Nutritional Management of Patients With Esophageal and Esophagogastric Junction Cancer

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Several strategies can be incorporated to preserve or restore nutritional status of malnourished patients during management of esophageal cancer.

Background: Malnutrition is common in patients with esophageal and esophagogastric cancer. Compared to patients with other digestive and extradigestive neoplasia, the highest incidence (78.9%) was found in those with esophageal cancer. Malnutrition is associated with postoperative complications, increased morbidity, and prolonged hospital stays.

Methods: The authors review the impact and causes of malnutrition in esophageal cancer patients and present strategies that can be used to preserve or restore the nutritional status in this patient population throughout treatment.

Results: Patients usually are unable to sustain weight on oral intake alone and require additional means of nutritional support. Several methods can be used to provide nutritional care to the esophageal cancer patient, such as diet modification, oral supplementation, and enteral or parenteral nutrition. The enteral route is preferred due to preservation of gut integrity, reduced risk of complications, and less expense. In terminally ill patients, minimal nutritional intervention may be all that is needed to achieve patient comfort.

Conclusions: In order to improve clinical outcomes and the quality of life for patients with esophageal and esophagogastric cancers, the extent of malnutrition must be identified and treated.

Introduction

Although cancer of the esophagus is uncommon in the United States, its incidence is increasing. It is estimated that in the year 1998, 12,300 new cases of carcinoma of the esophagus will have occurred in the United States and 11,900 people will have died of esophageal cancer. Of those new cases, malnutrition is a common comorbidity. Compared to patients with other digestive and extradigestive neoplasia, the highest incidence of malnutrition (78.9%) was found in those with esophageal cancer. Patients typically present with malnutrition at the time of diagnosis, while the severe side effects of multimodality treatments contribute further risk for nutritional deficits. In a review of 30 esophageal cancer patients admitted to our center, nutritional marasmus, which is defined as a weight loss of >10%, was apparent in 70%. In most cases, weight loss occurred rapidly — over a period less than four months — as a result of progressive dysphagia and/or anorexia with intolerance to regular diet. Because weight loss has been identified as a poor prognostic factor in disease outcome, prompt nutritional intervention is necessary. This article reviews strategies that can be used by clinicians to preserve or restore the nutritional status of their patients throughout antineoplastic treatment.

Impact of Malnutrition

The clinical impact of malnutrition on the cancer patient can be significant. Nutritional status in cancer patients has been correlated with surgical resectability rates, response rates to chemotherapy, length of hospital stays, and survival. Significant weight loss prior to surgery has also been associated with substantially higher postoperative morbidity and mortality rates in patients with esophageal cancer. These results are consistent with the abundance of literature that has documented an increased susceptibility to infectious postoperative complications among other malnourished cancer patients and may be related to the adverse effect of malnutrition on immune status.

Benefits of Nutritional Support

Nutritional support can be of benefit in those malnourished patients who have potential for a positive response to treatment. Proper nutritional support with early intervention can lead to improvement in nutritional status and suppression of the gluconeogenesis associated with cancer cachexia, thereby decreasing catabolism. Nutritional support in malnourished cancer patients has also been shown to impact clinical outcomes including improvement in tolerance to therapy, decreased number of hospitalizations, improved sense of well being, and reduction in operative morbidity and mortality. Although demonstrating direct improvement in long-term survival is difficult because of the poor prognosis associated with the disease itself, adjuvant nutritional therapy is an important supportive measure that can reverse malnutrition and improve clinical outcomes in malnourished patients undergoing antineoplastic treatments.

Causes of Malnutrition

The causes of malnutrition and nutritional deterioration in cancer patients are multifactorial. The contributing factors and associated symptoms are usually a result of the local and systemic effects of the disease in combination with the side effects of treatment (Table 1). To properly assess patients’ needs and to provide appropriate nutrition intervention, it is essential to understand the underlying causes of the derangement of nutritional status.
Localized Effects of Tumor

Tumors of the esophagus physically interfere with consumption of nutrients, and the resultant malnutrition closely depends on tumor extent. Dysphagia occurs relatively late as the esophagus slowly distends to accommodate the ingestion of food or liquid to pass the tumor. Most cancers involve at least a 4-cm length of the esophagus before diagnosis, and the typical patient will have had 3 to 6 months of dysphagia and some weight loss before first contacting a physician. Other patients will report reflux, odynophagia, or coughing or choking on food; they are afraid or reluctant to eat, which places them at high risk for malnutrition from the time of diagnosis.

Systemic Effects of Tumor

Many patients with esophageal cancer develop cachexia at some point in the progression of their disease. The etiology of this syndrome of weight loss, debilitation, and progressive anorexia is unknown but is believed to be related to tumor development independent of dysphagia. Patients with cancer cachexia experience increased rates of glucose turnover, gluconeogenesis, and protein breakdown with an inhibition of lipoprotein lipase. As a result, metabolic rate may increase in spite of decreases in energy intake, thus causing a significant increase in nutritional needs and further nutritional depletion.

Treatment Effects

The side effects of treatment are major contributing factors to the malnutrition and wasting syndrome commonly observed in patients with esophageal cancer. Surgeries of the esophagus and esophagogastrectomy junction can have profound effects on the patient’s ability to consume adequate nutrition. Changes in the anatomy of the stomach to a smaller reservoir result in early satiety, reflux, nausea, vomiting, and vitamin and mineral deficiencies, and in cases where a vagotomy is performed, gastric stasis may occur. Colonic or jejunal interposition, anastomotic leaks, anastomotic strictures substantially delay recovery of oral intake, which leads to inadequate intake in patients postoperatively. Chemotherapy and radiation therapy can also reduce the size of the tumor and thus relieve dysphagia, but these treatments can have profound effects on the gastrointestinal tract. Nausea, vomiting, diarrhea, and stomatitis occur with cisplatin and 5-fluorouracil therapy, while the most predominant symptoms of mediastinal radiation are esophagitis with dysphagia, odynophagia, reflux, and esophageal strictures. Nutritional side effects of chemotherapy usually resolve following treatment; however, the first symptoms of radiation damage from mucosal injury begin within two to three weeks after the start of therapy. Most cancer programs now advocate combined-modality therapy for localized disease, which results in even more acute toxicities and little time for nutritional repletion.

Nutritional Assessment

Nutritional assessment is the first step in the identification and treatment of malnutrition. Standard nutritional assessment techniques using nutrition history, medical history and physical examination, weight profile, and biochemical indices are needed to evaluate the nutritional status of patients with esophageal cancer.

Nutrition History

The nutrition history is a vital component of the nutritional assessment and can determine adequacy of food intake and the severity of dysphagia. The history is aimed at determining the patient’s prior dietary habits and how they have been affected by the malignancy. The following information is obtained using open-ended questions to allow for accurate recall: habitual diet and any change in diet pattern, appetite loss or early satiety, specific intolerance to texture or type of food (eg, solids vs liquids), pain with swallowing, alcohol consumption, poor dentition, nausea or vomiting, total fluid intake, and food allergies or intolerance.

Once obtained, the current nutrient intake is compared to predicted requirements to determine adequacy of intake and need for intervention. In cases where heavy alcohol use is suspected, supplementation with folate, thiamin, vitamin B12, and niacin combined with nutrition support and alcohol withdrawal may be indicated.

Medical History and Physical Examination

The medical history should include information regarding the specific location of the patient’s tumor, toxicities of past and present treatments, and the existence of any concurrent medical problems that may have nutritional significance. Evaluation of the patient’s functional status and barriers to nutrition therapy on physical examination is also essential prior to the development of the nutritional plan. Fatigue as a result of malnutrition or antineoplastic treatment can interfere with the patient’s ability to perform activities of daily living (eg, shopping, cooking, eating) and presents a significant barrier to nutritional therapy.

Weight Profile

Weight loss is common in patients with esophageal cancer and is usually present from the time of diagnosis. As an important component of nutritional assessment,
measurement of body weight and information regarding recent weight loss can identify patients in need of nutritional intervention. Weight status is usually assessed in comparison to usual (premorbid) weight or ideal body weight, taking into account the duration in which it occurred and the degree to which it was unintended. Severe weight loss is defined as >1% in one week, >5% in one month, >7.5% in three months, and >10% in six months. Current weight that is 20% or more below ideal body weight is also an indication of potential nutritional risk. However, weight status is frequently influenced by hydration status or the presence of edema and ascites and thus has serious limitations as an outcome measure or monitoring tool in hospitalized patients. For these reasons, weight profiles for nutritional assessment must be used in combination with other nutritional parameters.

Biochemical Parameters

Traditional biochemical indices of visceral protein status include serum albumin, transferrin, and prealbumin. The selection of laboratory tests for nutritional assessment is dependent on the value’s sensitivity to change (half-life), availability within the facility, degree to which it is influenced by disease factors, and cost versus benefit with regard to how it will influence the treatment plan. Serum concentration of visceral protein stores is influenced by hydration status, liver involvement, and renal dysfunction. Sepsis and surgery have also been shown to decrease these parameters regardless of overall nutritional status. Therefore, caution must be used when interpreting these data in the presence of disease.

Serum albumin is the most commonly used and readily available biochemical parameter used to assess protein status; however, its relatively long half-life (14 to 20 days) makes it slow to respond to dietary changes. Patients who present with esophageal cancer are often malnourished but with normal albumin levels. This may be due to the acute weight loss experienced in this population and the limited ability of albumin to detect early protein deficiency. This is consistent with our center’s findings in the esophageal cancer population.

With its shorter half-life (8 to 9 days), serum transferrin is more sensitive to short-term changes in nutrient intake and is useful when monitoring patient progress.

Prealbumin, also known as transthyretin and thyroxine-binding prealbumin, has a short half-life (2 to 3 days), making it a much more sensitive indicator of protein status. This parameter is most useful when assessing patients for acute change in nutritional status or short-term response to nutrition intervention.

Calculating Energy Requirements

Energy requirements in patients with cancer have been shown to vary depending on disease site and level of stress. One study demonstrated a 31% increase in resting metabolic rate one day after esophagectomy and thoracotomy compared to preoperative values, while other studies reveal inconsistent results in patients with esophageal cancer. Indirect calorimetry provides the most precise estimate of resting energy expenditure, but its use is limited by the expense and availability of the necessary equipment and the inconvenience of additional diagnostic testing on the patient. In clinical settings, the Harris and Benedict equation has been found to be a more practical and reliable method for measuring expected metabolic rate. Its accuracy has been verified in validation studies comparing actual measurements and predicted values of healthy individuals with a mean difference of 4%. Factors between 15% and 30% above basal energy expenditure are indicated for weight maintenance and anabolism, respectively, while increases of 10% to 80% above basal energy expenditure are used for postoperative or septic patients. Because these calculations are an estimate and not based on actual measurements of caloric expenditure, monitoring of patient response to the nutrition regimen and adjustments of calorie goals is necessary.

Calculating Protein Requirements

Acceleration of protein turnover and derangements in protein metabolism have been observed in cancer patients. In contrast to simple starvation, where the body attempts to spare protein, the opposite is true under conditions of metabolic stress such as cancer or antineoplastic therapy. Protein requirements are typically calculated based on the patient’s ideal or desirable body weight using either the Metropolitan Height-Weight Tables or the Hamwi method. The estimated protein requirement can then be determined based on the degree of protein depletion and the metabolic stress factors. For the well-nourished, mildly stressed individual, the protein needs may only be 0.8 to 1.0 g of protein/kg body weight. However, with mild to moderate depletion combined with metabolic stress, 1.5 to 2.0 g of protein/kg body weight may be required to achieve positive nitrogen balance. The best methods to determine if protein needs are being met in the malnourished patient are monitoring and reassessment for weight maintenance and nitrogen retention; in the well-nourished patient, the best methods are weight maintenance and nitrogen equilibrium.

Nutritional Management

Nutritional management of the patient with esophageal and esophagogastric cancer begins at the time of diagnosis and continues throughout the treatment period. Following the nutritional assessment, a care plan is developed that not only focuses on the nutrition-related side effects of the disease and treatment modalities, but also provides strategies to limit nutritional depletion (Table 2).

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Table 2.—Nutritional Intervention Strategies for Eating Problems Associated With Esophageal and Gastroesophageal Junction Cancer
Dysphagia

Dysphagia is the primary symptom of esophageal cancer, significantly impacts nutrient intake, and is usually the focus of treatment. Dysphagia first becomes apparent with ingestion of solid, bulky, dry foods, and then progresses to soft foods, and ultimately liquids, including saliva. Patients with esophageal cancer will unconsciously chew their food more thoroughly and substitute liquids for solids without even realizing the attempt to relieve dysphagia. Providing nutritional support via oral intake is preferred; however, modifications in textures are often necessary to improve patient tolerance. The severity and quality of the swallowing disorder is evaluated during the nutrition history and food consistencies with which the patient can swallow are identified. The dietitian works to provide these foods in quantities that will meet the patient’s nutrient requirements. The diet usually regresses in stages according to consistency and texture of foods, from normal meals to moist foods to pureed foods to thin liquids. Patients typically need to take small bites of food, chew thoroughly, and sip liquids slowly with meals to improve tolerance. Therefore, meals for the patient with dysphagia are usually time consuming and require substantial effort. Combinations of foods and oral supplements that will increase the nutrient density while minimizing the quantity of food that the patient will have to consume are recommended.

Tube Feeding the Patient With Dysphagia

The majority of patients with dysphagia are unable to sustain weight on oral intake alone and require additional means of nutritional support. Nasoenteric feedings are the easiest and least invasive of feeding methods. However, for most patients who have a life expectancy of several months, are unable to consume sufficient protein and calories for greater than 7 to 10 days, and will require long-term nutritional support, a percutaneous endoscopic gastrostomy (PEG) tube is preferred. The PEG tube can be placed under conscious sedation and the patient can begin feedings 24 hours later. Subsequently, intermittent feeding throughout the day or 24-hour pump-assisted feedings can be administered. The complication rate in cancer patients with PEG tubes compares favorably with that for surgically placed gastrostomies and PEG tubes in patients with nonmalignant diseases; thus, cancer patients are not at an increased risk for developing complications from this procedure. The use of total parenteral nutrition is infrequently necessary as patients with esophageal cancer usually have a functional gut below the tumor site. In most cases, the enteral nutrition is preferred due to preservation of gut integrity, lower risk of complications, and lesser expense.

Nutritional Management During Treatment

Radiation

Esophagitis, early satiety, reflux, and esophageal strictures are common effects of radiation therapy in patients with esophageal cancer. Dietary intervention should be timely, with the first signs of symptoms, to prevent further nutritional depletion. Guidelines for dysphagia management and for avoidance of possible irritants (eg, acidic foods, caffeine-containing items, and foods that are difficult to chew) are provided. A high-protein, moderate-fat diet consumed in small, frequent meals can be of benefit to improve tolerance to diet. Introduction of supplements high in calories and protein are often necessary for nutritional repletion and can be provided either orally or with a bypass feeding tube. Although less common, tracheoesophageal fistulas are occasionally seen as a significant side effect of radiation therapy. Nutritional therapy may be provided via enteral feeding tubes or parenteral means.

Chemotherapy

Nausea, vomiting, stomatitis, and diarrhea are all possible side effects depending on the type of chemotherapy and the protocol used in patients with esophageal cancer. Adjustments in dietary recommendations should be consistent with the problem affecting the patients nutritional status. Although dietary management rarely eliminates the problems, manipulation of the patient’s oral intake often can successfully reduce the severity of symptoms. Nutritional strategies are often combined with drug therapy for improved results.

Surgery

Surgical treatment of patients with esophageal and esophageogastric junction cancers significantly affects the patient’s ability to obtain adequate nutrition. In order to maintain and improve nutrition during the stress of esophagectomy and esophagogastrectomy, early postoperative enteral feeding is necessary. A feeding jejunostomy tube placed at the time of surgery allows for early postoperative feedings with preservation of gut function and optimal wound healing. Enteral nutrition via jejunostomy tubes has been shown to be both effective and cost efficient in the perioperative period and for long-term support in patients with cancer of the esophagus. Additionally, nutritional support from a feeding jejunostomy tube can relieve the patient of the often onerous chore of eating when recovering from surgery or undergoing further treatment that may restrict optimal oral intake. Complications such as jejunostal tube dislodgment, metabolic derangements, or gastrointestinal side effects are easily corrected.

Enteral feedings via the feeding jejunostomy can begin within 24 hours of surgery and are best tolerated with pump-assisted delivery of formula. Isotonic formulas are well tolerated at full strength if they are started at small volumes (20 to 30 cc/hr). The feeding can be increased by 20 cc/hr every 12 hours to the desired volume. Other patients may tolerate concentrated (1.5-2.0 kilocalories/cc) hyperosmolar formulas after intestinal adaptation. Elemental formulas generally have the highest osmolalities and thus should be diluted on initial administration to isotonicity (usually half-strength concentration) or 280 to 310 mOsm. However, these formulas are expensive and usually are not justified in the absence of malabsorption or intolerance to standard formula.

Once tube-feeding tolerance is established, oral intake may begin. Small (4 to 6 oz), frequent meals appear to prevent nausea, vomiting, distention, and diarrhea associated with gastric pull-up. The patient is encouraged to increase intake gradually to help stretch the stomach. Eliminating simple carbohydrates and alternating
solids and liquids are recommended to prevent osmotic diarrhea or "dumping syndrome." Daily calorie counts aid in determining the amount of food and total calories that the patient can tolerate. Most patients still require supplemental nocturnal feedings even after they start eating. This stimulates oral intake during the day and allows the patient to be mobile. The diet advances from clear liquids to full liquids with progression to five or six small meals that are high in protein. As tolerance improves, meal size can be increased and diet may be liberalized (Table 3).

Vagotomy

When vagotomy accompanies esophageal resection, patients may experience gastric stasis, early satiety, distention, nausea/vomiting, and subsequent difficulty eating enough to meet daily nutrient needs. Since fat-containing foods may further slow gastric emptying, small, frequent meals containing low-fat foods should initially be selected. Some experimentation with food choices and response to foods is necessary to determine which foods are best tolerated for each individual.

Colonic or Jejunal Interposition

Interposition may be performed in cases where there is insufficient tissue available for reanastomosis. However, the colonic or jejunal section lacks normal peristaltic movement and depends on gravity for passage of food. The patient, therefore, may experience continued dysphagia and frustration with the slow process of swallowing. Nutritional instruction includes recommendations for eating semisolid foods and drinking liquids after each bite to reduce the amount of time required for meals. Total oral intake may be inadequate to promote healing and to maintain weight while swallowing rehabilitation proceeds. As resumption of oral intake is slower to progress compared to patients having gastric pull-up, supplemental tube feedings should therefore be continued until nutritional needs are met.

Esophageal Dilation and Prosthesis

In advanced stages of esophageal cancer, a prosthesis or stent may be used for palliative treatment of dysphagia. Dilation of the esophagus to greater than 13 mm followed by the insertion of a prosthetic tube allows luminal patency and accomplishes passage of food. Dietary modification consists of elimination of foods that may block the esophagus or adhere to the sides of the prosthesis. Although this treatment is palliative and not curative, it can allow for improved food intake for four to six months after placement. When dilation is performed without stent placement, either for the passage of food or simply for the handling of oral secretions, relief of dysphagia typically lasts only a few days or weeks. In those cases, nutritional support via a PEG tube or a pre-existing feeding jejunostomy tube can provide the most effective maintenance of nutrition.

Ethical Issues in Nutritional Management

The decision to use enteral tube feedings or parenteral nutrition for patients with advanced incurable disease requires careful consideration of the goals of such support. It is difficult to justify expensive, aggressive, and sometimes invasive methods of nutritional support in patients who are not receiving curative antineoplastic therapy. Conditions for which "artificial" feeding (such as enteral or parenteral nutrition) is refused or considered inappropriate include end-stage disease, advanced dementia, and a persistent vegetative state. Some patients desire no support whatsoever, even in the form of intravenous hydration. The decision to deliver basic support should be discussed with the family in terms of prognosis, anticipated consequences of not receiving hydration or nutrition, risks involved in administering support, and cost. In many patients, the provision of enteral support via tube feeding can provide a better quality of life by restoring some degree of strength and energy and allowing patients to eat for enjoyment rather than feeling pressured. Ultimately, the choice for nutritional support in the end-stage cancer patient must lie with the family and caregivers, with as much information as possible provided from the health care team.

Conclusions

The prevalence of malnutrition in patients with esophageal and esophagogastric cancers at admission and its predictive value for the incidence and severity of complications during treatment are well established in the scientific literature. It is thus critical for the medical team to identify the degree of malnutrition and to plan and implement timely and appropriate nutritional care towards improving clinical outcomes and quality of life in this patient population.

No significant relationship exists between the authors and the companies/organizations whose products or services may be referenced in this article.

References


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