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Exploration of the effect of early enteral nutrition nursing on the nutritional status and immune function of postoperative patients with severe traumatic brain injury

Wen Chen

Qianhai Life Insurance Guangzhou General Hospital Guangzhou 511325, Guangdong

ABSTRACT

To evaluate the clinical effect of early enteral nutrition nursing in patients with severe traumatic brain injury after surgery. This study referred to different nursing methods and conducted a grouped study on 68 postoperative patients with severe traumatic brain injury from August 2022 to June 2024, with n=34. The reference group received routine nursing, while the experimental group received early enteral nutrition nursing in addition to routine nursing. The nutritional status, immune function, inflammatory level, nursing satisfaction, and complications of the two groups were compared. After nursing, the levels of prealbumin, albumin, and hemoglobin in the experimental group were higher than those in the reference group, P<0.05; the levels of CD8+, CD4+, CD3+, CD4+/CD8+in the experimental group were higher than those in the reference group, P<0.05; the levels of C-reactive protein, endotoxin, and procalcitonin in the experimental group were lower than those in the reference group, P<0.05; compared with the reference group, the satisfaction rate of nursing in the experimental group was relatively higher, P<0.05; the postoperative complications in the experimental group were fewer than those in the reference group, P<0.05. Early enteral nutrition nursing in patients with severe traumatic brain injury can effectively regulate their nutritional status, enhance immune function, reduce inflammation levels, prevent complications, and improve nursing satisfaction. The sentence is:.

KEYWORDS

Early enteral nutrition care; Severe illness; Traumatic brain injury; Nutritional status; immunity

Severe traumatic brain injury is a high incidence disease in neurosurgery, usually caused by high-altitude falls, traffic accidents, heavy object strikes, etc. After onset, patients may experience symptoms such as coma, loss of consciousness, increased intracranial pressure, and limb movement disorders. Neurosurgery is usually performed in clinical practice to remove necrotic tissue and reduce intracranial pressure, but the surgery can cause secondary damage and require a long recovery period after surgery. Patients with severe traumatic brain injury after surgery usually experience varying degrees of coma, which prevents them from eating normally. After surgery, the body tissues and organs are in a high metabolic state, requiring a large amount of energy and nutrients to be consumed, which can easily lead to malnutrition, immune deficiency, and complications such as organ dysfunction, which have adverse effects on their postoperative recovery. It has been reported that early enteral nutrition care can inject nutrient solution into the digestive tract through a nasal cannula, which conforms to the normal physiological structure of the

human body. It can not only supplement the nutrients needed for metabolism, but also improve gastrointestinal function. Therefore, this study aimed to implement early enteral nutrition nursing for postoperative patients with severe traumatic brain injury included between August 2022 and June 2024, and analyze their clinical effects.

1 Data and Methods

1.1 Basic Information

Research subjects: 68 postoperative patients with severe traumatic brain injury included from August 2022 to June 2024 were divided into different groups based on different nursing methods. The reference group (n=34) consisted of 20 males and 14 females, with upper/lower age limits of 72 and 21 years, respectively, and an average age of (45.37 ± 3.29) years. The experimental group (n=34 cases) consisted of 19 males and 15 females, with upper and lower age limits of 73 and 20 years, respectively. The average age was (45.61 ± 3.42) years. Verify two sets of basic data, $P>0.05$, no difference.

Inclusion criteria: (1) Meet the clinical indications for severe traumatic brain injury surgery; (2) GCS score below 8 points; (3) The patients and their families voluntarily signed the 'Informed Form' with the approval of the ethics committee, based on their knowledge of this study.

Exclusion criteria: (1) Partial loss of digestive organs; (2) Coagulation dysfunction; (3) Suffering from severe endocrine disorders; (4) Failure of vital organ function; (5) Lost midway.

1.2 Method

The reference group carries out routine nursing care, provides comfortable rehabilitation environment for patients after surgery, regularly ventilates and disinfects the ward, provides health education to patients and their families to popularize disease knowledge and prognostic rehabilitation precautions, follows medical advice to administer medication, and provides parenteral nutrition support according to their actual needs to maintain their water and electrolyte balance.

In addition to routine care, the experimental group carried out early enteral nutrition care, with specific measures: (1) Early enteral nutrition support: On the second day after surgery, continuous enteral nutrition support was provided to patients, and a nasal cannula was inserted to establish a nutrition channel. A suitable nutrient solution was prepared or selected for the patient, and a small amount of warm water was injected in advance to stimulate gastrointestinal peristalsis. Then, the nutrient solution was pumped at a rate of 20mL per hour for 8-10 hours, and the pumping rate was gradually increased according to the patient's tolerance to ensure that the residual nutrient solution in the patient's stomach was maintained at 100-200mL. (2) Nutritional care: Properly fix various pipelines such as nasointestinal tubes, infusion tubes, and urinary catheters, and reserve a certain length to prevent patients from bending or falling off when turning over or moving; During nasogastric feeding, keep the head of the bed raised by about 30 °, pause for 1 hour every 5 hours to check the remaining amount of nutrients in the stomach, and regularly rinse the nasointestinal tube with sterile water to avoid blockage; Assist patients in cleaning their oral cavity, promptly removing secretions from the mouth and nasal cavity, and ensuring smooth breathing. (3) Prevention of complications: Regularly inspect the ward to observe the patient's expression and condition, withdraw gastric juice once every period of time, and determine whether there is aspiration or reflux. If aspiration or reflux occurs, nasal feeding should be stopped and gastrointestinal decompression should be carried out; If the patient experiences coughing, the infusion rate should be appropriately reduced.

1.3 Indicator Analysis

(1) Nutritional status: Collect fasting venous blood samples from patients to measure levels of albumin, albumin, and hemoglobin.

(2) Immune function: Collect fasting venous blood from patients to detect CD8+, CD4+, CD3+ parameters and calculate CD4+/CD8+.

(3) Inflammatory level: Collect fasting venous blood from patients to detect C-reactive protein, endotoxins, and procalcitonin.

(4) Nursing satisfaction: At the end of nursing, guide patients and their families to conduct a one click evaluation of the entire nursing process, divided into three options: very satisfied, relatively satisfied, and dissatisfied, and calculate the satisfaction rate. The formula for calculating nursing satisfaction rate is (very satisfied+relatively satisfied)/total number of cases * 100%.

1.4 Statistical Methods

Implement SPSS 25.0 software validation to verify nutritional status, immune function, and inflammatory levels expressed in the form of (mean ± standard deviation) through t-test, and nursing satisfaction and complications expressed in the form of rate (%) through chi square test, with $P<0.05$, indicating differences in calculation.

2 Results

2.1 Nutritional Status

Before nursing, comparing the levels of prealbumin, albumin, and hemoglobin between the reference group and the experimental group, $P>0.05$, has no analytical significance; After nursing, the levels of prealbumin, albumin, and hemoglobin in the experimental group were higher than those in the reference group, with $P<0.05$, indicating a difference in calculation, as shown in Table 1.

Table 1 Comparison of Nutritional Status

Group cases: Pre albumin (g/L) Albumin (g/L) Hemoglobin (g/L)

Pre care, post care, pre care, post care, pre care, post care

Experimental group 34 181.67 ± 24.59 238.49 ± 35.72 30.72 ± 2.95 37.49 ± 3.84 102.59 ± 11.75 125.69 ± 14.27

Reference group 34 181.93 ± 24.86 206.79 ± 29.54 30.94 ± 3.08 34.16 ± 3.42 104.19 ± 11.93 113.85 ± 12.89

t 0.0434 3.9878 0.3008 3.7760 0.5572 3.5902

P 0.9655 0.0002 0.7645 0.0003 0.5793 0.0006

2.2 Immune function

Before nursing, comparing the immune function between the reference group and the experimental group, $P>0.05$, has no analytical significance; After nursing, the levels of CD8+, CD4+, CD3+, and CD4+/CD8+in the experimental group were higher than those in the control group, with $P<0.05$. There were differences in the calculation, as shown in Table 2.

Table 2 Comparison of Immune Function

Number of cases in each group: CD8+CD4+CD3+CD4+/CD8+

Pre nursing, post nursing, pre nursing, post nursing, pre nursing, post nursing

Experimental group 34 284.26 ± 24.75 446.26 ± 37.54 485.26 ± 39.37 1465.82 ± 104.59 759.46 ± 38.41 1842.59 ± 83.64 2.18 ± 0.26 4.82 ± 0.84

Reference group 34 286.34 ± 25.18 372.18 ± 31.89 485.49 ± 40.25 816.27 ± 36.83 756.18 ± 36.29 1257.76 ± 63.25 2.24 ± 0.29 3.17 ± 0.52

t 0.3435 8.7695 0.0238 34.1569 0.3619 32.5198 0.8983 9.7386

P 0.7323 0.0000 0.9811 0.0000 0.7186 0.0000 0.3723 0.0000

2.3 Inflammatory level

Before nursing, comparing the inflammatory levels between the reference group and the experimental group, P>0.05, has no analytical significance; After nursing, the levels of C-reactive protein, endotoxin, and calcitonin in the experimental group were lower than those in the reference group on average, with P<0.05. There was a difference in the calculation, as shown in Table 3.

Table 3 Comparison of Inflammatory Levels

Group cases: C-reactive protein (mg/L), endotoxin (EU/mL), procalcitonin (g/L)

Pre care, post care, pre care, post care, pre care, post care

Experimental group 34 16.27 ± 2.38 6.14 ± 1.63 0.93 ± 0.14 0.29 ± 0.04 4.48 ± 0.59 1.49 ± 0.15

Reference group 34 16.45 ± 2.62 9.82 ± 1.95 0.98 ± 0.16 0.51 ± 0.09 4.57 ± 0.62 2.37 ± 0.29

t 0.2965 8.4429 1.3713 13.0250 0.6132 15.7161

P 0.7678 0.0000 0.1749 0.0000 0.5419 0.0000

2.4 Nursing Satisfaction

Compared with the reference group, the experimental group had a relatively higher satisfaction rate with nursing care, P<0.05, indicating a difference in calculation.

Table 4 Comparison of Nursing Satisfaction

Very satisfied with the number of cases in the group, relatively satisfied with the number of cases, dissatisfied with the number of cases, satisfaction rate

Experimental group 34 22 11 1 33 (97.06%)

Reference group 34 10 16 8 26 (76.47%)

X2 6.2750

P 0.0122

2.5 Postoperative complications

Compared with the reference group, the experimental group had relatively fewer postoperative complications, P<0.05, indicating a difference in calculation.

Table 5 Comparison of Postoperative Complications

Number of cases in each group: Gastrointestinal bleeding, aspiration, pulmonary infection, and incidence of diarrhea

Experimental group 34 0 1 0 1 2 (5.88%)

Reference group 34 1 3 2 4 10 (29.41%)

X2 6.4762

P 0.0109

3 Discussions

Severe traumatic brain injury is a common clinical emergency that requires immediate surgical treatment to save the patient's life. However, severe damage to the patient's brain can cause pathological changes such as tissue edema, hypoxia, ischemia, and calcium overload. The body's

metabolism is in a high energy consuming state, which can easily cause metabolic disorders and affect the patient's postoperative recovery. Due to the patient still being in a coma after surgery and unable to eat orally, there is a lack of energy and nutrition. Excessive consumption of the body can worsen the condition, and weakened immunity can easily lead to various infections. Effective nursing measures should be taken proactively to correct nutritional imbalances. In the past, parenteral nutrition support was often used to supplement nutrition through intravenous infusion, but the infusion time was strictly limited, and prolonged infusion could easily cause phlebitis, which was not conducive to the recovery of gastrointestinal function [6]. Early enteral nutrition care involves infusing nutrient solution into the gastrointestinal tract through a nasal cannula, which is more in line with the normal physiological state of the human body. It can not only provide energy and nutrition for patients, but also protect the gastric mucosa, balance the gut microbiota, avoid bacterial colonization or translocation, and promote gastrointestinal recovery. In addition, early enteral nutrition support can stimulate the secretion of gastrointestinal hormones and immunoglobulins, improve the patient's immune system, and effectively prevent lung infections [7]. During early enteral nutrition, it is necessary to regularly flush the tube to prevent blockage, properly fix the tube, regularly withdraw gastric juice and detect residual amounts in the stomach, in order to adjust the infusion rate of nutrient solution in a timely manner. In case of aspiration, reflux, diarrhea, etc., nasal feeding should be stopped, corresponding nursing measures should be taken in a timely manner to reduce irritation to the gastrointestinal tract, oral hygiene should be done well, and respiratory secretions should be cleared to promote postoperative recovery of patients [8].

This study showed that after nursing, the levels of prealbumin, albumin, and hemoglobin in the experimental group were higher than those in the reference group, $P<0.05$; the levels of CD8+, CD4+, CD3+, CD4+/CD8+in the experimental group were higher than those in the reference group, $P<0.05$; the levels of C-reactive protein, endotoxin, and procalcitonin in the experimental group were lower than those in the reference group, $P<0.05$; compared with the reference group, the satisfaction rate of nursing in the experimental group was relatively higher, and the postoperative complications in the experimental group were less than those in the reference group, $P<0.05$. This suggests that early enteral nutrition nursing can improve patients' nutritional levels, enhance immunity, reduce inflammatory reactions, and help prevent complications. Analyzing the reasons, early enteral nutrition nursing can provide patients with sufficient energy for organ and tissue metabolism, and reasonable control of nutrient infusion rate can improve their tolerance. Compared with traditional parenteral infusion, it has lower costs, can maintain the balance of trace elements in the body, stimulate the secretion of immunoglobulin in the gastrointestinal tract to enhance immunity, protect the gastric mucosa, avoid bacterial translocation and infection, and is conducive to the recovery of gastrointestinal function.

Based on the above conclusions, the application of early enteral nutrition nursing in postoperative patients with severe traumatic brain injury can effectively improve their nutritional level, enhance their immune system, reduce inflammatory reactions, lower the risk of complications, and increase nursing satisfaction.

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