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Application Of Perioperative Nutritional Management Plan For Patients Undergoing Pancreaticoduodenectomy

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Abstract: The aim was to explore a dietary control model suitable for patients undergoing pancreaticoduodenal surgery in order to better improve their nutritional status, minimize complications and improve patient satisfaction. Methods 60 patients who were to undergo pancreaticoduodenectomy were treated according to the usual nutritional management and divided into 30 cases. The observation group adopted the method of whole personalized nutritional management, formulated various nutritional support systems and procedures, organized nutritional knowledge training, and carried out quality control on them. Results The observation group was significantly better than the treatment group in terms of hospitalization days and hospitalization costs (P<0.05); the postoperative complications in the observation group were 10.0%, which was significantly better than the control group of 40 0% (P<0.05). Conclusion Perioperative nutritional management is a new idea more adapted to contemporary medical thought and today's accelerated rehabilitation surgery development for the health of patients.

Keywords: Combined Nutritional Management; Pancreaticoduodenectomy; Perioperative; Nursing Care

Introduction

Pancreaticoduodenectomy is a common surgical major operation, because it requires gastrointestinal anastomosis, therefore, the remodeling of the gastrointestinal tract will have a great impact on the normal physiology of the gastrointestinal tract and intestines of the patient. Aiming at the current nutritional problems in performing pancreaticoduodenectomy, a set of nutritional management methods suitable for patients undergoing pancreaticoduodenectomy is proposed with the goal of reducing the incidence of postoperative complications and improving patient satisfaction.

1. Information and methods

1.1 General information

The 60 patients were divided into 2 groups according to the treatment time. Of the 30 patients in the observation group, age 37-69 years old, mean (55.3±7.8) years old; 30 patients in the control group; 30 patients in the control group; a total of 36 patients in both groups were diagnosed with pancreatic tumors by examination, age 41-70 years old, mean (58.4±8.9) years old; 19 cases of intraduodenal tumors; and 5 patients with tumors of the lower part of the bile duct[1].

Inclusion criteria were: ① CT diagnosis of pancreatic cancer patients; ② age ≧ 18 years old; ③ age≤70 years old; ④ intended to perform pancreatic cancer resection; ⑤ NRS2002 Nutritional Risk Screening Scale ≧ 3 points; ⑥ no gastrointestinal digestive diseases, and able to implement enteral nutrition.

Exclusion criteria: ① Non-pancreatic cancer; ② Combined serious complications; ③ Gastrointestinal dysfunction, unable to perform enteral nutrition.

1.2 Methodology

1.2.1 Models of preoperative nutritional management

Control group: no nasoenteric tube was placed before the operation, all the preoperative period was the same as that of the treatment group, and intravenous hypernourishment was used until anal defecation at the end of the operation, which was gradually converted to enteral nutrition.

Observation group: standardized nutritional support program: (1) first, establish a nutritional care team consisting of clinicians, nurse leaders, clinical dietitians and nursing staff; assist in the development of perioperative nutritional programs, systems and procedures; carry out training on relevant knowledge about nutritional support; nursing staff should follow the standards of enteral nutritional care, and at the same time, they should pay close attention to all kinds of nutritional statuses of the patients, and do a good job in the preventive work of various complications that appear during the period of receiving nutritional support, so as to achieve early diagnosis and treatment. (2) Nutritional intervention: For patients with nutritional risk, appropriate nutritional intervention should be carried out to calculate the appropriate nutritional intake ratio for each meal of the day according to their nutritional deficiency status and the nutritional requirements of the human body, so as to make the nutritional status of the patients be effectively improved. However, for obese patients, medical staff should pay more attention to the nutritional ratios of meals to prevent nutritional metabolic disorders. Pre-operative enteral nutrition and nutritional management 4-6 days before surgery: adopt the principle of "step by step" nutritional support, i.e., self-feeding → oral nutritional supplementation → enteral nutrition → parenteral nutrition: ① Requirements for daily energy needs: 25-30 kcal/kg x body weight (kg) x age coefficient x activity factor (AF) x Body Temperature Factor (TF); ② Requirements for protein, fat, and carbohydrates (calculate kcal and then grams according to the ratio of the three to the total calories); ③ Calculate the amount of the three nutrients in three meals; ④ Convert grains and potatoes, fruits and vegetables, meat and eggs, and sugars and fats according to the exchange of portions; ⑤ Set up a set of basic recipes.

1.2.2 Models of postoperative nutritional management

Control group: given routine to carry out parenteral nutrition therapy. On this basis, based on the patient's nutritional status and various indexes, and in connection with the patient's physical condition, the daily energy required was determined, and parenteral nutrition therapy was administered using central venous cannulae within 1 d of the operation, and was administered for 12-16 hours per day for 7 days. The dosage of parenteral nutrition was gradually reduced after the patient returned to a transoral diet.

Observation group: (1) Enteral nutrition therapy was started early (24 hours) after surgery, 500 ml of glucose solution was given to nourish the gastrointestinal tract via naso-jejunal nutritional tube on the 1st day of surgery. Enteral nutrition was given from the second day of surgery if there was no significant discomfort. A constant-rate infusion pump and warming were used to gradually increase the rate from 20 ml/hour to 100 ml/hour, with a total flow of 1000-1500 mL/day. Beplix (product name: Beplix), manufactured by Newdia Pharma (Wuxi), was initially infused at a rate of 20 ml/h-1 and then gradually increased as the patient received nutrition. According to the traditional enteral nutrition management method, the patient's bed is elevated by 30-45 degrees, so that the water temperature of the nutritional solution is maintained at about 37°C, and this is used as a criterion, and the patient is monitored for gastrointestinal tolerance once every 6 hours or so, and its use should be stopped or slowed down[2] immediately in case of bloating, diarrhea, nausea, vomiting, and so on. (2) Combination of postoperative parenteral nutrition and enteral nutrition: ① Infusion of parenteral nutrition is started according to the energy requirement, and on the first day of postoperative period, 5% GNS 250 mL is fed by tube. the parenteral nutrition solution is a bag of 3L configured with a heat-to-nitrogen ratio of 100-150:1, and the proportions of carbohydrates, fats, and proteins are 50%—60%, 20%—30%, and 15%—20%, respectively. Immunonutrients such as amino acids (glutamine, W-3 unsaturated fatty acids and arginine) were supplemented. ② On the 3rd postoperative day, 500ml—1000ml of whole protein enteral nutrition milk was fed by tube. ③ On the 5th postoperative day, a light liquid diet was injected orally. ④ On the 6th postoperative day, gradually transition from liquid diet to semi-liquid diet. ⑤ Stop parenteral nutrition on the 8th postoperative day. When gastric residue or symptoms of intolerance to enteral nutrition such as abdominal distension, diarrhea, vomiting and so on appear more, prokinetic drugs should be used first to promote gastrointestinal peristalsis instead of blindly stopping enteral nutrition; lastly, the effect and safety of nutritional support should be evaluated dynamically and nutritional support programs should be provided when it is necessary to adjust the rate of nutrition. (3) Nutritional monitoring throughout the whole process: punctual nutritional monitoring should be done for the admitted patients from the beginning to the post-discharge period, closely observe the nutritional status of the patients, and intervene in a timely manner when malnutrition occurs in the patients, so that not only the intraoperative surgical risk of the patients can be reduced, and at the same time the reduction of postoperative complications can be achieved, and it can be possible to make timely prediction of the patient's condition, and to fully understand the real-time status of the patients.

1.2.3 Nutritional support options

1.2.3.1 Enteral nutrition support

Enteral nutrition is a way of supplying nutrients to patients through the gastrointestinal tract. Compared with parenteral nutrition, enteral nutrition therapy is more effective, which is conducive to maintaining the normal function of the intestinal tract and reducing complications. Tao Dan (2016) showed that early enteral nutrition therapy can improve the body's organic immunity, reduce the pressure on the body, reduce the body's inflammation, reduce the infection rate, maintain the normal physiological function of the patient, and thus reduce the number of days of hospitalization of the patient. At present, there are a variety of different tube feeding nutrition programs at home and abroad, but most of the Li Jinjun (2016) study believes that the safest and most efficient method is not clear, and its biggest reference standard is whether the operator has mastered the relevant technology, and in the process of operation there may be diarrhea, abdominal pain, abdominal distension, reflux and misinsufflation, and other adverse reactions, which can lead to the interruption of enteral nutrition feeding. For patients with poor nasal feeding, it has been shown that rational dietary interventions can significantly improve the dietary tolerance and nutritional completion rate of PD patients. Guidelines for adult perioperative nutritional support also suggest that enteral nutrition should take into account the patient's intestinal tolerance, starting from 20-30 ml/hour, and at the same time, the patient's digestion and feeding tolerance should be closely monitored. Our scholars have proposed the use of EN three-stage nursing decision-making, which improves patients' reliance on EN by providing them with knowledge and guidance on the significance of nutritional support and ways to alleviate uncomfortable symptoms in a hierarchical manner. Studies have found that early bed rest and exercise are associated with enteral nutrition tolerance, and that lack of exercise is an important cause of enteral malnutrition in the early postoperative period. In line with the concept of "Accelerated Recovery", it is recommended that patients should get out of bed and exercise more frequently in the early post-surgical period, which is conducive to the recovery of digestive tract function and enhances the patients' ability to tolerate nutrition.

1.2.3.2 Parenteral nutritional support

PN refers to patients who are unable to ingest or have insufficient intake through the gastrointestinal tract, and are supplied with the nutrients they need through the vein to promote anabolism and inhibit catabolism, thus maintaining the body's normal physiological functions. Parenteral nutrition is a major form of nutritional supplementation for patients who cannot be fed through parenteral nutrition, which allows the body to receive the required nutrient intake as early as possible. It has been shown by Yang Liangliang (2015) that intravenous parenteral nutrition is an effective and efficient treatment for 232 patients with postoperative complications, but its side effects are mostly hyperglycemia, while infections of blood origin are rare. However, the application of PN also has certain dangers, and long-term application of PN can cause changes in the structure and function of intestinal epithelial cells, which can lead to clinical infections and sepsis, which is detrimental to the recovery of patients. In addition, patients treated with parenteral nutrition will also develop various metabolic diseases, such as refeeding syndrome, hyperglycemia and blood electrolyte disorders, etc.[3] . Scholars[2,3] believe that improving the nutritional status and liver function of PD patients by both enteral and parenteral means can not only reduce the occurrence of infections, but also reduce the number of hospitalization days of patients.

Therefore, adequate nutrition at the initial stage of surgery is essential to improve the prognosis and reduce patient mortality. It is recommended that patients who are malnourished before surgery, have high nutritional risk and have serious complications at the early stage of surgery should be given nutritional support immediately. At present, scholars at home and abroad generally attach importance to parenteral nutrition therapy, and break through the inherent understanding of "parenteral nutrition within 24 h". However, the interruption of enteral nutrition occurs from time to time due to the different tolerance level of patients to enteral nutrition.

1.3 Observation indicators

Clinical indicators, nutritional status, immunological indicators (CD4, CD8, TNFα, endotoxin, etc.), hospitalization days, costs, incidence of various postoperative adverse effects, and incidence of postoperative complications such as pancreatic fistulae, bile leaks, abdominal infections, gastrointestinal hemorrhage, and pulmonary infections were observed before and after surgery.

1.4 Statistical methods

The results obtained were processed using SPSS 23.0 statistical package. Count data were expressed as mean ± standard deviation, and the two methods were analyzed for comparison between groups. Measured data were statistically analyzed by chi-square test or Fisher's precision test and expressed as absolute value or percentage, respectively. p<0.05 indicates significant difference.

2. Results

(1) Comparing the observation group with the control group, the endotoxin level, CD4/CD8 ratio, tumor necrosis factor α, and IL-10 levels of the observation group were significantly better than those of the control group, as shown in Table 1.

(2) Differences in nutritional status between the two groups of patients. There was no statistical significance (P>05) in the comparison of total protein and body weight between the two groups of patients in the preoperative and postoperative periods. The serum albumin levels in each group on postoperative days 3, 5, and 7 are shown in Table 2.

Table 1 Changes in immunologic indices in patients one week after surgery

operation	1 days afte operation	3 days after operation	6 days after
内毒素 (ng/L)			
治疗组	0.51±0.17	0.35±0.11	0.25±0.28
对照组	0.63±0.30	0.46±0.14a	0.41±0.19 a
T test	0.9375	15.64 a	7.56 a
CD cells (CD4+/CD8+)			
治疗组	1.45±0.09	1.61±0.05	1.68±0.07
对照组	1.43±0.07	1.40±0.08 a	1.64±0.04 a
T test	1.47	10.52 a	4.54 a
TNF-α (ng/L)			
治疗组	604±112	413±89	301±13.3
对照组	594±87	553±49 a	452±25 a
T test	0.86	8.62 a	39.02 a

"P<005 treatment group vs. control group.

Table 2 Comparison of the two groups postoperatively

3 天	27.3±3.6	22.4±4.0
5 天	29.7±3.1	23.5±3.8
7 天	30.4±3.6	26.5±4.4

(3) Observe the surgical results of the two groups of patients. RESULTS: 27.3% and 30.7% (8/26) in the experimental group and control group respectively. The number of postoperative anal tube evacuation, average hospitalization days and treatment cost were observed in the two groups. RESULTS: Compared with the conventional method, there were significant differences between both groups, and the anal tube exhaustion in the observation group was significantly faster and became better in 2~3 days.

(4) The patients in both groups prepared enteral nutrition preoperatively and received enteral enteral nutrition in the early postoperative period were well tolerated, and their most common discomfort symptoms were abdominal distension, nausea, and abdominal pain, which improved rapidly after symptomatic treatment, and the delivery of energy and electrolytes via the nasoenteric tract was also consistent with the physiology of the body, and the patient's subjective discomfort was also significantly relieved.

3. Discussion

Pancreaticoduodenectomy is a classic surgical procedure for the treatment of patients with pancreatic cancer, duodenal jugular cancer, cholangiocarcinoma, and neuroendocrine tumors. Its morbidity and mortality rate is around 3%—4% due to its high level of injury and more complications. It is now widely recognized that there is a strong link between postoperative complications and patient malnutrition, so good nutritional support for patients is of utmost importance. Enteral nutrition and parenteral nutrition are the two most commonly used nutritional support methods at present. Enteral nutrition is a kind of digestive tract-based, through the nasoduodenal tube, nasojejunal tube, intraoperative fistula and other tubes to the gastrointestinal tract to supply the body's required nutrients and a variety of nutrients, generally used for patients with normal operation of the digestive tract[4]. Parenteral nutrition is a peripheral intravenous or central venous nutrition for postoperative and critically ill patients, all nutrition comes from the venous access, and its role is to maintain the nutritional status of the patient and to help the patient's trauma recovery if he/she is not able to eat. The gastrointestinal tract is not only an organ with good digestive, absorptive and defensive abilities, but also an important immune tissue of the organism, therefore, the role of the gastrointestinal tract is getting more and more attention. At the same time, the influence of enteral nutrition on postoperative nutrition of postoperative patients has also been increasingly emphasized by the majority of patients, and it has been gradually applied to the clinic. At the initial stage, enteral nutrition can be used as a way to supply energy to the tissues, thus accelerating the peristalsis of the intestinal tract, and it can also promote the proliferation of intestinal epithelial cells, as well as the secretion of gastrointestinal hormones, which enables the barrier function of the gastrointestinal tract epithelium to be maintained, and avoids the abnormal delivery of intestinal microecology, thereby reducing the chances of intestinal-borne infections. In addition, enteral nutrition has many advantages, such as: more compatible with human physiology, easy to administer, and lower cost. The results of our previous study showed that the control group treated by enteral nutrition was significantly better than the control group in terms of basic nutritional recovery, gastrointestinal function recovery time, complication rate, average hospitalization days, and total cost ($P<0.05$).

In conclusion, early enteral nutrition therapy is closer to the physiological needs of human beings, safe and convenient, inexpensive, and short hospitalization time, which can reduce postoperative complications, accelerate the recovery process of patients, and speed up the normal life of patients.

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