SHORT REPORT

Percutaneous Ilio-sacral Screw Fixation for Unstable Pelvic Ring Injuries

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Abstract

This prospective interventional study was planned to determine the clinical and radiological outcome of percutaneous iliosacral screw fixation for unstable pelvic ring injuries. It was conducted from March 2008 to June 2014 at the Department of Orthopaedic Surgery Combined Military Hospital (CMH) at Lahore, Multan, Rawalpindi and Muzaffarabad. It comprised 50 patients with unstable pelvic ring injuries. Visual analogue scale (VAS), Majeed pelvic score and Lindahl criteria were used for functional and radiological outcomes assessment. The mean age of the patients was 47.82±8.94 years. Moreover, 33(66%) participants were males and 17(34%) were females. The mean pre-operative Majeed and VAS scores were 38.98±6.28 and 9.04±0.67, respectively. Operating time and blood loss were reduced significantly. VAS score for post-operative pain was 3.82±1.26 at 1 month and decreased further to 2.68±1.30 at 12 months post-operatively (p<0.001). Radiological outcome and the post-operative Majeed scores were good to excellent in 43(86%) cases. Thus Percutaneous iliosacral screw fixation of unstable pelvic ring injuries resulted in excellent radiological and functional outcome with significantly decreased post-operative VAS score for SI joint pain.

Keywords: Unstable pelvic ring injury, Percutaneous iliosacral screw fixation, Radiological outcome, Functional outcome.

Introduction

Pelvic fractures result from high energy trauma mostly due to roadside accidents and falls. Among all skeletal injuries, pelvic fractures constitute around 3-8%. However, they are seen in 25% of patients with polytrauma.[1] As these injuries rarely occur in isolation, pelvic fractures are associated with increased frequency of mortality (4.8%-50%) due to associated injuries. In patients who survive the initial injury, pelvic fracture results in significant long-term disability.[2]

Among the pelvic injuries, disruption of the posterior pelvic ring is critically important which may involve fractures of the sacrum, pure sacroiliac dislocation, fracture dislocation of the sacroiliac joint, and fractures of the ilium. Treatment of patients with posterior pelvic ring (PPR) injury can be broadly categorised as conservative/ non-operative, open reduction and internal fixation and percutaneous screw fixation.[3] Henderson in 1989 reported low backache (50%), limp (32%) and work disability (43%) among 26 patients of PPR injury who were managed conservatively.[4] Tornetta et al. in 1996 reported better long-term outcome after operative management.[5]

Percutaneous screw fixation appears better than conventional open reduction and internal fixation owing to decreased operative time, limited soft tissue striping resulting in decreased operative blood loss, risk of infection and need for post-operative hospital stay thus reducing hospital cost.[6] The current study was planned to determine the early and late outcome of percutaneous screw fixation for unstable pelvic ring injuries.

Methods and Results

This study was conducted at the Department of Orthopaedic Surgery of Combined Military Hospital (CMH) at Multan, Muzaffarabad, Rawalpindi and Lahore from March 2008 to June 2014, and comprised patients

Table-1: Radiological and functional outcome.

Characteristics	Patients (n=50)
Radiological Outcome	
◆ Excellent	26 (52.0%)
◆ Good	15 (30.0%)
◆ Fair	9 (18.0%)
Functional Outcome	
Post-operative Majeed Score	67.58±10.55
Post-operative Majeed Pelvic Grade	
◆ Excellent	26 (52%)
◆ Good	17 (34.0)
◆ Fair	5 (10.0)
◆ Poor	2 (4.0%)

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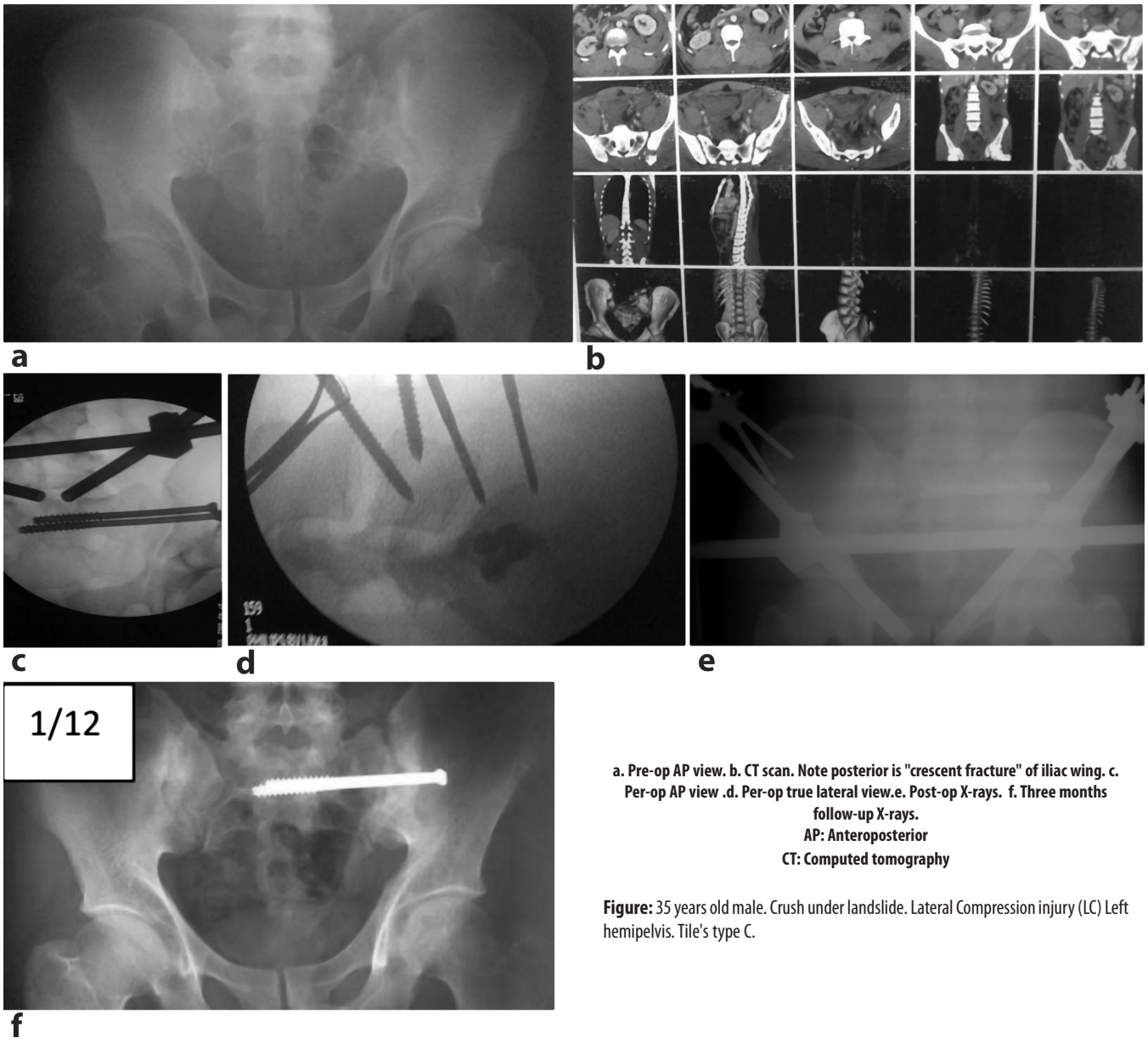

a. Pre-op AP view. b. CT scan. Note posterior is "crescent fracture" of iliac wing. c. Per-op AP view .d. Per-op true lateral view.e. Post-op X-rays. f. Three months follow-up X-rays.
AP: Anteroposterior
CT: Computed tomography

Figure: 35 years old male. Crush under landslide. Lateral Compression injury (LC) Left hemipelvis. Tile's type C.

with unstable pelvic ring injuries.

Written informed consent was obtained from every patient. Routine pre-operative workup was done. Patients requiring open reduction were excluded. All the patients undergoing percutaneous ilio-sacral screw fixation were also provided stability by either plating of symphysis pubis if required or anteriorly applied external fixator.

The essential requirements per-operatively were a radiolucent table, an image intensifier with C-arm, a trained radiographer with understanding of views of pelvis, and 73 mm cannulated screw set. Patients were positioned supine. Reduction was achieved manually through longitudinal traction and also helped by manipulating iliac pins inserted in iliac blade as part of anterior external fixator. Three views inlet, outlet and true lateral, were essentially required for safe insertion of screws for maintaining posterior pelvic manipulated reduction (Figure).

Early outcome variables included time to surgery, operative time, operative blood loss and length of hospital stay. Late outcome variables included sacroiliac (SI) joint pain, functional and radiological outcome. Visual analogue scale (VAS) was used to describe pain while

Majeed pelvic score was used to assess functional outcome. Radiological outcome was assessed by Lindahl criteria.

Of the 50 participants, there were 33(66%) men and 17(34%) women. The overall mean age was 47.82±8.94 years (range: 35 to 65 years). Trauma due to roadside accidents was the most frequent cause and was observed in 41(82%) cases. Pre-operative Majeed score ranged from 30 to 56 with a mean of 38.98±6.28 while the pre-operative VAS score for SI joint pain ranged from 8 to 10 with a mean of 9.04±0.67.

The mean time to surgery was 2.90±0.84 days (1 to 4 days). The mean operative time was 71.18±13.90 minutes (45 to 97 minutes). The mean operative blood loss was 46.44±20.70ml (range: 20-80 ml) while the mean length of hospital stay was 2.50±1.06 days (1-4 days).

Mean VAS score for post-operative SI joint pain was 3.82±1.26 at 1 month and decreased further to be 2.68±1.30 at 12 months post-operatively. Compared to pre-operative mean VAS score this difference was statistically significant (p=0.001).

The radiological outcome was excellent in 26(52%) patients and good in 15(30%) patients. Moreover, 9(18%) patients had fair radiological outcome while none of the patients had poor radiological outcome using Lindahlcriteria. The mean post-operative Majeed score was 67.58±10.55 (range: 43 to 89). It was excellent in 26(52%) cases, good in 17(34%) and fair in 5(10%) cases. Besides, 2(4%) patients had poor Majeed pelvic grade (Table).

Conclusion

Patients sustaining unstable pelvic ring disruptions do pose a challenging clinical situation for orthopaedic surgeons and if not dealt with appropriately do suffer from prolonged morbidity. Fixation of posterior pelvic ring remains technically challenging and demanding and hence many methods have been reported in literature to achieve the same. We employed percutaneous iliosacral screw fixation, which has been reported to be associated with less complications and good clinical outcomes. In our study, the mean age of the patients was 47.82±8.94 years. Chen et al. observed similar mean age of 45.13±23.17 years among Taiwanese patients presenting with pelvic ring injuries.[7] Trauma due to roadside accidents was the most frequent underlying cause and was observed in 41(82%) cases.

Time to surgery ranged from 1 to 4 days with a mean of 2.90±0.84 days. Mean operative time was 71.18±13.9 minutes while the mean operative blood loss was 46.44±20.7ml. Our results are in line with those of Smith et al. who observed similar mean operative time of 70±24 minutes and mean operative blood loss of 33±27ml.[8] There were 33(66%) male and 17(34%) female patients. A similar male predominance among patients of pelvic ring injuries have been reported previously by Abhishek et al [9](63.41%) in Indian population The mean length of hospital stay was 2.50±1.06 days. Smith et al. however reported comparatively lower mean length of hospital stay (1.3±0.5 days).[8] The mean pre-operative VAS score was 9.04±0.67. Mean VAS score for post-operative SI joint pain was 3.82±1.26 at 1 month and decreased further to be 2.68±1.30 at 12 months post-operatively. Compared to pre-operative mean VAS score this difference was statistically significant (p=0.001). These results match with those of Chen et al. who observed similar mean pre-operative VAS score (9.06±0.79), mean post-operative VAS score at 1 month (3.73±1.48) and 12 months (2.73±1.43)7 for SI joint.

The radiological outcome was excellent in 26(52%) patients and good in 15(30%) patients. Also, 9(18.0%) patients had fair radiological outcome while none of the patients had poor radiological outcome using Lindahl criteria. Zaki et al. reported similar frequency of excellent (50%), good (30%) and fair (20%) outcome from Egypt in patients undergoing fixation with plates and screws.[10]

The mean pre-operative Majeed score[11] was 38.98±6.28 compared to post-operative score of 67.58±10.55 (p=0.001). Mason et al. reported similar mean pre-operative (36.18±15.08) and post-operative (64.78±20.18) Majeed score after percutaneous stabilisation of the sacroiliac joint with hollow modular anchorage screws.[3] Functional outcome was excellent in 52% cases, good in 34% and fair in 10% cases. Moreover, 2(4%) patients had poor Majeedpelvic grade. Our results are again comparable to those of Zaki et al. who achieved excellent, good and fair outcome in 50%, 30% and 15% patients with stabilisation of sacroiliac joint by plates and screws.[10]

We recommend that percutaneous iliosacral screw fixation of unstable pelvic ring injuries should always be combined with anterior pelvic fixation for stable repair.

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