended treatments include ISF, posterior tension band application, open reduction and internal fixation, or SPF.[6,7,8] In our clinical practice, SPF, which offers vertical stability, and ISF, which we think is simpler to apply, are commonly utilized for posterior pelvic ring injuries. However, clinical studies comparing these treatment methods are still limited. Based on the findings of this study, while each method has distinct advantages and disadvantages, neither was found to be superior in terms of long-term functional outcomes, quality of life, or radiologic results.

The SPF method facilitates early mobilization due to better vertical stability compared to iliosacral screws, as demonstrated by biomechanical studies.[23] Additionally, in our experience, SPF requires less fluoroscopic imaging than ISF. While our follow-up protocol differs between the methods of weight-bearing (immediate weight-bearing as tolerated for SPF versus six weeks of non-weight-bearing for ISF), our study found a significant difference in fluoroscopy duration (p<0.001). In contrast, one study reported similar fluoroscopy durations for both methods in the treatment of bilateral sacral fractures.[6]

Iliosacral screw fixation can be considered a less invasive method;[6] therefore, less surgery time, blood loss, and fewer major complications might be expected. Operative times were 67±10.6 minutes in the SPF group and 37.7±11.3 minutes in the ISF group. The difference between preoperative and postoperative hemoglobin (Hb) levels was 2.2 (1-3.7) g/dL in the SPF group and 1 (0.2-2) g/dL in the ISF group. The median number of blood product replacements was 2 (1-4) units (p=0.124), and complications such as embolism were observed in 5 (17.8%) patients in the SPF group and 4 (15.4%) in the ISF group (p=1). There was no mortality.

Table 3. Complications associated with procedures

			Toplam (n=54)	SPF (n=28)	ISF (n=26)	p value
Complication	Present		18 (33.3%)	13 (46.4%)	5 (19.2%)	0.034[1]
	Absent		36 (66.7%)	15 (53.6%)	21 (80.8%)	
Neurological deficit	Present		2 (3.7%)	1 (3.6%)	1 (3.8%)	1[2]
	Absent		52 (96.3%)	27 (96.4%)	25 (96.2%)	
Screw malposition	Present		3 (5.6%)	1 (3.6%)	2 (7.7%)	0.604[2]
	Absent		51 (94.4%)	27 (96.4%)	24 (92.3%)	
Infection	Present	Superficial	8 (14.8%)	7 (25%)	1 (3.8%)	<0.001[2]
		Deep	5 (9.3%)	5 (17.9%)	0 (0%)	
	Absent		41 (75.9%)	16 (57.1%)	25 (96.2%)	
Complications of hospitalization	Present	Cardiovascular or thromboembolic event	6 (11.1%)	3 (10.7%)	3 (11.6%)	1[2]
		Pulmonary complications	1 (1.9%)	0 (0%)	1 (3.8%)	
		Sepsis	2 (3.7%)	2 (7.1%)	0 (0%)	
	Absent		45 (83.3%)	23 (82.2%)	22 (84.6%)	

VAS: visual analogue scale, SF-36: Short Form 36 [1]: Mann-Whitney U test, [2]: independent samples t test, [3]: Fisher's exact test.

In the current study, the median length of hospitalization was 9.5 days, and the mean intensive care unit stay was 3.9±4 days, with no difference between groups (p=0.122, p=0.668). Dong et al.[24] found the mean duration of hospitalization to be 25 days in a study performed on elderly patients with pelvic ring injuries who underwent surgical treatment. Lundin et al.[25] reported a mean hospital stay of 15 days in patients with pelvic ring injuries who underwent surgical treatment. Mommi et al.[26] observed an intensive care unit stay of 4.5 days in a study of elderly patients with high-energy pelvic ring injuries. The shorter hospitalization period in our study compared to other studies can be attributed to the younger age of our patients (mean 38.9 years).

Although the literature on the surgical treatment of pelvic fractures has mostly focused on the prevention of complications, there is also a need for studies on postoperative pain and function. In our study, there was no difference in terms of VAS scores, Majeed scores, and SF-36 scores. Gross et al.[27] found a median postoperative VAS score of 2 in a study of unstable sacral fractures in elderly patients using combined lumbosacral and iliosacral screws. In the current study, the median VAS score at the last follow-up was also 2, with no difference between groups (p=0.326). The mean Majeed score in our study was 66.1±17.8. Ayvaz et al.[28] reported this score to be 93.3 and Lai et al.[29] reported it as 70.6 in the postoperative first year. SF-36 scores in both groups did not reach population normal values. There are mixed results regarding this issue in the literature.[28,30,31]

In our study, anatomical Matta scores were achieved in 70.4% of patients across both groups, with a median leg length discrepancy was 2 (1-3) mm. Postoperative radiological reduction quality measures and limb length discrepancies were similar between groups (p=0.201, p=0.909). Cai et al.[32] and Yu et al.[33] reported excellent-to-good reduction rates of 77% and 95%, respectively. In our study, screw malposition was observed in 3 (5.6%) patients in total, with 1 (3.6%) case in the SPF group and 2 (7.7%) cases in the ISF group. Alzobi et al.[34] reported a screw malposition rate of 6% for ISF,[34] while Wenning et al.[6] reported a 10.6% screw malposition rate for ISF and 0% for SPF in cases of sacral fractures. However, these studies did not provide a clear definition of malposition. None of the patients with screw malposition in our study experienced neurological complications.

The SPF group exhibited higher rates of deep infection in our study compared to the ISF group (17.9% vs. 0%; p<0.001). While this is an expected outcome given the extent of the surgery, our results are comparable to the existing literature, which reports infection rates ranging from 2.7% to 13.8%,[6,35] This issue can be considered a significant drawback of the SPF method. One patient underwent implant removal surgery due to a deep infection but experienced no further complications, while the remaining patients recovered with implant

retention and debridement combined with antibiotic treatment.

Two patients in our study experienced postoperative neurological deficit: one femoral nerve palsy in the ISF group and one sciatic nerve palsy in the SPF group. Alzobi et al.[34] reported a postoperative neurological deficit rate of 2% for ISF, while Moo Young et al.[36] observed postoperative bladder dysfunction in 7.5% for SPF cases. Although rare, these complications are serious and require careful consideration.

The limitations of our study include the relatively small sample size and its retrospective design. A group of patients who underwent anterior intervention might introduce bias; however, the rate of patients with anterior fixation was similar in both groups (p=0.382). Additionally, the follow-up period could not be standardized. Nonetheless, we believe that a follow-up of at least one year is valuable for evaluating results. Studies with longer follow-up periods are needed to assess the late outcomes of these two treatment methods. Furthermore, there are no studies in the literature evaluating these methods with so many parameters, including both preoperative and postoperative follow-up. In our opinion, this study makes a valuable contribution to the literature.

CONCLUSION

Both spinopelvic fixation and iliosacral screw fixation can be used with similar success in terms of radiological and clinical outcomes, as well as low complication rates. However, SPF was associated with a higher rate of infection and greater hemoglobin loss, while ISF required longer fluoroscopy times.

Ethics Committee Approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by Ankara Etlik City Hospital Clinical Studies Ethics Committee (Date: 19.07.2023, Decision No: AEŞH-EK1-2023-283).

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ORİJİNAL ÇALIŞMA - *ÖZ*

Posterior pelvik halka yaralanmalarında spinopelvik fiksasyon ve iliosakral vida fiksasyonunun karşılaştırılması

AMAÇ: Posterior pelvik halka yaralanmalarının tedavisi konusunda literatürde görüş birliği bulunmamaktadır. Çalışmada, posterior pelvik halka yaralanması olan hastalarda spinopelvik fiksasyon (SPF) ve iliosakral vida fiksasyonunun (ISF) radyolojik, klinik sonuçlarını ve komplikasyonlarını karşılaştırmayı amaçladık

GEREÇ VE YÖNTEM: Bu çalışmada, 2016-2023 yılları arasında Tile tip B ve tip C olarak sınıflandırılan ve posterior tutulumu olan pelvik halka yaralanması olan, iki merkezde SPF veya ISF ile tedavi edilen ve en az bir yıllık takibi olan 54 hasta (37 kadın, 17 erkek, ortalama yaş 38.9±18.7) retrospektif olarak analiz edilmiştir. 28 hasta SPF grubunda ve 26 hasta ISF grubundaydı. Perioperatif veriler (hemoglobin kaybı, kan ürünü replasmanı, hastanede ve yoğun bakımda kalış süresi, ameliyat süresi, floroskopi süresi) ve klinik sonuçlar (uzuv uzunluğu uyuşmazlığı, Majeed skoru, görsel analog skala (VAS) skoru ve Kısa Form-36 (SF-36)) gruplar arasında karşılaştırıldı. Radyolojik sonuçlar Matta sonuç derecelendirmesi kullanılarak değerlendirildi. Komplikasyonlar incelendi.

BULGULAR: Hemoglobin düşüşü (ortanca 2.2-1 g/dl) (p=0.027) ve ameliyat süresi (67±10.6-37.7±11.3 dakika) (p<0.001) SPF grubunda daha fazla iken, floroskopi süresi (ortanca 2-51.5 saniye) (p<0.001) ISF grubunda daha yüksekti. Diğer perioperatif parametreler gruplar arasında farklılık göstermedi. En az bir yıllık takipte, klinik skorlar (Majeed skoru, VAS, SF-36), ekstremite uzunluk farkı ve Matta sonuç dereceleri gruplar arasında benzerdi. Toplam komplikasyon (%46.4-%19.2) (p=0.034) ve enfeksiyon (%42.9-%3.8) (p<0.001) oranları SPF grubunda daha yüksekken, nörolojik defisit, vida malpozisyonu ve diğer yatış komplikasyonları (örn. tromboembolik veya kardiyovasküler olaylar, pulmoner komplikasyonlar, sepsis) oranları arasındaki farklar anlamlı değildi.

SONUÇ: Hem spinopelvik fiksasyon (SPF) hem de iliosakral vida fiksasyonu (ISF) teknikleri klinik ve radyolojik sonuçlar açısından benzer etkinliktedir ve her iki yöntem de düşük komplikasyon oranı sergilemektedir. Bununla birlikte, SPF grubunda daha yüksek enfeksiyon oranları ve daha fazla hemoglobin kaybı görülürken ISF ise daha fazla floroskopi maruziyeti gerektirmiştir.

Anahtar sözcükler: İliosakral vida fiksasyonu; posterior pelvik halka yaralanması; spinopelvik fiksasyon.

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