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Original Research Article

An epidemiological trend in surgical management of pelvis and acetabulum fractures at Indira Gandhi Institute of Medical Sciences level-1 trauma centre in Patna: a retrospective study

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ABSTRACT

Background: Pelvic and acetabular fractures, principally resulting from high-energy trauma like motor vehicle accidents, are challenging orthopedic injuries that can lead to significant morbidity and functional impairment. Understanding their epidemiology, treatment, and outcomes is crucial for improving patient care.
Methods: This retrospective cohort study involving 34 patients who underwent surgery for pelvic and acetabular fractures from April 2021 to September 2023. Data on patient demographics, injury mechanisms, fracture types, surgical approaches, and post-operative outcomes were collected and analyzed.
Results: The study group comprised predominantly males (67%) with mean age of 35 years. Road traffic accidents were the leading cause of injuries (95%). The most common fracture types were the posterior wall of the acetabulum (10%) and type II anteroposterior compression fractures (10%). Related injuries included long bone fractures (62.5%) and posterior hip dislocation (33.33%). Surgical treatment primarily involved open reduction and internal fixation with various approaches. Postoperative complications included sciatic nerve palsy (4.17%), venous thromboembolism (20.83%), and wound infections (12.5%), but both post-operative mortality and heterotopic ossification were absent.
Conclusions: The study highlights the prevalence of pelvic and acetabular fractures due to road traffic accidents and the complexity of their surgical management. The associated injuries and postoperative complications underscore the need for specialized orthopedic care.

Keywords: Pelvic fractures, Orthopedic surgery, Acetabular fractures, Postoperative complications

INTRODUCTION

Pelvis and acetabulum fractures are significant orthopedic injuries often associated with high-energy trauma, such as falls from heights, motor vehicle accidents, or industrial mishaps. These fractures can lead to severe morbidity and functional impairment if not appropriately managed.[1] In recent years, there has been a growing interest in studying the epidemiology of surgically treated pelvis and acetabulum fractures to better understand their incidence, demographic patterns, and associated risk factors.[2]

The rising prevalence of these fractures is a matter of concern, as they often require complex surgical interventions and extensive rehabilitation. Additionally, they may have a significant negative effect on the quality of life of those who are impacted, which may result in long-term incapacity and financial strain on healthcare systems.[3]

Epidemiological studies play a crucial role in identifying the trends and characteristics of pelvis and acetabulum fractures. They can provide insights into the age, gender, and socioeconomic factors associated with these injuries, helping healthcare providers and policymakers allocate resources effectively.[4] Additionally, understanding the mechanisms of injury and associated risk factors can contribute to the development of preventive strategies,

such as improved safety measures in high-risk industries or enhanced traffic safety regulations.

This study's objective was to conduct an epidemiological analysis of fractures of the pelvis and acetabulum that were operated on by Indira Gandhi Institute of Medical Sciences (IGIMS), Patna.

METHODS

Study design

It was a retrospective cohort study.

Study setting

The study was conducted at IGIMS, Patna, India, between a period of April 2021 to September 2023.

Participants

The study included 34 patients who had presented to the hospital April 2021 to September 2023 with pelvic and acetabular fractures and had undergone surgery.

Inclusion criteria

Patients who were diagnosed with pelvis and acetabular fractures following the below criteria were included.

Treatment setting and age

Patients treated at the IGIMS Level-1 trauma centre between 18 to 58 years age groups included in study.

Surgical management

Patients who undergo surgical intervention for the management of fractures.

Time frame

Data from during April 2021 to September 2023 period to ensure a cohesive and relevant dataset.

Complete medical records

Cases with comprehensive medical records, including details of surgical procedures and follow-up.

Exclusion criteria

Patients following the below criteria were excluded.

Non-surgical cases

Patients managed non-surgically for pelvis and acetabular fractures.

Incomplete records

Cases lacking essential medical records.

Paediatric cases

Patients below 18 years of age excluded from study.

Non-traumatic fractures

Cases involving pelvis and acetabulum fractures due to non-traumatic cause were excluded from study.

Bias

To minimize bias, we collected data retrospectively, and all eligible patients within the defined time frame were included in the study.

Variables

Age, gender, fracture type, concomitant injuries, trauma mechanism, surgical technique, related complications, and radiological scores were among the variables.

Data collection

Information from the hospital system of records was gathered, including patient records, radiographs, and surgical records. The Judet and Letournel classification system was used to categorize fractures based on radiographs and computed tomography scans. Radiographs were assessed at different time points, including immediate postoperative, 6-week post-operative, and 3-month follow-up, using Matta's radiological scoring system.

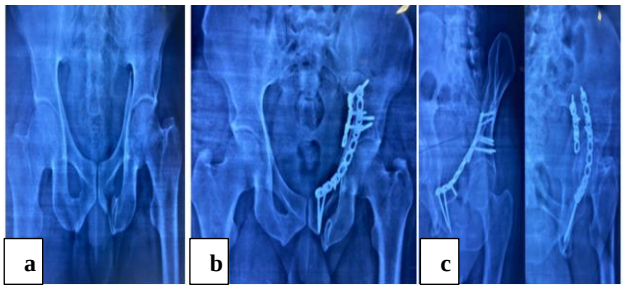

Figure 1 (a-c): Anterior column fracture which involve quadrilateral surface. Treated by dual plate through modified Stoppa approach.

Statistical analysis

Descriptive statistics were used to summarize the collected data, including means, medians, frequencies, and percentages, as appropriate. Comparative analysis was performed to assess the relationship between various variables.

Figure 2 (a-c): Posterior column fracture dislocation of right acetabulum. Treated by posterior plating through K-L approach.

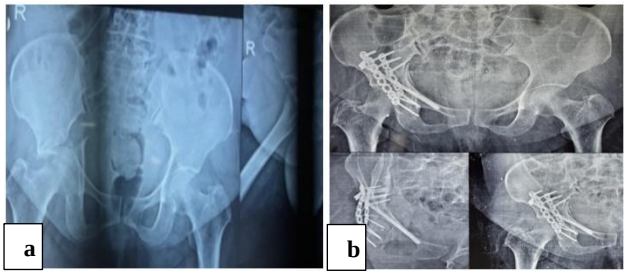

Figure 3 (a and b): Case of both coloumn fracture treated by dual plating through K-L approach. And anterior coloumn fix by CC screws through lateral window.

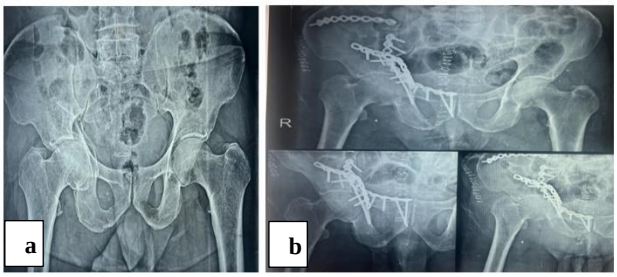

Figure 4 (a and b): Case of both coloumn fracture and iliac wing fractures treated by anterior dual plating through stoppa approach. And posterior coloumn fix by CC screws.

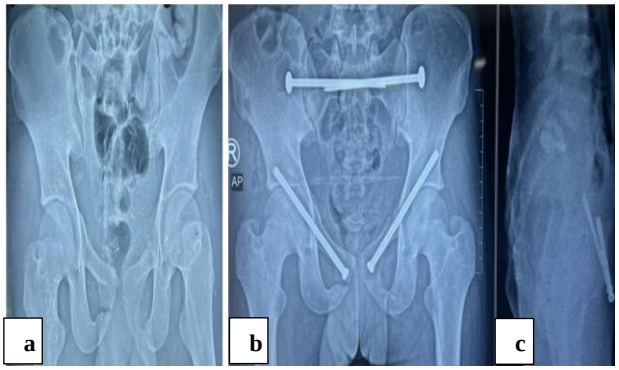

Figure 5 (a-c): Case of bilateral anterior columns and SI joint disruption. Treated by percutaneous CC screws.

RESULTS

Of the 34 patients, 9 had pelvic fractures and 25 had acetabular fractures. The demographics of the study population are mentioned in Table 1. There were 21 males and 13 females among the study participants, for a male-to-female ratio of 2:1. The patients were between the ages of 18 and 58, with an average age of 35. Road traffic accidents (RTAs) accounted for 95% of cases of trauma, with falls from heights accounting for 5% of occurrences. RTAs were the leading cause of trauma.

Table 1: Demographics of the participants.

Parameters	Value
Total participants	34
Gender	
Male	21 (67)
Female	13 (33)
Mean age (years)	35
Average time from admission to surgery	5 days
Side (%)	
Left	17 (50)
Right	17 (50)
Associated injuries (%)	
Long bone fracture	15 (62.5)
Posterior hip dislocation	7 (29.17)
Other systems' injury	5 (20.83)

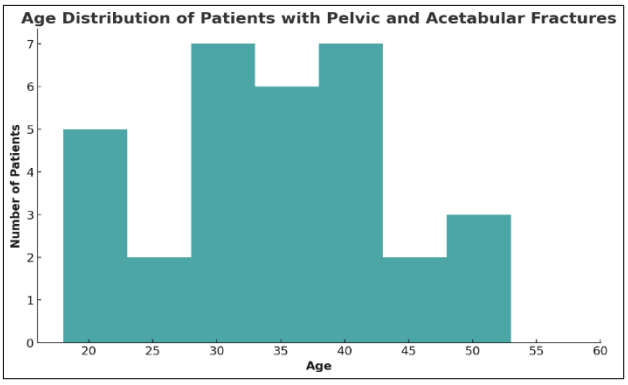

Figure 6: Age distribution of the study population.

With 10% of instances, the posterior wall of the acetabulum was the most often encountered kind of fracture, subsequent to transverse fractures in 6.25 percent of cases (Table 2). With 10% of cases, type II anteroposterior compression fractures were the most common type of pelvic fractures. Long bone fractures were present in about 62.5% of patients, and 52% of them occurred on the identical side as the pelvic fracture. In 20.83% of instances, injuries to the abdomen, maxillofacial region, spine, and chest were reported. Furthermore, 33.33% of patients also experienced a concomitant hip posterior dislocation.

Open reduction and internal fixation (ORIF) was used in all acetabular fracture cases, and the average time to surgery was five days following admission. The most popular technique for treating posterior wall and posterior column fractures was the Kocher-Langenbeck approach. The modified Stoppa technique was mostly used for anterior column and quadrilateral plate fractures. Staged fixation was used in most cases involving both transverse and bilateral column fractures, starting with the fracture that was more displaced.

Table 2: Type of fracture encountered during the study.

Type of fracture	Percentage of cases
Posterior wall of acetabulum	10
Transverse fractures	6.25
Type II anteroposterior compression fractures	10
Long bone fractures (any location)	62.5
Pelvic fracture and same-side long bone fracture	52
Injuries to abdomen, maxillofacial region, spine, and chest	20.83
Concomitant hip posterior dislocation	33.33

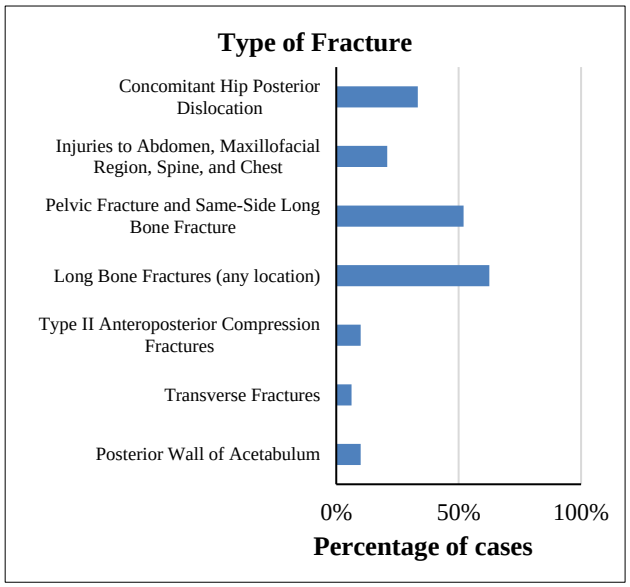

Figure 7: Type of fractures encountered during the study.

Percutaneous fixation was used to address sacroiliac disturbances, with intraoperative pelvic inlet and outlet views and a true lateral view serving as guides. Patients with pubic symphyseal diastasis were treated with anterior pelvic stabilization using reconstruction plates and Pfannenstiel incisions. Ilioiliac fixation was used to treat the majority of sacral fractures. Iliolumbar fixation was performed in a few cases of iliolumbar dissociation that were also associated with transverse process fractures of the fifth lumbar vertebra.

Among the patients, 4.17% experienced postoperative sciatic nerve palsy, which eventually resolved over time. 20.83% of patients suffered from venous thromboembolism, with one of them developing pulmonary embolism. 12.5% of cases reported wound infection, with 4.17% of them being deep infections requiring surgical debridement. The other 8.33% occurrences of wound infection were superficial and managed with wound care and intravenous antibiotics. There were no cases of heterotopic ossification or documented post-operative mortality.

DISCUSSION

This study analysed 34 patients with pelvic and acetabular fractures, predominantly caused by road traffic accidents (95%). It found a higher incidence in males (21 out of 34), with mean patient age of 35 years. The most common fractures were the posterior wall of the acetabulum (10%) and type II anteroposterior compression fractures in the pelvis (10%). Associated injuries included long bone fractures (62.5%), with a significant number occurring on the same side as the pelvic fracture, and posterior hip dislocation (33.33%). Treatment primarily involved ORIF, using various surgical approaches like the Kocher-Langenbeck and modified Stoppa. Postoperative complications included sciatic nerve palsy (4.17%), venous thromboembolism (20.83%), and wound infections (12.5%), but there were no cases of heterotopic ossification or post-operative mortality. This study provides critical insights into the epidemiology, treatment, and outcomes of pelvic and acetabular fractures in a specific patient cohort.

The current study aligns with broader trends observed in the existing literature. The combined insights from a hospital-based study by Halwai et al, and Makker on acetabular fractures in North India and the expert symposium on pelviacetabular fractures offer a detailed picture of the epidemiology, causes, and treatment advancements for these injuries in India.[5,6] Highlighting road traffic accidents as a major cause and emphasizing the need for preventive strategies, these works also delve into the latest surgical and management techniques. Together, they stress the importance of empirical research and expert knowledge in improving outcomes for patients with acetabular fractures, advocating for ongoing education and policy efforts to mitigate these injuries. Research by Hinz et al indicates a considerable socioeconomic impact of these fractures, particularly in work-related contexts, as seen in Germany.[7] In the USA, the frequency of pelvic and acetabular fractures between 2007 and 2014 was notably higher than previously reported by Alvarez-Nebreda et al suggesting an increasing trend.[8] These injuries often co-occur with other orthopedic traumas, especially in high-energy contexts like road traffic accidents, which aligns with the study findings by Cuthbert et al on the primary cause of trauma.[9] The demographic distribution, predominantly affecting males and the commonality of nerve injuries associated with acetabular fractures, particularly involving the posterior wall, is consistent with the study observations by Zhang et al and Singh et al.[10,11] Interestingly, in a study by Lehmann et al, regions like

Singapore have seen a reduction in these fractures, likely due to enhanced safety measures.[12]

Limitations

The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

CONCLUSION

The study contributes valuable insights into the epidemiology, treatment strategies, and outcomes of surgically treated pelvic and acetabular fractures in a specific regional context. It underscores the need for continued focus on preventive measures, especially in relation to road traffic accidents, and highlights the importance of specialized surgical techniques and postoperative care in managing these challenging injuries. The findings can inform clinical practice and healthcare policy, aiding in resource allocation and the development of targeted prevention strategies.

Recommendations

Enhanced road safety measures and public awareness campaigns are recommended to reduce the prevalence of such injuries. Further research into advanced surgical techniques and postoperative care protocols is also suggested to improve patient outcomes.

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