**Original Research Paper** 



# PERCUTANEOUS SACROILIAC JOINT FIXATION- OUR EXPERIENCE

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ABSTRACT Background: Closed reduction and percutaneous fixation of sacroiliac joint disruptions has the advantage over open reduction as it minimize soft tissue injury, decreased operation time, limited blood loss and decreased infection rates. The objective of this study was to evaluate the functional and radiological outcome after percutaneous fixation of sacroiliac joint (SIJ) disruptions by cannulated screw.

Aim: Sacroiliac joint disruptions treated by closed reduction and percutaneous fixation by iliosacral screw.

Material And Methods: This study was carried out in Trauma and Emergency Department, IGIMS, Patna. The study included 12 patients of age groups 29-69 years out of which 7 males and 5 females. Most commonly mode of injury was road traffic accident secondary was fall from height, 6 patients affected right side while 6 patients affected left and one patient affected bilaterally.

**Results:** All patients evaluated clinically by Majeed scoring system. The Majeed score was satisfactory in 75%, while unsatisfactory in 25% of cases. Postoperative radiological evaluation was done by Matta and tornetta score. 25% had excellent and fair results each while 50% had good results. Postoperative complication superficial infection in 6 patients and one patient had chronic posterior pelvic brim pain.

**Conclusion:** Percutaneous fixation of sacroiliac joint disruptions has the advantage over open reduction as it minimize soft tissue injury, decreased operation time, limited blood loss and decreased infection rates.

# KEYWORDS : Sacroiliac Joint Disruption, Iliosacral screw fixation, Pelvic Injuries

#### INTRODUCTION

The sacroiliac joint (SIJ) is articulation between the medial aspect of the ilium and lateral aspect of the sacrum supported by strong anteriorly and posteriorly ligamentous complex. The sacroiliac joint has two types of movement nutation and counter nutation (1) and allowing transfer of forces from the upper part body to lower part of the body. Nutation (anterior-inferior movement of the sacrum while the coccyx moves posteriorly relative to the ilium) and Counternutation (posterior-superior movement of the sacrum while the coccyx moves anterior relative to the ilium). Sacroiliac joint disruptions occur along with other pelvic injury. Pelvic ring injuries occur due to APC or LC forces, shearing or combined forces. Unstable pelvic injuries causes high rate of morbidity and mortality(2).

The posterior sacroiliac complex is responsible for pelvic stability. It prevents anterio-posterior displacement of the axial skeleton over the pelvis. So, the patients of polytrauma should adequately assessment for pelvic stability. Pain and limitation of function may occur following Sacroiliac Joint instability (2, 3). Different classifications for pelvic ring injuries depending on anatomic site , the mechanism of injury or pelvic stability. The most common and useful classifications are Tile classification depending on pelvic stability in vertical and horizontal planes and Young and Burgess classification depending on the mechanism of injury (4). The treatment protocol in the Advanced Trauma Life Support (ATLS) Program is recommended for evaluation and general assessment of the patient (2, 4). Evaluation of the patient with history of the incident. A full and detailed history should be taken. Clinical evaluation either general or local evaluation, radiological assessment and neurovascular examination in patient with pelvic ring injury (5).Generally the aim of treatment is to achieve union in satisfactory position. Operative treatment ensuring optimum reduction and maintenance of fixation (6). The treatment option of SIJ disruptions included open methods of reduction, fixation and percutaneous fixation of the Sacroiliac Joint. Percutaneous fixation of the Sacroiliac Joint by screws is preferred as it minimize soft tissue injury, decreased operation time, limited blood loss and decreased infection rates as compared to open method (6, 7). Complications of SIJ disruptions include instability of pelvis, deformity, persistent SI pain and limitation of function, haemorrhage, visceral and soft tissue injuries and thromboembolism. However the percutaneous iliosacral screw may cause nerve root injury (2, 7).

#### AIM

To assess the results fixation of sacroiliac joint disruptions by percutaneous iliosacral screw.

# MATERIAL

This study was conducted in Department of Trauma and Emergency, IGIMS, Patna. The study included 12 patients .The inclusion criteria. 1. Patients with sacroiliac joint disruptions either isolated or associated with other injuries. 2. Patients fit for surgery Exclusion criteria. 1. Patients less than 18 years old. 2. Old disruptions. 3. Patients unfit for surgery 4. Infected wound.

#### **METHODS:**

Complete history to be taken. Clinical examination to be done

and assessed as per advanced trauma life support (ATLS): primary and secondary and complete examination from head to toe to be done. Neurological examination of lumbosacral plexus mainly L4-L5 nerve roots by ankle and big toe dorsiflexion and their sensory functions at their dermatomal level is done. Radiological Evaluation by: Plain Radiograph-AP radiographs, inlet and outlet views were obtained. Associated bony injury like acetabular fractures assess by CT scan. Post-operative CT scan is also done to evaluate reduction and accuracy of screw positioning.

The treatment protocol includes

A-Initial treatment

- External immobilization by application of a pelvic binder.
- Thromboembolic prophylaxis: Pneumatic calf and leg compression was done. Patients were kept well hydrated.
- IV cannulation and catheterization of the urinary bladder done.

B-Operative treatment:

- An informed consent was taken from every patient.
- Preoperative bowel preparation done 24 hours before operation.
- Preoperative IV antibiotics given.
- We used orthopaedic table and C-arm to insure an accurate antero -posterior, inlet and outlet views.
- Anesthesia: Combined Spinal Epidural(CSE) anaethesia used.
- Position: supine position.

# The following steps were followed to insert the ilio- sacral screw (s) percutaneously

- The true lateral position or C-arm was positioned horizontally parallel to the transverse plane to the patient's pelvis. The ilio-cortical density(ICD) was determined on this view and the entry point of the guide wire was inferior to this mark point.



Fig. (1): The Pelvis At The Upper Level Of The S1 Vertebral Body Shows The Safest Path For A Screw<sup>(8)</sup>.

The patient in supine position, the iliac crest and greater trochanter were marked. The C- arm was used to identify the entry port. A K wire was placed over the hip to mark the vertical arm. The three different views(true AP, inlet, outlet and lateral view) to confirm the position of guide wire.



Fig. (2): Preop Marking And Intra Op Showing Position Of Guide Wire

The AP view, inlet and outlet views were used to ascertain that

the vertical arm remains in the sacral promontory. K wire is kept in the safe zone, just behind the iliac cortical density (ICD) and in front of the foramina of the S1 nerve root. The guide wire is advanced and its position too is confirmed. A 6.5 mm cannulated partially threaded cancellous screw with a washer was use after drilling over the guide wire and taking appropriate measurements. The final position check under c arm.





Fig. (3): Pre op X ray and CT shows B/L SI joints disruption with pubic diastasis confirm on CT scan

Post operative X-ray showing Iliosacral screws with pubic rami fixation with plate.

1. Prophylactic parenteral antibiotics were used for 1 week, then oral antibiotics for 1 week.

2. Adequate analgesia given.

3. Postoperative x-rays (AP view, inlet and outlet views) were done to assess reduction, degrees of displacement, quality of fixation and the presence of malpositioned screw.

### Rehabilitation:

The patients were mobilized as early as possible. All patients, if their general condition allowed partial weight bearing after another 6 weeks and full weight bearing at 12 weeks postoperatively.

# Radiological Evaluation

Post-operative AP radiographs were done routinely next day of operation. Follow up radiographs were taken at 6, 12 weeks and six months postoperatively. The posterior reduction was graded according to **Matta and Tornetta**<sup>(9)</sup>.

Table 1 Radiological Grading Of The Posterior Reduction According To Matta And Tornetta [9]

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Excellent	Residual vertical displacement < 5 mm
Good	Residual vertical displacement of 5-10 mm
Fair	Residual vertical displacement of 11-20 mm
Poor	Residual vertical displacement >20 mm

#### Clinical Evaluation:

All patients were assessed according to **Majeed scoring** system at the end of the follow up.

Majeed score includes 1. Pain-30 points 2. Work-20 points 3. Sitting-10 points 4. Sexual intercourse-4 points 5. Standing-36 points A Waliking aids(12) B Gait unaided(12) C Walking distance(12)

#### Table 2 Clinical Outcomes According To The Majeed Score Working before injury Not working before injury Grade

	·		
>85	>70		Excellent
70-84	55-69		Good
55-69	45-54		Fair
<55	<45		Poor
X-ray evaluation	Majeed score		
-	Satisfactory	Unsatisfac	tory
Fair	0	2	
	0.0%	66.7%	
Good	8	0	
	88.9%	0.0%	
Excellent	1	1	
	11.1%	33.3%	
Excellent	1	1	
Total	9	3	

#### RESULTS

This study include 12 patient of Sacroiliac joint disruptions underwent surgery in IGIMS, Patna with age ranged from 19-59 years, 7males and 5 females. Mode of injury was road traffic accident in 58.3% of cases and fall from height in 41.7%, right side was affected in 6 patients, left side was affected in 5 patients and one patient was affected bilaterally.

According to **tile classification** Injuries of 5 patients (41.7%) were classified B1and 2 patients (16.7%) were B2. 5 patients (41.7%) were C2. According to Young and Burgess classification, 2 patients (16.7%) were APC1, 5 patients (42.7%) Were APC2, vertical shear was in 2 (16.7%) patients and 3 patients (25%) were combined mechanism. The duration of follow-up ranged from 6 to 12 months with a mean of 9 months. The patients were assessed both clinically and radiologically at the end of the follow-up period.

#### Clinical Results:

Patients of this study were subjected to clinical examination at the last follow up visit which was based on Majeed score. The final overall results were considered satisfactory in 9 (75%) patients; 3 (25%) were excellent, 6 (50%) were good, and 3 patients (25%) were unsatisfactory fair outcome (Table 2).

#### **Radiological Results:**

Our post-operative AP radiographs that assessed vertical displacement reduction by measuring amount of distraction between two femoral heads according to Matta and Tornetta.

Three patients were excellent with residual displacement less than 5 mm.

Six patients were good with residual displacement from 5-10 mm.

Three patients were fair with residual is placement from 11-20 mm.

## Complications:

Among the studied cases in this study no preoperative or intra

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operative complication were detected. All complications were reported postoperatively. 25% of patients reported superficial infection responding to drainage and repeated dressing and antibiotics. Only one patient had recurrent posterior pelvic pain improved with analgesia and anti-inflammatory medications.

## DISCUSSION

Posterior sacroiliac complex determine the pelvic stability . This complex can withstand the transference of the weightbearing forces from the spine to the lower extremities (10). Unstable pelvic ring injuries are serious condition, associated with a high rate of morbidity and mortality (11).

Schweitzer et al. (12) in their study had satisfactory radiological outcome in 97.18% of patients and only 2.81% of patients had unsatisfactory radiological outcome. Also, satisfactory clinical results in 87, 3% of patients and unsatisfactory in 7.14% with low incidence of complications. Lindahl and Hirvensalo (13) had no poor radiological outcome. Abhishek et al. (14) documented in their study that 51.22% of cases had excellent clinical outcome, 31.7% had good outcome and unsatisfactory results were fair in 9.7% of cases or poor in 7.31% of cases. These results are near to the results of our study also near in their low incidence of complications.

El Mannawy et al. (15) documented the occurrence of deep tissue infection and foot drop and pelvic tilt in their study of anterior stabilization of the SIJ. Mardanpour and Rahbar (16) documented various complications following open method of SIJ fixation including deep and superficial infections, injury to lateral cutaneous nerve of the thigh, pulmonary embolism and urinary tract infections. Simpson et al. (17) in study of open reduction and fixation of SIJ either by staples or plate documented occurrence of loss of reduction in two patients with stable fixation and one patient with plate fixation. Sobhan et al. (18) in study of spino-pelvic fixation in cases of sacroiliac joint injuries found satisfactory clinical results in 78% of cases and excellent reduction in 92.8% of cases but documented occurrence of implant failure in 7.1% and wound infection in 21.4% of case.

Complications associated with percutaneous method usually encountered in superficial infection or nerve root injury or malpositioning of the screw. The most serious complication is injury to lumbosacral roots due to misplacement of the screw and this risk increased with prescence of incomplete reduction. Several techniques used to avoid misplacement of the screw like CT guided and computer assisted navigation guided techniques but these methods have their limitation that lead to usage of fluoroscopy in majority of cases (19).

#### CONCLUSION

Percutaneous sacroiliac joint fixation has maximum efficiency and limited complications. Early surgical treatment makes reduction easier with high chance of anatomic reduction.

Percutaneous method of fixation of the sacroiliac joint disruptions ensuring minimize soft tissue injury, decreased operation time, limited blood loss and decreased infection rates, low incidence of complications and good rehabilitation results especially early mobilization.

#### REFERENCES

- I.Solonen KA (1957): The sacroiliac joint in the light of anatomical, roentgenological and clinical studies. Acta Orthop Scand., 27: 1–127.
   Agarwal A (2015): Pelvic ring fractures. In: Rockwood and Green's fractures in
- Agarwal A (2015): Pelvic ring fractures. In: Rockwood and Green's fractures in adults. Court-Brown CM, Heckman JD, MCqueen M.M et.al. (eds). 8th ed. Philadelphia, Wolter Kluwer Health, 4: 1795–1884.
- Failinger MS, McGainty PL (1992): Current concepts review unstable fractures of the pelvic ring. J Bone Joint Surg., 74: 781-86.
- Guyton JL, Perez A (2016): Fracture of acetabulum and pelvis in: Campbell's operative orthopaedics. Azar FM, Canale ST, Beaty JH, 13th edition. e- book, Elsevier Health Sciences, 56: 2865-2912.

- O'Brien PJ, Dickson KF (2005): Pelvic fractures evaluation and acute management. In: Orthopaedic knowledge update, Trauma 3. Rosemont, IL. AAOS.
- https://www.aaos.org/OKOJ/vol15/issue9/OKOJ-15-9-1/?ssopc=1
- Schweitzer D, Alejandro Z, Marcelo C et al. (2008): Closed reduction and illiosacral percutaneous fixation of unstable pelvic ring fractures. Injury, 39: 869-874.
- Routt ML, Nork SE, Mills WJ (2000): Percutaneous fixation of pelvic ring disruptions. Clin Orthop Relat Res., 375: 15-29.
- Routt ML, Meier MC, Kregor PJ et al. (1993): Percutaneous ilio-sacral screws with the patient supine technique. Oper. Techn. Orthop., 3: 35-45.
   Matta JM, Tornetta P (1996): Internal fixation of unstable pelvic ring injuries.
- North JM, Tohlerta P (1956): Internal inclusion of unstable performing injuries. Clin Orthop Relat Res., 329: 129-140.
   Tile M, Helfet D, Kellam J et al. (2003): Fractures of the Pelvis and Acetabulum.
- The M, Hener D, Kendin J et al. (2005): Fractures of the Perios and Acetabulant. 3rd ed. Philadelphia: Lippincott Williams & Williams, Pp: 12-21
   Cole ID. Blum AD. Ansel LI et al. (1996): Outcome after fixation of unstable
- Cole JD, Blum ÅD, Ansel LJ et al. (1996): Outcome after fixation of unstable posterior pelvic ring injuries. Clinical Orthopaedics Related Res., 329: 160-179.
- Schweitzer D, Zylberberg A, Cordora M et al. (2008): Closed Reduction and Percutaneous Fixation of Unstable Pelvic Ring Fractures. Elsevier Injury Journal, 39:869-874
- Lindahl J, Hirvensalo E (2005): Outcome of Operatively Treated Type-C Injuries of Pelvic Ring. Act Orthopaedica, 76 (5): 667-678.
   Abhishek SM, Azhar AL, Vijay GB et al. (2015): Functional Outcome with
- Abhishek SM, Azhar AL, Vijay GB et al. (2015): Functional Outcome with Percutaneous Ilio-sacral Screw Fixation for Posterior Pelvic Ring Injuries in Patients Involved in Heavy Manual Laboring. Malysean Orthop J., 3: 23-27.
- El-Mannawy M, El Shoura SA, Youssef SA et al. (2015): Treatment of sacroiliac joint disruption with ant stabilization. Egypt Ortho J., 6: 45-50
   Mardanpour K, Rahbar M (2013): The Outcome of Surgically Treaated
- Mardanpour K, Rahbar M (2013): The Outcome of Surgically Treaated Traumatic Un stable Pelvic Fracture by Open Reduction and Internal Fixation. J Inj & Violence, 5 (2): 77-82.
- J Inj & Violence, 5 (2): 77-82.
  18. Simpson L, Waddel J, Leighton K et al. (1987): Anterior Approach and Stabilization of the Disrupted Sacroiliac Joint. J of Trauma, 12: 1332-1339.
- Sobhan MR, Abrisham S, Vakili M et al. (2016): Spinopelvic Fixation of Sacroiliac Joint Fractures and Fracture-Dislocations: A Clinical 8 Years Follow-Up Study. ABJS., 4: 381-386.
- El-Desouky II, Mohamed M, Kandil A (2016): Percutaneous iliosacral screw fixation in vertically un stable pelvic injuries, a refined conventional method. Acta Orthop Belg., 82: 52-59.