

Presentation and Management Outcomes of Pelvic fractures: a single Institutional Review.

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Abstract

Background: Pelvic fractures are orthopaedic emergencies associated with polytrauma. These fractures have gradually increased in recent times as a result of increasing high speed and complex road traffic accidents.

Objective: To describe the presentation and management outcome of patients that were managed in our institution for pelvic fractures over the study period

Methodology: We retrospectively reviewed the hospital records of patients who were admitted and treated in our hospital with pelvic injuries from February 2012 to January 2015.

Results: Majority 122 (75.8%) of the patients in this study were aged below 40 years. These fractures were mostly caused by road traffic accidents. Most 116 (71.9%) of our patients had Tile class A and B fractures. Polytrauma seen in 41.6% of the patients was the most common associated injury seen with

pelvic fractures. The mean Injury Severity Score (ISS) 31.4 shows that these patients were mostly severely injured patients. The fatality rate in this study was 16.12%. These mortality were higher for patients with Tile class C than B injury and no death was recorded for class A injuries.

Conclusion: Majority of the patients were less than 40 years and Road Traffic Accident is the commonest aetiology. Many were successfully managed conservatively particularly those with stable and partially stable injuries. Functional outcome is generally good.

Key words: Pelvic Fractures, Injury Severity Score, Pelvic Fractures

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Introduction

Pelvic fractures are reported to represent 4% of all fractures encountered^{1,2,3}. The trauma is commonly associated with multiple injuries and a high mortality rate^{2,4,5}. The incidence of pelvic fractures has been on the increase over the last decade because of increasing rates of high speed accidents and trauma^{3,4}.

Mortality rate of pelvic fractures in association with multiple injuries ranges from 30% to 58%^{3,6}. It is a common cause of death in trauma. Delayed recognition and inappropriate management of the trauma patient with pelvic injury can lead to a poor and fatal outcome⁷. Pelvic fractures historically have been treated non-operatively^{2,3}.

Severe injuries to the pelvis that involve several breaks can be life threatening. Shock, extensive internal bleeding and internal organs damage may be involved, requiring urgent treatment.

In such severe injuries the fracture may be treated by closed reduction under general anesthesia, traction, Spica casts, pelvic slings and turnbuckles^{2,3}. Operative management of unstable pelvic injuries has increased in

recent Orthopaedic history due to improved Anesthetic techniques, improved blood salvage systems and recent advances in intra-operative image intensification, and availability of malleable implants.

Operative treatment allows for early patient mobilization and improved clinical outcomes. Conservative management in most cases leaves the patient with continuing pain⁸, nonunion especially of the posterior complex and malunion in over 40% of cases⁶. However, even with operative treatment a large number of patients, > 9% still had chronic pain.

In most resource- poor countries like ours, non-operative modalities of treatment continues to play a major role in the treatment of all pelvic fractures with apparently good results. Olasinde et al⁴ in South West Nigeria noted good to excellent outcome in their study.

The management of associated soft tissue injuries must also be aggressive, including meticulous wound debridement and irrigation. Where need be, selective faecal diversion based on wound location is compulsory and safe, thereby minimizing the risk of sepsis and reducing mortality rates.

Materials and Method

This was a retrospective study, using reviews of medical record of patients admitted during February 2012 to January 2016 at Lagos University Teaching Hospital.

Lagos State is the smallest state in Nigeria with an area of 903,066 acres (3,777 square kilometers). In spite of this, it

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has the highest population of over 18 million growing at 3.2% annually with population density of 5032 persons per sq.km

A total of 161 patients who presented to the hospital with history of trauma, a radiological evidence of pelvic fractures and or ligamentous disruption on plain radiograph or CT scan. All patients with significant comorbidities which may affect outcome e.g. tuberculosis, congestive heart failure etc were excluded.

Injuries were managed according to the usual local protocols. Pelvic fractures were classified according to the Tile's classification into types A, B and C. (Figure 1)⁹ The bio data of the patients, age of patients, aetiology, and treatment modalities, length of hospital stay as well as associated injuries and management outcome were obtained and analyzed with SPSS. The fractures were radiologically classified using Tiles classification¹⁸ into group A, B and C depending on severity as shown below.

Results

A total of 161 patients were seen and treated in the period under review. Their ages ranged from 11years to 75years. Mean age was 38 ± 13.74years. One hundred and twenty two (75.8%) of the patients were aged below 40 years. There were 109 males and 52 females giving a male: female ratio 2.1:1. Table 1, age and sex distribution.

Figure 1: The Tile Classification of Pelvic injuries

Classification of Pelvic Ring Lesions	
Type A: Stable (Posterior Arch Intact)	
A1	Avulsion injury
A2	Iliac wing or anterior arch fracture caused by a direct blow
A3	Transverse sacrococcygeal fracture
Type B: Partially Stable (Incomplete Disruption of Posterior Arch)	
B1	Open book injury (external rotation)
B2	Lateral compression injury (internal rotation)
B2-1	Ipsilateral anterior and posterior injuries
B2-2	Contralateral (bucket-handle) injuries
B3	Bilateral
Type C: Unstable (Complete Disruption of Posterior Arch)	
C1	Unilateral
C1-1	Iliac fracture
C1-2	Sacroiliac fracture-dislocation
C1-3	Sacral fracture
C2	Bilateral, with one side type B, one side type C
C3	Bilateral

Pedestrian motor vehicle accident (MVA) was the most common cause of injury with 57(35.1%) patients followed by motor vehicular accident with 40(24.6%) patients and motorcycle accidents with 34(21.1%) patients (Table 2).

The duration of patients' complaint at presentation varied from 1 hour to 672 hours (28 days). Eighty two

(50.9%) of the patients presented in the first 12 hours following injury. Seventy six (76%) percent (63 of 82) of the patients who presented within 12 hours of their injury required blood transfusion. Forty seven(47%) percent of the patients were transfused between 1 to 2 units of blood and 32.8% 3 to 4 units of blood respectively. Further 25.2% patients were transfused 5 to 6 units of blood. All transfused patients belonged to Tile class B and C with transfusion rates of 48.3% and 58.9% respectively.

Table 1: Age & Sex Distribution

Age (years)	Female	Male	Total	percentage
11-20	9	14	23	14.3
21-30	20	52	72	44.7
31-40	7	20	27	16.8
41-50	6	6	12	7.5
51-60	6	4	10	6.2
>60	4	13	17	10.5
Total	52	109	161	100

Table 2: Distribution by aetiology of injury

Aetiology	Frequency N161	Percentage
MM (Occupants)	40	24.6
MCA (Riders)	34	21.1
Collapsed building	3	1.8
Pedestrian MVA	57	35.1
Fall from height	3	1.8
Pedestrian MCA	13	8.7
Industrial accident	11	6.9
Total	161	100

Whereas none of the Tile A patients was haemodynamically unstable, 35.3% of the Tile B and 55.6% of the Tile C patients had haemodynamic instability. p = 530 (Haemodynamic instability as defined by Heini and Ganz¹³ referred to ratio of pulse rate to systolic blood pressure at presentation of greater than 1.

The mean age of patients with haemodynamic instability at presentation who survived was 32 ± 6.75 years whereas that of those that died was 55 ± 18.06 years p= 0.026

Mean injury severity score was 31.4 ± 11.6. Serial chi square for ISS revealed ISS >35 as level above which the risk of dying became significant (p < 0.05). The mean injury severity score (ISS) for patients that survived and died were 29.57 ± 13.09 and 41.17 ± 7.88 respectively. p= 0.044. Seventeen (65%) of the patients that died were

older than 55 years old. $p=0.002$.

Among the 161 patients studied, 56 patients (34.7%) had type A injury, 60 patients (37.2%) had type B and 45 patients (28.1%) had type C injury. Table 4. One hundred and eight (70.8%) patients had associated injuries. Traumatic shock was a common early complication in most of the patients with Tile B and C fractures, seen in 65 (40.6%) of these patients followed by polytrauma 24%, Urethral injury 15.3% with Gastrointestinal injury and Neurologic injuries being 8.2% and 9.7% respectively. Eighty (80) percent (4 of 5) of patients with open fracture had sepsis.

Table 3: Classification of injuries

Tile class	Frequency	Percentage
A1	22	13.7
A2	34	21.1
B1	11	6.8
B2	42	26.1
B3	7	4.3
C1	29	18.0
C2	12	7.5
C3	4	2.5
Total	161	100

Table 4: Tile's classification by treatment

Type of fracture	Number of patient	Type of treatment	
		Non operative	Operative
A	56	56 (100%)	
B	60	52 (87%)	8 (13%)
C	45	41 (91%)	4 (9%)
Total	161	149 (93%)	2(7%)

One hundred and forty nine (93%) of the patients were managed conservatively. The most common conservative treatment modality used was bed rest alone in 70 (43.8%) patients, followed by bed rest and skeletal traction in 44 (27.1%) patients. A total of 179 chronic complications were noted in 121(72%) of the 161 patients. The most common late complication was post traumatic pelvic pain accounting for 55.69% of the complications. Other late complications include malunion 35.4% and non – union 8.8% respectively, figure 3.

The fatality rate in this study was 26 (16.12%) patients, of which 16 were males and 10 were females. Thirteen patients died within 1 to 3 days of arrival to the

hospital, 7 patients died within 4 to 10 days and 6 patients after 10days. Seventeen (65%) of the patients that died were older than 55 years of age, $p= 0.002$. Mortality of pelvic fracture associated with the multiple injuries is shown in the Table 5.

Figure 2: Associated injuries/complications

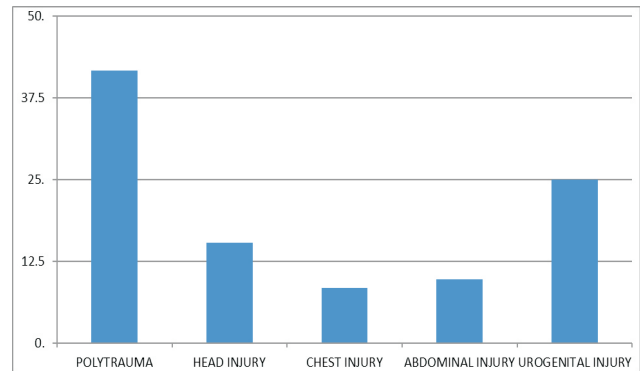


Figure 3: Types of conservative treatment

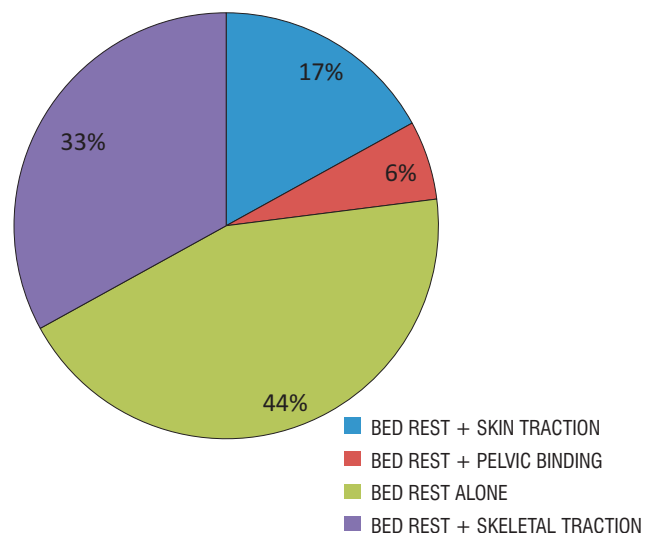


Table 5: Associated injuries and mortality.

Association injury with pelvic fracture	Mortality	Percentage
Polytrauma	10	38
Head injury	7	27
Abdominal injury	7	27
Urogenital injury	2	8
Total no deaths	26	100

Patients who were surgically treated returned to their work without significant disability and complication in an average of 16 weeks in Tile B and 16 to 22 weeks in Type C. The average hospital stay of the patients in our study was found to be 14 days in operative group and 42

to 56 days in conservatively treated group due to prolonged period of traction. The overall functional outcome was good.

Table 6: Functional outcome

OUTCOME	NUMBER	PERCENTAGE
Excellent	108	67.0
Good	32	17.9
Satisfactory	17	10.6
Bad	4	2.5
Total	161	100

Duration of hospital stay was 2 to 4 weeks for those who were operated upon compared to 8 to 12 weeks for those who not operated ($p = .001$). Forty four (27.3%) of the patients had pelvic pain at 6 months. There were 18 (26.7%) in Tile class B and 26 (57.8%) in tile class C. There was a steady increase in the proportion of all patients with no persisting pelvic pain and a gradual increase of Grade 1 and a decline of those with grade 11 and 111 scores over time with treatment was also noted. At the end of 24 weeks follow up, 19 (11.8%) patients had pelvic pain chronicity. Four (2.3%) and 3 (1.9%) patients had Grade 11 and Grade 111 pain scores respectively. $p = 0.005$ confirming the decrease in pain with treatment as statistically significant.

Discussion

Pelvic fractures are known Orthopaedic Emergencies Associated with polytrauma. The occurrence of pelvic fractures has gradually increased in recent times as a result of high speed and complex Road Traffic Accidents (RTAs). Majority (75.8%) of the patients in this study were aged below 40 years with the modal age class found to be 21-30yrs. These findings are in agreement with finding of other studies⁴. The male to female ratio of 2.1:1 is similarly consistent with the work of other authors and this suggests that young adult males who are very energetic and active are more prone to pelvic fractures⁴. These fractures are mostly caused by RTAs which are the most common cause of morbidity and mortality in the productive period of life^{4, 6, 10}. The reason for the male preponderance may be related to the higher number of males involved in road traffic and industrial accidents. Similar higher male preponderance is as found by Olasinde et al⁴ and Demetriades et al¹⁰. Most (71.9%) of our patient had Tile class A or B fractures. This compares with the finding of Tile et al^{2,7}. Only 3.1% had open fractures. These correlates with the finding of 5.6% by Olasinde et al⁴. Polytrauma (41.6%) was the most common associated injury seen with pelvic fractures, however urogenital injury (25%) was a

significant single injury associated with pelvic fracture. This is less than the 35% reported by Bartolomeo and Michelutto in their study of epidemiology of high grade trauma in 2009¹². This difference may be due to the exclusion of urogenital injury patients without pelvic fracture from our study.

The ISS score of 31.4 was significantly higher than 20.1 obtained by Olasinde et al⁴ in Ile-Ife Nigeria, this means that our patients were more severely injured. There was a high transfusion rate for patients with unstable fractures, 48.3% and 58.9% for Tile B and C fractures respectively. This compares well with 38 to 75% found by Demetriades and coworkers¹⁰.

The mortality in this study was 16.12%. These level of mortality were higher for patients with Tile class C than B injury and no death was recorded for class A injury. All deaths occurred within two weeks of admission. The early deaths were as a result of severe shock and occurred within 12 hours of presentation; the period of ongoing resuscitation while the late deaths were as a result of sepsis and effect of associated injuries. This finding was similar to the study by Pohleman and others¹³. It therefore follows that Hemodynamic instability and or shock at presentation was associated with a significant risk of dying ($p < .05$). Whereas none of the patient with Tile A died being relatively stable, over 39% of the more unstable Tile B and C with hemodynamic instability and significant associated injuries and/or sepsis died. These compare with the findings of Henni and Gaaz¹⁴ who reported a mortality of 44% and 57% by Starr AJ et al¹⁵ in their respective studies. Elderly patients were more likely to die as shown by a mean age of 55years for those that died and 32years for survivors ($p = 0.026$).

This was also the same as was found by Henry et al¹⁶ who reported that patients older than 55yrs have a greater chance of death than younger ones. The higher rates of death among older patients have been attributed to a number of issues ranging from their limited physiologic reserve to increased susceptibility of older atherosclerotic vessels to tearing and low resistance to sepsis¹⁶. Overall, the patients that died were more severely injured as shown by their higher mean ISS of 41.17 ± 7.88 compared to 29.57 ± 13.09 for those that survived. This is also as reported by other studies¹⁷. Assessment of morbidity/disability showed that 44(27.3%) of all patients had pelvic pain at 6months. This high prevalence of post-traumatic pelvic pain is far less than the findings of Gerbershagen et al¹⁸ who reported values as high as 63.8% at over 12months of follow up. This may be as a result of their study assessing only patient with unstable pelvic fractures.

Finally on the management outcome, good to excellent outcome was noted. Gradually decreased in

pain with time and treatment shows an outcomes were statistically better ($P < .005$) in patients who had significant decrease in pain with time and treatment.

Conclusion

Pelvic fracture is an orthopaedic emergency, the active age group is predominantly affected and mortality is high especially for the unstable injuries with hemodynamic instability, associated injuries with hemodynamic instability, associated injuries and Sepsis. Mortality is also higher in older patients. Those with stable and partially stable injuries did well on conservative treatment. Functional outcome is generally good.

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