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# Functional outcomes in pelvic fractures and the factors affecting them— A short term, prospective observational study at a tertiary care hospital<sup>☆</sup>

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## ABSTRACT

**Background:** Pelvic fractures are markers of high energy trauma and are associated with significant morbidity and mortality. With evolution of modern diagnostic tools and intervention their management has come a long way.

**Research question:** Whether or not modern healthcare could provide the victims of such high energy trauma with a good functional outcome and optimal quality of life, such that they are able to perform their activities of daily living independently?

**Objectives:** To evaluate the functional outcomes in pelvic fractures and to find out factors that could indicate the prognosis.

**Methodology:** Ours is a prospective observational study with 75 patients at a tertiary care hospital between September 2015 to December 2016. The minimum duration of follow up was six months. Patients' demographic profile, mode and pattern of injury, associated injuries, management and subsequent complications, if any were recorded prospectively. Functional outcomes were assessed using the Majeed score. All preoperative parameters were correlated statistically with the Majeed score to find out their association.

**Results:** Majeed scores were excellent in 27 patients, good in 29 patients, fair in 12 patients and poor in 7 patients. Overall functional outcome were good due to availability of sophisticated diagnostic tools, dedicated trauma management team and experienced pelvi-acetabular surgeon. Poorer outcomes were seen in male gender, associated urogenital injuries, associated acetabulum and sacrum fractures, associated nerve injuries and bedsores. No association were seen with age, fracture pattern, treatment modality and timing of surgery.

**Conclusion:** With modern day diagnostic and therapeutic modalities the functional outcome a patient could achieve is promising. With associated risk factors guiding the outcome, the health care provider can individualise the management and decrease the overall morbidity and mortality of such high energy injuries.

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## 1. Introduction

Pelvic injuries are of special significance for orthopaedic trauma surgeons. Though incidence is relatively low as these fractures are

results of very high energy trauma and are often associated with a multitude of other injuries.<sup>1–9</sup> Most common mode of these injuries are road traffic accidents, followed by falls from height.<sup>7,10,11</sup>

During the past decade, due to better understanding of physiological response to trauma and advancements in diagnostic tools and efficacy of acute trauma management, the morbidity and mortality in patients with pelvic fractures have decreased.<sup>12–18</sup> While stable pelvic fractures seldom result in major long term complications, unstable pelvic ring injuries are difficult to treat; recovery is slow and sometimes incomplete, (25%–75%).<sup>19–25</sup> The management of these injuries should focus more on the functional

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and quality of life related outcomes, rather than just radiological fixation and early stabilisation.<sup>1,26</sup>

Significant considerations while evaluating a pelvic fracture patient should be identification of associated skeletal and other system injuries, patient's age, gender, mode of injury, pattern of injury, timing of surgery and surgeon's experience in managing such fractures. Whether or not, one or all of these affect the overall outcome is something that we set out to assess. There is scarce literature on spectrum of pelvic fractures, and their outcome, especially in Indian scenario and the present study focuses on this aspect.

## 2. Materials and Methods

This prospective observational study was conducted between September 2015 to December 2016 after approval from the institute's Ethics Committee, at the advanced trauma centre of a reputed tertiary care hospital in North India which is well equipped with modern diagnostic tools, a dedicated trauma team and experienced pelvi-acetabular surgeons. After taking written informed consents from all patients, information was accumulated by taking detailed history, clinical evaluation, specific laboratory investigation and imaging and specific questionnaires.

On presentation, all patients were thoroughly evaluated by the members of concerned trauma unit in the triage area. Haemodynamically unstable patients were resuscitated accordingly. Pelvic binder was applied to all patients suspected of pelvic fractures. After initial stabilisation, patients who met the inclusion criteria for the study with skeletal maturity were enrolled, while those with isolated acetabulum fractures and patients in paediatric age group were excluded.

We classified pelvic fractures according to Young and Burgess classification, which includes 4 types of injuries and their subclassification – lateral compression (LC), antero-posterior compression (APC), vertical shear (VS) and combined (CM). LC injuries are further subclassified as LC1, LC2, and LC3. APC injuries are subclassified as APC1, APC2 and APC3. Among these, only LC1 and APC1 are considered as stable injury patterns.<sup>27</sup>

Management of patients either surgical or conservative, was decided as per the injury patterns and associated injuries or comorbidities that could preclude surgical intervention. Patients, for whom conservative management was contemplated, were advised bed rest for 6 weeks with pelvic binders or skeletal traction according to the fracture patterns. All patients were advised to avoid full weight bearing on affected side for initial 3 months.

At the follow up at sixth month all patients were evaluated for functional outcome according to Majeed's score.<sup>28</sup> Majeed's score, includes 4 clinical grades based on a score out of 100 points. Outcome was graded as excellent (score>85), good (score 70–84), fair (score 55–69) and poor (score<55).

## 3. Results

There were 75 patients in the study out of which 13 were above age of 50 years, while 62 were younger than 50 years [Table 1]. There were 56 males and 19 females. 58 cases were due to road traffic accidents while 16 were due to falls from height. 1 case was due to a fall of heavy object on the patient. The majority of the cases (70) were closed fractures. 22 cases had associated lower limb long bone fractures, while 13 had acetabulum fractures, 3 had spine injuries, 7 had sacrum fractures and 2 had facio-maxillary injuries. 17 patients had head injuries, 8 had associated trauma to chest and 21 had blunt trauma to abdomen. 17 patients had urogenital injuries. 23 patients were treated conservatively while remaining 52 were operated. In the conservative group, 11 had the fracture

**Table 1**  
Parameters and number of patients.

Age	>50 years-13 <50 years-62
Gender	Male – 56 Female – 19
Mode of injury	Road traffic accidents –58 Fall from height – 16 Fall of heavy object – 1
Type of injury	Open – 5 Closed – 70
Associated orthopaedic injuries	Lower limb fracture – 22 Acetabulum fracture – 13 Sacrum fracture – 7 Spine fracture – 3
Associated non-orthopaedic injuries	Head injury – 17 Blunt trauma chest – 8 Blunt trauma abdomen – 21 Urogenital injury – 17
Management	Conservative – 23 Surgery –52
Bedsores	5
Infection	5
Nerve injury	Foot drop – 8 Isolated sensory loss – 3

pattern suitable for conservative management and in 12 patients surgical management was not done due to presence of severe associated injuries. 5 patients developed bed sores. Out of 75 patients, 8 had foot drop, 3 patients had isolated sensory loss of lower limb, 5 patients could not be assessed for nerve injury due to presence of head injury and 59 patients had no nerve injury. 5 patients developed infection. 10 patients were operated within 2 days of presentation, 17 patients were operated within 7 days and rest of the patients were operated beyond that.

Correlation of various factors with Majeed's score were assessed to understand their significance with relation to the functional outcome, where Majeed's score was categorised into four groups - Excellent, good, fair and poor [Table 2].

Better results were seen in female patients (p value 0.047) and open injuries (p value 0.023). Poor outcomes were seen in associated acetabulum, sacrum, spine, facio-maxillary injuries (p value 0.003), associated urogenital injuries (p value 0.045), associated nerve injury with foot drop (p value 0.001) and with bed-sores (p value 0.032).

There were no statistically significant correlation of outcome with age, fracture pattern, associated long bone injuries, head injury, blunt trauma abdomen, blunt trauma chest, presence of infection, type of treatment and timing of surgical intervention.

## 4. Discussion

In spite of relative rarity, pelvic fractures carry high risk of mortality and morbidity. Severe associated injuries are seen in conjunction with pelvic ring injuries due to high energy trauma that cause them. This is getting common in the present era of fast paced life on the roads, leading to increased incidence of such accidents.

**Table 2**  
Majeed's score.

Score	No of patients	Percentage(%)
Excellent	27	36%
Good	29	38.7%
Fair	12	16%
Poor	7	9.3%

Incidence of pelvic fracture at our centre was 2.82% of the total trauma patients, showing slightly lower incidence as compared to other studies.<sup>7,29</sup> This was probably due to lesser number of referrals for those patients who sustain less severe injuries, to our centre.

The short term functional outcome in the majority was good to excellent, probably due to available resources and manpower at our tertiary hospital. Females had better outcomes as compared to their male counterparts. This may be attributed to exposure of female patients of our study to low energy injury, as 8 out of 19 female patients sustained pelvic fractures due to falls from height. Patients in younger age group (<50 years) formed the majority of the study population (82%). This is indicative of predilection of pelvic fractures to the young, economically productive, adult males who travel far and wide for livelihood in Indian society and could meet more accidents.<sup>30</sup>

Literature suggests that open pelvic fractures are associated with infection, high rate of morbidity and mortality. In present study there were no such complications, probably because all open injury patients had stable fracture pattern- Jones class 1 injury.<sup>31</sup>

Pelvic fractures are most often associated with other injuries. Other orthopaedic injuries observed were fractures of long bones, acetabulum, sacrum and spine. Patients with long bone injuries were intervened early by surgical intervention and that could have resulted in better outcome and hence they did not affect the overall outcome. Moreover, patients with pelvic fractures had to be bedridden for a long period and by that time other fractures did heal and did not alter the functional outcome. Associated acetabulum & sacrum fractures make the injury even more unstable and hence affected the functional outcome with poorer result.

Though, in correlation analysis there was no association between fracture patterns and functional outcomes, we observed that Majeed's score was found excellent in 13 patients (52%) and good in 9 patients (36%) among the 25 patients in our study, who had stable pattern of injuries (LC1, APC1), where as in 50 patients who had unstable pattern, we observed that 14 had excellent scores (28%) and 20 patients showed good scores (40%). These findings indicate that better outcomes are understandably more in stable fracture patterns.

Only five of the patients having head injuries, underwent neurosurgical intervention and the rest were treated conservatively; indicating that they sustained less severe head injuries. Hence they did not affect the outcome. Urogenital injuries are frequently associated with high energy pelvic fractures. In the present study, overall incidence of urogenital injury was 22.7%, comparable to the reported incidence in literature.<sup>11,29,32</sup> Among these 17 patients, 12 had a urinary bladder injury. Urethral injury was noted in 8 patients, either in association with the bladder injuries or isolated. There was significant difference in functional outcomes in these patients, compared to those not having urogenital injuries associated with pelvic fracture, with inferior results in the former (p value 0.045).

Patients having associated extraperitoneal bladder injuries were managed conservatively by the urology team, by putting urinary catheter through supra pubic cystostomy. In these patients we could not proceed for definitive internal fixation, and we had to use external fixation in some patients, while we treated others conservatively. This could be the cause of inferior functional outcomes in these patients.

Additionally in Majeed's questionnaires, there are some points on the performance of sexual intercourse, and in patients with urogenital injuries these points are lower, causing poorer scores.

Bed sores were noted in 5 patients, comprising 6.7% of the study population and all were seen in the patients who were treated conservatively. All of them needed surgical debridements. On

correlation analysis with Majeed's score these patients showed poor functional outcomes (p value 0.032). This might be attributed to the associated injuries, disallowing surgical management and subsequently causing prolonged immobilisation, resulting in bedsores.

Incidence of neurological injuries were common in unstable pelvic fractures. 12 patients had associated nerve injuries, comprising 14.7% of total study population. Among them only 1 patient (1.3%) developed post operative foot drop, probably due to traction injury (iatrogenic) but recovered well, as noted in subsequent post operative follow ups. Other patients had nerve injuries since the presentation to the emergency department. The incidence ranges from 2.9% to 48% according to previous literature and we got similar results in the present study.<sup>33–37</sup> Malunion was seen in 3 patients treated with external fixators. In present study, mortality rate was 11.7%, showing lower mortality rate compared to other studies.<sup>7,11,29,33,38</sup> Every case of mortality in our study occurred in pre operative period. No post operative mortality was reported.

Ours is probably the first study detailing the epidemiology of pelvic fractures prospectively from northern part of the country that includes hilly terrains and roads resulting in high energy trauma. Though we get different patterns and modes of injuries, all the cases are from a tertiary care centre, and probable limitation could be the under reporting of such cases not referred from the primary centres. So overall incidence cannot be commented upon, however we get a fair idea about the prevalence and associated injuries.

## 5. Conclusion

Pelvic fractures are an increasing subset of trauma injuries where multiple systems are often involved. Though historically they are associated with inferior outcomes, with modern day diagnostic and therapeutic modalities the functional outcome a patient could achieve is promising. With associated risk factors guiding the outcome, the health care provider can individualise the management and decrease the overall morbidity and mortality of such high energy injuries.

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## Conflicts of interest

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