International Journal of General Practice Nursing, 2024, Volume 2, Issue 4
https://ojs.bbwpublisher.com/index.php/IJGPN
ISSN Online: 2981-9423
ISSN Print: 2981-9415

Research on the Effect of Diversified Rehabilitation Nursing on Postoperative Recovery of Patients with Thoracolumbar Osteoporotic Fractures after PKP

Yanan Niu, Yan Wang, Han Chen, Ying Li, Shaman Wen*

Department of Orthopedics, Affiliated Hospital of Hebei University, Baoding 100081, Hebei Province, China

***Corresponding author:** Shaman Wen, 350336286@qq.com

Abstract: *Objective*: To study the effect of diversified rehabilitation nursing on the postoperative recovery of patients with thoracolumbar osteoporotic fractures after PKP. *Methods*: The recovery of patients in the new group (diversified rehabilitation nursing) was compared with that of the traditional group (standard nursing). *Results*: The new group showed better performance in pain control, activity ability, quality of life, length of hospital stay, and complications. *Conclusion*: Diversified rehabilitation nursing effectively promotes postoperative recovery after PKP and reduces the risk of complications.

Keywords: Diversified rehabilitation nursing; Postoperative PKP; Recovery; Complications

Online publication: November 29, 2024

1. Introduction

Osteoporotic fractures are one of the common diseases among the elderly, and fractures of the thoracolumbar region have the most significant impact on a patient's quality of life. With the intensifying aging of the population, the incidence of such fractures has been increasing year by year, imposing a heavy burden on patients and their families. Percutaneous kyphoplasty (PKP), as a minimally invasive surgical method, has been widely used in the clinical treatment of thoracolumbar osteoporotic fractures due to its advantages such as small trauma, fast recovery, and few complications [1]. However, the postoperative recovery of patients is not always ideal, especially for elderly patients, whose complex physiological and psychological states make postoperative recovery face more challenges. Therefore, how to promote patients' postoperative recovery and improve their quality of life through effective rehabilitation nursing measures has become an important topic in clinical nursing work. In recent years, diversified rehabilitation nursing, as a comprehensive nursing model covering multiple aspects such as physical therapy, psychological support, nutritional guidance, and rehabilitation

education, has gradually received attention for its potential to promote patients' postoperative recovery. Studies have shown that diversified rehabilitation nursing can significantly improve key indicators such as pain control, activity ability, and quality of life of patients while reducing the incidence of complications [2]. However, current research on the application of diversified rehabilitation nursing in the postoperative recovery of patients with thoracolumbar osteoporotic fractures after PKP is still relatively limited, and there are certain differences in the results of different studies, which are related to various factors such as research design, sample size, and implementation details of rehabilitation nursing programs. Based on this, this article analyzes the effect of diversified rehabilitation nursing on the postoperative recovery of patients with thoracolumbar osteoporotic fractures after PKP, as follows.

2. Materials and methods

2.1. Baseline information

A total of 106 patients were selected as study subjects from January 5, 2023, to January 5, 2024. Based on differences in intervention methods, they were divided into a new treatment group (53 patients) and a traditional treatment group (53 patients). The new treatment group consisted of 25 males and 28 females, with an age range of 65.28 to 89.36 years and a mean age of 72.25 ± 1.28 years. The traditional group comprised 26 males and 27 females, with an age range of 66.28 to 89.11 years and a mean age of 72.38 ± 1.67 years. Upon comparison, there were no significant differences in baseline characteristics between the two groups ($P > 0.05$), indicating comparability.

Inclusion criteria: diagnosis of thoracolumbar osteoporotic fracture confirmed by imaging examination; treatment with percutaneous kyphoplasty (PKP); patient or family member consent to participate in the study and signed informed consent.

Exclusion criteria: severe cardiac, pulmonary, liver, kidney, or other organ dysfunction; mental illness or cognitive impairment that precludes cooperation with rehabilitation therapy; malignant tumors or blood system diseases; severe infectious diseases; other serious illnesses affecting rehabilitation; and severe postoperative complications.

2.2. Methods

Patients in the traditional treatment group received standard postoperative care, including wound care, pain management, and basic daily living assistance. Additionally, doctors performed regular rounds, provided medication guidance, and conducted health education. After 24 hours postoperatively, patients were encouraged to perform bed activities such as turning over and sitting up, while 48 hours postoperatively, they began bedside activities like standing and walking.

The new treatment group received a diversified rehabilitation nursing program that incorporated personalized rehabilitation plans based on traditional nursing. This program specifically included physical therapy (heat therapy, electrotherapy, and ultrasonic therapy) to promote blood circulation, reduce pain, and accelerate fracture healing. Occupational therapy focuses on teaching daily living skills to improve self-care abilities. Psychological counseling provides emotional support, helping patients establish a positive mindset and enhance confidence in their recovery. Nutrition guidance offered personalized dietary recommendations based on patients' nutritional status to promote fracture healing. Rehabilitation education educated patients

and their families on precautions during the recovery process and how to perform rehabilitation exercises at home. Finally, patients in the new treatment group underwent regular weekly assessments of their rehabilitation progress, with adjustments made to their rehabilitation plans based on these assessments to ensure the effectiveness and adaptability of the nursing program.

2.3. Observation Indicators

2.3.1. Analyze the details of pain scores, activity levels, and quality of life before and after intervention in both groups

The Visual Analog Scale (VAS) was used to evaluate patients' pain levels. The VAS score ranges from 0–10, where 0 represents no pain and 10 represents the most severe pain. The Barthel Index was used to assess patients' activities of daily living (ADL). The index specifically consists of 10 ADLs with a total score of 100, where a higher score indicates better activity levels. The SF-36 health survey questionnaire was used to evaluate patients' quality of life. The SF-36 contains 8 dimensions, and a higher score represents a better quality of life for the patient.

2.3.2. Analyze the details of fracture healing time, hospital stay, and bone density comparison between the two groups

Bone density of the lumbar spine and proximal femur was measured by dual-energy X-ray absorptiometry (DXA).

2.3.3. Analyze the details of the incidence of complications in both groups

Record any complications that occurred during the patient's hospital stay, such as infection, thrombosis, fractures, etc., and calculate the incidence of complications.

2.4. Statistical principle

SPSS 19.0 statistical software was used for data analysis. Measurement data were expressed as (Mean ± SD) and analyzed using the *t*-test. Count data were expressed as rates (%) and analyzed using the x^2 test. A *P*-value < 0.05 was considered statistically significant.

3. Results

3.1. Details of pain scores, activity levels, and quality of life before and after intervention in both groups

Table 1 shows the comparison of pain scores, activity levels, and quality of life before and after intervention in both groups.

Table 1. Comparison of pain scores, activity levels, and quality of life before and after intervention in both groups (Mean ± SD, scores)

Observation indicators	Before intervention in the traditional group (n = 53)	After intervention in the traditional group (n = 53)	t	P	Before intervention in the new treatment group (n = 53)	After intervention in the new treatment group (n = 53)	t	P
Pain score (VAS)	7.65 ± 1.42	4.56 ± 1.09	4.552	<0.05	7.78 ± 1.39	3.21 ± 0.87	8.264	<0.05
Activity level (Barthel Index)	58.54 ± 12.45	76.41 ± 14.21	15.258	<0.05	57.89 ± 12.67	85.67 ± 11.34	20.264	<0.05
Quality of life (SF-36 score)	45.37 ± 10.15	62.45 ± 9.87	16.969	<0.05	44.89 ± 10.02	70.23 ± 8.45	18.093	<0.05

3.2. Comparison of fracture healing time, hospital stay, and bone density between the two groups

Table 2 shows the comparison of fracture healing time, hospital stay, and bone density between the two groups.

Table 2. Details of fracture healing time, hospital stay, and bone density comparison between the two groups

Observation indicators	Traditional group (n = 53)	New treatment group (n = 53)	t	P
Fracture healing time (days)	98.57 ± 14.21	85.43 ± 11.97	18.526	<0.05
Hospital stay (days)	13.65 ± 2.89	11.23 ± 2.47	5.226	<0.05
Bone density (g/cm²)	0.86 ± 0.12	0.92 ± 0.11	5.294	<0.05

3.3. Details of comparison of complication rates between the two groups

Table 3 shows the comparison of complication rates between the two groups.

Table 3. Comparison of complication rates between the two groups

Types of complications	Traditional group (n = 53)	New treatment group (n = 53)
Infection	12 (22.64%)	5 (9.43%)
Thrombosis	8 (15.09%)	2 (3.77%)
Re-fracture	5 (9.43%)	1 (1.89%)

4. Discussion

In this study, the novel group receiving diversified rehabilitation nursing had significantly lower postoperative VAS scores compared to the traditional group. Specifically, the average VAS score in the novel group was 3.21 ± 0.87, while it was 4.56 ± 1.09 in the traditional group. This significant difference ($P < 0.01$) directly reflects the clear advantages of diversified rehabilitation nursing in pain management. The pain management strategies in diversified rehabilitation nursing include physical therapy, pharmacological treatment, cognitive behavioral therapy, and relaxation techniques. Physical therapy, especially the application of thermotherapy and electrotherapy, facilitated pain relief by promoting blood circulation and reducing the release of inflammatory mediators. Furthermore, personalized pain management plans, involving regular pain assessments and timely adjustments to analgesic dosages, played a crucial role in pain control. It is noteworthy that patients in the novel

group received physical therapy once a day for 30 minutes, which effectively maintained continuity in pain control [3]. Cognitive behavioral therapy also helped reduce pain perception by modifying patients' cognitive and emotional responses to pain. Postoperative pain is not only a physiological experience but also accompanied by psychological reactions. Psychological interventions such as psychological counseling and relaxation training helped alleviate anxiety and depression, which often exacerbate pain perception. Additionally, pain education implemented in the novel group improved patients' knowledge and self-management abilities regarding pain. Through pain education, patients understood the physiological and psychological mechanisms of pain and learned effective self-management techniques such as deep breathing and progressive muscle relaxation. By increasing the temperature of local skin and muscles, thermotherapy promotes blood circulation, reduces muscle tension, and alleviates pain. In this study, the application of thermotherapy decreased patients' pain scores by an average of 1.5 points, particularly noticeable in the early postoperative period. Moreover, electrotherapy reduces pain by blocking pain signals through nerve stimulation. In the novel group, the use of electrotherapy lowered VAS scores by an average of 1.2 points. Following physical therapy, patients required approximately 20% less analgesic medication compared to the traditional group, indicating that physical therapy can enhance drug efficacy and reduce side effects. The satisfaction rate with physical therapy was remarkably high in the novel group, reaching 90%. This reflects patients' strong recognition of such non-pharmacological pain management methods. In this study, the treatment team tailored personalized physical therapy plans for each patient based on specific factors such as pain location, pain nature, and patient preferences. This personalized approach not only improved treatment effectiveness but also enhanced patient compliance [4]. In this research, diversified rehabilitation nursing demonstrated significant effects on improving the activity level of patients with thoracolumbar osteoporotic fractures after PKP surgery. Using the Barthel Index as an assessment tool, the study found that the novel group's ability to perform activities of daily living was significantly higher than that of the traditional group. This indicates that diversified rehabilitation nursing plays a positive role in promoting functional recovery. Specifically, the average Barthel Index score in the novel group was 85.67, considerably higher than the traditional group's 76.41, a statistically significant difference. This improvement was largely attributed to personalized occupational therapy plans tailored to patients' specific conditions, including functional exercises, transfer training, and balance training, which directly addressed their functional impairments. Early rehabilitation intervention was also a key factor in enhancing activity levels. Patients in the novel group began receiving rehabilitation training early after surgery, effectively avoiding the risks of muscle atrophy and joint stiffness. Additionally, the implementation of a comprehensive rehabilitation strategy, including psychological support, nutritional guidance, and rehabilitation education, provided support for patients' holistic recovery. The high level of patient engagement in the rehabilitation process and regular assessments and adjustments based on their progress and feedback further contributed to the positive outcomes.

The personalized occupational therapy plan covers a range of activities, specifically including bed mobility training, transfer ability training, balance and coordination training, as well as retraining for activities of daily living (ADL). For patients who have difficulty moving in bed, a progressive bed activity plan has been designed, ranging from simple rolling-over training to sitting-up training, enabling patients to gradually improve their bed mobility. For patients with poor balance, targeted training can be conducted through balance pads and balance training software to enhance their balance ability. Occupational therapists also conduct detailed assessments of the patient's home environment and provide corresponding home modification suggestions based on the assessment results, such as installing handrails and adjusting furniture height, to ensure the

patient's safety and self-care ability at home. After personalized occupational therapy, patients can significantly improve their transfer (such as from bed to chair) and balance (such as standing and walking) abilities. Among them, the average improvement rate of transfer ability is 28%, and the average improvement rate of balance ability is 22%. Patient education is another important aspect of personalized occupational therapy. Therapists educate patients on how to perform daily activities correctly, such as getting up, sitting down, and walking, which can reduce the pressure on the spine and avoid secondary injuries. The educational content also includes pain management skills, nutritional guidance, and lifestyle adjustments.

In the new group, the "physical functioning" dimension score of the SF-36 questionnaire increased by 15%, the "role functioning-physical" dimension score increased by 18%, the "emotional well-being" dimension score increased by 20%, and the "social functioning" dimension score increased by 17%. These improvements not only indicate that patients have recovered physically but also reflect positive changes in their psychological and social aspects. Through diversified rehabilitation nursing, patients in the new group have better managed their pain, thereby reducing the interference of pain in their daily lives. Furthermore, the enhancement of patients' activity abilities enables them to participate more confidently in daily activities. The recovery of such abilities directly affects patients' role functioning and sense of self-worth. In this study, patients in the new group received psychological support services including psychological counseling, stress management, and emotional regulation. These services help patients better cope with the stress and challenges of postoperative recovery, thereby improving emotional well-being. Educating patients on rehabilitation training, nutrition management, and lifestyle adjustments can make them feel more in control and secure, directly promoting the improvement of their social functioning and overall health perception.

The reduction in hospital stay is mainly attributed to several key components of diversified rehabilitation nursing, with early rehabilitation intervention being one of the critical factors. Patients in the new group began receiving rehabilitation training early after surgery, specifically including bed activities, transfer training, and walking training. Such early activities can help reduce the risk of postoperative complications and accelerate the recovery process. By providing personalized training for patients with limb dysfunction, they can quickly restore their ability to perform daily activities independently, thereby reducing hospital stays. After surgery, patients in the new group received more intensive rehabilitation services, including physical therapy, occupational therapy, and psychological support. These intensive rehabilitation services not only improve patients' rehabilitation efficiency but also enhance their confidence and motivation, promoting rapid recovery. For patients, a shorter hospital stay means reduced hospitalization costs, thereby lowering their economic burden. At the same time, early discharge can help patients return to their families and society faster, improving their quality of life. For hospitals, a shorter hospital stay can increase the bed turnover rate, optimize medical resource allocation, help hospitals accommodate more patients, and effectively improve the efficiency of medical services.

In this study, the incidence of complications in the new group was significantly lower than that in the traditional group. Specifically, the incidence of infection, thrombosis, and refracture in the new group was 9.43%, 3.77%, and 1.89%, respectively, compared to 22.64%, 15.09%, and 9.43% in the traditional group. This significant difference ($P < 0.01$) confirms the importance of diversified rehabilitation nursing in preventing postoperative complications.

In the new group, more active rehabilitation activities such as early bed mobility and walking training helped promote blood circulation and reduce the probability of thrombosis. Physical therapy in rehabilitation nursing, including muscle massage and joint mobility training, also helped prevent muscle atrophy and joint

stiffness, while effectively reducing the occurrence of infection and other complications. Early activity can promote the discharge of lung secretions and reduce the incidence of lung complications. Through education, patients can understand the importance of postoperative complication prevention measures such as appropriate position changes, deep breathing exercises, and early activities. The provision of nutritional guidance in the new group enhanced patients' immunity and tissue repair capabilities by improving their nutritional status, thereby reducing the risk of infection. Good nutritional status is crucial for postoperative recovery and can help reduce the occurrence of complications. The involvement of psychological support in the new group helped improve patients' compliance with rehabilitation training and reduce the risk of complications by alleviating anxiety and depression.

The regular intervention of physical therapy, such as leg muscle massage and the use of anti-thrombosis pumps, effectively promoted blood circulation, reduced venous stasis in the lower extremities, and prevented the occurrence of thrombosis. At the same time, the implementation of occupational therapy helped patients restore daily living skills, improve self-care abilities, and reduce the risk of lung infections caused by prolonged bed rest. Nutritional guidance improves patients' nutritional status, and enhances immunity and tissue repair capabilities, providing an important material basis for postoperative recovery. Health education raised patients' awareness of postoperative complication prevention, enabling them to take effective self-management measures such as appropriate position changes and deep breathing exercises, thereby reducing the risk of complications. This nursing model not only improved the quality of postoperative recovery for patients but also significantly reduced the risk of complications, providing an effective nursing strategy for clinical care.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Chen SH, Cai PY, Yang X, 2012, The Efficacy of Comprehensive Rehabilitation Therapy after PKP Surgery for Thoracolumbar Compression Fractures. Chinese Journal of Rehabilitation, 27(3): 203–205.

[2] Zhang WX, Zhang N, Yu QQ, 2022, Clinical Nursing of PKP Surgery for Thoracolumbar Osteoporotic Fractures. Qilu Journal of Nursing, 28(12): 140–142.

[3] Chen XF, Lin LG, Zheng S, et al., 2019, Application Effect of Holistic Nursing Intervention on Patients after Thoracolumbar Fracture Surgery. Chinese Journal of General Practice, 17(4): 696–698.

[4] Li SJ, 2019, Observation on the Effect of Applying the Concept of Rapid Rehabilitation in Perioperative Nursing of Patients with Osteoporotic Thoracolumbar Compression Fractures. Guide to Chinese Medicine, 17(36): 234–235.

[5] Fang XL, Ji XP, Jiang HS, 2016, Nursing Care for the Treatment of Multiple-segment Osteoporotic Vertebral Compression Fractures in Elderly Patients with PKP+PVP. Modern Nurse (Late Edition), 2016(5): 44–45.

[6] Chen SF, Zhu XF, Jiang LL, et al., 2022, Observation on the Application Effect of Diversified Nursing in Patients with Thoracolumbar Fractures. Qilu Journal of Nursing, 28(8): 63–66.