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Management of malignant bowel obstruction with decompression tubes

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Abstract. – OBJECTIVE: To build a quantitative assessment system for normative cancer pain management.

PATIENTS AND METHODS: Two groups of 60 patients with malignant lower bowel obstruction were formed: the study group (n=30) patients receiving routine small intestinal decompression and enteral nutrition, and the control group (n=30) patients receiving nasogastric decompression and parenteral nutrition. The weight, protein indicators and occurrence of complications in the two groups were compared during the treatment.

RESULTS: The weight gain, increase of albumin and prealbumin, and complication rate were (1.9667 ± 1.38298) kg, (2.9133 ± 1.38258) g/L, (18.5333 ± 10.92840) mg/L and 26.67% in the study group compared with (0.6667±0.87428) kg, (1.5500 ± 0.72099) g/L, (12.9333 ± 8.47688) mg/L and 86.67% in the control group. There were statistically significant differences (t = -4,352,-4.789, -2.218; χ^2 = 21.9910; $p < 0.05$ or $p < 0.01$) between the two groups.

CONCLUSIONS: The application of small bowel decompression tubes can improve the nutritional status, physical fitness, reduce complications in patients with malignant lower intestinal obstruction.

Key Words:
Intestinal obstruction, Small bowel decompression tube, Enteral nutrition, Nursing.

Introduction

Malignant bowel obstruction is a common complication in patients with advanced abdominal or pelvic cancer[1]. The condition is caused by the tumor itself (tumor growth inside or outside the cavity), or benign causes such as adhesions, intestinal injury after radiotherapy, or inflammatory bowel disease[2]. In malignant bowel obstruction, surgery remains the treatment of choice. Patients can often have contraindications from disseminated tumors and cachexia. Continuous nasogastric decompression and fasting, joint with total parenteral nutrition support, is an important measure for the treatment of malignant bowel obstruction[3]. The treatment of malignant lower intestinal obstruction does not completely relieve the symptoms, thus resulting in a short survival and poor quality of life[4]. In 2009, patients with malignant lower bowel obstruction received total suction and decompression using 300 cm-long catheters (small bowel decompression tubes) placed nasally under radiography, and resumed oral intake after complete remission of intestinal obstruction at the Xuzhou Traditional Medicine Hospital. The related data are summarized as follows.

Patients and Methods

We enrolled 30 patients with malignant lower bowel obstruction who were admitted to Xuzhou Traditional Medicine Hospital from January 2009 to October 2010. The study group, included 22 men and eight women, aged 30-82 years with a mean age of (60 ± 13) years. There were 26 cases with incomplete obstruction and four cases with complete obstruction. Thirty patients aged 31 to 83 years, mean (61 ± 12) years, admitted from June 2007 to December 2008 for malignant bowel obstruction were selected as the control group. Both groups had abdominal metastasis, and their diagnoses were confirmed by standing and supine X-ray, abdominal plain film, ultrasound or CT scan. The two groups were comparable as there were no statistically significant differences in gender, age, etiology and clinical types ($p > 0.05$).

The materials used included nasal bowel obstruction decompression catheter (Createmedic, Japan), X-ray opaque catheter 300 cm, 16-18F, guide wire 350 cm, three-chamber dual-capsule tube (anterior capsule, posterior capsule), with

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the anterior capsule flushed with saline to facilitate the movement of the catheter in the small intestine, and the posterior capsule filled with gas to aid radiography of the small bowel.

The control group underwent nasogastric decompression with complete parenteral nutrition. The study group underwent intestinal decompression using tube oral nutrition combined with intravenous nutrition.

Under radiographic guidance, the catheter with built-in guide wire was inserted into the stomach through the nose. The catheter tip was adjusted so that it pointed towards the antrum and was pushed through the pylorus. The guide wire was withdrawn 5 cm from inside the catheter, and then the catheter was pushed forward 5 cm. The procedure was repeated until the catheter was inserted 40 cm further, and the guide wire was removed. Following intracapsular injection of sterile distilled water of 10-15 ml, suction was connected to the suction port of the catheter, with proper pressure of -2145 to -1147 kPa. A bolus was simulated with a saline-flushed balloon simulated to drive the catheter forward in the small intestine towards the distal end while suctioning the intestinal contents[5].

The first meal was attempted in one or two days following complete remission of the intestinal obstruction. Based on the daily bowel function, a 5% sugar and salt solution, short peptide nutrition preparations and elemental diet were given in addition to a small amount of rice, juice and vegetable soup. The concentrations and amounts were gradually increased from low to high until full concentration and amount was achieved. The energy portion that could not be achieved through oral intake could be supplemented through parenteral nutrition.

The evaluation measures included: body weight, protein index; albumin, prealbumin. Measurements were taken one day before and fourteen days after the intubation for both groups. The two parameters after decompression were compared with those before intubation to generate the differences. Occurrence of complications. Vomiting, diarrhea, abdominal distension, metabolic disorders and liver damage were experienced in both groups during treatment.

Statistical Analysis

The data were processed in SPSS.16.0 for statistical analysis (SPSS Inc., Chiacago, IL, USA) using the Chi-square test and *t*-test. A p value of less than 0.05 was considered statistically significant.

Results

The 30 patients in the study group experienced relief of intestinal obstruction in 24-48 hours after insertion of the decompression tubes, followed by complete remission in three to five days. The duration of intestinal decompression tube placement was 15-25 days. Nineteen patients had the catheters removed in hospital, while eleven had theirs removed at home after discharge.

Fourteen days after treatment, patients in the study group had higher weight gain compared to the control group ($p < 0.05$) (Table I).

Compared to the control group, both the albumin and prealbumin amounts in the study group, were significantly increased ($p < 0.05$) (Table II).

As shown by the results, the prevalence of complications was lower in the study group compared with the control group, and the difference was statistically significant ($p < 0.01$) (Table III).

Patients with malignant diseases suffer for prolonged periods, which may result in serious psychological problems. The small decompression tubes used for the treatment of malignant lower intestinal obstruction are new and many patients have concerns with the risks associated with the procedure, which can result in tension and fear amongst patients. Practice has proven that anxiety increases adrenaline in the blood. In animal experiments, injection or oral epinephrine can cause shortness of breath, increased blood pressure and sugar, vasodilation and anger. Anxiety and fear will inhibit the activity of the digestive glands and gastrointestinal motility[9]. In clinical settings, care providers need to fully understand the patients' emotional response, accurately assess the cause of their psychological reactions, and offer counseling. They need to explain the role and merits of intestinal decompression tube insertion, and nutrition improvement methods to patient, the discomfort during placement and the need for patients to cooperate after appropriate care, all patients were able to actively cooperate with the treatment.

Table I. Comparison of body weight gains between two groups (kg, $x + s$).

Group	Number	Body weight gain
Control group	30	0.6667+0.87428
Study group	30	1.9667+1.38298

Note: $t = -4.352$, $p < 0.05$.

Table II. Comparison of gains of proteins in two groups ($x + s$).

Group	Number	Gain of albumin (g/L)	Gain of prealbumin (mg/L)
Control group	30	1.5500 + 0.72099	12.9333 + 8.47688
Study group	30	2.9133 + 1.38258	18.5333 + 10.92840
t value		$t = -4.789$	$t = -2.218$
p value		$p < 0.01$	$p < 0.05$

Under the guidance of clinicians and dietitians, daily evaluation of the bowel functions were conducted. The total daily caloric needs were calculated according to the patients' height, weight, activity levels and other aspects. A 5% sugar and salt solution of 50-100 ml was given every two hours depending on bowel functionality. The abdominal signs and complaints were closely observed. If no discomfort was reported, a short peptide-based nutritional formula would be added. This would be prepared into a 5% to 10% nutrient solution of 60 ml given six to eight times a day, and gradually increased to the full amount at the full concentration. Intravenous nutritional supplements were prescribed to supplement the portion of energy that could not be achieved to the expected level through oral intake. Close monitoring of gastrointestinal reactions, such as bloating, abdominal pain and diarrhea were ensured during the intake. In case of recurring obstructive symptoms, a second decompression and drainage would be required. In the case of abdominal distension, tubes were to be closed to stop the drainage and the diet would be adjusted accordingly. If symptoms intensified, further drainage and decompression would be applied, while observing the defecation after eating as guidance for removal of the catheter. Two patients manifested abdominal distension and diarrhea and were relieved after adjustment to the nutrient solution concentrations and symptomatic treatment. For patients with poor gastrointestinal function, glutamine could be added to give energy to intestinal mucosal cells and to keep the intestinal barrier function. Based on the tolerability of the bowel function, the nutrition solution could be increased or reduced accordingly: the amounts could be increased when well tolerated by patients. The amounts were reduced when serious intestinal complications of various causes occurred. After analysis of the cause, the enteral amounts could be reduced until improvement.

Table III. Comparison of the complications between two groups.

Group	Number	Complications (n/%)
Control group	30	26 (86.67%)
Study group	30	8 (26.67%)

Note: $\chi^2 = 21.9910$, $p < 0.01$.

Safe Care of Intestinal Decompression Tubes

1. The insertion of the intestinal decompression tubes was done differently from that for the common stomach tubes. After successful placement, the tube was not attached to the nose but to an earlobe with tape, and 10-15 cm of the catheter was preserved between the nostril and the earlobe to facilitate the down motion of the tube during bowel movements so that it could reach the obstruction site. Patients were regularly escorted to the radiology department for adjustment of the adhesion points and measurement of the length of the tube beyond the nasal cavity with marks indicated with a pen to determine whether it had been pushed or pulled out. When the catheter reached the site of obstruction under X-ray fluoroscopy, the catheter was adhered to the nose wing with 3M strong adhesive tape, which was replaced on a daily basis[6].
2. All balloon catheter valves at the end of the catheter and the suction port were indicated in Chinese for ease of assessment and recognition by the nurses. The length beyond the nasal cavity and the date of catheter placement were documented.
3. An effective vacuum suction drainage was maintained, and the catheter was regularly suctioned to maintain patent. The color, nature and amount of drained gastrointestinal fluid was observed and recorded on a daily basis. Daily nasal lubrication with liquid paraffin was conducted to prevent damage to the nasal cavity. No catheter-related complications occurred during catheter indwelling in this study.

The results showed that the application of the small bowel decompression tubes had improved the nutritional and physical status, prolonged survival, improved the quality of life and alleviated the suffering in patients. With enteral nutrition, the nasal feeding tube was inserted through the nose, oral cavities or gastrointestinal stoma into the stomach or intestines for introduction of an elemental or liquid diet, to ensure adequate protein and calorie intake for patients. Compared with parenteral nutrition, enteral nutrition mimics physiological conditions better, maintains the integrity of the intestinal structure and function at a low cost, and is conducive to protein synthesis and associated with fewer complications. It protects the intestinal mucosal barrier functions at the early postoperative stage[7]. Long-term parenteral nutrition is associated with catheter infections and liver dysfunction, and long-term fasting may weaken the intestinal mucosal barrier, resulting in intestinal bacteria and endotoxin translocation[8]. Recent studies have shown that "as long as the intestinal function exists, enteral nutrition should be used" , which has been widely accepted. As a result, the clinical nutrition practice has shifted from a parenteral nutrition-based mode to an enteral nutrition-based protocol with more emphasis on early enteral nutrition.

Conclusions

Malignant bowel obstruction may give rise to proximal bowel swelling and pressure increase, causing further intestinal mucosal ischemia, hypoxia, blood circulation disorder of the intestinal wall, and eventually leading to intestinal necrosis, perforation, severe abdominal infection and shock[9-11]. Therefore, reducing the pressure in the intestines and the accumulation of gas and liquid above bowel obstruction, and improving local blood circulation has become one of the key links during the treatment. Due to gravity with the front tip and proximal intestinal movements, nasal decompression catheters could reach the proximal end of bowel obstruction for direct suction, which effectively reduces the pressure within the proximal bowel obstruction, thus reducing intestinal edema and promotes the recovery of intestinal blood supply, eventually relieving the bowel obstruction. The application of the decompression tube helps identify the location and cause of obstruction, and can significantly improve the clinical symptoms of patients with intestinal obstruction and reduce the surgery rate[12]. Nasogastric decompression tubes are a traditional alternative. Despite the short length, the anterior tip is located in the stomach, and is effective in draining the intestinal contents and decompressing upper obstruction. But, it is not as effective against lower obstruction, and as a result often prolongs the conservative treatment or leads to treatment failure. Hence, it is not an optimal option for rapidly and effectively relieving intestinal pressure for patients with malignant bowel obstruction.

Due to poor conditions and widespread metastatic cancer, patients with advanced tumors are often ineligible or reluctant to accept palliative surgery. Nasal placement of intestinal tubes provides a practical way to improve symptoms and relieve obstruction for these patients. This may help to improve the quality of life and prolong survival. Short peptide-based enteral nutrition can be absorbed without digestion, further reducing the burden on the digestive tract and enabling safe, direct and quick nutritional supplements by taking full advantage of the intestinal absorption, while maintaining the intestinal mucosal barrier functions and improving the host immunity.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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