

Original Article

Comprehensive nursing based on feedforward control and postoperative FMA and SF-36 levels in femoral intertrochanteric fracture

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Abstract

Objective: To study the effect of comprehensive nursing based on the concept of feedforward control on postoperative FMA (Fugl-Meyer Assessment) and SF-36 (health status questionnaire) in patients with femoral trochanteric fracture. **Methods:** 114 patients with femoral intertrochanteric fracture were enrolled in the study. Patients were divided into control group and observation group according to order of admission, 57 cases in each group. Both groups of patients received proximal femoral nail antirotation surgery, conventional nursing and feedforward control based comprehensive nursing. Nursing effects of the two groups of patients were compared. **Results:** Anus first exhaust time, the time of getting out of bed and hospitalization time, and after nursing, SAS (Self-Rating Anxiety) and SDS (Self-Rating Depression) score of the observation group were significantly lower than those of the control group ($p < 0.05$). FMA and SF-36 score of the observation group after surgical nursing were significantly higher than those of the control group ($p < 0.05$). The total incidence of complications in the observation group was lower than that in the control group ($p < 0.05$). **Conclusions:** Comprehensive care based on the concept of feedforward control has a better nursing effect for patients with intertrochanteric fracture, which can shorten the time of patient getting out of bed and hospitalization and reduce the incidence of post-complications.

Keywords: Comprehensive Nursing, Feedforward Control Concept, FMA, Intertrochanteric Fractures, SF-36

Introduction

Femoral intertrochanteric fracture is a common clinical fracture, which can be caused by indirect or direct violence, such as falls. Intertrochanteric fractures are mainly characterized by pain, swelling, bruising, and restricted lower limb activity, which seriously affect the health and quality of life of patients¹. Bone mass gradually declines with aging. The incidence of intertrochanteric fractures in the elderly

is significantly higher than in other age groups. Given the increase of aging population in China, incidence of femoral intertrochanteric fracture shows an increasing trend. Surgery is the main treatment of this type of fracture². Because the majority of patients are elderly with slow postoperative recovery, it is especially important to improve the quality of care of patients with intertrochanteric fractures. Given this, a study was conducted to provide comprehensive care based on the concept of feedforward control for some patients with intertrochanteric fractures and to compare with the effect of routine care.

The authors have no conflict of interest.

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Materials and methods

Clinical data

114 patients with intertrochanteric fractures who were admitted to The Third Affiliated Hospital of Qiqihar Medical University from February 2016 to February 2018 included in the study. All patients had closed fractures and an injury-time



Table 1. Comparison of general recovery indicators after operation in both groups (mean \pm SD).

Groups	Cases	Anus first exhaust time (h)	Time of getting out of bed (min)	Hospitalization time (days)
Control	57	25.68 \pm 6.58	99.93 \pm 11.41	8.04 \pm 0.57
Observation	57	17.98 \pm 5.39	78.17 \pm 10.53	4.31 \pm 0.46
t	-	6.835	10.581	38.447
p	-	0.000	0.000	0.000

of less than 10 days. Patients with other serious diseases and mental disorders were excluded. Patients were numbered 1-114 according to order of admission, and odd number patients were included in the control group, and even number patients were included in the observation group, 57 cases in each group. There were 37 males and 20 females in the control group, aged between 65 and 81 years, with a mean age of (77.49 \pm 3.46) years old. There were 36 males and 21 females in the observation group, aged between 66 and 79 years, with a mean age of (77.88 \pm 3.46) years. There were no significant differences between two groups in all aspects. Ethical approval for this study was obtained from The Third Affiliated Hospital of Qiqihar Medical University and all patients signed informed consent.

Research methods

Patients in the control group underwent routine nursing, including pre-operative regular education, nursing evaluation, etc. The observation group underwent comprehensive care based on the concept of feedforward control. Specific measures were as follows: 1. Implementation of feedforward control search to view past cases of intertrochanteric fractures and to understand the most common complications or adverse events in the care of such patients. Adverse events include pressure sores, pain, and wound infection, anal exhaust delay and anxiety, etc., identify the causes and risk factors leading to the above complications or adverse events, and make detailed records. Follow-up care measures were designed; 2. Enhanced preoperative care: a. Psychological counseling performed on patients to explain the successful cases of previous surgery, to improve patients' confidence in treatment. Patients were encouraged to read newspapers and listen to music, to forget sorrow, establish a good relationship between nurses and patients; b. Carefully evaluation of the patient's disease status, pay special attention to patients with other medical histories, and prepare for disease prevention and control in advance; c. Patients were advised to rest on time and perform muscle contraction exercise, instruct patients to learn to sputum, defecation, and turn over in the bed; 3. Post-operative care: a. Strengthen anti-infective care, require nursing staff to closely observe the changes in the patient's vital signs, ensure that the surgical wounds are clean and dry, and promptly report to the doctor for timely treatment

if there are any adverse conditions; confirm the types of pathogens, carry out anti-infective treatment, avoid blindness of treatment; guide patients to use water and cough to prevent infection of the lungs and urinary tract; b. Conducting exercise guidance: the nursing staff guides the patient's activity intensity according to the actual situation of the patient; the patient can exercise the hip and knee joint during bed rest; evaluate the recovery of the patient, and appropriately increase the exercise intensity, which can be assisted by the nursing staff; c. Strengthen the diet care for patients: patients are recommended to eat more digestible foods, avoid spicy, greasy, irritating foods, eggs, fish, shrimp, and other foods are preferred; 4. discharge health guidance: inform patients to pay attention after discharge. Patients are advised to adhere to physical function training. Nursing staff should track disease conditions and do regular telephone follow-up to understand the recovery of the patient's fracture.

Observation indicators³

1. General indicators of two groups were compared after surgery; 2. SAS and SDS rating scale were used to evaluate and compare the anxiety and depression of the two groups before and after surgery; 3. The changes in FMA score and SF-36 level before and after surgery were compared. The full score of FMA and SF-36 were both 100 points. The higher the score, the better the recovery. 4. The incidence of complications in two groups was compared.

Statistical methods

Statistical analysis was performed by SPSS19.0 statistical software. Quantitative data were expressed as mean \pm standard dev. t-test was used for comparison between groups, and χ^2 test was used for comparison between qualitative data. $p < 0.05$ was considered statistically significant.

Results

Comparison of general recovery indicators after operation in both groups

Anus first exhaust time, the time of getting out of bed, and hospitalization time were significantly better in the observation group than in the control group ($p < 0.05$) (Table 1).

Table 2. Comparison of anxiety and depression between the two groups before and after nursing (points, mean \pm SD).

Groups	Cases	SAS score		SDS score	
		Before treatment	After treatment	Before treatment	After treatment
Control	57	55.81 \pm 10.21	50.97 \pm 9.77	53.34 \pm 7.44	51.64 \pm 8.99
Observation	57	55.76 \pm 11.67	45.09 \pm 6.87	53.25 \pm 8.66	43.24 \pm 7.47
t	-	0.024	3.717	0.060	5.426
p	-	0.981	0.000	0.953	0.000

Table 3. Comparison of FMA scores and SF-36 levels before and after nursing in two groups (points, mean \pm SD).

Groups	Cases	FMA score		SF-36 level	
		Before treatment	After treatment	Before treatment	After treatment
Control	57	33.54 \pm 8.38	58.33 \pm 9.41	45.44 \pm 8.67	61.15 \pm 16.73
Observation	57	33.28 \pm 7.41	67.17 \pm 8.53	45.31 \pm 8.46	76.35 \pm 14.44
t	-	0.175	5.255	0.087	5.193
p	-	0.861	0.000	0.931	0.000

Table 4. Comparison of the incidence of complications between two groups (n, %).

Groups	Cases	Pressure sore	Pain	Wound infection	Others	Total incidence
Control	57	2 (3.51)	3 (5.26)	4 (7.02)	7 (12.28)	16 (28.07)
Observation	57	1 (1.75)	1 (1.75)	1 (1.75)	3 (5.26)	6 (10.53)
t	-	0.342	1.036	1.883	1.754	5.632
p	-	0.558	0.309	0.170	0.185	0.018

Comparison of anxiety and depression between the two groups before and after nursing

There were no significant differences in SAS and SDS scores between the two groups before nursing. However, after treatment, SAS and SDS scores of the observation group were significantly lower than those of the control group ($p < 0.05$) (Table 2).

Comparison of FMA scores and SF-36 levels before and after nursing in two groups

There were no significant differences in FMA scores and SF-36 levels between the two groups before nursing. FMA scores and SF-36 levels were significantly higher in the observation group than in the control group after nursing ($p < 0.05$) (Table 3).

Comparison of the incidence of complications in the two groups of patients

Complications such as pressure sore, pain, and wound infection occurred in both groups, but the total incidence

of complications in the observation group was 10.53%, which was significantly lower than that in the control group (28.07%, $p < 0.05$) (Table 4).

Discussion

Bone mass is gradually lost with aging, and the bone loss of the femoral trochanter is more obvious. Therefore, the elderly are at high-risk of fractures. Besides that bodily functions in elderly are declined, body has poor reparability and multiple diseases are combined, so requirements for surgical treatment and postoperative care of elderly are high⁴. Studies have shown that improving the quality of care in patients with intertrochanteric fractures is the key to improve treatment outcomes⁵. Feedforward control refers to the precautionary measures taken by observing the patient's status, collecting and sorting information, grasping the law and predicting the trend, and correctly predicting the problems that may arise in the future. Comprehensive care based on this concept aims to provide patients with intimate and comprehensive care and maximize patient's care effect⁶⁻⁸.

In this study, patients in two groups received conventional

nursing and feedforward control based on comprehensive nursing, respectively. Results showed that anus first exhaust time, the time of getting out of bed, and hospitalization time were significantly better in the observation group than in the control group ($p < 0.05$). There were no significant differences in FMA scores and SF-36 levels between two groups before nursing. However, FMA scores and SF-36 levels of patients after surgery were significantly higher than those of the control group ($p < 0.05$), suggesting that comprehensive nursing based on the concept of feedforward control can effectively improve the nursing effect and promote the recovery of patients. The reason for this observation is that the nursing care of the patients in the observation group fully takes into account the individuality of the patients. According to the actual status of the patients, targeted care is provided, including physical exercise and diet care, so that patients can exercise step by step, and their confidence in treatment and treatment compliance were enhanced^{9,10}. Also, after treatment, SAS and SDS scores of the observation group were significantly lower than those of the control group, suggesting that comprehensive care based on the concept of feedforward control can effectively improve patient's low mood. The possible explanation is that nursing care taken by the observation group pays attention to psychological care of the patients, and aims to enhance patient's treatment confidence by introducing successful cases, divert their attention by reading newspapers and listening to music, timely solve their problems, strengthen the communication between nursing staff and patients and establish a good relationship between them¹¹⁻¹³. At the same time, although the complications occurred in both groups, total incidence of complications in the observation group was 10.53%, which was significantly lower than 28.07% in control group, suggesting that the comprehensive care based on the concept of feedforward control can effectively reduce the incidence of postoperative complications. This is because the nursing staff evaluated the actual status of observation group before surgery and prevented and treated possible complications in advance, so the incidence of complications in the observation group was correspondingly reduced^{14,15}.

In conclusion, comprehensive care based on the concept of feedforward control has a better nursing effect for patients with intertrochanteric fracture. Comprehensive care based on the concept of feedforward control can shorten the time of patients getting out of bed and hospitalization, improve patients' low mood, improve FMA score and SF-36 level, and reduce the incidence of post-complications.

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Authors' contributions

DF, NZ and LH conceived and designed this study. NZ provided the administrative support of this study. ZL, WZ, LX and HG collected and tabulated the data of this study. DF, ST, WQ and ZL were responsible

for analyzing and interpreting the data of this study. DF, LX and LH wrote the initial draft of the paper, revised and finalized this paper. DF, NZ and ST approved the final manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of The Third Affiliated Hospital of Qiqihar Medical University. Signed written informed consents were obtained from the patients and/or guardians.

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