

REHABILITATION

УДК 616.718.1/.3-001.5-089.2(045)

DOI: <http://dx.doi.org/10.15674/0030-59872026296-103>

Features of medical rehabilitation of patients with pelvic fractures

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The goal is to develop and test a program for early active rehabilitation of patients after osteosynthesis of unstable fractures using external fixation devices (EFD) with rods with multidirectional threads. Methods. The clinical and radiological examination protocols of 42 patients were studied, who were randomized into two groups: main A (n = 25) and control B (n = 17). In group A, rods with a multidirectional thread were used in the EFD and the active early rehabilitation program developed by us was applied. In group B, rods in the EFD had a unidirectional thread; a standard rehabilitation program was prescribed. The control examination was carried out 3 months after surgery. Results. The developed plan of active early postoperative rehabilitation differed from the standard one in the presence of a training program that corrected the level of kinesiophobia and anxiety associated with the expectation of pain; in kinesiotherapy, the following additional methods were used: in the 1st period — extended mobilization of the trunk muscles, ideomotor exercises, dosed load in a vertical position with the use of additional support; in the 2nd — soft manual therapy techniques; in the 3rd — isometric exercises for the muscles of the lumbopelvic zone and the muscles of the pelvic floor. The average period of bed rest was (8.2 ± 3.7) days for group A and (16.9 ± 10.2) days for group B; $p < 0.05$. Conclusions. The developed technique had the following effectiveness: during the control examination after 3 months, all indicators (pain intensity according to VAS (3.6 ± 1.8) cm in group A and (4.8 ± 1.8) cm in B), level of kinesiophobia according to Tampa TSK scale (31.7 ± 9.8) points and 40.6 ± 11.4 respectively), level of anxiety according to PASS-20 questionnaire (21.6 ± 9.4) and (36.2 ± 8.9) points respectively), integral quantitative indicator of the degree of patient participation (full — in 24 and 12 % respectively; moderately limited — 40 and 24 %; significantly limited — 28 and 46 % respectively; nominal — 8 and 18 %), endurance of flexor muscles (112.1 ± 34.8) and (101.9 ± 35.4) s) and extensors of the pelvis and hips (96.4 ± 36.2) and (90.5 ± 36.2) s), the functional assessment of the consequences of pelvic fractures according to the Majeed scale (78.6 ± 4.4) and (76.2 ± 4.81) points) in the main group A was higher than the results of group B.

Мета. Розробити програму ранньої активної реабілітації пацієнтів після остеосинтезу нестабільних переломів таза апаратами зовнішньої фіксації (АЗФ) зі стрижнями з різноспрямованою нарізкою. Методи. Вивчалися протоколи клініко-рентгенологічного обстеження 42 пацієнтів, які були рандомізовані на дві групи: основну А (n = 25) і контрольну В (n = 17). У групі А в АЗФ використовували стрижні з різноспрямованою нарізкою та застосовували розроблену нами програму активної ранньої реабілітації. У групі В стрижні в АЗФ мали односпрямовану нарізку; призначалася стандартна програма реабілітації. Контрольне обстеження здійснювали через 3 міс. після хірургічного втручання. Результати. Розроблений план активної ранньої післяопераційної реабілітації відрізнявся від стандартного наявністю навчальної програми, яка корегувала рівень кінезіофобії та тривоги, пов'язаних з очікуванням болю; у кінезіотерапії додатково застосовували: у 1 періоді — розширену мобілізацію м'язів тулуба, ідеомоторні вправи, дозоване навантаження у вертикальній позі з використанням додаткової опори; у 2 — м'які техніки мануальної терапії; у 3 — ізометричні вправи для м'язів попереково-тазової зони та м'язів тазового дна. Середній термін ліжкового режиму склав $(8,2 \pm 3,7)$ діб для групи А та $(16,9 \pm 10,2)$ діб для В; $p < 0,05$. Висновки. Розроблена методика мала таку ефективність: під час контрольного огляду через 3 міс. усі показники (інтенсивність болю за VAS $(3,6 \pm 1,8)$ см у групі А та $(4,8 \pm 1,8)$ см у В), рівень кінезіофобії за шкалою Тампа TSK $(31,7 \pm 9,8)$ балів і $40,6 \pm 11,4$ відповідно), рівень тривоги за опитувальником PASS-20 $(21,6 \pm 9,4)$ та $(36,2 \pm 8,9)$ балів відповідно), інтегральний кількісний показник ступеня участі пацієнта (повноцінна — у 24 та 12 % відповідно; помірно обмежена — 40 і 24 %; значно обмежена — 28 і 46 % відповідно; номінальна — 8 і 18 %), витривалість м'язів згиначів $(112,1 \pm 34,8)$ та $(101,9 \pm 35,4)$ с) та розгиначів таза і стегон $(96,4 \pm 36,2)$ та $(90,5 \pm 36,2)$ с), функціональна оцінка наслідків переломів таза за шкалою Majeed $(78,6 \pm 4,4)$ та $(76,2 \pm 4,81)$ бала) в основній групі А була вищою за результати групи В. Ключові слова. Нестабільна травма тазового кільця, зовнішній остеосинтез зі стрижнями з різноспрямованою нарізкою, фізична реабілітація, кінезіотерапія.

Keywords. Unstable pelvic ring injury, external osteosynthesis with multidirectional threaded rods, physical rehabilitation, kinesiotherapy

Introduction

The incidence of pelvic ring injuries worldwide ranges from 20 to 34.3 cases per 100,000 population [1]. These injuries account for approximately 2–8 % of all skeletal fractures and are associated with polytrauma in about 25 % of cases [2]. Unstable pelvic ring injuries are associated with unfavorable outcomes in 40–60% of patients, including persistent pain, impaired function of the pelvic girdle and lower extremities, reduced overall musculoskeletal performance, and gait disturbances, all of which contribute to long-term disability and diminished quality of life [3].

Current treatment strategies for unstable pelvic ring injuries emphasize prompt stabilization of bone fragments, preferably using external fixation with pin-based external fixators (EFs) [4,5]. Stable fixation enables early postoperative rehabilitation, allowing patient mobilization within the first few days after osteosynthesis. Early rehabilitation aims to prevent complications related to prolonged immobilization, such as hypostatic pneumonia, intestinal atony, muscle atrophy, and joint contractures, while improving functional recovery [6,7].

However, osteosynthesis of unstable pelvic fractures using pin-based external fixation may be complicated by loosening of the fixation pins [8]. This compromises the stability of the construct, increases interfragmentary motion, impairs reparative bone regeneration at the fracture site [9], and prolongs postoperative rehabilitation. In our previous biomechanical studies, we demonstrated that pins with bidirectional threads provide greater stability to the bone–pin–external fixator construct. Under cyclic alternating loads simulating walking, these pins showed no evidence of loosening, whereas conventional unidirectional threaded pins backed out by an average of $824 \pm 112 \mu\text{m}$ [10]. Clinical implementation of bidirectional threaded pins enhanced construct stability and created the basis for developing and introducing an early active postoperative rehabilitation program.

Purpose: to develop and evaluate an early active rehabilitation program for patients undergoing osteosynthesis of unstable pelvic fractures using external fixation devices equipped with bidirectional threaded pins.

Materials and Methods

The study was approved by the Ethics and Bioethics Committee of Kharkiv National Medical University (Protocol No. 93, dated 12 May 2026) and was conducted in accordance with the principles of ICH

Good Clinical Practice, the Declaration of Helsinki, and the legislation of Ukraine. All participants received detailed information about the study and provided written informed consent.

The study included the clinical and radiographic records of 42 patients with type 61-B and 61-C pelvic fractures who were treated at the Municipal Non-Profit Enterprise (MNPE) of Kharkiv City Council (KhCC), Professor O. I. Meshchaninov Kharkiv City Emergency and Urgent Care Hospital, between 2006 and 2024. All patients had associated injuries, including musculoskeletal trauma, for which appropriate treatment was provided. Using random allocation, patients were assigned to either the intervention group (Group A, $n = 25$) or the control group (Group B, $n = 17$). Patients in Group A underwent the early rehabilitation program developed by the authors, whereas those in Group B received the standard early postoperative rehabilitation protocol routinely used at the MNPE KhCC Professor O. I. Meshchaninov Kharkiv City Emergency and Urgent Care Hospital for this patient population. Follow-up clinical and radiographic evaluations were performed three months after surgery.

The following research methods were employed:

- Clinical assessment, comprising evaluation of the orthopedic status and measurement of the endurance of the hip flexor muscles using the Killy test (maintaining a semi-sitting position with the back against a wall and the knees, hips, and ankles flexed to 90° for at least 219 s) and of the hip and pelvic extensor muscles (maintaining a prone position while holding the edge of the examination table with the upper body supported above the anterior superior iliac spines, with the buttocks and lower limbs unsupported beyond the edge of the table, for at least 200 s);
- Radiographic assessment to determine the type and mechanism of the pelvic fracture;
- Patient-reported outcome measures, including the Visual Analogue Scale (VAS) for postoperative pain intensity, the Tampa Scale for Kinesiophobia (TSK) to assess fear of movement, and the Pain Anxiety Symptoms Scale-20 (PASS-20) to evaluate anxiety and fear related to the anticipation of pain.

The following assessment tools were developed by the authors:

- An integral quantitative index to evaluate the degree of patient participation in the rehabilitation process based on pain intensity, the severity of kinesiophobia, and anxiety and fear associated with anticipated pain. Each domain was scored on a 5-point scale (0 = no limitation; 5 = very severe limitation). The total score was interpreted as follows:

3–6 points, full participation; 7–9 points, moderately limited participation; 10–12 points, markedly limited participation; and 13–15 points, minimal (nominal) participation in rehabilitation.

– The Questionnaire for Determining Permissible Loading During Early Rehabilitation of Patients with Pelvic Fractures, designed to provide an objective basis for determining the appropriate timing of assisted ambulation with crutches and the permissible degree of lower-limb weight-bearing. The questionnaire comprises three sections: (a) General information, including age, availability of home care, comorbidities (including osteoporosis and other sources of chronic pain), VAS, TSK, and PASS-20 scores, motivation to return to work, harmful habits, and the use of medications that may affect bone healing (e. g., cytotoxic agents, corticosteroids, and immunosuppressants); (b) Primary injury characteristics, including pelvic fracture classification according to the AO/OTA system, osteosynthesis technique, quality of fracture reduction according to the Matta criteria, and the need for preoperative resuscitation; and (c) Associated fractures, including concomitant fractures and early postoperative complications. The lowest possible score (32–34 points) corresponded to a patient aged 18–44 years with no comorbidities, no tobacco or alcohol dependence, an isolated type 61-B1 pelvic fracture, anatomical restoration of the pelvic ring achieved intraoperatively, no postoperative complications, no kinesiophobia or pain-related anxiety, low post-traumatic pain intensity, a strong intention to return to previous employment, and the ability to bear full weight on the lower limbs while using crutches.

Functional outcomes were assessed three months after injury using the 100-point Majeed Pelvic Score, which evaluates five domains of pelvic function: pain (30 points; 0 = severe pain, 30 = no pain), walking ability (30 points; 0 = unable to walk, 30 = unlimited walking, 20 = able to walk for more than 1 hour), work capacity (10 points; 0 = unable to work, 10 = full return to work), sexual function (10 points; 0 = severely impaired, 10 = normal), and sitting (10 points).

Statistical analysis included the calculation of relative frequencies, means, and standard errors. Data were analyzed using XLSTAT software. Comparisons between groups were performed using Student's t-test.

Results

The baseline characteristics of patients in Groups A and B are presented in Table 1.

All patients underwent surgical treatment in accordance with the principles of damage control sur-

gery (DCS) and damage control orthopedics (DCO). Sacroiliac joint injuries were stabilized using external fixation, while femoral and humeral fractures were treated with locked intramedullary nailing. In the intervention group (Group A), the external fixation construct incorporated one pin with a right-handed thread and one with a left-handed thread, whereas patients in the control group (Group B) received external fixators with conventionally threaded pins of the same orientation.

To improve the functional outcomes of patients with unstable pelvic fractures, we developed a novel concept of early active rehabilitation for this patient population (Fig. 1).

According to this concept, the scope of rehabilitation is determined by both intrinsic and extrinsic factors. Intrinsic factors reflect the bone's capacity to withstand mechanical loading and include fracture type, bone quality, the condition of the surrounding soft tissues forming the periosteal muscular envelope, and the method of osteosynthesis. Extrinsic factors relate to the patient's overall condition and include physical status, comorbidities, harmful lifestyle habits (smoking, alcohol consumption, and substance use), and biopsychosocial characteristics such as age, sex, psychological status, cognitive function, and resilience [11].

Table 1
Demographic Characteristics of Patients with Unstable Pelvic Fractures

Characteristics	Group	
	A (n = 25)	B (n = 17)
Gender:		
– male;	11; 44 %	6; 35 %
– female	14; 56 %	11; 65 %
Age, years	34.5 ± 14.9	38.8 ± 18.2
Mechanism of injury:		
– road traffic accident;	19; 76 %	12; 71 %
– fall from height	6; 24 %	5; 29 %
Pelvic ring injuries:		
– sacroiliac joint disruption;	23; 92 %	15; 88 %
– pubic ramus fracture;	24; 96 %	15; 88 %
– ischial fracture;	6; 24 %	5; 29 %
– sacral fracture	3; 12 %	1; 6 %
Associated injuries:		
– traumatic brain injury;	22; 88 %	12; 71 %
– thoracic injury;	9; 36 %	5; 29 %
– abdominal injury;	12; 48 %	8; 47 %
– bladder injury;	4; 16 %	2; 12 %
– perineal injury;	3; 12 %	1; 6 %
– musculoskeletal injury;	18; 72 %	13; 76 %
– upper-extremity injury;	5; 20 %	4; 24 %
– lower-extremity injury	13; 52 %	9; 52 %

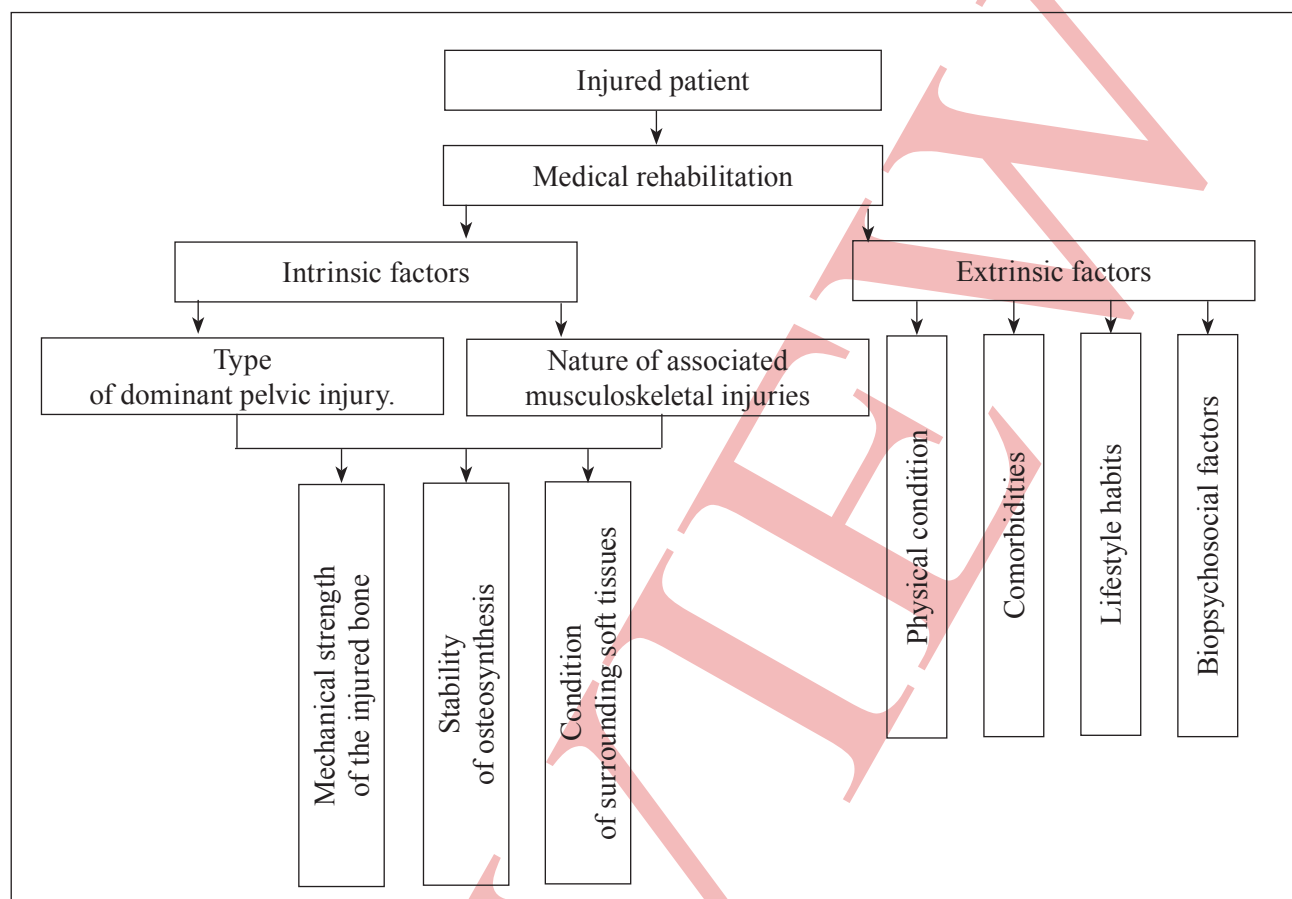


Fig. 1. Flowchart of the medical rehabilitation protocol for patients with polytrauma and a dominant unstable pelvic injury

Based on this concept, the proposed early active rehabilitation protocol for patients following surgical treatment of unstable pelvic injuries includes:

1. an educational program aimed at reducing kinesiophobia and anxiety and fear associated with the anticipation of pain in order to increase patient engagement in the rehabilitation process. The program included educational sessions addressing the nature of the injury, its impact on the musculoskeletal system, the extent of surgical treatment, and the effectiveness and safety of the prescribed kinesiotherapy program;

2. a kinesiotherapy program incorporating various physical rehabilitation interventions designed to restore the functional capacity of different muscle groups;

3. an individualized weight-bearing protocol based on a quantitative assessment of intrinsic and extrinsic factors, using indirect indicators of bone mechanical strength and the patient's overall condition.

During the early postoperative period, under a bed- or ward-based mobility regimen (Phase 1: postoperative days 2–3 to 2 weeks), the physical rehabilitation program focused on pain reduction, pre-

vention of respiratory complications and skin trophic disorders associated with prolonged bed rest, restoration of joint range of motion and muscle strength in the lower extremities and paravertebral muscles, and promotion of early mobility.

In Group A, postoperative rehabilitation began with educational sessions for patients. In both groups, the rehabilitation program included the following interventions:

1. mobilization of the trunk muscles and prevention of complications associated with immobilization through regular turning in bed and transitioning to a semi-recumbent position every 2–3 hours. In addition, patients in Group A performed bed mobility exercises involving upward and downward movement along the bed, as well as pelvic bridging using an overhead trapeze frame for support;

2. breathing exercises and general conditioning exercises;

3. restoration of lower-limb joint mobility through active-assisted exercises, including sliding each heel toward the buttock while lying in bed, followed by active straight-leg movements;

4. restoration of hip and knee flexor and extensor muscle strength using moderate-intensity isometric exercises. Patients in Group A additionally performed isometric exercises targeting the rectus abdominis and gluteal muscles;

5. in the presence of femoral or tibial fractures, patients in Group A also performed ideomotor (motor imagery) exercises involving mental rehearsal of movements of the muscles of the affected lower-limb segment. In Group B, the rehabilitation program did not include exercises for the muscles of the operated lower limb. Because patients in Group A additionally performed isometric exercises for the anterior abdominal wall, pelvic floor, and gluteal muscles, the intensity of the breathing, general conditioning, and isometric exercises in Group B was increased to ensure comparable overall exercise loads between the two groups;

6. when clinically indicated, patients in Group A were assisted into an upright position using external support, without weight-bearing on the lower limb ipsilateral to the pelvic injury. Early verticalization and weight-bearing in Group A were made possible by the enhanced stability of the external fixation construct achieved through the use of bidirectional threaded pins.

The highest level of lower-limb loading during ambulation with two crutches (50–70 % of body weight) in the early postoperative period was prescribed for five young patients who achieved the minimum score of 32 points on the Questionnaire for Determining Permissible Loading During Early Rehabilitation of Patients with Pelvic Fractures. The use of external support improved the safety and quality of walking and helped compensate for the functional limitations commonly observed during the early post-traumatic period. For the remaining patients, postoperative management followed the conventional protocol, with weight-bearing on the lower limbs restricted.

Early weight-bearing of the lower limbs was permitted in Group A only when patients were able to walk independently and safely with a gait that approximated normal walking as closely as possible. Partial weight-bearing of 50–70 % of body weight during standing and ambulation was allowed provided that the following conditions were met: the risk of tripping and falls was minimized; patients were able to walk a functionally appropriate distance at a comfortable speed; and gait characteristics compensated for any physical limitations while remaining within the patient's functional capacity. These measures were intended to reduce the risk of injury

associated with excessive loading during the early rehabilitation period.

During the second phase of postoperative rehabilitation under a free mobility regimen (2–6 weeks after surgery), the physical rehabilitation program focused on restoring the strength of the lumbopelvic and lower-limb muscles, improving joint range of motion, and training patients to stand and walk with assistive devices. In both groups, the rehabilitation interventions introduced during Phase 1 were continued at a higher intensity. As patients' physical condition improved, resistance and weighted exercises were gradually incorporated. Exercise intensity was guided by patient tolerance, with activities performed until the onset of moderate fatigue. Patients in Group B were mobilized to an upright position at the end of this phase, and standing and slow walking were initiated without weight-bearing on the lower limb ipsilateral to the pelvic injury. In addition, patients in Group A received gentle manual therapy techniques, including post-isometric relaxation of the lumbopelvic muscles according to the method of K. Lewit [12] and mobilization of postoperative soft-tissue scars following surgical fixation of upper- and lower-limb long-bone fractures.

During the third postoperative rehabilitation phase (6–8 weeks after surgery), the kinesiotherapy program was expanded to include coordination exercises, high-intensity isometric exercises for the lumbopelvic and pelvic floor muscles, and self-resisted stabilization exercises for the lower limbs. Isometric exercises targeting the lumbopelvic and pelvic floor muscles contributed to stabilization of the lumbosacral spine and sacroiliac joints during weight-bearing activities. The pelvic floor muscles, particularly the levator ani and coccygeus muscles, play a particularly important role by increasing compressive forces across the sacroiliac joints, thereby counteracting shear forces [13].

During the fourth phase of early postoperative rehabilitation (8–10 weeks after surgery), physical rehabilitation focused on improving postural stability, balance, and maximal lower-limb muscle strength. The program included marching in place, walking with sustained activation of the thigh muscles, stair climbing, high-intensity isotonic and self-resisted exercises for the lumbopelvic region and lower extremities, and full-range active resisted exercises for the lower-limb muscles.

The outcomes of the early rehabilitation programs in Groups A and B are presented in Table 2.

As shown in Table 2, the proposed early active rehabilitation protocol proved effective in patients

with unstable pelvic fractures. Educational sessions promoted active and informed patient participation in the rehabilitation process and fostered a positive psychological attitude from the earliest stages of recovery. The level of participation was classified as full in 24 % of patients in Group A and 12 % in Group B, moderately limited in 40 % and 24 %, markedly limited in 28 % and 46 %, and nominal in 8 % and 18 %, respectively.

The addition of gentle manual therapy techniques, including post-isometric relaxation and scar tissue mobilization, together with ideomotor exercises for surgically treated upper and lower extremities, resulted in a significant reduction in fear of movement during kinesiotherapy (TSK score: 31.7 ± 9.8 vs. 40.6 ± 11.4), anxiety and fear related to anticipated pain (PASS-20 score: 21.6 ± 9.4 vs. 36.2 ± 8.9), and pain intensity (VAS: 3.6 ± 1.8 vs. 4.8 ± 1.8 cm). These improvements facilitated early mobilization, enabling patients to stand with crutch support and without full weight-bearing on the operated side as early as postoperative days 3–4. The mean duration of bed rest was 8.2 ± 3.7 days in Group A compared with 16.9 ± 10.2 days in Group B ($p < 0.05$).

Discussion

The first step in the rehabilitation of patients with unstable pelvic fractures is stable osteosynthesis, which promotes timely fracture union while providing the mechanical stability required for early active physical rehabilitation. In Group A, construct stability was enhanced by the use of bidirectional threaded pins, which prevented loosening of the external fixation

device under cyclic multidirectional loading [10], including the alternating single- and double-limb support phases that occur during walking. To the best of our knowledge, no previous studies have reported the use of bidirectional threaded pins to increase the rigidity of external fixation constructs.

One of the key strengths of the proposed early active rehabilitation protocol is its educational component, which aims to improve patients' understanding of their injury, the scope and safety of surgical treatment, and the postoperative rehabilitation process. This component is particularly relevant because acute trauma, often accompanied by multiple and/or associated injuries, is typically associated with persistent severe pain, which may rapidly lead to the development of kinesiophobia and anxiety and fear related to the anticipation of pain [14]. Educational interventions designed to reduce kinesiophobia are widely incorporated into rehabilitation programs following major joint arthroplasty [15], sports injuries [16,17], and musculoskeletal trauma in general [18,19]. Their beneficial effects have been demonstrated regardless of the duration of the educational program [18].

Type B and C unstable pelvic fractures are typically associated with asymmetric injury to the muscles of the lumbopelvic region and lower extremities on the side of impact. Nevertheless, we consider it essential to include therapeutic exercises targeting the musculature of both the injured and contralateral limbs. This approach is justified because, during standing and particularly during walking, the muscles of the contralateral limb are required to compensate for the post-traumatic loss of strength and endurance of the injured musculature, resulting in increased functional demands. Previous studies have likewise shown that rehabilitation programs incorporating exercises for both the injured and contralateral limbs improve functional recovery after musculoskeletal trauma [6,20,21].

Restoration of independent ambulation, or walking with the least possible external support, together with improvements in static and dynamic balance, muscular endurance, and the ability to perform activities of daily living, are considered the principal long-term goals of physical rehabilitation after unstable pelvic fractures [22]. Increasing evidence supports the use of early progressive weight-bearing, which promotes bone healing while improving the functional performance of the pelvic and lower-limb musculature [22, 23]. The implementation of active postoperative rehabilitation programs has also been shown to accelerate recovery of musculoskeletal function in patients with unstable pelvic fractures [22–25].

Table 2

Functional outcomes of early rehabilitation in Groups A and B at 3 months after injury

Parameter	Group	
	A (n = 25)	B (n = 17)
VAS, cm	3.6 ± 1.8	4.8 ± 1.8
TSK score, points	31.7 ± 9.8	40.6 ± 11.4
PASS score, points	21.6 ± 9.4	36.2 ± 8.9
Patient participation in the rehabilitation process (points):		
– I (3–6);	6; 24 %	2; 12 %
– II (7–9);	10; 40 %	4; 24 %
– III (10–12);	7; 28 %	8; 46 %
– IV (13–15)	2; 8 %	3; 18 %
Killy test for endurance of hip and thigh flexor muscles, s	112.1 ± 34.8	101.9 ± 35.4
Endurance test of hip and thigh extensor muscles, s	96.4 ± 36.2	90.5 ± 36.2
Majeed score, points	78.6 ± 4.4	76.2 ± 4.81

Conclusions

A novel rehabilitation protocol for patients with unstable pelvic fractures was developed, comprising: (a) the use of bidirectional threaded pins in external fixation constructs to improve construct stability; (b) an early active rehabilitation program consisting of an educational component aimed at reducing kinesiophobia and anxiety and fear associated with anticipated pain; a structured kinesiotherapy program incorporating a range of physical rehabilitation interventions to restore the function of different muscle groups; and an individualized protocol for progressive vertical weight-bearing.

Comparison of the proposed rehabilitation protocol with the standard postoperative rehabilitation program demonstrated the effectiveness of the early active rehabilitation approach in patients with unstable pelvic fractures. At the three-month follow-up, all assessed outcomes favored the intervention group (Group A), including pelvic pain intensity measured by the VAS (3.6 ± 1.8 cm vs. 4.8 ± 1.8 cm in Group B), kinesiophobia assessed using the TSK (31.7 ± 9.8 vs. 40.6 ± 11.4 points), anxiety and fear related to anticipated pain assessed using the PASS-20 (21.6 ± 9.4 vs. 36.2 ± 8.9 points), the integral index of patient participation in the rehabilitation process (full participation: 24 % vs. 12 %; moderately limited: 40 % vs. 24 %; markedly limited: 28 % vs. 46 %; nominal: 8 % vs. 18 %), endurance of the hip flexor muscles (112.1 ± 34.8 s vs. 101.9 ± 35.4 s), endurance of the hip and pelvic extensor muscles (96.4 ± 36.2 s vs. 90.5 ± 36.2 s), and functional outcome assessed using the Majeed Pelvic Score (78.6 ± 4.4 vs. 76.2 ± 4.81 points).

Conflict of interest. The author declares no conflicts of interest.

Future research. Future studies should compare the functional outcomes of early rehabilitation following surgical treatment of unstable pelvic ring fractures using external fixation versus plate osteosynthesis.

Funding. This study received no external funding.

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The article has been sent to the editors 21.05.2026	Received after review 29.05.2026	Accepted for printing 01.06.2026
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FEATURES OF MEDICAL REHABILITATION OF PATIENTS WITH PELVIC FRACTURES

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