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Original Research Paper

Orthopaedics

CLINICAL AND FUNCTIONAL OUTCOMES AFTER DEFINITIVE INTERNAL FIXATION IN COMPLEX PELVIC FRACTURES PATIENTS: AN OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Complex pelvic fractures have high mortality and morbidity and hence require urgent resuscitation, haemodynamic stabilization and subsequent definitive treatment with internal fixation. Keeping in mind the various schools of thought regarding definitive management there was need to study the outcomes of complex pelvic fractures after internal fixation surgery. **Material & Method:** Twenty patients with Complex pelvic fractures treated with internal fixation surgery with at least 6 months follow-up during 1st June 2018- 31st December 2019 were included. Clinical and functional outcome of these patients was studied and evaluated using Majeed and Hannover scoring systems. **Results and Discussions:** 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. 72% patients of Tile B fractures and 50% 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 was good in 63.6% Tile B cases and 77.8% Tile C cases. Most common injuries in Complex pelvic fractures are urogenital injuries due to close proximity. In the outcomes chronic pain and sexual dysfunction are major issues. Every sexual dysfunction patient was male and had associated fracture of pubic rami or pubic diastasis.**Conclusions:** Early Definitive internal fixation in patients with complex pelvic fracture had very good clinical and functional outcome with about 70% patients having excellent outcome and remaining having good outcome after evaluation by Majeed Score and Hannover Score.

KEYWORDS : Pelvic Fracture; Polytrauma; Sexual Dysfunction; Rami Fracture; Diastasis; Internal Fixation

INTRODUCTION

Complex pelvic fracture is a group of musculoskeletal trauma that has a higher rate of morbidity compared to the other pelvic fracture. Complex pelvic fracture is defined as a pelvic fracture with soft tissue injury in the pelvic region, accompanied with hemodynamic instability of the patient[1]. Soft tissue injury includes injury to structures namely urogenital structure, rectum, sigmoid, lumbosacral plexus, and retroperitoneal vessels. Being highly associated with chronic pain, sexual dysfunction, and infection; complex pelvic fracture has a mortality rate of 33%, compared with 10-20% mortality rate for both unstable pelvic fracture and open pelvic fracture and 42% for open pelvic fracture alone[2-4].

Complex pelvic ring fractures require an aggressive approach. Hemodynamic instability requires an urgent stabilization of the pelvic ring with external pelvic fixator or pelvic binder and hemodynamic resuscitation with fluids and blood substitutes [5]. Extreme blood loss associated with complex pelvic ring fractures is possibly due to enlarged volume of the injured pelvis caused by a gap within the symphysis (pubic diastasis) or in the region of the pubic rami and by a shift in the posterior pelvic segment. Hence early realignment and proper anatomical restoration of pelvic ring by surgical fixation of the anterior and posterior segment is needed for good result.

This study assessing the outcome of these patients especially after the early definitive surgery is particularly important since previous studies about complex pelvic fractures mainly were focused on the survival rate. In this study, we assessed the clinical, functional and social outcome of open pelvic fracture and unstable pelvic fracture (Tile classification type B and type C) treated using internal fixation surgery in our trauma centre with the aim to evaluate the outcome which will subsequently help to increase the quality of treatment in terms of outcomes thus further reducing the morbidity and mortality rate. Also the high number of complex pelvic fracture patients in our level 1 trauma centre would enable us to quantify and analyse our data with high credibility.

MATERIAL AND METHOD

In this observational study, data of complex pelvic fracture patients treated by internal fixation in level 1 trauma care centre, Government Medical College, Nagpur, during 1st June 2018- 31st December 2019 was collected retrospectively. The data was pooled out, patients were followed up. They were assesed with clinico radiological examination and questioned in detail in the follow up for the study.

Inclusion criteria: Patients with open pelvic fracture or unstable pelvic fracture (type B and C Tile classification), who underwent internal fixation and were followed for a minimum of 6 months after internal fixation surgery.

Exclusion criteria: 1>Complex pelvic fracture patient with other comorbidities and only have external fixation as definitive treatment. 2> Patients non-compliant for follow-up.

Patients with complex pelvic fracture were first stabilized and then within 3-7 days was operated upon for definitive fixation surgery after complete preoperative workup. Anterior column, pubic rami and symphysis were fixed using Phannensteil incision with modified Stoppa dissection while posterior column, Cresent fractures, SI Joint and iliac blade were approached 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.

Among the several scoring systems 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[6]. 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. These scoring systems were chosen so that evaluation of clinical, functional and social outcomes from management of complex pelvic fracture can be accomplished.

Complex pelvic fracture cases from 1st June 2018 till 31st December 2019 were followed up for a minimum period of 6 months and evaluated using the Majeed Pelvic Score and

Hannover Score for Polytrauma Outcome (HASPOC). Comorbidities and complications like chronic pain, sexual dysfunction, and infection were also assessed and evaluated. The result was analysed with SPSS ver.20. All of the association between the variable were analysed with Fischer exact test. The Multi-variant analysis of complex pelvic fracture and comorbidities and functional score were analysed by using logistic regression.

The work was approved by the appropriate ethical committees related to the institution in which it was performed and subjects gave informed consent to the work and data collected from them.

RESULTS

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. Average age was found to be 34.9 ± 11.7.

Gender wise most patients were male (70%) while females were 6 (30%). Age wise most patients were in the group of 20-40 (65%) while there were 3 (15%) in group of <20 and 4(20%) in group of >40. Based on type of fracture, closed pelvic fractures were 19(95%) and open pelvic fractures were 1(5%) while Tile type B fractures were 11(55%) and Tile type C being 9(45%). We had five cases (25%) of complex pelvic fracture combined with poly-trauma cases. Most complex pelvic fractures were accompanied with urogenital injury (45%) [Table 1]. Sexual dysfunction (35%) and chronic pain (35%) were the most frequent complications observed followed by infection (20%) [Table 2]. Sexual dysfunction occurred in 7 patients and all of them were males. So statistically sexual dysfunction occurred in 50% of male patients with complex pelvic fractures. 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.

In Tile type B and type C fractures, Excellent Majeed Score were found on 72% and 55.6% cases respectively; while Hannover Score was very good in 36.4% type B cases and 22.2% type C cases; and good in 66.3% type B cases and 77.8% type C cases. In closed fractures, Majeed score was excellent in 63.2% and good in 36.8%. Single open fracture case had excellent Majeed score and very good Hannover score [Tables 3].

Statistical Analysis

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. Other variables like gender, open or closed fracture, Tile type fracture were statistically insignificant when compared to the functional score (Majeed or Hannover).

Table 1

COMORBIDITIES	Number of patients – n (%)
Urogenital injury	9 (45)
Fracture in extremities	6 (30)
Perineal rupture	3 (15)
Head injury	2 (10)
Abdominal injury	2 (10)

Table 2

COMPLICATIONS	Number of patients – n (%)
Sexual dysfunction	7 (35)
Chronic pain	7 (35)
Infection	4 (20)
Neurological deficit	1 (05)
Non-union	2 (10)

Table 3 OUTCOME ASSESSMENT USING MAJEED SCORE AND HASPOC

MAJEED Score at 6 months follow-up	score more than 85 EXCELLENT	score 70-84 GOOD
Fracture type by Tile classification	Number of patients – n (%)	Number of patients – n (%)
Tile type B (n=11)	8 (72)	3 (28)
Tile type C (n=09)	5 (55.6)	4 (44.4)
Fracture type Closed / Open	Number of patients – n (%)	Number of patients – n (%)
Closed (n=19)	12 (63.2)	7 (36.8)
Open (n=01)	1 (100)	0 (0)
Hannover Score (HASPOC)	Very good - n (%)	Good - n (%)
Tile type B (n=11)	4 (36.4)	7 (63.6)
Tile type C (n=09)	2 (22.2)	7 (77.8)

DISCUSSION

Open pelvic fractures have been traditionally known to have worse functional scores than closed pelvic fractures[8-9]. These difference also occur due to the small number of patients with open pelvic fractures and usually are correlated with other comorbidities[10]. Though our study only included only single open fracture patient, there was no statistically significant difference between the functional outcome of open and closed pelvic fracture.

Many findings and analysis in our study were found to be consistent with previous studies on complex pelvic fractures. The mean age of patients in this study was around 35 years corresponding to mobile working adults which is comparable with the study by Mardanpour *et al* that had the mean age of 37 years[7].

The functional outcome after internal fixation in complex pelvic fracture at our trauma centre was excellent in around 70 % patients while remaining patients had good outcome. Thus the overall outcome was satisfactory. In our study 72 % of Tile type B patients had excellent and good functional score, while in Tile type C patients, excellent and good functional score was found in 56% cases. Studies by Pohlemann *et al* and Mardanpour *et al* have found that the percentage of excellent and good functional score in Tile type B fracture is better than Tile type C fracture which is consistent with our study[11-14]. There is also no association between poly-trauma status and functional outcome of the complex pelvic fracture patients treated with internal fixation that were included in the study[15]. It is worthwhile to note that this co-relation cannot be applied to complex pelvic fracture patients that were not included in the study.

Of all the complications in complex pelvic fractures, sexual dysfunction is one of the most common [16-17]. Though overall incidence of sexual dysfunction was 35%, all patients having sexual dysfunction were males resulting in 50% incidence in males with complex pelvic fractures. Previous studies have shown that morbidity due to sexual dysfunction can reach upto around 60% of complex pelvic fracture cases[18-20]. In our study it was found that sexual dysfunction occurred in patients with associated pubic rami fracture or pubic diastasis as a component of complex pelvic fracture. The reason for this association can be hypothesized as due to abnormal pathological stretching and injury of neurovascular bundles of cavernosal bodies.

Chronic pain is a common complication in complex pelvic fracture affecting the patient's quality of life[21-22]. Studies by Langford *et al* and Pohlemann *et al* have shown that chronic pain commonly occurs in Tile type C fracture which is consistent with our study[23-24]. Chronic pain that occurred more in type C fractures was mostly due to sacroiliac joint pain in

these cases. Study by Meyhoff et al showed that chronic pain that occurred in their series can be attributed to persistent nerve lesions that were seen in 40% of patients with AO C and 5% with AO B fractures.

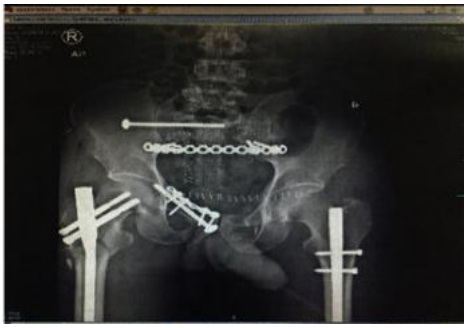
Study by Burkhardt *et al* [25] concluded that internal fixation should be performed within 7 days to get optimal outcome. In our study, we performed early definitive fixation of complex pelvic fractures to get excellent and good result, however, good preoperative preparation and intra and perioperative concurrent management by multi diciplinary teams is essential for good functional outcomes after definitive treatment of complex pelvic fractures.

CONCLUSION

Though the type of fracture is of little significance in determining the functional outcome of complex pelvic fracture patients after definitive fixation, Tile type C fractures have a preponderance towards landing the patient in chronic pain.

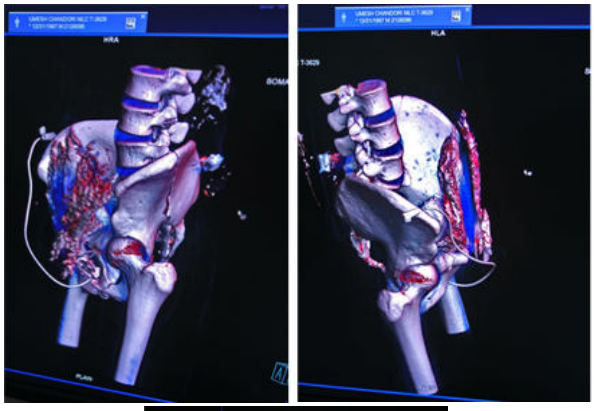
Sexual dysfunction is one the common complications associated with complex pelvic fractures, especially in males and its incidence is significantly related to presence of pubic rami fracture or pubic diastasis in a complex pelvic fracture patient.

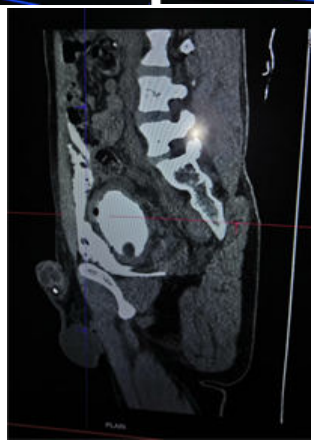
Early (3-7) definitive fixation of complex pelvic fractures have shown very good clinical and functional outcomes and can be conveniently relied on as a principle in management of complex pelvic fracture patients.

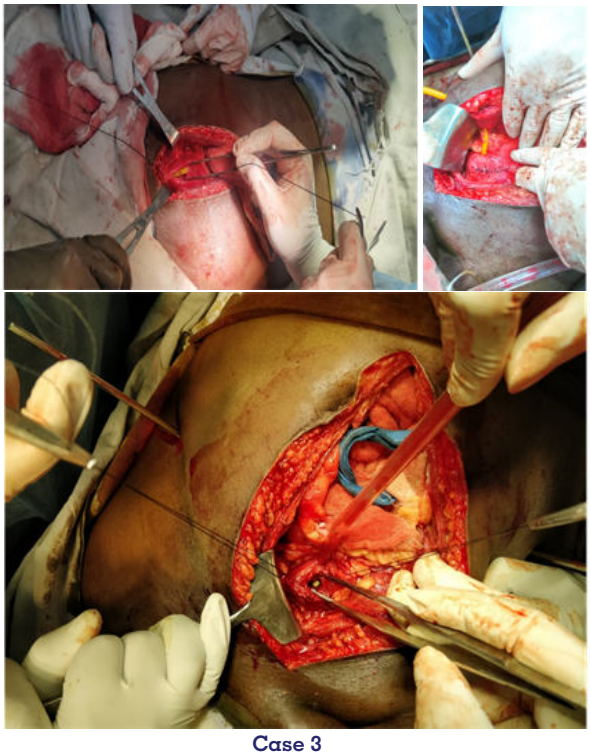


Case 1

Case 2







Case 3

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