

Using Percutaneous Screw Fixation in sacroiliac Fractures

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Abstract

Pelvic injury (PT) is perhaps the most intricate wounds in injury mind and happen in 3% of skeletal wounds. The point of this imminent investigation was to highlight utilizing percutaneous iliosacral screw obsession strategy in treatment of sacroiliac breaks or separation with exceptional reference to the actual procedure, its advantages, perils, impediments and difficulties. This is a planned report that will incorporate 20 patients of the two sexual orientations having SIJ disengagement fixed with percutaneous screw with a subsequent time of a half year postoperative. All patients have been evaluated radiologically by Plain radiographs X-beam Antero-back, horizontal, gulf and outlet perspectives on the pelvis. In the activity theater we need (C-arm X-beam unit) for imaging perspectives to keep away from blunders during ISS obsession of the crack. All patients were surveyed by Majeed scoring framework toward the finish of the subsequent period. The general outcomes were considered as palatable in 16 (80%) patients; 8 (40%) were superb and 8 (40%) were acceptable and just 4 (20%) patients were unacceptable; 3 (15%) were reasonable and one (5%) was poor. Iliosacral screw obsession is an exquisite choice for balancing out the back sore which is basic wellspring of lingering pain. The component of injury doesn't appear to influence the clinical result of the patients engaged with this examination.

Keywords: Percutaneous Screw Fixation, sacroiliac Fractures, Majeed scoring.

1. Introduction

Pelvic injury (PT) is quite possibly the most perplexing wounds in injury mind and happen in 3% of skeletal wounds [1]. Precarious wounds represent 46% of pelvic injury that outcome from high energy injury and generally connected with other skeletal wounds [2]. Shaky pelvic cracks are portrayed by deformation of the state of the pelvic ring as extreme injury prompts injury of the pelvic floor, muscles and tendons which are answerable for its security [3]. Uprooted insecure pelvic ring wounds are usually connected with interruption of the osteoarticular intersection of the sacroiliac joint, and stable obsession of sacroiliac joint is vital for security of the pelvic ring [4].

Anatomically the pelvic ring is made out of three bones (2 innominate bones: ilium, ischium pubis and the sacrum). Anteriorly, the pubic and the ischial rami are associated with symphysis pubis and posteriorly the sacrum and the 2 innominate bones are joined by sacroiliac joint. Pelvic soundness relies upon the back tendon constructions, pelvic floor muscles and belt [5].

The sacroiliac joint or SI joint (SIJ) is the joint between the sacrum and the ilium bones of the pelvis, which are associated by solid tendons [6].

The tendons of the sacroiliac joint incorporate the accompanying: Anterior sacroiliac tendon, interosseous sacroiliac tendon, back sacroiliac tendon, sacrotuberous tendon and sacrospinous tendon [7].

The SI joints are planned essentially for dependability. One of the SI joints' capacities is stun retention (contingent upon the measure of accessible movement at the sacroiliac joint) for the spine, alongside the work of force change permitting the cross over turns that happen in the lower furthest point to be communicated up the spine [8].

Previously, the greater part of these cracks were overseen moderately or by open decrease interior obsession, these strategies were utilized customarily and there were full of difficulties as the vast majority of them

identified with the injury like injury breakdown and pelvic hematoma because of extensile careful methodology, wound contamination, gut injury and incisional hernia. They were likewise connected with different confusions including iatrogenic nerve injury and huge volume blood misfortune, both essential and optional [9].

Treatment of flimsy pelvic injury means to get precise decrease with precisely stable obsession to accomplish early ambulation [10]. Percutaneous screw obsession has acquired expanded prominence worldwide as of late. As the muscular specialists utilize insignificant intrusive strategy of obsession by utilizing cannulated screws under picture of X beam guide and CT done before to decide how to manage the break [11].

Shut decrease and percutaneous screw obsession of the pelvic ring wounds was depicted by Matta and Routt [11]. Percutaneous sacroiliac screw obsession of insecure pelvic cracks has less harm, less dying, less agony, snappy recuperation, which is protected and powerful insignificantly intrusive careful strategy [12].

Ilio-sacral screw obsession has become a well-known procedure for treating unsteady wounds of the pelvis that include the back ring. In this system, a couple of enormous screws (6.5–7.3 mm width) are embedded under fluoroscopic direction through the ilium, across the sacroiliac enunciation, and into the prevalent sacral vertebral bodies utilizing percutaneous method [13].

The point of this planned investigation was to highlight utilizing percutaneous iliosacral screw obsession procedure in treatment of sacroiliac cracks or disengagement with exceptional reference to the actual method, its advantages, perils, limits and confusions.

2. Patient and Method

This is a planned report that will incorporate 20 patients of the two sexual orientations having SIJ separation fixed with percutaneous screw with a subsequent time of a half year postoperative. The

examination was done in the accompanying spots (Benha college emergency clinic, Nasser foundation, and El-Bank El Ahly clinic).

2.1. Inclusion criteria

- Patients with displaced SIJ fractures.
- Patients with SIJ dislocation.
- Fractures or dislocated joints will be treated in less than 3 weeks since primary injury date.
- Age from 18 to 65 years old (skeletally mature patients).
- Minimum follow up period 3 months.

2.2. Exclusion criteria

- Pediatric age group and patients more than 65 years old.
- Patients hemo-dynamically unstable due to specific disease or any other causes which make them unfit for surgery.
- Injuries older than 3 weeks.
- Active infection (local or systemic infection).
- Morbid obesity.
- Open pelvic fractures.
- Missed patients during follow up.

All patients have been assessed radiologically by Plain radiographs X-ray Antero-posterior, lateral, inlet and outlet views of the pelvis. In the operation theater we need (C-arm X-ray unit) for imaging views to avoid errors during ISS fixation of the fracture. In addition to proper AP, inlet and outlet views, a true lateral radiograph centered on S1 which is essential for ISS insertion. The true lateral x-ray shows the midline of the sacral promontory and the iliac cortical densities which marks the antero-superior surface of the sacral ala. The following structures should be clearly identifiable:

- Sacral foramina (outlet view)
- Spinal canal (inlet view)
- S1 body (inlet view)

All these structures should be clearly seen to make a safe trajectory for the ISS.

Antero-posterior radiographs were obtained for all patients as a part of the primary survey of ATLS protocol [14]. They were used mainly to diagnose and classify the pelvic ring injury. Also, these views were assessed for the presence of associated bony injury e.g: acetabular fractures.

The preoperative vertical displacement was measured in all the patients on the AP view using the method of Matta and Tornetta [15]. The vertical displacement was measured as the difference in the height of the femoral from a line perpendicular to the long axis of the sacrum. The same measurements were repeated using the postoperative AP radiographs at six months postoperatively

- High quality pelvic CT films are helpful for planning reduction maneuvers and safe, effective paths for ISS placement and showing bone quality, its anatomy and morphology. It is also helpful for detection of sacral fractures which are missed on 30% of plain

radiographs [16]. Two dimensions axial CT scan has been taken routinely in the pre-operative workup.

- Three dimensions CT reconstruction studies were added for better understanding of the fracture lines. Both inlet and outlets windows were made and this had substituted the preoperative inlet and outlet plain radiographic views.

2.3. External immobilization of the injured pelvis

Was done through application of a pelvic binder or a circumferential wrapping with a bed sheet.

1. All patients have been encouraged to maintain active exercises for toes and ankle, whenever possible as a mechanical way in thromboembolic prophylaxis. Pneumatic calf and foot compression were used whenever available. Patients were kept well hydrated.
2. Low molecular weight heparin was given for all patients starting from the day of injury. This was stopped 12 hours before the operation and then was given again 6-12 hours postoperatively for 28 days. If any contraindication (High risk of bleeding) for thromboembolic chemoprophylaxis was present, the patients had been kept on mechanical prophylaxis and chemoprophylaxis had been started as soon as patient's general condition permits

Surgical Fixation with Iliosacral screw.

long guide wires and screws preferred 6.5mm and 7.3mm partial and fully threaded.

The screw length is estimated with a ruler or measure reasonable for the guide-wire. A fitting screw opening is bored over the guide-wire, which ought to remain secured in the bone. The picked cannulated screw 7.3 mm incompletely strung screw is embedded with a washer. In the event of comminution, completely strung screws might be liked to evade over-pressure of a sacral break. Another extra sacroiliac slack screw might be embedded if the size of S1 pedicle permits by a similar way.

A 7.3 mm in part strung screw was applied and was fixed to pack the sacroiliac joint in instances of sacroiliac joint disengagement. In the cases with absolutely sacral break, extreme pressure was stayed away from all together not to pack the crack hole over the sacral nerve roots, as the position of the screw ought to be inside the cortical limits and dodging intra-bony neural pathways

The patients were assembled from bed as ahead of schedule as could really be expected. All patients, if their overall condition permitted, were encouraged to begin toe contact weight holding on for braces for about a month and a half and afterward fractional weight bearing for an additional a month and a half. Patients began full weight bearing at 12 weeks postoperatively.

For all patients, appropriate respiratory physiotherapy can assist with forestalling pneumonic inconveniences and is strongly suggested.

Furthest point and bed portability activities should start quickly with security against pelvic stacking as important.

Assembly can normally start the day after medical procedure except if critical shakiness is available.

For the most part, the patient can begin to sit the main day after medical procedure and start detached and dynamic helped works out.

For one-sided wounds, step preparing with a mobile casing or bolsters can start when the patient can remain with restricted weight bearing on the shaky side.

In insecure one-sided pelvic wounds, weight bearing on the harmed side ought to be restricted to "contact down" (weight of leg). Help with leg lifting in moves might be vital.

Reformist weight bearing can start as indicated by expected recuperating. Huge weight bearing is typically conceivable by multi week however utilization of bolsters may should be proceeded for a quarter of a year. It ought to be recalled that pelvic breaks typically mend inside 6 two months, however that essentially ligamentous wounds may require longer assurance (3-4 months).

Crack recuperating and pelvic arrangement are checked by customary X-beams each 4 a month and a half until mending is finished.

In the event of respective insecure pelvic cracks, physiotherapy of the middle and furthest point should start as quickly as time permits. This empowers these patients to get free in move from bed to seat. For the initial not many weeks, wheelchair ambulation might be essential. Following 3 a month strolling practices in a pool are begun.

Following a month and a half, if torment permits, the patient can begin strolling with a three point walk, with less weight bearing on the more precarious side.

Full weight bearing is conceivable after complete mending of the hard or ligamentous locales, regularly not before 12 weeks.

Post-employable AP radiographs were done regularly inside the main postoperative week and before the patients were released from the clinic. Follow up radiographs were taken at 6, 12 weeks and a half year postoperatively

All patients were surveyed by Majeed scoring framework [17] toward the finish of the subsequent period.

3. Results

The youngest was 18 years old and the Oldest was 60 years with mean of age 32 years

The right side was affected in 9 patients (45%) and the left side in 7 patients (35%) and bilateral in 4 patients (20 %).

Different types of mechanisms were reported; 19 patient (95%) reported road traffic accidents (RTA) and 1 patients (5%) reported falling from height (FFH).

In the present study 14 patients were classified TILE C type (70%) and 6 patients were classified TILE B type (30%)

In the present study 14 patients were classified VS type (70%) and 6 patients were classified APC1 type (30%).

It was ranged from 1-7 days with a mean of 4.95 days. The cause of delay varied from uncontrolled medical conditions

In this study 13 patients (65%) suffered from other associated fractures depending on the mode of trauma while the other 7 patients (35%) did not.

- There was no statistical significance in the relation between Majeed score and the age of the patients in our study.
- The relation between Majeed score and gender doesn't show statistical significance.
- According to the side and its relation to Majeed score, there was no statistical significance.
- Relation between Majeed score and the working status of the patients in our study shows statistical significance with $^{FE}p=0.013$.
- The different modes of trauma in relation to Majeed score was statistically insignificant.
- The relation between Majeed score and our postoperative lag days was statistically insignificant.
- There was no statistical significance as regard the relation between Majeed score and TILE classification, whether type B or C.
- There is no statistical significance in the relation between Majeed score and YB classification, whether VS or APC.
- The associated injuries in relation to Majeed score was statistically in significant.
- Whereas, the ^{FE}p was 0.032 regarding the relation between Majeed score nad complications, showing statistic significance.

Our post-operative AP radiographs that assessed vertical displacement reduction according to Matta and Tornetta showed the following results:

- **Eight patients were excellent with:** residual vertical displacement less than 5 mm.
- **Eight patients were good with:** residual vertical displacement from 5 to 10 mm.
- **Three patients were fair with:** residual vertical displacement 11-20 mm.
- **One patient poor with:** residual vertical displacement more than 20 mm.

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

Majeed score	No.	%
Unsatisfactory	4	20.0
Poor	1	5.0
Fair	3	15.0
Satisfactory	16	80.0
Good	8	40.0
Excellent	8	40.0

Min. – Max.	52.0 – 90.0
Mean ± SD.	78.65 ± 11.63
Median	83.0

Table 2: Relation between Majeed score and working (n=20)

Working	Majeed score		Satisfactory (n=16)	χ^2	FE p
	Unsatisfactory (n=4)				
	No.	%	No.	%	
No	3	15.0	1	5.0	9.453*
Yes	1	5.0	15	75.0	

χ^2 , p: χ^2 and p values for Chi square test

FE: Fisher Exact for Chi square test

*: Statistically significant at $p \leq 0.05$

Table (3) Relation between Majeed score and complications (n=20).

Complications	Majeed score				χ^2	FE p
	Unsatisfactory (n=4)		Satisfactory (n=16)			
	No.	%	No.	%		
No	2	10.0	16	80.0	8.889*	0.032*
Yes	2	10.0	0	0.0		

χ^2 , p: χ^2 and p values for Chi square test

FE: Fisher Exact for Chi square test

*: Statistically significant at $p \leq 0.05$

4. Discussion

In this examination, the sort of outside preparation didn't influence the last clinical or radiological result. We accept that outer pelvic immobilization ought to be important for the emergency vehicle administration convention and paramedics and it ought to be applied to all patients with high energy injury or on doubt of pelvic injury.

Patients in this investigation had all around situated tightens the sacral pedicle without infringement either on the spinal waterway, sacral foramina or the front sacral cortex.

Radiographic endeavors to evaluate relocation and nature of decrease have been applied however there is no normalized, acknowledged technique to measure these qualities [18]. Perhaps the most well-known strategies to evaluate the back pelvic relocation is the one portrayed by Matta and Tornetta [16], by estimating the distinction of the level of the femoral heads. At that point the postoperative removal is evaluated into magnificent, great, poor and reasonable result. Different strategies have been recently depicted in writing including estimation of the channel and outlet proportion as portrayed by Sagi [19], the cross estimation method as portrayed by Keshishyan [20] and the ADM as depicted by Lefavre [21]. The last has surveyed the between eyewitness dependability of these three strategies and they were found to have helpless unwavering quality [22].

In our investigation as per Matta and Tornetta [16] strategy for evaluation of the nature of the decrease of the back pelvic injury, there were no patients in this examination who had a poor radiological result. Just a single patient in this gathering had a reasonable result and different patients were delegated acceptable or brilliant. This was concurred with El-Desouky et al. [2], who detailed in their examination which was done on 20 cases who were dealt with carefully by percutaneous iliosacral screw obsession method and postoperative follow-up were assessed radiologically as indicated by the Matta and Tornetta [16]. Their reviewing was incredible in 14 cases, great in two cases (5-10 mm relocation) and reasonable in four cases (10-20 mm uprooting), and no helpless cases were found [2]. That was concurred with Lindahl et al [110] in their arrangement of 101 precisely treated sort C pelvic injury, who have utilized a similar technique for the radiological assessment of the back uprooting (as depicted by Matta and Tornetta)[16]. Their final radiographic outcomes were brilliant in 66 patients, great in 25 patients, and reasonable in 10 patients. They additionally didn't have helpless outcomes.

For recognizing the clinical result in this investigation we utilized an infection explicit pelvic ring appraisal apparatus, Majeed scoring framework, which is perhaps the most ordinarily utilized scoring frameworks for the clinical evaluation of patients with pelvic wounds [17]. The Majeed score has a few benefits including evaluation of the patient's degree of agony and covering

a few useful viewpoints through sitting, standing, strolling and sexual debilitation. Also, the Majeed score, as being aspecific patients detailed result measure (PROM), has the benefit of including patients in surveying their own degree of inability and torment [22]. The weaknesses of the Majeed score incorporate that neurological impedances, which have important prognostic impact, are not coordinated into the score and as the other pelvic explicit result scoring frameworks isn't yet approved [23].

In this examination, the generally Majeed score was 78.65 ± 11.63 . The general reviewing of the clinical result showed that 8 patients (40.0%) had astounding, 8 patients (40.0%) had great, 3 patients (15.0%) had reasonable and just a single patient (5.0%) had poor clinical result. In this manner, the patients with agreeable (astounding and great) results were 16 patients (80.0%) which was like the aftereffects of El-Desouky et al [2], who revealed in their investigation that the clinical scoring by Majeed score toward the finish of the subsequent period was superb in seven cases, great in ten cases, reasonable in two cases and poor in one patient. Lindahl and Hirvensalo[24], who published 101 continuous Tile order type C pelvic breaks. The entirety of their patients were dealt with precisely, with 78 patients getting both foremost and back ring obsession. Their Majeed useful score results were astounding in 68 patients (67.3%) great in 16 (15.8%), reasonable in 16 (15.8%) and poor in one patient (0.99%) with 84 patients (83.2%) got agreeable outcomes.

These were vastly improved outcomes contrasted with the previous report by similar creators [24] examining 40 patients with Tile type C wounds treated with foremost outside fixator alone. At a mean development of 4.1 years (range, 1–11 years), an aggregate of 95% of patients had reasonable or helpless results as seen on x-beams, 85% had reasonable or poor practical outcomes per Majeed score and 47.5% had critical pelvic agony. The creators reasoned that outside obsession alone is of restricted an incentive in treating type C wounds of the pelvic ring [109]. Mardanpour and Rahbar [25] broke down 11 patients with type C wounds, all were treated with open decrease and inner obsession. As indicated by Majeed score, 73% of patients had great or superb practical outcomes, with 63.6% of them totally torment free at follow-up [25].

Another investigation made by Chen P et al [26] was accounted for on a review examination of 32 patients with unsteady pelvic ring wounds who were treated with percutaneous situation of iliosacral screws (bunch A of 15 patients) or traditionalist methods (bunch B of 17 patients) from January 2002 to September 2009. Radiographic, clinical and utilitarian results were looked at between the two treatment gatherings. Patients who went through percutaneous iliosacral screw obsession after pelvic injury would do well to practical outcomes than those treated minimalistically, according to the Majeed evaluating framework. Patients in gathering (A) additionally shown less lingering removal on radiography at 1 year follow up

than those in gathering (B). At last, patients in gathering (A) would be advised to help with discomfort at multi month and 1 year subsequent meet-ups than those in gathering (B), they likewise utilized the Majeed useful reviewing framework, which permits simple and complete evaluation, including of explicit issues brought about by pelvic ring injury, for example, sitting or sex [14]. The Majeed utilitarian scores were better for gathering (A) than for gathering (B) on the torment ($p = 0.028$), work ($p = 0.006$), and sitting ($p = 0.049$) subscales; besides, gathering (A) had a higher extent of patients with grades of superb and great as contrasted and gathering (B). The creator presumed that Percutaneous iliosacral screw obsession for insecure back pelvic ring wounds brings about less lingering uprooting at medium term follow up, and better relief from discomfort at short and medium term follow up, than who recieved traditionalist treatment. Better utilitarian results were seen at 1 year follow up as contrasted and traditionalist treatment.

Another examination was finished by Khaled S et al [27] with the point of evaluating the clinical outcome and utilitarian score of 43 patients of pelvic ring injury 20 patients go for ISSF, 22 go for plate obsession, and 1 patient lost. The normal Majeed score for the gathering fixed with plates was 84.56 focuses (range: 66–100 focuses), and it was lower than the Majeed score for ISSF, which was 87.2 focuses (range: 53–97 focuses). Notwithstanding, the thing that matters was not measurably huge, with a P-estimation of 0.404. The creator inferred that Percutaneous ISS obsession is a decent choice for obsession of post pelvic ring cracks, with lesser blood misfortune and more limited employable time contrasted and plate obsession. The practical result of the cases fixed with ISS was better; be that as it may, the thing that matters was not genuinely huge.

Another examination was likewise done by Khaled SA et al [28] for ISSF done on 77 cases (46 of tile C and 31 of Tile B) with postoperative subsequent reach from 6-15 months, they additionally utilized the Majeed scoring framework for clinical assessment, the clinical and radiological outcomes were acceptable as the clinical association happen on the whole cases and radiologically 55 patients were astounding 16 acceptable and 6 reasonable with no helpless outcomes distinguished.

Another investigation done by Naudé PH et al [29] on 45 percutaneous sacroiliac fastens were embedded 41 patients with a mean period of 25.6 years (range 17-62). Crack sorts included 15 sort B, and 26 sort C. Their outcomes were that all patients had a palatable beginning decrease. One patient (2.4%) had screw scattering with resultant impermanent neurological aftermath. One patient (2.4%) had screw removal without neurological aftermath. The entirety of their patients had agreeable beginning decrease as estimated utilizing Starr's measures. The most extreme uprooting was estimated on the AP, gulf and outlet perspectives on the pelvis. As indicated by Starr's measures [29], uprooting of under 10 mm is worthy.

One patient (2.4%) had removal of a screw with resultant L5 nerve aftermath. The neuropraxia settled after screw evacuation. The patient was at first treated with two screws and went on to association with the excess screw

One patient (2.4%) had a lost screw with no neurological shortage. This patient additionally had two screws at first. The lost screw was eliminated with no further confusions and the patient was blessed to receive association with the excess screw.

One patient (2.4%) had screw removed with loss of decrease. This patient required correction with open decrease and obsession with a more extended sacroiliac screw crossing the midline. The patient had an acceptable correction and proceeded to recuperate with no further complexities.

The creator reasoned that Percutaneous obsession of wounds to the back pelvic constructions is acquiring ubiquity around the world. The confusions identified with performing open methodology for back adjustment are identified with inadmissibly high disease and wound breakdown rates. This has prompted an interest in less intrusive ways to deal with deal with these wounds. Percutaneous procedures have been appeared to have less injury related

5. Conclusion

In spite of the fact that iliosacral screws inclusion is a delicate strategy and necessities a specialist, it is financially savvy with less operable time. Iliosacral screws obsession is a powerful technique for the treatment of totally precarious pelvic wounds as it gives secure fixation. Iliosacral screw obsession is a rich alternative for balancing out the back sore which is regular wellspring of remaining pain. The instrument of injury doesn't appear to influence the clinical result of the patients engaged with this investigation

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