A Correlation of Functional Outcome Measures of Pelvis Fracture Following Operative Management, A Retrospective Case Series

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Research Article

Keywords: Pelvis, Majeed, Functional outcome, Operative

Posted Date: August 25th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-3219093/v1

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Abstract

Background

To evaluate the functional outcome of pelvis fracture after fixation using Majeed functional outcome score.

Methods

Patients from our institution, Baguio General Hospital and Medical Center, with pelvis fractures from 2019 to 2022 were retrospectively gathered and reviewed. All available data sources were exhausted, such as charts from the hospital records, patient census, and electronic medical records. The functional outcome of the surgical intervention was assessed using Majeed's functional outcome score.

Results

18 patients were included in the study (three females, 15 males; mean age of 41 years) with a range of follow-up of one to three years. We performed a functional assessment using Majeed's functional outcome score; the mean score was 72 points (range 22–100). An excellent clinical outcome was seen in 22%, a good result in 39%, a fair result in 11%, and a poor outcome in 17% treated with internal fixation. In contrast, those treated with external fixation had a fair outcome.

Conclusions

Surgical internal fixation for pelvic fractures may be better than external fixation. There were no noted advantages of doing early surgical procedures versus delayed surgery. Concomitant injuries such as nerve injury and multiply injured patients may contribute to a poor to fair functional outcome.

Background

Pelvic ring and acetabular fractures are potentially life-threatening [1] and relatively rare injuries accounting for only about 3% of all fractures [2]. The pelvis is highly stable due to its inherent and mechanical integrity [3–5]. Therefore, pelvis and acetabulum fractures occur most commonly in high-energy injuries such as vehicular motor accidents, high falling, and crushing injuries [6]. Low-impact injuries, such as athletic injuries in adolescents and falls while ambulating in the elderly, are also reported [7–8]. Due to rapid exsanguination and other associated injuries, the mortality rate is more significant in patients with hemodynamic instability accounting for 5–15% of pelvic fractures and 1% for acetabular fractures [9–11]. Hence, a multidisciplinary approach is crucial for resuscitating and managing bone injuries. The management focuses on identifying injury severity and other concomitant injuries, early hemodynamic stabilization, and restoration of the pelvic ring and acetabular structures with reliable and
stable rigid fixation [12–13]. Recovery from pelvic and acetabular fractures sometimes is slow and incomplete, resulting in long-term consequences on quality of life; therefore, in addition to early stabilization, functional and quality-of-life-related outcomes should also be considered [14]. The Majeed score is a pelvic injury-specific functional assessment divided into the following seven items: pain, work, sitting, sexual intercourse, standing, unaided gait, and walking distance [15]. The purpose of this study is to evaluate the functional outcome of pelvis fractures after fixation using Majeed's functional outcome score.

**Methods**

A retrospective case series study was conducted at our institution, Baguio General Hospital and Medical Center, for patients with pelvic and acetabular fractures treated with external fixation, open reduction and internal fixation, or a combination of these treatments from 2019 to 2022. All available data sources were exhausted, such as charts from the hospital records, patient census, and electronic medical records. The data collected were: age, gender, other associated injuries, time of surgery, intervention, and functional outcome using Majeed's functional outcome score. We assessed the following: pain (0–30 points), return to work (0–20 points), gait (0–12 points), use of walking aid (0–12 points), sitting tolerance (10 points), sexual intercourse (0–4 points), and performance at work (0–20 points). According to the total Majeed score, outcomes were graded as excellent (≥ 85), good (84 to 70), fair (69 to 55), and poor (< 55). A score of 100 points was defined as the best result. Categorical data were expressed in frequency and percentage [16].

**Results**

Eighteen (18) patients were included in the study (three females, 15 males; mean age of 41 years) with a range of follow-up of one to three years. Figure 1 shows the age and gender distribution of the 18 patients who participated in the study. Among these 18 participants, seven were associated with other injuries such as distal radius fracture, hip dislocation, sciatic nerve palsy, and calcaneal fractures, contributing significantly to the functional outcome post-surgery in Fig. 2. These participants are treated either with internal fixation (14 participants), external fixation (two participants), or both (two participants treated with external fixation temporarily followed by internal fixation as definitive management). The time of surgery is defined as a surgical intervention that was immediately done upon admission, less than a week, within two weeks, or more than two weeks. We performed a functional assessment using Majeed's functional outcome score; the mean score was 72 points (range 22–100). An excellent clinical outcome was seen in 22%, a good outcome in 39%, a fair outcome in 11%, and a poor outcome in 17% treated with internal fixation.

In contrast, those treated with external fixation had a fair outcome, as presented in Fig. 2. Furthermore, pelvic and acetabular injuries associated with other injuries show poor functional results. For the time of surgery, there's no significant difference whether the patient underwent surgical intervention immediately upon admission, less than two weeks, within two weeks, or more than two weeks.
Discussion

Pelvic ring and acetabular fractures are the most challenging high-energy injuries associated with motor vehicle accidents, pedestrian collisions, or falls from heights. It has a high mortality rate reported as high as 30–60%, which accounts for rapid exsanguination and other associated thoracic and abdominal injuries [17]. The anatomic restoration of the pelvic ring and acetabulum will allow patients to achieve good functional outcomes and clinical results, enabling patients to return to work [18]. This study uses Majeed's functional outcome score to assess the outcome of patients with pelvic and/or acetabular injuries treated with internal fixation, external fixation, and/or both fixations. According to this study, most affected individuals were male. With three years range of follow-up, patients associated with other injuries are reported with poor functional outcomes. Borg et al. state that the patient with these injuries is reported with a significantly lower quality of life both mentally and physically, even with good radiographic healing in two years post-surgical intervention [19]. Most patients treated with internal fixation showed good to excellent outcomes compared to external fixation. Figure 3 presents a case of a 34-year-old male with multiple rami fractures and a concomitant sacral ala right fracture secondary to a vehicular motor accident. The patient was managed solely by applying an external fixator (Fig. 4) and was removed two months post-operatively (Fig. 5). At six months post-operatively, the patient presented with a fair functional outcome score of 58% (Fig. 6). Another case, as shown in Fig. 7, is a 54-year-old male patient who presented with a similar case above but this time with no other associated injuries. The patient was managed initially with an application of an external fixator (Fig. 8) and subsequently underwent an open reduction internal fixation with plate and screws plus a bilateral iliosacral screw fixation (Fig. 9). The patient presented with an excellent functional outcome score of 100% six months post-operatively (Fig. 10).

The current study has limitations, such as the sample size being too small and using only one functional scoring. We recommend including other validated questionnaires and a larger sample size for future studies. Another one is to compare those patients treated conservatively versus surgically would be a better design.

Conclusions

Surgical internal fixation for pelvic fractures may be better than external fixation. Furthermore, early surgery has no advantage over delayed surgery, and concomitant injuries such as nerve injury and multiply injured patients may contribute to a poor to fair functional outcome.

Declarations

Ethical approval: This was a retrospective study. The imaging and other data used in this study were approved by the Ethics Committee of our institution, Baguio General Hospital and Medical Center, per the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.
**Consent to participate:** Informed consent was obtained from all the participants and/or their legal guardians.

**Consent for publication:** Not applicable

**Availability of Data and Materials:** The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

**Competing Interest:** The authors have no conflict of interest to declare.

**Funding:** The authors declare that they have no funding sources.

**Author Contribution:** All authors contributed to the design and implementation of the study. Dr. Shiela Marie Delizo conducted data collection and analysis. She wrote the first draft of the manuscript, and research process supervision and manuscript proofreading were carried out by Dr. Isagani Garin. All the authors have read and approved the final manuscript.

**Acknowledgements:** Not applicable

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**References**


Figures

Figure 1

Demographics

Summary of Functional Outcome Score

Figure 2

Summary of Functional Outcome Score
Figure 3

Pre-operative radiograph of 34/M, MVA.

Figure 4

Immediate post-operative radiograph, 34/M with an external fixator.

Figure 5

2 months post-operative radiograph, 34/M.
Figure 6

6 months post-operative radiograph, 34/M.

Figure 7

Pre-operative radiograph of 50/M, MVA.

Figure 8
Immediate post-operative radiograph, 50/M with an external fixator.

Figure 9

Immediate post-operative radiograph, 50/M, s/p ORIF.

Figure 10

6 months post-operative radiograph, 50/M.