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 antetorsion 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.

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
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±3.46) years. There were 36 males and 21 females in the observation group, aged between 66 and 79 years, with a mean age of (77.88±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.

**Statistical methods**

Statistical analysis was performed by SPSS19.0 statistical software. Quantitative data were expressed as mean ± standard dev. t-test was used for comparison between groups, and χ² 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).

| Groups     | Cases | Anus first exhaust time (h) | Time of getting out of bed (min) | Hospitalization time (days) |
|------------|-------|-----------------------------|----------------------------------|-----------------------------|
| Control    | 57    | 25.68±6.58                  | 99.93±11.41                      | 8.04±0.57                   |
| Observation| 57    | 17.98±5.39                  | 78.17±10.53                      | 4.31±0.46                   |

Table 1. Comparison of general recovery indicators after operation in both groups (mean ± SD).
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 repairability 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.
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\textsuperscript{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 them\textsuperscript{11-13}. 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\textsuperscript{4,15}.

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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