# Stabilization of Sacroiliac Joint Disruption through Anterior Approach by Plates and screws.

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**Abstract: Objectives:** To study and evaluate the clinical results of stabilization of sacroiliac joint disruption through anterior approach by plates and screws and its outcome after fixation. **Background:** Sacroiliac joint disruption result from high energy trauma is complicated with chronic pain and long term morbidity. Open anterior stabilization with plates and screws allow direct reduction and stabilization with biomechanically advantages. **Methods**: Surgery on sacroiliac joint injuries is the time demanding surgery that requires skills and thorough knowledge of surgical anatomy of pelvic ring. Twenty cases of sacroiliac joint disruption were managed by plates and screws through anterior approach. Open reduction and internal fixation is the ideal way to treat the SI joint disruption in order to prevent shortening mal-union and marked pelvic tilt. Anatomical reduction is the basic aim in the management of all SI joint injuries, true anatomical reduction of the joint and restoration of the length of limb were the main aim during the surgery. **Results:** Twenty patients were included in this study, 13 males and 7 females with (10) excellent patients, (6) good patients, (3) fair patients and (1) poor patient. **Conclusion: Sacroiliac** joint disruption should be fixed early through anterior approach by plates and screws to prevent complications especially in young patients.
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**Keywords:** Sacroiliac joint disruption- anterior fixation - plates - screws.

## 1. Introduction

Unstable pelvic ring fractures are usually secondary to high energy trauma such as motor vehicle crashes and fall from a height.[1] Thus, these injuries rarely occur in isolation; as the high-energy force applied to the pelvic ring is also distributed to the other parts of the skeleton and may result in injuries to soft tissues, neural elements, major blood vessels and often urological or bowel injuries and fractures to other parts. [2-4] So, the acute management of these polytraumatized patients often requires a multidisciplinary approach involving a variety of specialties. [3]

Despite the introduction of organized trauma system, pelvic ring disruption continues to be a significant source of morbidity and mortality ranging from 4.8% to 50% in open fractures [5]. For those trauma patients who survive, pelvic ring disruption is a significant cause of permanent disability.[6,2]

Particular attention must be given to distinguish patterns of posterior pelvic injury. Four main categories exist: fractures of the sacrum, fracture dislocations of the sacroiliac joint, fractures of the ilium, and pure sacroiliac dislocations.[7]

Definitive stabilization of the pelvic ring disruption remains a challenge to the orthopedic surgeon. Biomechanical studies have shown that anterior external fixation, useful in the acute situation to reduce pelvic volume and control hemorrhage, cannot stabilize the posterior lesion in an unstable type C pelvic disruption.[8,4]

Several studies have found internal fixation to be superior to both external fixation and conservative treatment in managing unstable pelvic ring disruptions.[7,9-11]

## 2. Patients and methods

This work was a prospective study of twenty patients with sacroiliac joint disruption treated by plates and screws through anterior approach in orthopedic department, Faculty of Medicine, Menoufiya University; during the period from March 2012 to August 2013. The age of the patients ranged from 34-70 years. there were 13 males and 7 females. The left side in 11 patients and the right side in 9 patients. The reconstruction plates were used in 12 cases and DCP in 8 cases.We exclude in our study other associated injures that my affect the results.

According to AO / ASIF classification, the pelvic fractures were types B1 in two cases, type B2 in 4 cases, type C1 in 6 cases, and type C2 in 8 cases. X-rays of pelvic AP/LAT, inlet and outlet views were carried out in all patients. CT-scan was done preoperatively in every patient. All patients operated under spinal anesthesia in supine position with sand bag under the effected side of pelvis. Incision along iliac crest followed by stripping of iliacus muscle of the iliac wing to allow access to the anterior portion of sacroiliac joint. This approach provided better

visualization of the joint than posterior approach and allowed access to Ileum. The clinical results assessed by Majeed score, [12] and radiological evaluation according to residual displacement as described by Lindahl *et al.,* [13]

## 3. Results

Early fixation was carried out in 16 cases (80%) with satisfactory results while late fixation was carried out in 4 cases (20%) with unsatisfactory result. Satisfactory results were found in patients who had car accident; while unsatisfactory results were found in patients who had fall from height and pedestrian accidents.

According to clinical Majeed score, we had (10) excellent patients, (6) good patients, (3) fair patients and (1) poor patients regarding radiological results, we had (10) excellent patients, (6) good patients, (3) fair patients and (1) poor patients.

Partial weight bearing started on the 45 days. The average time to partial weight bearing ranged from 30-50 days with an average of 40 days. Nineteen patients (95%) were walking unaided by final follow up.

Healing at 3 months occurred in all cases at the final follow up. 10 cases (50%) had less than 5mm displacement of the sacroiliac joint, 6 cases (30%) had 5-10 mm displacement, 4 cases (20%) had 11-15 mm of displacement.

In this study superficial wound Infection occurred in 2 patients (10%) and were treated with an appropriate antibiotic and debridement which eventually healed,

DVT, loss of reduction nonunion were not found in this study and nerve Paresthesis was occurred in one case and cured after one and half months.

**Table (1): Showing the relationship for the nutrient foramen and for the ''at risk area'' to important bony pelvis landmarks.**

| | At risk area | Mean distance to nutrient foramen |
|---|---|---|
| From ASIS | 80–95 mm | 88.1 mm |
| From SI joint | 12–25 mm | 18.0 mm |
| Above pelvic brim | 16–30 mm | 20.1 mm |

**Table (2): The clinical results assessed by Majeed score.**

| Majeed score | N | % |
|---|---|---|
| **excellent** | 10 | 50% |
| **Good** | 6 | 30% |
| **Fair** | 3 | 15% |
| **Poor** | 1 | 5% |

**Table (3): The radiological results described by Lindahl.**

| outcome | N | % |
|---|---|---|
| **excellent** | 10 | 50% |
| **Good** | 6 | 30% |
| **Fair** | 4 | 20% |

**Table (4):** The satisfactory and unsatisfactory results for fixation.

| Fixation | Result | N | % |
|---|---|---|---|
| **Early fixation** (less than 15 days) | Satisfactory | 16 | 80% |

**Table (5):** The time of operation, pre-operative HB, post-operative HB, incision length, operation bleeding, operation time, screening time, partial weight bearing, hospital stay

| | N |
|---|---|
| **HB%** | 9-13 |
| **Post-operative HB%** | 8-11 |
| **Incision. (cm)** | 10-15 |
| **Oper. Bleed. (ml)** | 400-600 |
| **Oper. time min.** | 110-190 |
| **Screen time (min)** | 5 |
| **Partial W.B. (days)** | 45-60 |
| **Hosp stay (days)** | 5-20 |

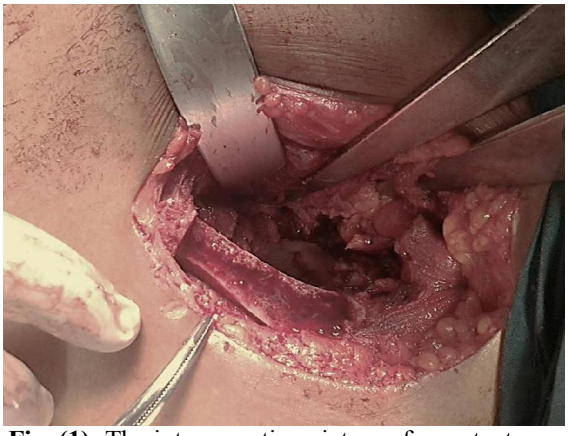

**Fig. (1):** The intraoperative picture of an osteotomy for iliac crest.

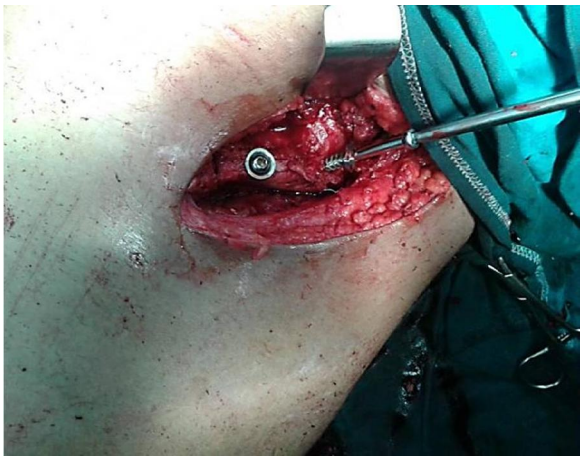

**Fig. (2):** The intraoperative picture of fixed iliac crest by 2 partial thread cancellous screws.

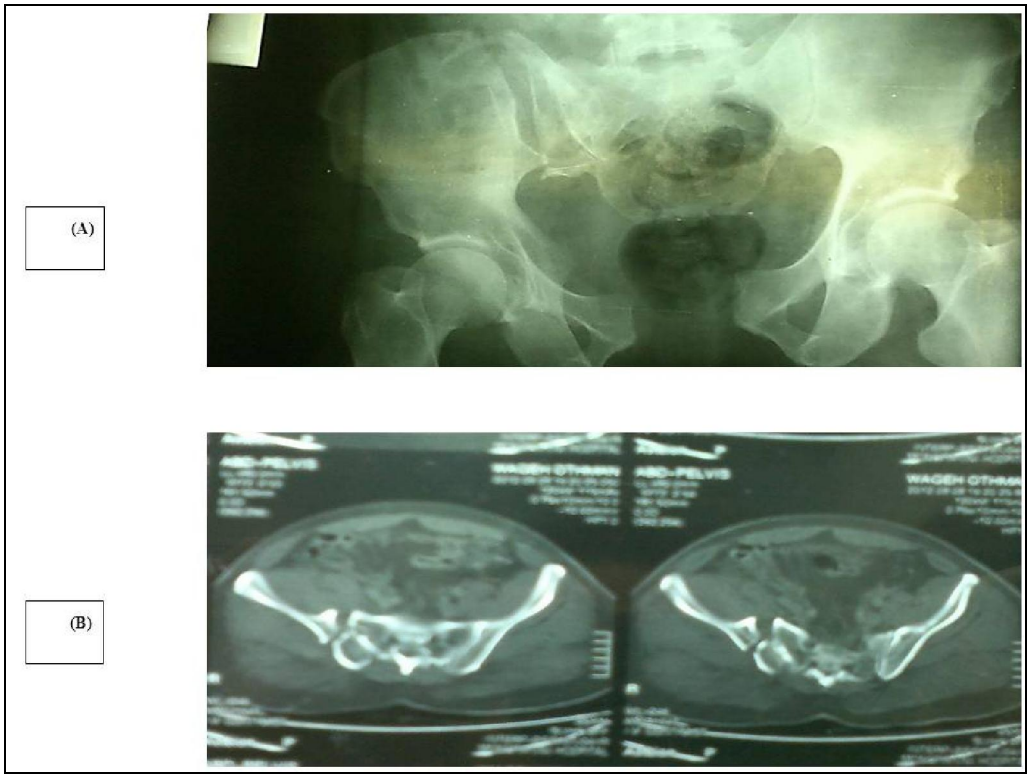


**Fig. (3): Preoperative plain X ray antero-posterior view and axial CT.**

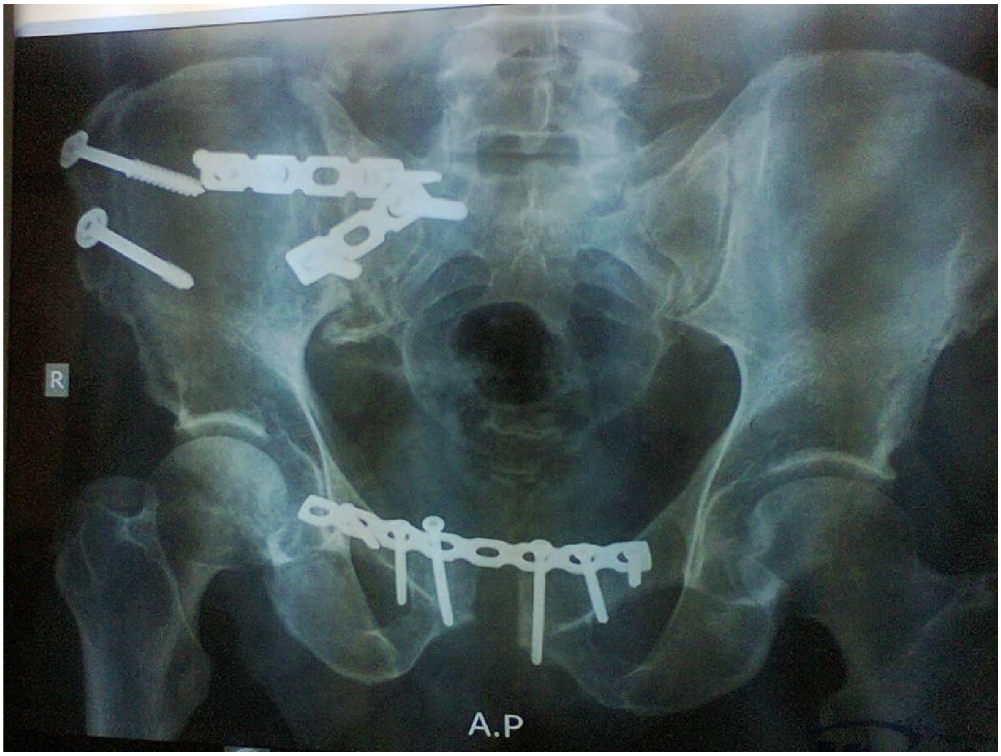


**Fig. (4): Postoperative AP view taken 3 months postoperatively showing union in anatomical position.**

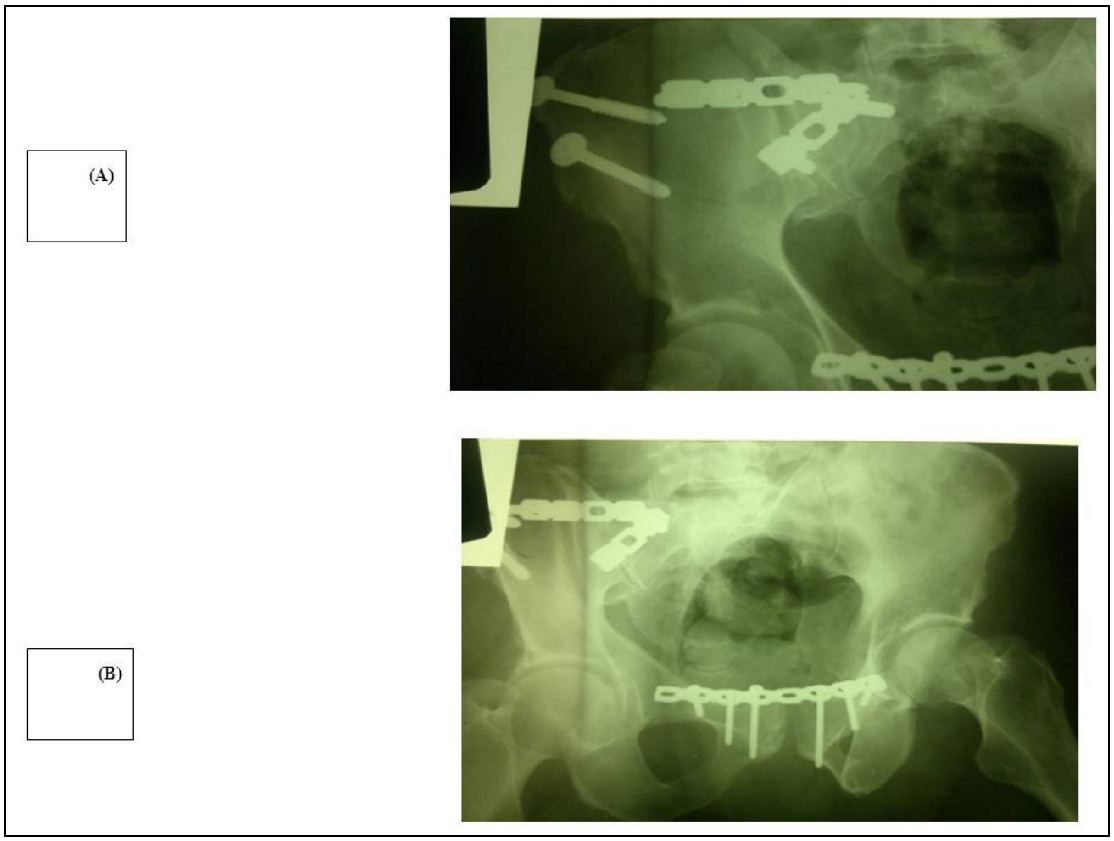


**Fig (5): Postoperative AP view taken 6 months postoperatively.**

## 4. Discussion

**Anterior approach** for stabilization of SI joint dislocation is the ideal way to manage such injuries. This method allows direct visualization of fracture dislocation and the best way to save the neurovascular structures.[14]

**McMurtry**[18]in his study of 32 cases has shown that open reduction and internal fixation of all fracture dislocations with anterior plating is the ideal way to manage such injuries **Matta**,. Pointed out that all SI joint dislocations should be operated through anterior approach with anterior plating that helps in reduction and restoration of anatomy of SI joint. [14- 17]

**Tile, M.** pointed out that SI joint fixation is mandatory in all fracture dislocation of sacroiliac area. [18- 20] This helps in anatomical reduction, maintenance of the length of limb and restoration of normal gait. [19] The early fixation produced much better results that not only reduced the hemorrhage but also helped in early rehabilitation of patient and prevented complications.[21]

**Lumbar 5 nerve** root can be visualised and a nerve injury is preventable. More than two-thirds of patients with surgically treated unstable pelvic injury returned to their original occupation without any disability, however neurological impairment may compromise the final outcome. [22]

**Matta & Tornetta** concluded that open reduction and internal fixation of unstable pelvic ring injuries, when performed within 21 days, is associated with a higher percentage of excellent reductions than in reductions performed after 21 days (70%) versus (55%).[23]

**Matta** believes that SI dislocations are particularly problematic injuries to treat non-operatively, because the injury is a pure ligamentous disruption, and therefore, a union in a satisfactory position is quite unpredictable. [25] Adverse consequences of non-operative treatment include leg-length discrepancy, rotational mal-union; prolonged recumbency, delayed neurological compromised and chronic pain. [22]

**Road traffic accidents** were responsible for the majority of accidents (85%) in the present work, especially the car occupants who represented alone 58.8% of these cases. **Semba *et al.*, and Miranda *et al.*,** reported nearly similar findings. This can be explained by the fact that road traffic accidents entails the worst high energy trauma as compared to other causative agents, and such accidents are multifactorial

depending on the atmospheric condition, the road state, the car condition, driver and pedestrian mistakes. [25, 26]

In the present study, the pelvic ring injuries commonly involved the young adults. That is similar to the findings of Lange and Hansen *et al.,* **Leung *et al.,* and Lindahl and Hirvensalo *et al.,*** [27-29] This can be explained by the fact that the **young adults** are at high risk of high energy trauma as they are highly active, ambitious and hasty during driving. In addition they have strong body built that can withstand the major pelvic trauma until their primary admission. In the present series, males (65 %) were commonly affected than females (35%), this nearly agrees with the findings of **Dujardin *et al.,* and Rommens and Hessman** et al. [30,31]

If the residual displacement is more than 1 cm, nearly 70% of patients shall have severe pain with abnormal function. [32] **Matta and Tornetta** et al., graded the reductions by the maximal displacement measured on the 3 views of the pelvis: Excellent (4 mm), good (4-10 mm), fair (10-20 mm), and poor (> 20 mm). [9]

In our study the patients are discharged on the 4th or 5th postoperative day. Suction drain is removed on 3rd day. The patients are discharged on the 5th or 6th postoperative day, when normal bowel and bladder functions are accomplished. Suction drain is removed on 3rd day.First week is "quiet time" patient is mobilized non-weight bearing on crutches after two weeks. Weight bearing is started after 6 weeks of surgery. [33]

**Barbara *et al.,*** attributed 37.8% reduction of hospital stay in their second group of patients treated by early internal fixation to the improved pulmonary outcome, and fewer fracture associated complications. [34] The earlier series of **Goldstein *et al.,*** and **Kellam *et al.,*** reported 18-25% incidence of infection. [35, 36] **Kellam *et al.,*** reported a 25% incidence of skin breakdown for such posterior incisions, and Goldstein et al. also reported high infection rates. [37,38]

**Posterior plating** had been considered to have a disadvantage associated with wound complications. Infection rates up to 27%have been reported when using a posterior approach. [218,219]

**Matta, Saucedo and Routt et al**., The complications of illiosacral screw usage include fixation failures, misplaced screws, nerve injuries, infections, and poor posterior pelvic reduction, among others. [39,40]

There were 7% (15/220) **malpositioned** screws in all the patients who underwent postoperative CT and 44% (4/9) in the subgroup with neurologic complaints. This is in contrast to better results reported earlier. It also demonstrates the obvious fact that patients with malpositioned screws are at much higher risk for iatrogenic neurologic injury. [41]

**Keating *et al.,*** obtained an anatomically or near anatomically pelvic reduction with sacroiliac screws in 84% of patients but had a 44% malunion rate finally. [42]

**Griffin *et al.,*** found that in the management of vertical sacral fracture with sacroiliac screws, fixation failure and loss of reduction are more likely to happen. [43]

**Tile** also states that **malreduction** of the posterior sacroiliac complex, especially in cases of a pure sacroiliac dislocation, usually the result of an unsatisfactory closed reduction, frequently leads to chronic sacroiliac pain and he advocates surgical treatment. [44]

## 5. Summary and Conclusion

The anterior approach to the sacroiliac joint offers safe, easily to reach, reliable access to that structure and allows anterior plates to be positioned accurately across the joint.

Anterior approach is the best way because evaluation of dislocation is best visualized through this approach and neurovascular structures are saved under vision.

Early fixation of fracture disruption(less than 15 days) of sacroiliac joint not only reduces the dislocation but also prevent deformity / shortening and abnormal gait of the patient.

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