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Research on the Application of Early Functional Exercise Rehabilitation Nursing in Patients After Limb Fracture Surgery

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Abstract: *Objective:* To observe the effect of early functional exercise rehabilitation nursing in patients after limb fracture surgery. *Methods:* 76 patients with limb fractures in our hospital (from August 2024 to October 2025) were selected and divided into a control group (38 cases) of conventional rehabilitation and an observation group (38 cases) of early functional exercise rehabilitation care according to the random number table method. The study observed the patient's limb function, daily living ability, complication rate, quality of life, and satisfaction. *Results:* Compared with the control group, the observation group had higher limb function scores and daily living ability scores, lower complication rates, higher quality of life scores, and higher satisfaction scores, $P < 0.05$. *Conclusion:* Carrying out early functional exercise rehabilitation care in patients after limb fracture surgery can improve limb function and daily living ability, reduce the incidence of complications, and improve quality of life and satisfaction, which is worth learning from.

Keywords: Early functional exercise rehabilitation nursing; Limb fractures; Surgery

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1. Introduction

Limb fractures are a traumatic disease with a high incidence rate and are closely related to various accidental injuries, such as traffic accidents, external impacts, etc. The disease affects a wide range of people, and it has the characteristics of a high risk of disability and a long recovery period [1]. Limbs play a very important role in human limb activities and weight-bearing processes. Once a fracture occurs, it will cause the continuity of the bone to be interrupted, and symptoms such as local soft tissue damage, swelling, and pain will occur, which will have a great impact on the patient's normal life and physical function [2]. At this stage, for patients with obviously displaced and unstable limb fractures, surgical internal fixation is the main treatment method. The above aspects are conducive to the reduction of the fracture ends and the fixation of the bone structure,

laying a good foundation for final healing. However, surgical treatment can only repair the anatomical structure and cannot directly restore the patient's limb movement function. For patients, various adverse conditions may occur due to long-term bed rest and immobilization of the affected limb after surgery, such as local blood circulation disorders, muscle disuse atrophy, etc., which will have a great impact on the fracture healing process and limb function, and reduce the postoperative quality of life [3]. Based on the above content, we must pay attention to the early postoperative functional exercise of patients with limb fractures, and carry out phased rehabilitation training as soon as possible after the condition is stable, so as to improve local blood supply, reduce the risk of complications, and accelerate the recovery of limb function.

2. Materials and methods

2.1. General information

A total of 76 patients with limb fractures in our hospital from August 2024 to October 2025 were selected and randomly divided into 2 groups. There were 38 patients in the control group, including 20 males and 18 females, aged 55 to 86 (75.38 ± 5.68) years old, with 15 upper limb fractures and 23 lower limb fractures. In the observation group, there were 21 males and 17 females, aged 56 to 87 (75.45 ± 5.71) years old, with 16 upper limb fractures and 22 lower limb fractures. Comparison of general data, $P > 0.05$.

Inclusion criteria: closed fractures of limbs; clear consciousness; normal cognition and ability to communicate; no contraindications to surgery.

Exclusion criteria: bone and joint disease; severe osteoporosis; open fracture; mental illness; inability to cooperate with rehabilitation training; pathological fracture; polytrauma; serious medical illness.

2.2. Method

Routine nursing measures such as basic care, analgesia, dressing changes, and health education remained the same between the two groups of patients, with only the rehabilitation exercise programs being different.

Control group: Regularly evaluate the peripheral blood supply, sensation and activity of the affected limb, elevate the affected limb, and guide the patients to perform isometric contraction training of the muscles of the affected limb after the fracture is stabilized, and gradually carry out simple joint activities. During the recovery process, the incision, limb swelling and pain changes were closely observed, and patients' questions related to recovery were answered in a timely manner. Alternating cold compresses and hot compresses can help reduce swelling and pain after surgery. Before discharge, basic home rehabilitation verbal guidance was given, and rehabilitation precautions were explained.

Observation group: (1) The patient's surgical incision did not heal in the early postoperative period (1 to 7 days after operation), and his limbs showed pain, swelling and other symptoms. Therefore, the main content of the rehabilitation exercise process was passive activities and slight active activities. During specific training, patients with upper limb fractures are instructed to flex and extend their fingers, make fists, and slightly rotate their wrist joints, 3 to 4 times a day, for 10 to 15 minutes each time. For patients with lower limb fractures, they need to be guided to carry out toe flexion and extension, ankle dorsiflexion and quadriceps isometric contraction training. During the specific implementation process, the contracted muscles need to be maintained for 5 seconds and then relaxed and repeated three times a day, 15 minutes each time. During the training, the range of motion and strength should be strictly controlled under the guidance of nursing staff, so as not to cause traction on the surgical incision or aggravate the fracture displacement.

After the exercise, pay attention to the patient's condition and assess the swelling and pain in the limbs, so as to make reasonable adjustments to the training intensity. (2) In the mid-term postoperative period (8 to 21 days after operation), the patient's incision has basically healed, and the swelling and pain symptoms have been significantly relieved, and the fracture end has gradually stabilized. In this case, the training intensity can be further enhanced and the range of activities can be improved. For patients with upper limb fractures, elbow and shoulder joint flexion, extension, abduction, and rotation training can be increased, followed by certain light strength training, such as arm lifting, lifting objects, etc. For patients with lower limb fractures, ankle and knee joint flexion and extension training can be carried out. As time goes by, bedside standing and weight-bearing training can be carried out under the protection of braces. During this period, taking into account the patient's tolerance, the weight-bearing weight and standing time are gradually increased, 2 to 3 times a day, 20 to 30 minutes each time. Be careful not to exercise strenuously, and it needs to be gradual. (3) In the later stage of patient recovery (after 22 days after surgery), the fracture end is more stable. During the training period, patients need to be guided to perform all-round joint flexion, extension, rotation, and weight-bearing training. For patients with upper limb fractures, fine motor training can be further carried out, and daily functional training can be guided, such as grasping, combing hair, dressing, etc. Patients with lower limb fractures can perform movements such as walking up and down steps, walking slowly, and squatting.

2.3. Observation indicators

(1) Recovery: Fugl-Meyer score (FMA) evaluates limb function. Since it can quantitatively evaluate limb movement and coordination function, this study uses it to evaluate limb function after fracture surgery, and the Barthel index evaluates daily living ability;
(2) Complication rate;
(3) Quality of life: Comprehensive Quality of Life Assessment Questionnaire (GQOL-74);
(4) Satisfaction: Newcastle Nursing Service Satisfaction Scale (NSNS).

2.4. Statistical methods

SPSS26.0 software processes data, measurement data is expressed as mean ± standard deivatioin (SD), t test, count data is expressed as: n,%, χ^2 test, $P < 0.05$, the difference is statistically significant.

3. Results

3.1. Comparison of recovery situations

After intervention, the observation group was higher than the control group, $P < 0.05$, **Table 1**.

Table 1. Comparison of FMA and Barthel scores between the two groups before and after intervention (points)

Group	Limb function score		Daily living ability score	
	Before intervention	After intervention	Before intervention	After intervention
Control group (n=38)	42.81 ± 4.92	74.38 ± 5.23	50.83 ± 5.72	73.28 ± 5.47
Observation group (n=38)	42.57 ± 4.67	84.57 ± 4.69	50.68 ± 5.46	82.37 ± 4.95
t	0.218	8.942	0.117	7.596
P	0.828	0.000	0.907	0.000

3.2. Comparison of complication rates

The observation group was lower than the control group, $P < 0.05$, see **Table 2**.

Table 2. Comparison of complication rates between the two groups (n%)

Group	Joint stiffness	Muscle atrophy	Incision infection	Complications occur
Control group (n=38)	3(7.89)	2(5.26)	1(2.63)	6(15.79)
Observation group (n=38)	0(0.00)	0(0.00)	1(2.63)	1(2.63)
χ^2	-	-	-	3.934
P	-	-	-	0.047

3.3. Comparison of quality of life

After intervention, the observation group was higher than the control group, $P < 0.05$, see **Table 3**.

Table 3. Comparison of quality of life scores between the two groups before and after intervention (points)

Group	Material life		Social function		Psychological function		Physical function	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group (n=38)	77.86 ± 3.62	82.12 ± 4.48	75.52 ± 2.39	81.83 ± 3.61	76.61 ± 3.27	81.81 ± 2.52	77.29 ± 2.72	82.92 ± 1.61
Observation group (n=38)	77.73 ± 3.96	87.83 ± 4.40	75.71 ± 2.53	86.49 ± 4.37	76.81 ± 3.74	87.84 ± 4.51	77.47 ± 2.51	86.67±4.20
t	0.149	5.605	0.336	5.068	0.248	7.195	0.300	5.139
P	0.882	0.000	0.737	0.000	0.805	0.000	0.765	0.000

3.4. Satisfaction comparison

The observation group was higher than the control group, $P < 0.05$, see **Table 4**.

Table 4. Comparison of nursing satisfaction scores between the two groups (points)

Group	Satisfaction score
Control group (n=38)	81.62 ± 3.82
Observation group (n=38)	89.72 ± 3.93
t	9.111
P	0.000

4. Discussions

After limb fractures, patients will not only experience bone structural fractures, but also show secondary damage to surrounding soft tissues and neurovascular systems, as well as swelling, pain and other symptoms [4]. The surgical treatment process is beneficial for the reconstruction of the fracture anatomy, but the inflammatory response caused by trauma will not subside immediately after the operation. If the patient is immobilized for a long time after surgery, the joint capsule and surrounding ligaments will show contracture and adhesions, and the lack of stimulation of the skeletal muscles will also lead to disuse atrophy [5]. Many patients are afraid of pain

and are worried about internal fixation. They are prone to fear of movement and are unable to actively carry out rehabilitation training, which leads to increased limitation of limb activities and prolonged recovery time [6]. Clinically, although many patients have achieved fracture healing, their limb motor function recovery has not reached the ideal level, and they are unable to independently complete related daily activities, such as dressing, walking, etc., further reducing their quality of life. Therefore, targeted rehabilitation intervention must be carried out after surgery to ensure the patient's comprehensive recovery.

In the results of this study, compared with the control group, the observation group had higher limb function and daily living ability scores, $P < 0.05$. The reason is that during the implementation of early functional exercise rehabilitation care, passive and low-intensity active training in the early postoperative period can maintain muscle physiological excitability through finger and toe activities and isometric contraction of the quadriceps, promote local blood circulation, reduce inflammation and edema, and prevent soft tissue adhesion. In the mid-term, the range of joint motion can be further expanded, and joint flexion and extension, and moderate weight-bearing exercises can be actively performed, which is conducive to the recovery of muscle strength and joint mobility. Later training on fine movements, walking, squatting, etc. can simulate daily behavior patterns, and nursing staff can correct wrong movements in real time, which can ensure the quality of training to a large extent and ultimately improve limb functions and daily living abilities [7]. Compared with the control group, the incidence of complications in the observation group was lower, $P < 0.05$. Staged training can promote blood and lymph circulation, reduce the patient's swelling symptoms, and prevent disuse atrophy when muscles contract regularly. Moderate joint movement in the early stage can avoid joint stiffness. At the same time, strict control of specific intensity during training can avoid incision traction injuries and reduce the incidence of complications in patients through the above aspects. Compared with the control group, the observation group had a higher quality of life score, $P < 0.05$. The reason is that during the early functional exercise rehabilitation care process, systemic rehabilitation can effectively improve physical function, reduce patients' pain, and improve the patient's overall quality of life [8]. Compared with the control group, the observation group had a higher satisfaction score, $P < 0.05$. During the entire training process, nursing staff actively communicated and educated the patients to maintain a correct understanding of the training content, and dynamically adjusted the rehabilitation plan. After discharge, they continued to provide rehabilitation support through a variety of follow-up methods to ensure that patients received continuous and individualized rehabilitation guidance, ultimately improving satisfaction.

Therefore, the application of early functional exercise rehabilitation care to patients after limb fracture surgery is beneficial for improving limb function and daily living ability, reducing the occurrence of complications, improving quality of life and satisfaction, and has promotional value.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhao ZH, Jiang Y, Li T, 2025, Application Effect of Sequential Pain Care Model in Analgesia and Rehabilitation After Limb Fractures. Journal of Practical Orthopedics, 31(01): 92–96.

[2] Wang LM, Fang JH, Wu FQ, et al., 2024, The Mediating Effect of Self-Efficacy Between Pain Catastrophizing

and Fear of Movement in Children With Traumatic Limb Fractures. Chinese Journal of Trauma, 40(8): 739–742.

[3] Zhang HJ, Dong RY, 2023, Application of Multidisciplinary Collaboration Information Nursing Management Model in the Perioperative Period of Traumatic Fractures – Comment on "Illustrated Posture and Rehabilitation Nursing of Traumatic Fractures." World Traditional Chinese Medicine, 18(22): I0003.

[4] Niu Y, Han LN, 2023, Analysis of the Application Effect of Refined Nursing Based on Risk Assessment Strategies in Patients With Limb Fractures. Guizhou Medicine, 47(2): 313–314.

[5] Xin Y, 2023, The Effect of Detailed Intervention in the Operating Room on Reducing Surgical Incision Infection of Open Limb Fractures. Life Science Instruments, 21(4): 139–141.

[6] Cai YH, 2023, Research on the Value of 5E Care Combined With Pain Care Model and the Improvement Effect on Activities of Daily Living in Patients With Limb Fractures. Shanxi Medical Journal, 52(6): 468–471.

[7] Zhang YG, Han QQ, Wang HM, et al., 2023, Research on the Effectiveness Evaluation of Pneumatic Limb Circulation Promotion Device in Reducing Swelling After Lower Limb Fracture Surgery. Chinese Medical Equipment, 20(12): 139–143.

[8] Chen H, Xiang J, Li H, 2023, The Application Value of Diversified Pain Care Management in Postoperative Rehabilitation of Limb Fractures. Shanxi Medical Journal, 52(16): 1269–1272.

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