

Outcome of minimally invasive technique for fixation of Sacroiliac injury

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Abstract

It is the goal of this study to highlight the minimally invasive sacroiliac screw fixation for posterior pelvic instability, as well as to examine its accuracy; safety; efficacy; and early outcomes; and to explain the possible pitfalls and problems. There were 20 patients with an unstable posterior pelvic ring at Banha University Hospital who were given minimally invasive sacroiliac screws and would be monitored for 12 months. The mean age of the analysed cases was 49.20 (11.25SD) with a range of (25.0 – 65.0), and two of the studied cases were less than 30 years of age. 14 (seventy percent) of the cases examined included men, whereas 6 (thirty percent) were women. There were 6 (30% of the cases examined) that were deemed unsatisfactory, 14 (70%) that were found to be satisfactory, 2 (10%) that were deemed poor (55), 4 (20%) that were deemed fair (between 55 and 69), and 7(35%) that were deemed satisfactory (between 70 and 84%) and 7(35%) that were deemed excellent (above 85%). Majeed's mean was 74.30 (14.68 SD). More over a third of the unsatisfactory students had a diagnosis of RTA or FPH. Six of the Satisfactory students were RTAs, and eight were FFHs (40 percent). Statistics showed that there was a substantial difference in trauma mode across the groups investigated. A posterior pelvic ring fracture may be successfully treated with either minimally invasive plate and screw internal fixation or sacroiliac joint screw fixation. Improve surgical outcomes and minimise complications will be achieved by increasing the number of participants in future trials, extending the follow-up period, and enlarging the population that will be studied.

Keywords: invasive technique, fixation, Sacroiliac, Disruption.

1. Introduction

Pelvic an estimated 1–3 percent of all bone fractures are caused by high- or low-energy traumatic episodes, respectively. Low-energy pelvic fractures may be treated with analgesics, rest and cautious physiotherapy, but those arising from high-energy trauma, such as a car accident, are frequently accompanied with significant soft tissue damage and joint instability that need further treatment. [1]

Traditional methods of internal fixation include substantial surgical exposure of the pelvis' deep components, which may lead to wound healing issues, nerve damage, and a 25% infection rate. The majority of these issues stem from the surgical exposure, not the original damage. As a result, less intrusive solutions should be considered [2].

Percutaneous fixation of the pelvis is gaining popularity as a means of reducing the morbidity associated with extensile surgical techniques. The use of an iliosacral screw for sacroiliac dislocation and sacral fracture percutaneous fixation was reported and shown to be a safe and repeatable procedure. This design is biomechanically sound and less prone to bleeding and infection than other alternatives. The use of iliosacral screws for percutaneous fixation in the treatment of pelvic ring injuries has grown in popularity since then [2].

Techniques using the percutaneous approach have the potential to minimise surgical time, exposure risks, and soft tissue damage. The soft tissue planes remain intact, making it easier to do hip arthroplasty in the future. The percutaneous approach is beneficial in patients with severe comminution and osteopenia, or when the head of the femur has been injured. Because it does not decompress the pelvic hematoma, surgery to stabilise it is safe against further bleeding [3].

Using percutaneous procedures to stabilise the pelvic ring with early and precise closure reduction may be an effective therapy for certain pelvic ring disturbances, especially in polytrauma. Reduced tissue stress and the absence of a big open incision mean that the danger of infection is reduced, which is especially relevant when treating patients with an underlying cancer. Percutaneous fixation allows patients to commence weight-bearing within two weeks and does not need a lengthy recovery period [4].

There may be comorbid conditions that make an open reduction more dangerous for elderly patients, so they may benefit from a percutaneous procedure, which provides rapid pain relief, prompt initiation of proactive or proactive assisted transfers, and the possibility of an early discharge from the hospital [5].

Using fluoroscopic guidance to position sacroiliac screws percutaneously is a challenging treatment because of the risk of damaging sacral nerves. The possibility of neurological damage after the insertion of sacroiliac screws has been estimated at anywhere from 0.5% to 7.7%. However, complications have been rare because of the use of high-quality image intensification and careful consideration of the sacrum's structure. There have also been reports of damage to the superior gluteal artery. Neurovascular structures might be damaged if the screw is misplaced by as little as 4° [2].

Finally, this study will examine possible difficulties of sacroiliac screw fixation for posterior pelvic instability, highlighting the accuracy, safety and efficacy of this minimally invasive procedure. And complications.

2. Patients and methods

At this research, 20 patients with unstable posterior pelvic rings were treated with minimally invasive screws in banha university hospital and monitored for a year after their procedure.

Criteria for inclusion:

Instable posterior pelvic ring damage in an adult

Criteria for exclusion:

Patient is unsuited for surgery due to pathological disturbance.

Use of an operating table that glows in the dark

Patient lying on his back with the afflicted joint raised in an oblique supine posture.

No one manoeuvre can lessen the disturbance, but only under fluoroscopic supervision can it be done. Fracture reduction begins with a combination of traction and/or manipulation under the influence of dependent gravity.

axial spiral CT imaging will be used to determine the exact location of the bone fragments.

Spiral CT imaging with an axial thickness of 4mm and a 3mm index will be used for the pretreatment evaluation.

There will be an aseptic method of preparing the surgery site.

For the safety of neurovascular structures, continuous imaging is essential throughout the whole treatment.

Kirschner screws and wires may need to be introduced at different angles depending on the bone structure, which should always be checked using fluoroscopy.

Before inserting iliosacral screws, the hemipelvis must be reduced anatomically.

Antero superior iliac spine, and the femoral diaphysis, connect at the upper posterior quadrant.

The first sacral vertebra's body is approached by passing a guide wire from the ilium's lateral edge perpendicular to the sacroiliac joint.

Sagittal views are obtained to ensure that the guide wire is positioned inside the safe zone, avoiding a 'in-in-out' screw.

What's next?

X-ray evaluations

Films will be taken after the procedure to verify the reduction and screw locations.

A plain x-ray will be used to do serial radiological assessments every 1, 3, and 6 months.

Observation of patients at the clinic

The majeed score will be used to undertake functional assessments at the following intervals: 1 month, 3 months, or 6 months.

IRB clearance is required for the study protocol, which must be ethically sound.

Hospital managers must provide their approval before the research can begin.

Each participant will be asked to sign a written permission form before to participating in the research.

All stages of the investigation will maintain strict confidentiality and privacy.

This information will not be used for any other purpose."

In many institutions, the method utilised was previously approved by the Institutional Review Board.

Analysis of data:

IBM SPSS version 20.0 was used to analyse the data given into the computer. (Armonk, New York: IBM Corporation) Number and percentage were used to describe qualitative data. The normality of the distribution was confirmed using the Kolmogorov-Smirnov test. The range (minimum and maximum), mean, standard deviation, median, and interquartile range (IQR) were used to characterise quantitative data (IQR). The 5% threshold of significance was used to evaluate the reported findings. For categorical data, the Chi-square test was employed to compare various categories. Correction for chi-square when more than 20% of the cells have anticipated count less than 5. Mann Whitney test; For abnormally distributed quantitative variables, to compare across groups of the same kind.

3. Results

The average age was 49.20 (11.25SD) with a range of (25.0 – 65.0) among the cases analysed, with 2 (10%) being under the age of 30, and 18 (90%) being beyond the age of 30. 14 (70 percent) of the investigated cases were male, and 6 (30 percent) were female. According to the Unsatisfactory, 14(70%) of the instances analysed were deemed satisfactory, while 6(30%) were deemed unsatisfactory. Two percent were poor (55), four percent were fair (55 to 69), seven percent were good (70 to 84), and seven percent were excellent (>85), with a mean of 74.30 (14.68 SD) according to Majeed's Satisfactory scale. With range (40.0 – 90.0), table (1)

Among Unsatisfactory, 1(5%) were right side, 5(25%) were left side. Among Satisfactory, 8(40%) were right side, 6(30%) were left side. There was no statistically significant difference between studied groups. figure (1).

Among Unsatisfactory, 6(30%) were RTA, 0(0%) were FFH. Among Satisfactory, 6(30%) were RTA, 8(40%) were FFH. There was statistically significant difference between studied groups as regard mode of trauma. figure (2)

Among Unsatisfactory, 1(5%) were ≤ 5 , 5(25%) were >5 , the mean was 9.67 (± 3.93 SD) with range (3.0 – 14.0). Among Satisfactory, 3(15%) were ≤ 5 , 11(55%) were >5 , the mean was 6.93 (± 1.98 SD) with range (3.0 – 11.0). There was no statistically significant difference between studied groups. figure (3)

Table (1) Distribution of the studied cases according to Majeed (n=20)

Majeed	No.	%
Unsatisfactory	6	30.0
Poor (<55)	2	10.0
Fair (55 to 69)	4	20.0
Satisfactory	14	70.0
Good(70 to 84)	7	35.0
Excellent(>85)	7	35.0
Min. – Max.	40.0 – 90.0	
Mean ± SD.	74.30 ± 14.68	
Median (IQR)	78.0 (66.0 – 85.5)	

IQR: Inter Quartile Range SD: Standard deviation

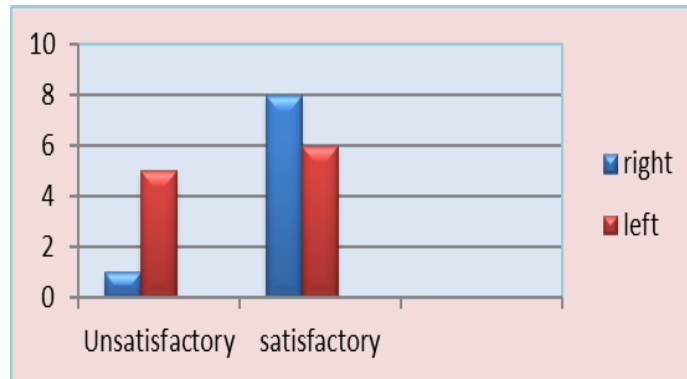


Fig. (1) comparison between Unsatisfactory and satisfactory according to side



Fig. (2) comparison between Unsatisfactory and satisfactory according to mode of trauma

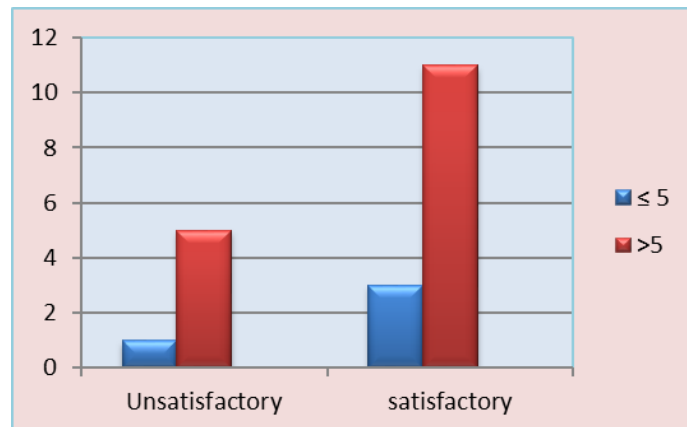


Fig. (3) comparison between Unsatisfactory and satisfactory according to time between injuries

Among Unsatisfactory, 4(20%) were negative, 2(10%) were positive. Among Satisfactory, 12(60%) were negative, 2(10%) were positive. There was no statistically significant difference between studied groups. figure (4)

Among Unsatisfactory, 4(20%) had no complications, 2(10%) had complications. Among Satisfactory, 14(70%) had no complications, 0(0%) had complications. There was no statistically significant difference between studied groups. figure (5)

Among Unsatisfactory, 1(5%) were B1, 1(5%) were C1-2, 2(10%) were C1-3, 1(5%) were C2, 1(5%) were C3. Among Satisfactory, 3(15%) were B1, 2(10%) were C1-2, 4(20%) were C1-3, 5(25%) were C2, 0(0%) were C3. There was no statistically significant difference between studied groups. table (2)

Among Unsatisfactory, 5(25%) were unilateral, 1(5%) were bilateral. Among Satisfactory, 14(70%) were unilateral, 0(0%) were bilateral. There was no statistically significant difference between studied groups. figure (6)



Fig. (4) comparison between Unsatisfactory and satisfactory according to associated injuries

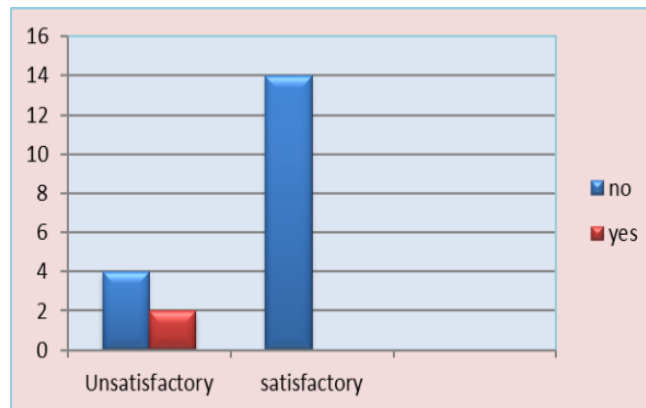


Fig. (5) comparison between Unsatisfactory and satisfactory according to complications

Table (2) Relation between Majeed score and TILE class (n=20)

TILE class	Majeed score				χ^2	MC p
	Unsatisfactory (n=6)		Satisfactory (n=14)			
	N.	%	N.	%		
B1	1	5.0	3	15.0	2.979	0.673
C1-2	1	5.0	2	10.0		
C1-3	2	10.0	4	20.0		
C2	1	5.0	5	25.0		
C3	1	5.0	0	0.0		

χ^2 : Chi square test MC: Monte Carlo p: p value for comparing between Unsatisfactory and Satisfactory, *: Statistically significant at p ≤ 0.05

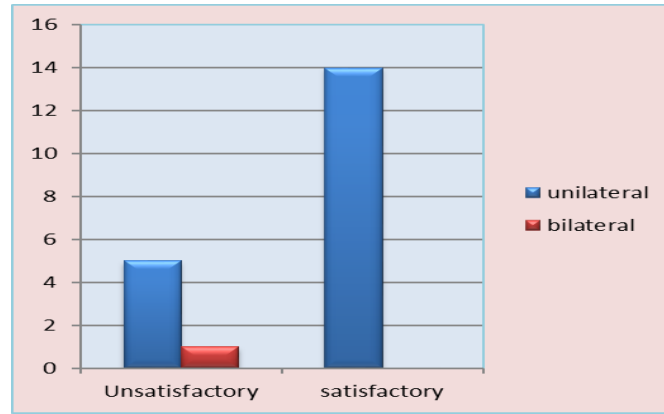


Fig. (6) comparison between Unsatisfactory and satisfactory according to unilateral

Case presentation: 32 years old female. Falling from height, C1-2 Tile’s injury/ vertical shear (Young and Burgess) with bilateral sacroiliac disruption, Associated injury: non

Preoperative:



Fig. (7) AP plain radiograph showing bilateral sacroiliac disruption , Symphyseal diastasis (open book)

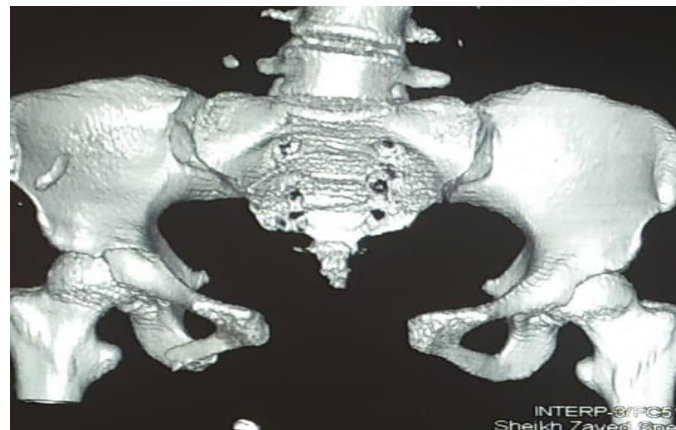


Fig. (8) CT reconstruction showing bilateral sacroiliac joint dislocation with symphyseal diastasis.

Postoperative:

Fig. (9) Immediate postoperative plain radiographs showing satisfactory reduction of the posterior pelvic injury with percutaneous Ilio-sacral screws

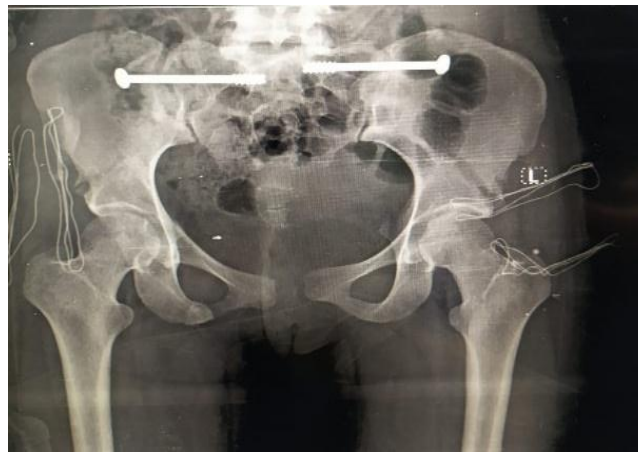


Fig. (10) Six months follow up radiographs showing good reduction of the posterior pelvic injury

Table (3) Clinical outcome.

Total Majeed score	90
Pain	30
Work	16
Sitting	10
Standing	32
Sexual disability	2
Clinical outcome grade	excellent

Radiological outcome:

Radiological grade: Excellent

4. Discussion

In the present According to our research, just two of the cases analysed (10 percent) were under the age of 30, while the other eighteen (90 percent) were above the age of 30, with an average age of 49.20 (11.25SD) and a range of 25.0 – 65.0.

Ages ranged from 19 to 59 years in the study by El-badawy et al. [6]. Over half of the patients studied by Sachs and colleagues were over 65 years old; the random-effects estimate for this group was 57.7 years (95 percent confidence interval 53–62.4; range 30–

89). According to Rudolf et al. [8], the average age was 54, although the range was as wide as 24–85. It has been reported that the mean age of the participants was 64 years, with a range of 39 to 80 years. According to Kobbe et al. [10], the average age of the injured person was 47.3 years old, with a range of 18–83 years.

Seven of every ten instances were men, and just six were women, according to our research.

El-badawy et al. [6] found that 60% of the patients analysed were men, and 40% were women,

which is in line with our findings. The findings of Rudolf et al. [8] were in direct opposition to ours, since they found that only 16 percent of the patients analysed were male and that 34 percent were female.

As we found, Abhishek et al. (11), revealed that 26 of the investigated cases were males and 15 were girls.

According to Whang et al. [12], men made up 27.2 percent of the study participants, while females accounted for 72.8 percent of the total.

Males made up 75% of the cases examined by Kobbe et al. [10], while females made up 25% of the cases.

According to Unsatisfactory, we discovered that 6 (or 30%) were Unsatisfactory, whereas 14 (or 70%) were Satisfactory, while 2 (10%) were Poor (55), and 4 (20%) were Fair (55 to 69), respectively. Majeed had a mean of 74.30 (14.68 SD) with a range of (40.0 – 90.0) from which 7 (35 percent) were rated as good (70 to 84).

El-badawy et al. [6] found that 9 (75 percent) of the patients had acceptable outcomes; 3 (25 percent) were outstanding, 6 (50 percent) were good, and 3 (25 percent) had an unsatisfactory fair outcome.

When it comes to SIJ injuries, Majeed functional score and pelvic grade score have been shown to be the most generally utilised rating system by Abhishek et al [11]. Whang et al. [12] found that 82.92 percent of our patients were in the excellent or good group.

In a study by Sachs et al. [7], 111 (77.1 percent) were pleased, 20 (13.9 percent) were Somewhat satisfied, 6 (4.2 percent) were Somewhat unhappy, and 7 (4.9 percent) were dissatisfied.

10 (55.6%) were extremely happy, 7 (38.9%) somewhat satisfied, and 1 (5.6%) were dissatisfied, according to Cummings et al. [9].

At six months, Whang et al. [12] found high levels of satisfaction with SIJF, which persisted throughout the whole follow-up period. At 24 months, 85% of patients said they would have the operation done again, but that figure dropped to 75% at 5 years (75 percent). Throughout the follow-up period, just 2% to 6% of patients said they wouldn't have the treatment done again. Satisfaction ratings were linked to a decrease in SIJ pain and ODI scores. The usage of opioid painkillers has steadily declined over time.

5. Conclusion

In As a result, both minimally invasive plate-screw internal fixation and sacroiliac joint screw fixation have indications and therapeutic benefits similar to one other in the treatment of posterior pelvic ring fractures. Improve surgical outcomes by increasing sample size and follow-up duration in future research; this will allow us to better understand the surgical reasons, as well as reducing risk of complications. Complications.

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