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Nutritional support after gastrectomy

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ABSTRACT

Malnutrition is common after gastric cancer surgery and can lead to postoperative complications and poor prognosis. Nutrient intolerance and malabsorption in patients with gastric cancer undergoing gastrectomy are often due to dumping syndrome, gastric retention, and fat indigestion. Nutritional deficiencies may develop months to years after partial or total gastrectomy. Anemia and metabolic bone disease are the most common signs of malnutrition in these patients. Recently, the concept of the enhanced recovery after surgery (ERAS) pathway has been widely accepted by hospitals in Korea. Efforts and trials of nutritional support are being conducted to apply 'the ERAS' pathway to daily clinical practice in many institutes in Korea. After gastrectomy, it is recommended that patients not overeat at mealtimes, eat small, frequent meals, take time to eat, and avoid high-fat foods. Dietary education and nutritional support from professional teams are important for patients after gastrectomy.

Keywords: Gastrectomy; Nutrition

INTRODUCTION

Gastric cancer (GC) is the most common cancer in Korea. Nutritional status is an important factor in improving the treatment and survival rates of patients with GC. Malnutrition in patients with GC is caused by mechanical obstruction during cancer progression and decreased food intake due to anorexia-cachexia syndrome [1]. Patients with GC undergoing gastrectomy who have developed malnourishment are at a greater risk of clinical adverse events, including higher complication rates and lower survival rates [2,3].

Nutritional intolerance and malabsorption in patients with GC after partial or total gastrectomy can lead to nutritional deficiencies and undesirable clinical outcomes [4]. Important appetite signals are missing in patients who have undergone gastrectomy owing to a lack of hormones secreted by the stomach. Even without this problem, patients cannot eat normal amounts of food because of the smaller available pouch. Nutritional deficiencies may develop months to years after partial or total gastrectomy.

Although gastric resection is the basis of treatment for patients with GC and has an excellent survival rate, there are still many controversies concerning the timing and routes of

nutritional support in the management of these patients post-surgery. Adequate nutritional support is essential for patients with GC undergoing surgical resection of tumors and those receiving palliative care [5].

Nutritional assessment and perioperative nutritional support are aimed at improving nutritional status, metabolism, the incidence of postoperative complications, adherence to chemotherapy, quality of life, and survival [6].

PREOPERATIVE NUTRITIONAL MANAGEMENT

As mentioned above, preoperative malnutrition can lead to postoperative complications and a poor prognosis in patients with GC. In addition, postoperative complications can adversely affect the overall and recurrence-free survival of patients with GC [7]. Therefore, in the case of malnourished patients with GC, it is essential to properly evaluate the preoperative nutritional status through various biochemical and physiological tests and then perform nutritional intervention before gastrectomy.

Preoperative nutritional support

According to the guidelines of the European Society for Clinical Nutrition and Metabolism (ESPEN), preoperative nutritional support is recommended for patients with GC with insufficient dietary intake, defined as an oral food intake of <500 kcal/day or ≤75% of the requirement for 1–2 weeks or longer [8]. Peripheral or total parenteral nutrition (TPN) is often administered to malnourished patients with GC. Although peripheral parenteral nutrition often does not provide sufficient energy or nutrients, it can provide sufficient nutrients over a long period of time. However, parenteral nutrition results in various impairments in host defense mechanisms, including gut immunity, hepatic immunity, and peritoneal host defense [9].

The American Society for Parenteral and Enteral Nutrition and ESPEN guidelines recommend oral or enteral feeding whenever possible [10,11]. Enteral nutrition is preferred over parenteral nutrition for preoperative nutritional support in patients with GC with insufficient dietary intake and an intact gastrointestinal tract. It can be administered through nasogastric or nasojejunal tubes [12]. However, in the case of obstruction of the upper gastrointestinal tract or impaired gastrointestinal function, preoperative nutritional support can be administered via the parenteral route.

Preoperative clear oral carbohydrate fluid loading

The enhanced recovery after surgery (ERAS) protocol involves the integrated application of various medical interventions to enhance postoperative recovery [13,14]. Preoperative carbohydrate loading is a key element of the ERAS protocol and has been demonstrated to reduce postoperative insulin resistance [15]. According to the ERAS protocol, patients were allowed to eat a regular diet until the day before surgery. Preoperative carbohydrate loading (800 mL of a 12.5% carbohydrate drink the night before the operation and 400 mL of a 12.5% carbohydrate drink on the morning of the operation day 2–3 hours prior to the induction of anesthesia) was recommended to reduce the insulin resistance and tissue glycosylation caused by the surgical injury [16]. Preoperative clear oral carbohydrate fluid loading helps in postoperative glucose control, sustains normal bowel function, and may shorten the length of hospital stay compared with overnight fasting in GC patients receiving gastrectomy [17].

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POSTOPERATIVE NUTRITIONAL MANAGEMENT

Early postoperative dietary support

Recently, early oral nutritional support has been recommended after gastrectomy. Early oral feeding is one of the most important postoperative elements in ERAS [16]. After abdominal surgery, small intestinal functions resume between 6 and 12 hours after surgery, indicating that postoperative oral or enteral nutrition can be initiated at that point.

Several studies have shown that early oral feeding or enteral nutrition is feasible and safe, even starting on the day of surgery, regardless of the extent of gastric resection and type of surgery [18,19]. In fact, there are no reports that early oral nutrition increases adverse events, including anastomotic leakage. In contrast, early oral feeding or enteral nutrition in patients with GC after gastrectomy contributes to early recovery of intestinal function and nutritional status after surgery, reduction of postoperative complications, and shortened hospital stay and immune function [20,21].

Managing dumping syndrome

Early dumping syndrome occurs approximately 15–30 minutes after eating a meal owing to loss of gastric storage and rapid gastric emptying of hyperosmolar contents into the proximal small intestine [22]. Common symptoms include epigastric fullness, vomiting, abdominal cramps, diarrhea, and hypotension. Late dumping syndrome, presenting with sweating, anxiety, hunger, and weakness, occurs approximately 2–3 hours after eating. Reactive hypoglycemia contributes to the symptoms of later dumping syndrome. It is treated by eating small meals 6 or more times a day, limiting the amount of refined sugars, and avoiding liquids with meals to slow gastric emptying. This does not always occur, and so does not restrict diet unless symptoms are present.

After gastrectomy, patients are recommended not to overeat at mealtime, eat a small amount of food frequently, spend their time at meals, and not consume a fat-rich diet. A specialized team's dietary education and nutritional support are crucial for patients post-gastrectomy.

LONG-TERM POSTOPERATIVE NUTRITIONAL MANAGEMENT

Nutrient deficiencies and undesirable clinical consequences owing to digestive disorders and impaired nutritional absorption may develop after total or subtotal gastrectomy. Following gastrectomy, common nutritional problems include vitamin B12, folate, iron, calcium, and vitamin D deficiency. Nutrient deficiencies include malabsorption, rapid gastrointestinal transit, bacterial overgrowth, and insufficient oral intake [23,24]. Nutrient deficiencies develop months to years after gastrectomy and can have detrimental clinical consequences. Anemia and metabolic bone disease are the most common manifestations of nutrient deficiencies in patients with GC undergoing gastrectomy [25].

Vitamin B12 deficiency anemia

Anemia and neurological disorders due to vitamin B12 deficiency are common long-term complications in patients with GC without adequate nutritional supplementation after gastrectomy. Intrinsic factors, mainly secreted by parietal cells, are necessary for the absorption of enteral vitamin B12 [25]. Decreased intrinsic factors and gastric acidity may contribute to vitamin B12 deficiency in patients undergoing total or subtotal gastrectomy.

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The median time to vitamin B12 deficiency was 15 months after the total gastrectomy [26]. Symptoms of vitamin B12 deficiency include drowsiness, dizziness, fatigue, chills, numbness of the extremities, and neurological disorders [27]. However, the clinical features can be non-specific or absent in some patients [28]. Therefore, routine vitamin B12 supplementation and periodic serum monitoring with vitamin B12 supplementation are indicated for patients with GC undergoing total gastrectomy and subtotal gastrectomy, respectively. Interestingly, enteral vitamin B12 supplementation rapidly increased the serum vitamin B12 concentration. Symptom resolution was comparable between the patients who received enteral and parenteral supplementation. After total gastrectomy, the body can adapt and produce intrinsic factors in the duodenum and jejunum [27].

Iron deficiency anemia

Iron deficiency anemia is common in patients with GC after total or subtotal gastrectomy [29,30]. Malabsorption of dietary iron may result from a reduction in gastric acid secretion and bypassing the duodenum. Reduced gastric acidity impairs the conversion of non-heme iron into a more absorbable ferrous form [30]. Reconstruction after gastrectomy may decrease iron absorption by bypassing the duodenum and proximal jejunum, major sites of iron absorption. The incidence of iron deficiency was significantly higher in women than in men with GC after gastrectomy [31]. In summary, iron deficiency anemia following GC surgery should be monitored, especially in women.

SUMMARY

An appropriate assessment of preoperative nutritional status and subsequent nutritional intervention before gastrectomy is essential for malnourished patients with GC. Preoperative clear oral carbohydrate fluid loading can lead to a shorter hospital stay than overnight fasting in patients with GC who have undergone gastrectomy. Following GC surgery, early oral and enteral tube feeding can result in a shorter hospital stay than TPN. Compared to late oral feeding, early oral feeding can reduce hospital stay in patients with GC undergoing gastrectomy without increasing the complication rate.

Periodic nutritional assessment and intervention are important to prevent nutrient deficiencies in patients with GC following surgery. Routine supplementation with vitamin B12 is indicated for GC patients undergoing total gastrectomy, and periodic serum monitoring and supplementation of vitamin B12 is warranted for GC patients undergoing subtotal gastrectomy. Iron deficiency anemia is common in patients with GC after total or subtotal gastrectomy. It should be monitored following GC surgery, especially in women.

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