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The Impact of Early Postoperative Rehabilitation Training on Balance Ability and Quality of Life in Elderly Patients with Hip Fracture

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Abstract: Objective: To analyze the improvement effect of early postoperative rehabilitation training on balance ability and quality of life in elderly patients with hip fracture. Methods: A total of 50 elderly patients with hip fracture admitted to our hospital from January 2023 to January 2024 were selected and divided into the observation group (25 cases) and the control group (25 cases) by random number table method. The control group received routine nursing, while the observation group received early rehabilitation training on the basis of routine nursing. The balance ability (Berg Balance Scale, BBS) and quality of life (SF-36) of the two groups were compared. *Results:* The BBS scores of the observation group at all postoperative time points were significantly higher than those of the control group ($p < 0.05$), and the quality-of-life scores of the observation group were also significantly higher than those of the control group ($p < 0.05$). *Conclusion:* Early postoperative rehabilitation training for elderly patients with hip fracture can improve their balance ability, enhance their quality of life, and reduce the incidence of postoperative complications, which is worthy of clinical promotion.

Keywords: Elderly hip fracture; Early postoperative rehabilitation training; Balance ability; Quality of life; Complications

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1. Introduction

Hip fracture in the elderly is a common traumatic disease in orthopedics, including femoral neck fracture and intertrochanteric fracture. With the aggravation of aging, the incidence of this disease is increasing year by year. According to relevant statistics, the annual incidence of hip fracture in the elderly over 65 years old in the world is 3–5%, and the disability rate within 1 year after operation is 50–60%. Due to the decline of physical function, weakened muscle strength and decreased balance ability, elderly patients are prone to complications such as muscle atrophy, joint stiffness and deep vein thrombosis after long-term bed rest and immobilization after fracture, which seriously affects the recovery of patients' balance ability, reduces their quality of life, and causes a huge burden on families and society. At present, surgical treatment is still the main treatment method for elderly hip

fracture, which can restore the anatomical structure of the fracture and facilitate early activities. However, the timeliness and scientificness of postoperative rehabilitation training are crucial for patients' rehabilitation. The traditional rehabilitation model mostly starts intervention after the patient's condition stabilizes after operation, at which time the patient has developed varying degrees of disuse muscle atrophy, increasing the difficulty of rehabilitation. Based on the above situation, this study selected 50 elderly patients with hip fracture as research objects, and analyzed the actual effect of early postoperative rehabilitation training through group comparison, so as to provide certain reference for improving the postoperative rehabilitation program of elderly hip fracture [1].

2. Materials and methods

2.1. Clinical data

A total of 50 elderly patients with hip fracture admitted to the orthopedics department of our hospital from January 2023 to January 2024 were selected and divided into the observation group (25 cases) and the control group (25 cases) by random number table method. In the observation group, there were 11 males and 14 females, aged 65–88 years, with an average of (76.32 ± 5.41) years. In the control group, there were 12 males and 13 females, aged 66–89 years, with an average of (77.15 ± 5.63) years. This study has been approved by the medical ethics committee [2].

2.1.1. Inclusion criteria

(1) Diagnosis of elderly hip fracture conforms to the standard, confirmed by X-ray or CT examination;
(2) Patients and their families are informed and consent to sign the informed consent form.

2.1.2. Exclusion criteria

(1) Complicated with severe heart, liver, kidney and other organ failure;
(2) Complicated with malignant tumors and coagulation disorders. There were no statistically significant differences in general data such as gender, age, fracture type, cause of injury and comorbidities between the two groups ($p > 0.05$), which were comparable.

2.2. Methods

Both groups underwent routine surgery and basic nursing (vital sign monitoring, wound care, anti-infection, pain management, etc.) [3,4].

2.2.1. Control group

Routine postoperative rehabilitation nursing. During bed rest, ankle flexion and extension and isometric contraction training of quadriceps were performed twice a day, 15 to 20 minutes each time; after the condition improved 2 to 3 weeks after operation, help patients sit up, stand and walk, and gradually increase the difficulty.

2.2.2. Observation group

On the basis of the control group, the observation group carried out early postoperative rehabilitation training. A rehabilitation team composed of rehabilitation physicians, responsible nurses and rehabilitation therapists formulated an individualized rehabilitation training plan according to the patient's surgical method and physical condition.

2.2.3. Training strategy

Training started 1–3 days after operation, and the training content was carried out in stages.

Stage 1 (1–7 days after operation): Bedside passive training + active assisted training to prevent muscle atrophy and joint restriction.

(1) Passive training

Rehabilitation therapists helped patients complete passive flexion and extension training of hip and knee joints, with the angle starting from 30° and gradually increasing to 90°, 10–15 min each time, twice a day;

(2) Active assisted training

Guided patients to carry out ankle dorsiflexion and plantar flexion training, 10 min each time, three times a day; isometric contraction training of quadriceps, contraction for 5–10 s each time, 10–15 times per group, three groups a day; gluteus maximus contraction training, 10 times per group, three times a day;

(3) Respiratory function training

Guided patients to carry out abdominal breathing training, 10 min each time, twice a day, to prevent pulmonary infection.

Stage 2 (8–14 days after operation): Focus on active training and preliminary balance function training to enhance muscle strength and joint range of motion.

(1) Active training

Patients independently completed active flexion and extension training of hip and knee joints, gradually increasing the training angle and range, about 15 min each time, twice a day; straight leg raising training, the lifting height starts from 10 cm and gradually increases to 30 cm, 10 times per group, three groups a day;

(2) Balance function training

Assisted patients to sit by the bed with both feet on the ground for sitting balance training, 10 min each time, twice a day

(3) Transfer training

Guided patients to perform bed-chair transfer training with the help of walkers, 10–15 min each time, twice a day.

Stage 3 (15d after operation–discharge): Focus on intensive balance function training and walking training to improve activities of daily living.

(1) Balance function training

Single-leg standing and eyes-closed standing, 5–10 min each time, twice a day;

(2) Walking training

Straight-line walking and turning walking, gradually extending the walking distance and increasing the walking speed, 20–30 min each time, twice a day;

(3) Activities of daily living training

Dressing, washing, eating, etc., 15–20 min each time, twice a day. Patients were followed up for 6 months after discharge, and rehabilitation training was regularly guided through telephone and outpatient review.

2.3. Observation indicators

(1) Balance ability

Evaluated by Berg Balance Scale (BBS) at 1 month, 3 months and 6 months after operation, with a total

of 14 items, 0–4 points per item, total score 0–56 points, higher score indicates better balance [5].

(2) Quality of life

Evaluated by the 36-Item Short Form Health Survey (SF-36) at 6 months after operation, including 7 aspects such as physical function, bodily pain, general health and social function, 0–100 points per dimension, higher score indicates better quality of life [6].

2.4. Statistical methods

The data in this group were processed and analyzed with SPSS21.0 software. Measurement data were expressed as ($\bar{x} \pm s$) and tested by *t* test; count data were expressed as % and tested by χ^2 test. $p < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of BBS scores between the two groups at different postoperative time points

At 1 month, 3 months and 6 months after operation, the BBS scores of the observation group were significantly higher than those of the control group ($p < 0.05$). The specific results are shown in **Table 1**.

Table 1. Comparison of BBS scores between the two groups at different postoperative time points ($\bar{x} \pm s$)

Groups	Number of cases	1 month after operation (points)	3 months after operation (points)	6 months after operation (points)
Observation group	25	32.45 ± 4.21	41.68 ± 5.32	50.32 ± 4.89
Control group	25	25.12 ± 3.89	33.25 ± 4.98	42.15 ± 5.12
t	-	6.3939	5.7841	5.7698
p	-	0.0000	0.0000	0.0000

3.2. Comparison of SF-36 scores between the two groups at 6 months after operation

At 6 months after operation, the scores of each dimension of SF-36 in the observation group were significantly higher than those in the control group ($p < 0.05$). The specific results are shown in **Table 2**.

Table 2. Comparison of SF-36 scores between the two groups at 6 months after operation ($\bar{x} \pm s$)

Groups	Number of cases	Physical function (points)	Bodily pain (points)	General health (points)	Social function (points)
Observation group	25	78.32 ± 6.54	75.12 ± 5.89	72.45 ± 6.12	79.68 ± 5.98
Control group	25	65.15 ± 5.98	62.35 ± 6.12	60.12 ± 5.89	66.32 ± 6.45
t	-	7.4307	7.5172	7.2581	7.5947
p	-	0.0000	0.0000	0.0000	0.0000

4. Discussion

The core of postoperative rehabilitation for elderly hip fracture is to restore limb function, improve balance ability

and quality of life. Elderly patients recover slowly after operation, and if not intervened in time, adverse outcomes such as muscle atrophy and joint adhesion are likely to occur. The results of this study showed that the BBS scores of the observation group at all postoperative time points were higher than those of the control group, indicating that early rehabilitation training can significantly improve the patient's balance ability. The reason is that early rehabilitation carries out passive, active and balance training in stages, stimulates muscle contraction, enhances muscle strength, improves joint range of motion, and balance training improves body stability [6–10]. The BBS score of the observation group was significantly improved 1 month after operation, indicating that early intervention can break the vicious circle of bed rest, muscle atrophy and balance decline; the score was close to normal 6 months after operation, indicating long-term effectiveness. Quality of life is an important evaluation index of postoperative rehabilitation effect, which is affected by limb function, pain, social participation, etc. This study showed that at 6 months after operation, the observation group scored higher than the control group in all dimensions of SF-36, indicating that early rehabilitation can improve the patient's quality of life. Because early rehabilitation improves balance and muscle strength, promotes the recovery of limb function, reduces dependence on others, and improves physical function and general health scores; improved limb function reduces pain and improves sleep and vitality levels; patients participate in social activities as soon as possible, improving social function and mental health scores [11–13]. The control group started rehabilitation late, had slow recovery of limb function, long duration of pain, limited social participation, and poor improvement in quality of life. Early rehabilitation focuses on individualization, formulates rehabilitation plans according to the type of surgery and physical condition, advances them step by step in stages, and strengthens training monitoring. No serious complications such as prosthesis loosening occurred in the observation group, which verified the safety of the program. However, this study has a small sample size, single center and short follow-up time, so the results may be biased [14,15]. In the future, the sample size should be increased, and multi-center research and long-term follow-up are needed to determine the long-term effect.

5. Conclusion

In conclusion, early postoperative rehabilitation training for elderly patients with hip fracture can improve balance ability, enhance quality of life, and have high safety, which is worthy of clinical promotion. Clinically, attention should be paid to early rehabilitation intervention, a professional team should be established, individualized plans should be formulated, guidance and monitoring should be strengthened, and rehabilitation effects should be improved.

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Disclosure statement

The authors declare no conflict of interest.

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