

Original Research Article

The early definitive internal fixation of complex pelvic fracture and its outcome: our experience in level 1 trauma care centre

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ABSTRACT

Background: Complex pelvic fractures have high mortality and morbidity hence required urgent resuscitation, haemodynamic stabilization and fracture fixation. Keeping in mind the various schools of thought regarding definitive management, there is need to study the outcomes of complex pelvic fractures after internal fixation surgery.

Methods: Twenty patients with complex pelvic fractures treated with internal fixation surgery in between 1st June 2018-31st December 2019 with at least 12 months follow-up were included. Clinical and functional outcome of these patients was studied and evaluated using Majeed and Hannover scoring systems.

Results: Of 20 patients, 19 had closed while 1 had open pelvic fracture while 11 had tile type B and 9 had tile type C fracture. After 12 months of follow up, 72% patients of tile B fractures and 55.6% in tile C had excellent Majeed score with rest having good score. Hannover score was very good in 36.4% tile B cases and 22.2% tile C cases and good in 63.6% tile B cases and 77.8% tile C cases. Type of fracture (type B or type C) had a statistically significant co-relation with chronic pain ($p=0.016$). It was also found that urogenital injury and sexual dysfunction ($p=0.007$) had a significant co-relation.

Conclusions: Early definitive internal fixation in patients with complex pelvic fracture had very good clinical and functional outcome. Most common associated injuries in complex pelvic fractures are urogenital injuries due to close proximity. In the outcomes chronic pain and sexual dysfunction are major issues. The sexual dysfunction patients usually associated fracture of pubic rami or pubic diastasis.

Keywords: Complex pelvic fracture, Functional outcome, Complications, Majeed score, Hannover score

INTRODUCTION

Complex pelvic fractures were combination of pelvic bone fracture, soft tissue injuries of pelvic region along with hemodynamic instability.¹ The prevalence of these injuries constitutes about 1.5-3% of all skeletal injuries.² They predominantly occurred due to high energy traumatic conditions like road traffic accidents, height energy fall and crush injuries.³ These fractures associated with high mortality (30-50%) and morbidity rate.^{4,5} The rate of mortality is significantly increased by factors like haemorrhagic shock, open fracture and associated other systemic injuries. The management of complex pelvic fractures require a coordinated multidisciplinary approach

from both pre-hospital trauma network and regional trauma centre team. It includes the early transportation with proper splintage, hemodynamic resuscitation, bleeding control and urgent stabilization of the pelvic ring. In recent time, evolution in diagnostic and therapeutic facilities resulted significant improvement in outcome. However, the management of these fractures is still challenging in developing world due to inadequate transport and health care facility. Majority of previous studies about complex pelvic fractures mainly were focused on the survival rate with least interest on outcome. In this study, we assessed the clinical, functional and social outcome of these fractures treated with early internal fixation surgery in our trauma centre. We hope that our

study will help to increase the quality of treatment in terms of outcomes further reducing morbidity and mortality rate.

METHODS

In this retrospective observational study, we evaluated complex pelvic fracture patients treated by internal fixation in level 1 trauma care centre during 1st June 2018-31st December 2019. The data was pooled out, patients were followed up. They were assessed with clinical and radiological examination and questioned in detail in the follow up for the study. The work was approved by institutional ethical committees and patients gave informed consent to work and data collected from them.

Inclusion criteria

Patients with open pelvic fracture or unstable pelvic fracture (type B and C tile classification), who underwent internal fixation with in 1-5 days of trauma and followed for a minimum of 12 months after internal fixation surgery were included in the study.

Exclusion criteria

Complex pelvic fracture patient with other comorbidities and only have external fixation as definitive treatment and patients non-compliant for follow-up were excluded from the study.

All patients are managed according to combination of extended focus assessment with sonography for trauma (E-FAST) and institutional protocols (Figure 1).⁶ After initial resuscitation and stabilization of the patient, the fractures were classified according to Tile classification with help of pelvic plane radiograph and three-dimensional CT scan.⁷ After complete preoperative workup, all patients are operated within 1-5 days of trauma. Anterior column, pubic rami and symphysis were fixed using phannensteil incision with modified Stoppa dissection while posterior column, Crescent fractures, SI Joint and iliac blade were fixed by appropriate approach. In patients who were taken for emergency laparotomy for urogenital and bladder injury, definitive fixation was done in the same sitting. In such patients pubic rami and symphysis were fixed through the midline incision, used for laparotomy. To evaluate the outcome of complex pelvic fracture treatment, we used the Majeed functional score and Hannover score for polytrauma outcome (HASPOC). Majeed score assesses five factors, namely pain, standing, sitting, sexual activity, and working ability.⁸ Hannover score (HASPOC) is based on 2-part assessment including a subjective evaluation by a patient questionnaire and an objective evaluation by a physician after physical examination of the patient.⁹ These scoring systems were chosen so that evaluation of clinical, functional and social outcomes from management of complex pelvic fracture can be accomplished. The complications like chronic pain, sexual dysfunction, and infection were also assessed and evaluated. The result was analysed with SPSS ver 20. All

of the associations between the variables were analysed with Fischer exact test. The multi-variant analysis of complex pelvic fracture and comorbidities and functional score were analysed by logistic regression.

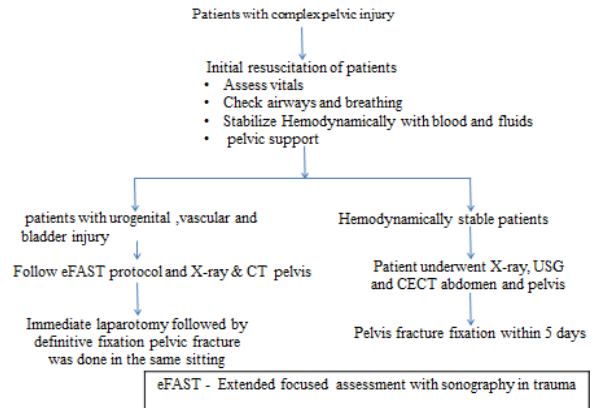


Figure 1: Institutional protocol for management of complex pelvic injury.

RESULTS

Patient demographic and injury data: Thirty-three complex pelvic fracture patients were admitted in our trauma centre during 2018-2019, of which 20 patients who fit the inclusion criteria were included in this study (Table 1). Average age was found to be 34.9±11.7. Gender wise most patients were male 14 (70%) while females were 6 (30%). Age wise most patients were in the group of 20-40 years (65%). Most of these fractures occur due to road traffic accidents (75%). We had five cases (25%) of complex pelvic fracture combined with fracture of other bone. Most of the complex pelvic fractures were accompanied with internal organ injuries (Table 2).

Table 1: Demographic characteristics.

Characteristics	N (%)
Age (Years)	
<20	3 (15)
>40	4 (20)
20-40	13 (65)
Open or closed fracture	
Open	1 (5)
Closed	19 (95)
Mode of injury	
road traffic accidents	15 (75)
fall from height	4 (20)
crush under heavy object	1 (5)
Tile fracture type	
Tile B	11
Tile C	9
Average time for surgery	3.5 days
Average duration of stay in hospital	10 days
Mean duration of follow-up	14.2 month

Table 2: Patients with associated injuries.

Associated injuries	N (%)
Urogenital injury	9 (45)
Fracture in extremities	6 (30)
Perineal rupture	3 (15)
Head injury	2 (10)
Abdominal injury	2 (10)

Outcomes and complications

In tile type B and type C fractures, excellent Majeed score were found on 72% and 55.6% cases respectively (Figure 2); while Hannover score was very good in 36.4% type B cases and 22.2% type C cases; and good in 63.6% type B cases and 77.8% type C cases (Table 3). At the end of 12 months follow-up, Majeed score was excellent in 63.2% and good in 36.8% in closed fractures. Single open fracture case had excellent Majeed score and very good Hannover score. Sexual dysfunction (35%) and chronic pain (35%) were the most frequent complications observed followed by infection (20%) (Table 4). Sexual dysfunction occurred in 7 patients and all of them were males. Also, all sexual dysfunction patients had associated pubic rami fracture or pubic diastasis as a component of complex pelvic fracture. There were 2 non-union observed in our patients. Type of fracture (type B or type C) had a statistically significant co-relation with chronic pain (p=0.016). It was also found that urogenital injury and sexual dysfunction (p=0.007) had a significant co-relation.

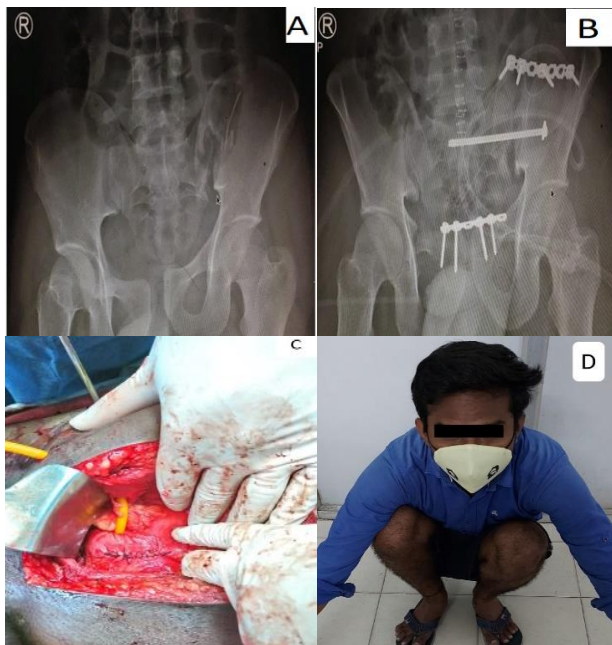


Figure 2 (A-D): An example of 26-year-old motor vehicle injury who sustained a pelvic fracture with associated urinary bladder injury. Preoperative radiograph, immediate postoperative radiograph, intraoperative picture shows repair of urinary bladder and 12th month clinical picture of patient with excellent Majeed pelvic score.

Table 3: Functional assessment scoring at 12th month follow-up.

Fracture type	Tile type B, n (%)	Tile type C, n (%)
Majeed score		
Excellent (>85)	8 (72)	5 (55.6)
Good (70-84)	3 (28)	4 (44.4)
Hannover score (HASPOC)		
Very good	4 (36.4)	2 (22.2)
Good	7 (63.6)	7 (77.8)

Table 4: Complications associated with management.

Complications	N (%)
Sexual dysfunction	7 (35)
Chronic pain	7 (35)
Infection	4 (20)
Neurological deficit	1 (05)
Non-union	2 (10)

DISCUSSION

Management of complex pelvic injury is challenging to trauma team. In this study road traffic accident is leading cause followed by fall from height. Majority of patients belong to young age group. The main goals of management were control of bleeding, hemodynamic stabilisation and maintain the stability and integrity of the pelvic ring.¹⁰ Management of these injuries with E-FAST protocol helps in diagnosis of open pelvic fracture (pubic symphysis widening >25 mm), assessment of hemodynamic stability and early decision making in emergency room.⁶ The unstable pelvic fracture facilitates adequate space for haemorrhage and compromises the tamponade effect of intra pelvic and retroperitoneal organs which further increases the bleeding. Hence early realignment and proper anatomical restoration of pelvic ring by surgical fixation is essential.¹¹ Traditionally the external fixators were commonly used to stabilize the pelvic ring but it carries risks like pin tract infection, injury to lateral femoral cutaneous nerve and pin loosening.^{12,13}

With evolution in management protocol of these fractures, studies shows good outcome with early internal fixation of fractures. It provides direct fracture reduction with superior biomechanical stability and allows early mobilization.¹⁴ In our study, the overall functional outcome (Majeed and Hannover score) was satisfactory after internal fixation in complex pelvic fracture. The tile type B fracture patients had slight better outcome than type C fracture patients. However, we didn't find any significant correlation between type of Tile classification and the functional score. Similar study done by Ismail et al reported excellent Majeed score in 78.6% of tile type B and 50% tile type C cases and good Hannover score in 53.3% type B cases and 72.7% type C cases.¹ Mardanpour et al reported 66 % of tile type B patients had excellent and 15% patients had good Majeed score, while for tile type C

patients, 46% patients had excellent and 27% patients had good Majeed score.¹⁵

Most common soft tissue injuries include urogenital structure, rectum, sigmoid, lumbosacral plexus, and retroperitoneal vessels. In this study 45% of patients had urogenital injury. These structures usually get injured due to sharp fractured bony end. Early diagnosis and management of associated soft tissue injuries is utmost important in complex pelvic fracture management to achieve good outcome.^{4,15}

Even after good management complex pelvic fracture are associated with high rate of short term and long-term complications. Sexual dysfunction was common complication in complex pelvic fractures. Studies have shown that morbidity due to sexual dysfunction can reach up to around 60% of complex pelvic fracture cases.¹⁶⁻¹⁸ The combination of vascular, neurogenic and psychological trauma majorly influences this complication. In our study overall incidence of sexual dysfunction was 35% and all of them were male patients. Most commonly sexual dysfunction occurred in patients with associated pubic rami fracture or pubic diastasis as a component of complex pelvic fracture. It's probably due to abnormal stretching or injury to prostatic urethra and injury to neurovascular bundles of cavernosal bodies.^{17,19}

Chronic pain is another major complication in complex pelvic fractures that compromises the patient's quality of life.^{20,21} We found that type C fractures had a statistically significant co-relation with chronic pain ($p=0.016$). It was mostly due to sacroiliac joint pain, nerve lesion, non-union, malunion and limb length discrepancy.²²

Infection was devastating complication in pelvic injury. Factors like open fracture, injury to bowel, urogenital injury and subcutaneous soft tissue trauma (Morel-Lavellee lesion) increases chance of infection. In present study four patients (20%) developed superficial surgical site infection and all of them were managed with intravenous antibiotic therapy. Ismail et al also reported infection rate of 19% which is almost similar to our study.¹

Limitation of our study includes small sample size and retrospective nature. Thus, study with large sample size and the higher statistical power required to validate our data.

CONCLUSION

Early definitive fixation of complex pelvic fractures had shown very good clinical and functional outcomes. Tile type C fractures have preponderance of landing the patient in chronic pain. Sexual dysfunction was common complication associated with complex pelvic fractures, especially in males. Its incidence was significantly related to pubic rami fracture or pubic diastasis and urogenital injuries.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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