Vietnam Journal of Community Medicine, Vol. 66, English version, 198-202

OUTCOMES OF INTERNAL FIXATION IN THE MANAGEMENT OF PELVIC FRACTURES AT BACH MAI HOSPITAL

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Received: 20/06/2025
Revised: 26/06/2025; Accepted: 30/06/2025

ABSTRACT

Introduction: Pelvic fractures are severe injuries associated with a high mortality rate due to shock and hemorrhage, particularly in cases of unstable fractures. Internal fixation surgery plays a critical role in restoring both anatomical structure and functional integrity.

Objective: This study aims to evaluate the outcomes of internal fixation in the treatment of pelvic fractures at Bach Mai Hospital and to identify factors influencing surgical results.

Methods: A retrospective cross-sectional study was conducted at Bach Mai Hospital, involving 30 patients with pelvic fractures who met the surgical indication criteria and were eligible for inclusion. Data were analyzed using SPSS version 20.0, with statistical significance set at $p < 0.05$.

Results: The study included 30 patients who underwent internal fixation for pelvic fractures at the Department of Orthopedic Trauma and Spine Surgery, Bach Mai Hospital. The mean patient age was 49.1 ± 17.2 years, with a male-to-female ratio of 3:2. The predominant cause of injury was traffic accidents. According to the AO classification, type B fractures accounted for the highest proportion (63.3%), while the most common injury mechanism, according to the Young–Burgess classification, was lateral compression (LC). Complications included internal iliac vein rupture (1 case, 3.3%), pressure ulcers (4 cases, 16.7%), superficial surgical site infection (1 case, 3.3%), and posterior tibial vein thrombosis (1 case, 3.3%). The mean operative time was 76.73 ± 26.15 minutes. Treatment outcomes were assessed using the Iowa Pelvic Score, Majeed Pelvic Score, and IIEF, indicating favorable recovery; the average IIEF score was consistent with the published literature.

Conclusion: Internal fixation for pelvic fractures yields good recovery outcomes with a low rate of complications when appropriately indicated and technically well-executed.

Keywords: Unstable pelvic ring, internal fixation, pelvic fracture complications.

1. INTRODUCTION

Pelvic fractures represent a severe form of injury associated with a high risk of morbidity and mortality, particularly in cases involving unstable pelvic ring disruptions. The most common etiologies include high-energy trauma such as road traffic accidents, falls from height, and blunt force impacts. Mortality rates range from 1% to 15%, but may increase up to 50% in the presence of massive hemorrhage or penetrating injuries [1]. Hemorrhagic shock and traumatic bleeding are the leading causes of death in patients with pelvic fractures. Risk factors for mortality include systolic blood pressure <90 mmHg, age over 60 years, and the presence of severe associated injuries. According to the Young–Burgess classification, the degree of pelvic displacement and concomitant injuries are critical prognostic indicators [2]. Mortality rates are particularly high in cases with associated injuries such as thoracic trauma (63%), long bone fractures (50%), spinal injuries (25%), or concomitant

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head and abdominal trauma (40%). Long-term complications, including chronic pain, impaired mobility, sexual dysfunction, and infection, may occur, especially in cases with sacroiliac joint displacement >1 cm or neurological injury [3].

The management of pelvic fractures is complex, requiring a coordinated approach involving initial resuscitation, hemorrhage control, and temporary stabilization, followed by definitive internal fixation to restore anatomical alignment and functional outcomes. At Bach Mai Hospital, internal fixation techniques for pelvic fracture management have been employed for several years. However, no comprehensive assessment of clinical outcomes has been conducted to date at this institution. Therefore, the present study aims to evaluate the results of internal fixation in the treatment of pelvic fractures at Bach Mai Hospital and to analyze potential factors that influence clinical outcomes, thereby contributing to improved patient care quality.

2. STUDY SUBJECTS AND METHODS

2.1. Study Population

- Inclusion criteria:

Patients aged ≥18 years diagnosed with pelvic fractures according to the AO and Young–Burgess classifications, who had indications for internal fixation surgery. Eligible patients had a stable preoperative condition, complete medical records and radiological documentation (X-ray/CT), and were followed up for at least six months. The same surgical team performed all surgeries.

- Exclusion criteria:

Patients with incomplete medical records or a follow-up period of less than six months were excluded from the study.

2.2. Research methodology

- Study design: A retrospective, descriptive study.

- Sample size: All patients who met the inclusion criteria were included (n = 30).

- Data collection methods:

+ Patient information: Clinical data were collected from paper-based medical records at Bach Mai Hospital; radiographic images (X-rays and CT scans) were retrieved from the hospital's PARC system.

+ Patient follow-up: Patients were scheduled for periodic follow-up visits and assessed at a minimum of six months postoperatively. Pelvic X-rays were obtained during follow-up visits, and clinical outcomes were evaluated using standardized scoring systems.

- Primary variables analyzed:

+ Demographic and clinical characteristics: Age, sex, mechanism of injury (high fall, traffic accident, others), injury characteristics (time from clinical stabilization to surgery, length of hospital stay, associated injuries, pelvic fracture classification by AO and Young–Burgess, surgical approach).

+ Outcome measures: Postoperative outcomes were assessed using the Visual Analog Scale (VAS), Majeed Pelvic Score, Iowa Pelvic Score, and the International Index of Erectile Function (IIEF).

+ Complications: Intraoperative complications (hemorrhage, neurovascular injury, visceral injury) and postoperative complications (infection, venous thromboembolism) were recorded.

+ Surgical techniques: Open reduction and internal fixation (ORIF) using anterior/posterior or combined approaches; percutaneous sacroiliac screw fixation as appropriate.

- Data processing and analysis:

Data were analyzed using SPSS version 20.0. Appropriate statistical tests (t-test, Chi-square, or Fisher's exact test) were applied as needed. Statistical significance was defined as $p < 0.05$.

- Ethical considerations:

The study was approved by the Scientific and Ethics Committee of Bach Mai Hospital and received technical endorsement from the Ministry of Health.

3. RESULTS

This retrospective study analyzed 30 patients who underwent internal fixation surgery for pelvic fractures at the Department of Orthopedic and Spine Surgery, Bach Mai Hospital. The findings are summarized as follows:

3.1. Patient Characteristics

Table 1. Patient Characteristics

Characteristic	Group	n	%
Age	< 65 years	25	83.3
	≥ 65 years	5	16.7
	Mean age	49.1 ± 17.2 (range: 18–81)	
Sex	Female	12	40
	Male	18	60

Characteristic	Group	n	%
Mechanism of Injury	Road traffic accident	23	76.7
	Occupational accident	2	6.7
	Domestic accident	5	16.7
AO Classification	Type A	1	3.3
	Type B	19	63.3
	Type C	10	33.4
Young–Burgess Mechanism	Lateral Compression (LC)	25	83.3
	Anteroposterior Compression (APC)	5	16.7
	Vertical Shear (VS)	0	0
	Combined Mechanism (CM)	0	0
Total		30	100

Observations: The majority of patients were under 65 years of age (83.3%), with a mean age of 49.1 ± 17.2 years. Male patients were predominant, accounting for 60% of the sample. Road traffic accidents were the most common cause of injury (76.7%). According to the AO classification, type B fractures were the most frequent (63.3%), followed by type C (33.4%). Based on the Young–Burgess classification, most injuries resulted from lateral compression mechanisms (LC – 83.3%). No cases were attributed to vertical shear (VS) or combined mechanisms (CM).

Table 2: Time to Surgical Stabilization and Time to Hospital Discharge

Parameter	Mean Duration (days)	Minimum (days)	Maximum (days)
Time from injury to surgery	8.4	2	22
Time from surgery to hospital discharge	10.5	5	20

Observations: Among the 30 patients included in the study, the average duration from injury to surgery was 8.4 days. The mean time from surgery to hospital discharge was 10.5 days.

3.2. Characteristics of injury, surgical approach, and complications

Table 3. Injury Characteristics

Feature	Subgroup	Number of patients (n = 30)	%
Associated Injuries	None	15	50.0
	Thoracic trauma	2	6.7
	Abdominal trauma	3	10.0
	Traumatic brain injury	1	3.3
	Other fractures	8	26.7
	Polytrauma	1	3.3
Surgical Approach	Ilioinguinal	19	63.3
	Posterior	1	3.3
	Stoppa	0	0
	Percutaneous (C-arm guided screw fixation)	2	6.7
	Combined approaches	8	26.7
Complications	Urinary tract infection	1	3.3
	Pressure ulcers	5	16.7
	Chronic pain	4	13.3
	Nonunion or malunion	0	0
	Wound infection	1	3.3
	Hemorrhage	1	3.3
	Thrombosis or embolism	1	3.3
	Nerve injury	0	0
	Mortality	0	0
Total		30	100

Observations: Half of the patients (50%) had no associated injuries, while the remaining 50% sustained at least one concurrent injury, the most common being additional fractures (26.7%), followed by blunt abdominal trauma (10%). The incidence of polytrauma and traumatic brain injury was low (3.3% each). Regarding surgical exposure,

the ilioinguinal approach was the most frequent (63.3%), and 26.7% of patients required a combined approach. The Stoppa approach was not utilized in this cohort.

The most common complications were pressure ulcers (16.7%) and chronic pain (13.3%). Other complications—such as urinary tract infection, wound infection, intraoperative hemorrhage, and thromboembolic events—were each observed in one case (3.3%). One patient (3.3%) experienced a laceration of the internal iliac vein during vessel and nerve retraction to expose the sacroiliac joint via the ilioinguinal approach. The injury was managed with 4/0 Prolene suture repair, and the patient received more than 4000 mL of blood transfusion intra- and postoperatively.

There were no cases of nonunion, nerve injury, or postoperative mortality. All patients achieved radiographic bone union within six months post-surgery.

3.3. Treatment Outcomes

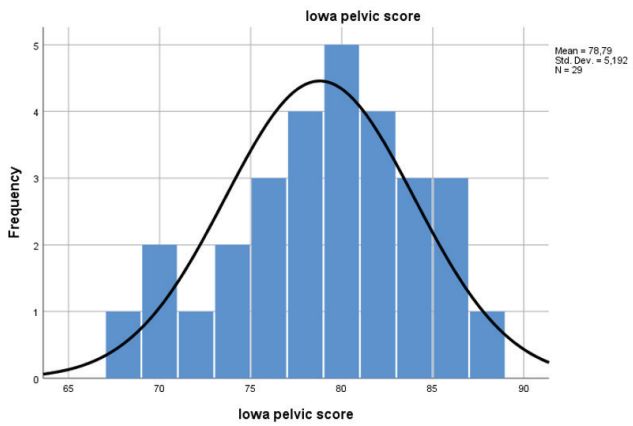

Figure 1. Iowa Pelvic Score

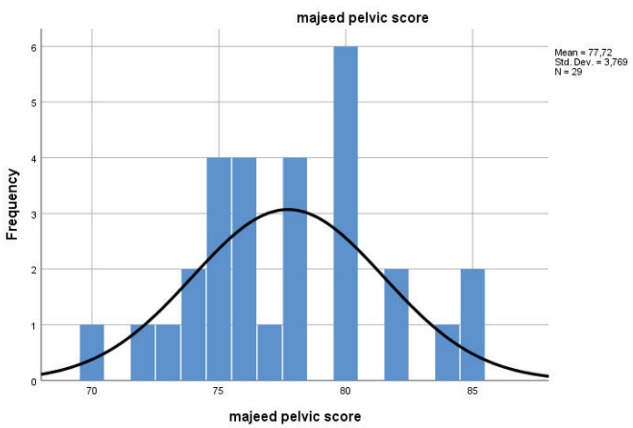

Figure 2. Majeed Pelvic Score

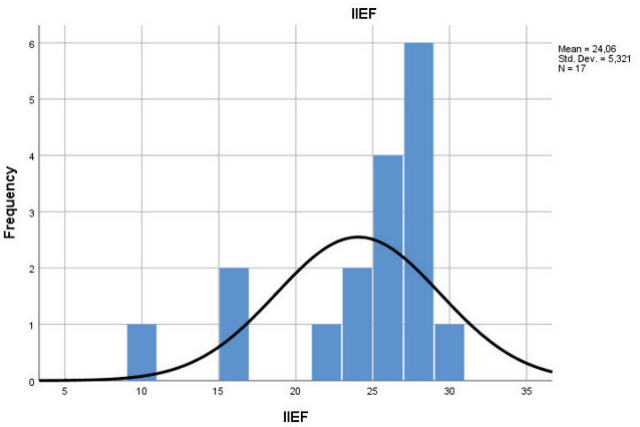

Figure 3. International Index of Erectile Function (IIEF) Score

Observations: Postoperative recovery, as assessed using validated functional scoring systems, indicated that the majority of patients achieved high scores. According to the Iowa Pelvic Score and Majeed Pelvic Score, most patients attained good to excellent outcomes. Postoperative sexual function, as assessed by the IIEF score, was relatively preserved, with average scores comparable to those reported in previous studies. These findings suggest that internal fixation for pelvic fractures yields favorable functional recovery and has minimal long-term impact on overall quality of life.

4. DISCUSSION

Pelvic fractures are among the most severe injuries encountered in orthopedic trauma, often resulting from high-energy mechanisms such as traffic accidents, falls from height, or occupational injuries. In this study of 30 patients treated at Bach Mai Hospital, the majority were male (60%), with a mean age of 49.1 ± 17.2 years. Traffic accidents accounted for 76.7% of the cases. These findings are consistent with the report by Nguyen Huu Dat et al. (2024) in Vietnam, which noted that the working-age group represented the highest proportion of pelvic fractures due to road traffic accidents [4].

In terms of fracture classification, AO Type B injuries were the most prevalent (63.3%), followed by Type C (33.4%). These represent relatively or completely unstable patterns, typically requiring early surgical intervention. Classification according to the Young–Burgess system showed that most patients sustained lateral compression (LC) injuries (83.3%), which aligns with existing literature indicating that lateral impact is a common mechanism in road traffic trauma [2].

The average interval from injury to surgery was 8.4 days, reflecting the need for hemodynamic

stabilization and thorough evaluation of associated injuries prior to surgery, in line with local clinical practice. According to Tile et al., delayed surgery following patient stabilization significantly reduces the risk of complications, particularly in cases involving multi-organ trauma [5].

Associated injuries were present in 50% of cases, with additional fractures (26.7%) and blunt abdominal trauma (10%) being the most common. The ilioinguinal approach was the most frequently utilized surgical route (63.3%), offering optimal exposure to anterior pelvic structures. Notably, the Stoppa approach was not used in this cohort, despite its recognized advantages in central pelvic access with reduced invasiveness. This may reflect surgeon preference or specific characteristics of the injury.

Postoperative complication rates were generally low. The most common complications were pressure ulcers (16.7%) and chronic pain (13.3%), whereas infection, hemorrhage, and thromboembolic events were infrequent (3.3% each). There were no cases of nonunion, nerve injury, or mortality, indicating a relatively high standard of surgical technique and postoperative care. A serious intraoperative complication—laceration of the internal iliac vein—occurred in one case (3.3%) during sacroiliac joint exposure via the ilioinguinal approach. This was successfully managed with 4/0 Prolene repair and substantial intra- and postoperative blood transfusion, with no long-term sequelae.

Functional recovery, as assessed by the Iowa Pelvic Score, Majeed Score, and IIEF, demonstrated that most patients achieved good to excellent outcomes. The preservation of sexual function was consistent with findings by Gänsslen et al. (2013), who emphasized that recovery following pelvic fracture surgery extends beyond physical mobility to encompass broader aspects of quality of life [6].

5. CONCLUSION

Based on the study results, internal fixation for pelvic fractures appears to be highly effective when appropriately indicated and performed with proper surgical technique. Nonetheless, early detection and management of complications are crucial to optimizing long-term outcomes. The selection of the surgical approach should be tailored to the specific injury pattern and the patient's clinical condition, which is essential for minimizing complications and facilitating a timely functional recovery.

REFERENCES

[1] Smith W, Williams A, Agudelo J, et al. Early predictors of mortality in hemodynamically unstable pelvis fractures. J Orthop Trauma. 2007;21(1):31-37. doi:10.1097/bot.0b013e31802ea951

[2] Burgess AR, Eastridge BJ, Young JWR, et al. Pelvic ring disruptions: Effective classification system and treatment protocols. J Trauma - Inj Infect Crit Care. 1990;30(7):848-856. doi:10.1097/00005373-199007000-00015

[3] Flores HA, Stewart RM. The multiply injured patient. Semin Thorac Cardiovasc Surg. 2008;20(1):64-68. doi:10.1053/j.semtcvs.2008.01.007

[4] Đạt NH, Nam NV, Từ NT, Thuyết NH, Hết NV, Tấn NT. Đánh giá kết quả điều trị gãy mất vững khung chậu bằng phương pháp kết hợp xương bên trong. Tạp Chí Học Việt Nam. 2024;540(3). doi:10.51298/vmj.v540i3.10474

[5] Tile M. Acute Pelvic Fractures: I. Causation and Classification. J Am Acad Orthop Surg. 1996;4(3):143-151. doi:10.5435/00124635-199605000-00004

[6] Functional outcomes in pelvic fractures and the factors affecting them– A short-term, prospective observational study at a tertiary care hospital - PMC. Accessed June 16, 2025. https://pmc.ncbi.nlm.nih.gov/articles/PMC6739489/