ORIGINAL RESEARCH PAPER
Volume-6 | Issue-9 | September-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ANALYSIS OF SURGICAL MANAGAMENT OF UNSTABLE PELVIC FRACTURES

Orthopaedics

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ABSTRACT

Twenty one patients with unstable pelvic fractures were treated surgically and analyzed with an average follow up of 8.7 months (range 3-16 months). 13 out of 21 patients suffered Tile's type B injury and the remaining were type C injuries. In our study, 11 patients (52.4%) had associated skeletal and/or soft tissue injuries. Six of the twenty one patients were hemodynamically unstable after resuscitation. Emergent external pelvic fixation was done in all these patients. The remaining 15 patients were treated with open reduction & internal fixation.3 patients died in the acute phase. Functional outcome of the survived patients were assessed using the pelvic outcome scale by Cole et al. 2 patients were lost for follow up and 1 patient could not be functionally evaluated due to associated injury. Of the remaining 15 patients, 12 had good, 2 had fair and 1 patient had poor outcome.

KEYWORDS

C.V.D in Kashmir Valley, Deuteranomalia, C.V.D, Most Common

INTRODUCTION

Pelvic injuries are an important aspect of orthopaedic trauma, which are caused by high velocity injuries such as road traffic accidents and industrial accidents. The management, especially those of unstable pelvic ring injuries is complex and challenging to the orthopaedic surgeon. Conventional orthopaedic wisdom is that patients who survive disruption of pelvic ring eventually have few musculoskeletal problems. Of late, several studies underscore the fact that not all pelvic disruptions are alike. The stable injuries generally have a good prognosis, whereas as without thoughtful orthopaedic management the unstable types have a much poorer prognosis. This led to clinical trials on internal fixation and several studies have shown that early open reduction and stable internal fixation improves the chances of survival and more importantly, reduces the incidence of late musculoskeletal morbidity.

Materials and Methods

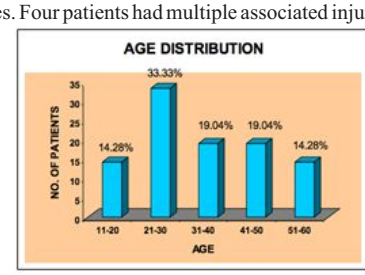
Our study is an analysis of 21 cases of unstable pelvic injuries (Tile's Type B and C) managed surgically by external fixation or open reduction and internal fixation. The study period extends from October 2004 to October 2006, done in Rajiv Gandhi Government General Hospital, Chennai, India. All the patients with stable pelvic ring injury (Tile type A) were excluded from the study. Unstable pelvic injury patients, who died before surgical intervention (3 patients) and patients who couldn't be operated for various reasons were excluded from the study.

Advanced Trauma Life Support (ATLS) protocol was followed for management of patients in the acute stage. A detailed clinical examination and radiological assessment was done in all patients by means of which the injury pattern and stability of the injured pelvis was assessed.

Decision on emergent external fixation or elective internal fixation was made on case by case basis, depending on the hemodynamic stability of the patient and the fracture pattern. Only those patients who were hemodynamically unstable after aggressive general resuscitation were taken up for emergent external fixation. All other patients whose hemodynamic status got stabilized after resuscitation were managed by elective open reduction and internal fixation irrespective of the type of fracture. The age of the patients ranged from 13 to 58 years. The mean age was 31.5 years. One third of our patients belonged to the third decade (33.33%) followed equally by fourth & fifth decade (19%).Nearly 50% of our patients were less than 30 years of age. In our study, male patients predominated with the male: female ratio of 18:03. Majority of patients suffered road traffic accidents followed by fall from height.

Two patients suffered open fractures in our series and the rest were closed injuries. The various types of fracture pattern in our series were as follows. 13 out of 21 patients suffered Tile's type B (rotationally unstable) injury. But analyzing the subtypes, Tile's type C1 (unilateral vertical shear) was the commonest type involving 8 out of 21 patients.

In our study, 11 patients (52.4%) had associated skeletal and/or soft tissue injuries. Four patients had multiple associated injuries.



Tile's type	*No. of patients*
B1	06
B2	06
B3	01
C1	08
C2	Nil
C3	Nil

Associated Injury	*No. of Patients*
Fracture of shaft of humerus	01
Fracture of BB forearm	01
Fracture of scapula and ribs	01
Fracture of neck of femur	02
Subtrochanteric fracture of femur	02
Fracture of shaft of femur	01
Fracture shaft of tibia	01
Fracture of acetabulum	01
Posterior dislocation of hip	01
Nerve injury (L4, L5 roots)	02
Injury to urethra	01
Injury to urinary bladder	01
Injury to external iliac artery	01
Head injury	01

One patient had associated vascular injury. The injured vessel was external iliac artery. One patient had post injury nerve palsy, which recovered partially. One case of a rare type of injury, a locked symphysis pubis was encountered.

Surgical Procedures

Various surgical procedures and approaches used are as follows.

Procedure	*No. of cases*
External fixation	06
Open reduction and internal fixation of sacroiliac joint Anterior approach (Plating). Posterior approach (Ilio sacral screws).	02 03

Open reduction and internal fixation of ilium	03
Open reduction and internal fixation of symphysis pubis (Plating) Symphysis pubis diastasis. Locked symphysis.	07 01

Functional Outcome

Functional outcome of the survived patients were assessed using the pelvic outcome scale by Cole et al. It is based on a 40 point scale for pain, ambulation, work and activity status, clinical examination and radiographic appearance.



Fig 1 Left unilateral vertical shear with upward displacement of left hemipelvis, treated by combined anterior and posterior fixation. Patient had implant loosening anteriorly however good functional results.



Fig 2 AP view of the injured pelvis & CT Scan showing Disruption of Lt. SI joint



Fig 2 10 months Post OP x-ray showing fused left sacroiliac joint

Results

Twenty one patients with unstable pelvic fractures were treated surgically and analyzed with an average follow up of 8.7 months (range 3-16 months). Functional outcome of the survived patients were assessed using the pelvic outcome scale by Cole et al. Six of the twenty one patients were hemodynamically unstable after initial general resuscitation. Emergent external pelvic fixation was done in all these patients. Three patients died in the acute phase. Two patients died within few hours and the other who died after 9 days had unidentified bowel injury with intra abdominal sepsis at autopsy. Average surgical time was 30 minutes for external fixation group and 103 minutes (range 60-180) for the internal fixation group. The average time delay between injury and surgery was 9.6 hours (range 2 to 24) for emergency external fixation group and 22.26 days (range 4-72 days) for the elective internal fixation group.

One patient had implant loosening with screw migration. One patient developed post operative neurological deficit(L5palsy) which recovered partially. Two patients in the external fixation group (3 out of 6 died) had pin tract infection. One patient in internal fixation group (out of 15) had superficial postoperative infection. Anatomical reduction was obtained in 10 out of 15 cases of internal fixation. Perfect reduction could not be obtained in any of the patients in external fixation group. One patient had worsening of displacement at sacroiliac joint postoperatively after a non-anatomic reduction during surgery. The mortality rate of unstable pelvic injuries after surgical fixation in our study was 14.3% (3 of 21 patients). Thrombop rophylaxis was not used in our patients and we did not have any symptomatic deep vein thrombosis. Three patients died and two patients were lost for follow up. In one patient the functional outcome couldn't be assessed due to associated injury. Out of 15 remaining patients, 12 had good, 2 had fair, and 1 patient had poor outcome.

Discussion

Despite aggressive resuscitation including application of external fixators, the mortality of 10-20% remain unchanged. The mean age of the patient in our study was 31.5 years where as the SunnyBrook Medical Centre[2] series reported 30.9 years. Cole et al[5] reported an average age of 32 years. Sunil et al[6] reported on 78 cases with an average age of 29.99 years (range 10-65).

13 of the 21 cases suffered Tile's type B injury against 8 cases of type C injury. But Tile's type C1 (unilateral vertical shear) comprised of the single most common of subtype (8 cases/38%) followed by type B1 and B2(6 cases each). We did not encounter any case with Tile's type C2 or C3. Cole et al5 in their series of 64 vertically unstable injuries reported Tile's type C1 in 75% of cases. Miranda et al[9] in his series of 80 patients, reported 31 cases of Tile's B type and 24 cases of C type injuries.

A rare case of type B injury, a locked symphysis pubis was treated successfully by open reduction and internal fixation with symphyseal plating. Few authors like Shanmugasundaram[10], Webb[11] have reported a single case with such type of injury Among nine patients with pubic symphysis diastasis, 8 patients were treated with elective open reduction and symphyseal plating, and one patient with emergent external fixation. The patient who was treated with external fixation died in the acute phase and 1 patient in internal fixation group lost follow up. Other seven patients had good functional results.A single plate was used in all fractures. One patient, in whom anterior plating was done, had implant loosening with screw migration down the thigh. Tornetta et al[7] reported on 29 patients operated with a single symphyseal plate. They reported 96% excellent results and four cases of hardware failure. Webb et al[12] in his series of 14 cases treated with a two holed plate fixation encouraged early mobilization of his patients and concluded that single plating allows some normal motion to take place at the symphysis pubis. However McGowan et al4 and Schied13 in their studies concluded that two plates at 900 would give excellent stability, especially to the unstable pelvis.

In our study, [7] patients were treated with open reduction and posterior internal fixation, including one case of combined fixation. Two patients had anterior plating of the sacroiliac joint, three patients were treated with open reduction and posterior iliosacral screw fixation and three others had 3.5 mm reconstruction plating for ilium. In two patients treated with iliosacral screws, reduction was unsatisfactory with sacroiliac joint mal alignment. One of them had further vertical displacement at the sacroiliac joint after he started early weight bearing. Both the patients had posterior pain. Tornetta et al[14] reported on 48 patients of unstable posterior pelvic ring disruptions treated with open reduction and internal fixation. 67% of patients had good functional results. Cole et al[5] on 51 patients treated with posterior infernal fixation for type C injuries reported that 15 patients had functional deficits with a mean pelvic score of 29 points (Range 8-40).

The major cause of mortality in pelvic fractures is hemorrhage. Direct injury to arteries is reported in 10-20% of patients with massive hemorrhage[2]. The incidence of direct tear of a large bore artery like external iliac artery is rare (Wolfgang K Ertel). Metz et al[15] reported on 39 consecutive patients with hemodynamic instability who underwent pelvic angiography. In their study, bleeding from either internal iliac artery or its branches were the cause of hemorrhage in all of their patients. However it is surprising that in our study, we came across three patients with arterial injury and all of them had external iliac artery injury.(Two of them died before skeletal stabilization who were excluded from this study and one patient treated with external fixation and vascular repair also died on 3rd day).

Conclusion

Despite better understanding of the personality of the acutely injured pelvis and modern aggressive treatment modalities, the mortality rate still remains high. Periodic thorough clinical and radiological assessment is mandatory to identify any occult injury. The role of team approach with various specialists cannot be over emphasized. The degree of hemodynamic instability does not correlate with type of pelvic injury. Emergent external skeletal fixation alone is not sufficient

to restore hemodynamic stability in all patients who fail to improve after initial resuscitation.

Anatomic reduction and internal fixation of unstable pelvic injuries gives excellent stability, allows early mobility with good functional outcome. Delayed internal fixation was not associated with increased perioperative morbidity and might achieve better reductions than those could be obtained with external fixation. Delaying the fixation, however, increased the difficulty of obtaining anatomic reduction in certain cases. Even delayed internal fixation may yield equally good functional outcome in patients where anatomic reduction could be obtained. Acute management of unstable pelvic injuries is challenging and techniques of safe internal fixation are demanding. Constant dedication to improvement is and must be the goal of pelvic surgeons.

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