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Research Progress on Enteral Nutrition in Patients with Esophageal Cancer

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Abstract:

Patients with esophageal cancer often experience symptoms such as dysphagia due to the progression of the disease, resulting in insufficient intake and energy consumption caused by their own diseases. Eventually, this leads to malnutrition, decreased immunity, increased inflammation levels, and affects the quality of life. After surgery, negative nitrogen balance is also caused by factors such as surgical trauma and stress. Therefore, enteral nutrition has become a nutritional support method for patients with esophageal cancer. To promote better development in the field of enteral nutrition research for patients with esophageal cancer, this article summarizes the research status in this field through literature review and data access. It elaborates from aspects such as the nutritional status of patients, enteral nutrition pathways, and the timing of implementing enteral nutrition, summarizes its advantages and disadvantages, promotes further development in this field, and provides more effective and safe enteral nutrition plans for patients with esophageal cancer.

Keywords: Esophageal cancer; enteral nutrition; progress.

1. Introduction

Esophageal cancer is a common tumor in the digestive tract and is also one of the six common tumors in China. It has a high incidence rate and a low 5-year survival rate after surgery, still less than 30% [1,2]. Esophageal cancer patients often have no obvious symptoms in the early stage as the disease progresses. Occasionally, they may feel uncomfortable when swallowing coarse and hard food. In the middle and advanced stages, progressive dysphagia, retrosternal foreign body and other symptoms lead to insufficient intake and increased energy consumption due to their own diseases, often resulting in varying degrees of malnutrition, affecting the quality of life of patients [3]. For cancer patients, various enhanced metabolisms and eating disorders within themselves tend to result in increased catabolism, aggravating the compromised immune function. Meanwhile, the immune system is suppressed after surgical trauma, and the levels of immune factors and immunoglobulins become abnormal, which affects the patients' quality of life. If they remain in a state of hunger for an extended period, the intestinal immunity and mucosal barrier will be impaired, the normal flora will be disrupted, and the intestinal flora will translocate. The clinical treatment methods of esophageal cancer are mainly surgery combined with radiotherapy and chemotherapy [4]. Standardized anti-tumor treatment can significantly improve the prognosis of esophageal cancer patients. However, esophageal cancer patients often have progressive dysphagia and insufficient nutritional intake. After surgery, due to surgical trauma, physiological stress and fasting, they are often in negative nitrogen balance after surgery. Therefore, enteral nutrition is often a nutritional support method for esophageal cancer patients [5].

Enteral nutrition can not only ensure energy demand, maintain electrolyte balance, gastrointestinal function, regulate the body's immunity, but also reduce the occurrence of inflammation and complications, promote wound recovery, shorten the length of hospital stay, reduce the psychological burden of patients, and be beneficial to the recovery of the postoperative traumatized body [6]. Thus, it can be seen the importance of nutrition for tumor patients. Based on the above current situation of esophageal cancer and the advantages of enteral nutrition, Chinese researchers have carried out a large number of studies and there are numerous clinical studies in this research field; however, there are relatively few review types regarding research progress and the like, which cannot present the current research status well, thereby entailing certain limitations. Now, through literature review and evalua-

tion, this article explores the current situation of enteral nutrition in esophageal cancer patients and summarizes its advantages and disadvantages to promote further development.

2. Nutritional Status of Esophageal Cancer Patients

Some studies have shown that patients with esophageal cancer are often in an acute stress state. In the acute stress state, a large number of related stress hormones such as catecholamines, thyroid hormones, and cortisol are released in the body. These hormones can accelerate the body's metabolic rate. Cells and tissues need more energy to cope with the stress state. The high metabolic state leads to increased energy consumption in the body. In order to meet the needs of high energy consumption, the body will accelerate the decomposition process of fat, glycogen and protein to obtain more energy, resulting in a high decomposition state [7]. At the same time, the body provides amino acids for energy metabolism and the synthesis of proteins accelerates the decomposition of proteins such as white blood cells and antibodies, resulting in a negative nitrogen balance state. These changes may lead to severe malnutrition and decreased immune function in patients [8].

According to research findings, weight loss is one of the significant manifestations of malnutrition among patients with esophageal cancer [9]. Moreover, Conti et al. reported earlier that if the weight loss of patients with esophageal cancer exceeds 15% of their usual body weight, their mortality rate increases significantly [10]. Similarly, Zemanova et al. reported that weight loss before treatment was a risk factor affecting the overall survival rate of esophageal cancer patients [11]. Esophageal cancer patients with nutritional risks have prolonged hospital stays and are prone to postoperative complications [12]. Park et al. conducted a multivariate regression analysis on 7227 esophageal cancer patients undergoing esophagectomy, and the results suggested that the hospital mortality rate was closely related to hypoalbuminemia during hospitalization [13]. Chen Chao retrospectively analyzed esophageal cancer patients who underwent radiotherapy and chemotherapy after surgery, and the results showed that the worse the nutritional status before radiotherapy and chemotherapy, the higher the incidence of adverse reactions and the worse the treatment tolerance [14].

Malnutrition may lead to excessive activation of pro-inflammatory cytokines and decreased production of anti-inflammatory cytokines, and abnormal activation of the immune system [15]. Takeuchi H et al. pointed out that the decreased function of immune cells in esophageal cancer patients can increase the incidence of perioperative, especially infection-related complications, thereby increasing the mortality rate after esophageal cancer surgery [16]. Immune cells regulate the immune response by producing different types of cytokines such as pro-inflammatory cytokines and anti-inflammatory cytokines. Chen Sizeng and other researchers proposed that when the body tissues are damaged or infected for various reasons, C-reactive protein (CRP) will increase sharply, and accurate results can be obtained through the detection of peripheral venous blood samples, with extremely high sensitivity. Different concentrations of C-reactive protein can be found in the peripheral serum when the body has acute inflammation. Therefore, it is an extremely sensitive indicator when the body has an inflammatory response [17]. However, Xu Bindong et al.'s research showed that the preoperative CPR level of esophageal cancer patients was at a relatively high level, suggesting a perioperative stress response in esophageal cancer patients [7].

3. Approaches of Enteral Nutrition

The approaches of enteral nutrition are divided into two types: one is to introduce the nutrient solution into the stomach or intestine through the jejunum tube, namely nasogastric tube and nasojejunal tube; the other is through percutaneous jejunostomy tube placement; the appropriate enteral nutrition approach is selected according to the patient's own condition [18]. Both nasogastric tube and nasojejunal tube are simple and non-invasive, but they are prone to cause discomfort such as foreign body sensation in the patient's pharynx or larynx, but they maintain the integrity of the structure and function of the gastrointestinal tract. Nasal feeding nutrition is prone to complications such as displacement, shedding and blockage of the nasal feeding tube, but no other serious complications have been found. Due to its advantages such as small trauma and low cost, it is currently a more commonly used enteral nutrition pathway. Jejunostomy tube placement is an invasive approach where the jejunostomy tube is placed into the jejunum and fixed to the abdominal wall. The advantage of the jejunostomy tube placement pathway is that it improves the patient's comfort compared to the nasal approach and has lower requirements for the intensity of the patient's activities, but complications such as intestinal fistula and stoma infection may occur [19]. Compared with the placement of the two types of enteral nutrition pathways, jejunostomy may be superior to nasal feeding tubes. The risks and benefits between the two are difficult to compare. For the choice of enteral nutrition method after esophageal cancer surgery, it needs to be combined with the method of esophageal cancer surgery.

4. Effects of Enteral Nutrition

4.1 Nutritional Status

Due to the total protein (TP), albumin (ALB), and transferrin (TRF) levels often decrease when the body is malnourished, they are mostly used as nutritional status indicators in clinical practice [20]. The experimental results of Zhu Wenjuan et al. showed that the levels of TP, ALB, and TRF in esophageal cancer patients receiving enteral nutrition increased compared to those before surgery and were higher than those in patients without enteral nutrition. The patient's nutritional condition is good, which is conducive to wound recovery and physical health recovery [21]. Existing evidence shows that after esophageal cancer surgery, patients receiving enteral nutrition have a higher body mass index than those not receiving enteral nutrition, indicating that enteral nutrition can correct severe malnutrition, prevent weight loss in patients after surgery, improve nutritional status, and improve the quality of life [22].

4.2 Immune Function

By implementing early enteral nutrition, the body's inflammatory response is reduced, the levels of immunoglobulins and lymphocyte ratios are increased, thereby improving the immune ability. The nutrient solution can activate T cells and B cells to transfer to the mesenteric lymphatic vessels and enter the blood to produce immune antibodies [1]. According to Li Qiuze's research, the levels of humoral immune indicators (IgA, IgC, IgM) and cellular immune indicators T lymphocytes and their subsets (CD3+, CD4+, CD8+, CD4+/CD8+) in patients receiving enteral nutrition decreased compared to those before surgery, and the immunity level of the patients was relatively higher than that of patients without enteral nutrition care [23]. Other research also showed that enteral nutrition can reduce the postoperative inflammatory factor C-reactive protein (CRP) in patients [7]. The patient's immune indicators have improved and stabilized, thereby improving the immune function, indicating that early enteral nutrition has a positive effect on the body's immune function.

4.3 Gastrointestinal Function

Early enteral nutrition support can reduce the stress response and damage to the intestinal mucosal barrier after esophageal cancer surgery, promote the repair of the intestinal mucosal barrier, restore intestinal function, reduce intestinal flora imbalance, and promote the growth of intestinal mucosal cells, which is conducive to the secretion of gastrointestinal hormones [24]. In addition, it can maintain the integrity of the mucosa and also maintain the functional barrier to inhibit C-reactive protein (CRP) and complement proteins, reduce the inflammatory response, and can enhance the anti-malnutrition and anti-stress ability after surgery [25].

From the abovementioned, enteral nutrition can ameliorate the nutritional status of patients with esophageal cancer, prevent weight loss in patients, improve immune indicators, enhance immune function, alleviate stress response, facilitate the growth of intestinal mucosal cells, promote the restoration of gastrointestinal function, and strengthen the anti-stress ability, exerting positive effects in these three aspects.

5. Implementation Time of Enteral Nutrition

After esophageal cancer surgery, it is traditionally required to fast for about 5 days, and the daily required intake of nutrients is habitually supplemented by parenteral nutrition. However, in recent years, the application rate of early enteral nutrition has exceeded that of parenteral nutrition [1]. To achieve the maximum efficacy of early enteral nutrition, the timing of feeding needs to be determined based on the function of the gastrointestinal tract. If the early postoperative gastrointestinal function is not fully restored, premature implementation of enteral nutrition can cause gastrointestinal discomfort such as intestinal colic, abdominal pain and abdominal distension [26]. Some scholars have found that 6-12 hours after general anesthesia, the anesthetic drugs begin to lose effect, and the absorption, digestion and peristalsis functions of the small intestine recover [27]. Therefore, patients can receive enteral nutrition support 6-12 hours after surgery. However, some scholars believe that the ideal enteral nutrition should start within 24-48 hours after surgery, and other studies have shown that patients who receive enteral nutrition during this stage can adapt well. Every year, there are corresponding reports on it. The reporting time is not uniform, but all are more than 6 hours [28]. The digestive tract can get rid of the effect of anesthesia and restore most digestive functions in about 4 hours; while the small intestine can restore some functions in about 6 hours. Therefore, scholars all believe that the time of enteral nutrition should be at least more than 6 hours. Before providing nutritional support to patients, confirm whether they have contraindications to avoid causing secondary harm to the patients. When infusing enteral nutrition fluid, attention should be paid to temperature, speed, concentration, time, etc. [29]. During the infusion, attention should also be paid to whether the patient has any discomfort to avoid complications. Most clinical practices have proved

that early enteral nutrition support is beneficial for the recovery of the gastrointestinal tract, improving the nutritional status of patients, promoting early recovery and improving the quality of life [1].

6. Conclusion

With the in-depth clinical research on enteral nutrition, enteral nutrition support has become the main way of postoperative nutritional support for patients with esophageal cancer, and parenteral nutrition is used as a supplement. As long as the patient's gastrointestinal function is normal, enteral nutrition should be the first choice, and its effectiveness and safety have been confirmed by most researchers. It can improve the immune indicators of patients, enhance the body's immune function, improve the status of malnutrition, avoid weight loss, promote the recovery of gastrointestinal function, maintain the integrity of the mucosa, reduce inflammatory responses, enhance the ability to resist malnutrition and stress after surgery, accelerate the recovery of the postoperative survival state of patients, and reduce postoperative complications, etc. The timing of implementing enteral nutrition after esophageal cancer surgery is also very important. Implementing it too early can cause gastrointestinal discomfort,while implementing it too late will not improve the nutritional status and is not conducive to postoperative recovery, early enteral nutrition support can be given within 6-24 hours after the operation according to the patient's own situation. Formulating an early nutrition support plan can help patients absorb nutrients without causing gastrointestinal burden and improve the quality of life of patients.

However, it should be noted that each patient shows variance, and not every postoperative patient is suitable for enteral nutrition. Whether to choose enteral nutrition should be based on the patient's own situation. At the same time, it is also necessary to pay attention to individualized nutritional support for patients with enteral nutrition, which is more conducive to recovery. However, due to the certain difficulty in implementing individualized nutritional treatment plans in clinical work, further research and exploration are needed by researchers to provide a higher-quality enteral nutrition plan formulation system for patients with esophageal cancer.On the one hand, enhance the experimental stringency and research depth of relevant indicators while taking their feasibility into account. On the other hand, in the clinical context, a multidisciplinary nutritional support team can be formed, and the continuous care team can be brought into play. The nutritional status and immune level of patients should be strictly monitored throughout the entire process. Intestinal nutrition management should be conducted based on the recovery situation and changes in indicators. Meanwhile, health education should be provided to patients and their families, informing them of precautions to accelerate the recovery speed and improve the quality, and increase the survival rate and quality of life.

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