

AN OVERVIEW OF MEDICAL NUTRITIONAL THERAPY FOR UPPER GASTROINTESTINAL TRACT DISORDERS

ÜST GASTROİNTESTİNAL SİSTEM BOZUKLUKLARINDA TIBBİ BESLENME TEDAVİSİNE GENEL BİR BAKIŞ

Corresponding Author

Gamze Akbulut

Gazi University, Faculty of Health Sciences,
Department of Nutrition and Dietetics, Beşevler,
Ankara, Turkey.

E-mail: gakbulut@gazi.edu.tr

ABSTRACT

Digestive disorders persist to be among the most common problems in health care. The consumption of high cholesterol and dietary fat intake, highly spicy foods, alcohol, nicotine, caffeine provoke gastric acid secretions. The consumption of vegetable and fruit and dietary fibre intakes are known to protect the gastrointestinal tract against various diseases. Gastroesophageal reflux disease, hiatal hernia, gastritis, peptic ulcers and dumping syndrome are some of the gastrointestinal system disorders. Dietary therapy for hiatal hernia is aimed at decreasing symptoms in patients who have reflux or esophagitis. Dyspepsia (indigestion) is a general term that is frequently used to describe common symptoms of upper gastrointestinal tract. The most common cause of gastritis and peptic ulcers is helicobacter pylori infection. It is responsible for chronic inflammation of the gastric mucosa, for gastric and duodenal ulcers, and for some forms of atrophic gastritis and gastric cancer. Dumping syndrome usually occurs as a result of a loss of normal regulation of gastric emptying and systemic responses to a meal. Progress in the medical management of gastrointestinal disorders has mostly eliminated the need for this strict level of medical nutrition therapy. Today, nutritional therapy for patients with upper gastrointestinal system disorders is more specific for a patient, and far more effective than in the past.

Key Words: Gastroesophageal reflux disease; hiatal hernia; gastritis; peptic ulcers; dumping syndrome; medical nutritional therapy.

ÖZET

Sindirim bozuklukları, sağlık alanında en sık görülen sorunlar arasında olmaya devam etmektedir. Diyetle yüksek kolesterol ve yağ alımı, çok baharatlı yiyecekler, alkol, nikotin ve kafein tüketimi mide asit salgılarını uyarıcı etki

göstermektedir. Sebze ve meyve tüketimi ve diyet posası alımının, gastrointestinal sistemin çeşitli hastalıklarına karşı koruduğu bilinmektedir. Gastroözofageal reflü hastalığı, hiatal herni, gastrit, peptik ülser ve dumping sendromu, sindirim sisteminin bazı bozukluklarıdır. Hiatal herninin diyet tedavisinde, reflü veya özofajit görülen hastalarda semptomların azaltılması hedeflenmektedir. Dispepsi (hazımsızlık), sıklıkla üst gastrointestinal sistem semptomlarının tanımlanmasında kullanılan genel bir terimdir. Gastrit ve peptik ülserin en sık görülen nedeni, *helicobacter pylori* enfeksiyonudur. Mide ve onikiparmak bağırsağı ülserlerinde mide mukozasının kronik inflamasyonundan ve atrofik gastritin bazı türleri ile mide kanserinden sorumlu olduğu düşünülmektedir. Dumping Sendromu, genel olarak mide boşalmasının normal regülasyonu ve öğüne olan sistemik yanıtın bozulması sonucu olarak ortaya çıkmaktadır. Gastrointestinal bozuklukların tıbbi yönetimindeki ilerlemeler çoğunlukla katı düzeydeki tıbbi beslenme tedavisi gereksinimlerini ortadan kaldırmıştır. Günümüzde üst gastrointestinal sistem bozukluğu olan hastalarda beslenme tedavisinin bireye özgü ve geçmişe oranla çok daha etkili olduğu bilinmektedir.

Anahtar Kelimeler: *Gastroözofageal reflü hastalığı; hiatal herni; gastrit; peptik ülser; dumping sendromu; tıbbi beslenme tedavisi.*

INTRODUCTION

Digestive disorders persist to be among the most common problems in health care. Normal functioning of the gastrointestinal (GI) tract is essential to normal digestion, nutrient absorption, and egestion (excretion of undigested food as faeces) (1). In healthy humans, nutrients are absorbed from ingested foods by the GI tract through a series of mechanical, enzymatic, hormonal and neural mechanisms. Persons with a healthy, functioning GI tract who consume a well-balanced diet can maintain adequate

nutritional stores without supplements or alternative alimentation. Because normal digestion and absorption depend on fine integration of GI function and accessory organs plus the nervous, endocrine, and circulatory systems, many diseases and surgical procedures can cause malnutrition (2). Gastrointestinal pathology can impair nutritional status in a variety of ways, depending on the site, nature and extent of disease or injury. Conversely nutritional status and specific exposures to ingested substances can significantly affect the health of the gastrointestinal tract via both direct and systemic influences. GI diseases can often be prevented or managed, in whole or in part, by dietary means (1). High cholesterol/fat, highly spicy foods, alcohol, nicotine, caffeine, most of which provoke gastric acid secretions dyspepsia and heartburn, and vegetables and dietary fibre are known to protect the GI tract against various diseases. In this review, the roles of dietary hygiene implicating certain microorganisms associated with GI diseases like *Helicobacter Pylori* (*H. Pylori*) are also discussed.

1.0 Normal GI function

The GI tract starts at the mouth, ends at the anus, and includes the salivary glands, the liver, the pancreas, and the gallbladder. Digestion begins in the mouth, where the salivary glands secrete amylase, which initiates digestion of carbohydrates. Once food is chewed and moistened, the bolus is moved past the pharynx into the esophagus by a swallow. The food bolus is then propelled through the esophagus by peristalsis, which is regulated by cholinergic nerves. When the food reaches the end of the esophagus, the lower esophageal sphincter muscle relaxes and allows the food to pass into the stomach (1,2).

The stomach is an expandable reservoir. The empty stomach's capacity is about 50 mL, but it can normally accommodate 1.0 to 1.5 L after a meal. The stomach has three sections: fundus, body, and antrum.

The adult small intestine measures approximately 20 to 22 feet. The first and shortest portion, the duodenum, measures only 8 to 10 inches. Of the remaining small intestine, approximately 8 feet is jejunum and 12 feet is ileum. The epithelial surface area of the small intestine is approximately 300 m². Large mucosal folds, fingerlike projections throughout the mucosa (villi), and microscopic projections covering the villi (microvilli) impart to the small intestine its massive absorptive surface. The microvilli (brush border) produce intestinal enzymes that achieve final digestion before nutrients are absorbed (2,3).

A well articulated diet and proper dietary manipulations remain the cure for all diet induced GI disorders while avoidance of bad dietary habits that predispose to them must be encouraged to ensure proper and healthy GI tract (4).

2.0 Disorders of the esophagus

The entire esophagus functions as one tissue during swallowing. As a bolus of food is moved voluntarily from the mouth to the pharynx, the upper sphincter relaxes, the food moves into the esophagus, and peristaltic waves move the bolus down the esophagus; the lower esophageal sphincter (LES) relaxes to allow the food bolus to pass into the stomach (**Table 1**) (2).

GI condition	Common symptoms	Possible nutritional consequences
Esophagitis and esophageal reflux disease (GERD)	Reflux of gastric contents; Burning sensation in upper middle of chest after meals (heartburn); increased belching, and sometimes painful spasm	Possible discomfort during and after eating or change in eating habits, especially in evening; reduced intake
Esophageal stricture or tumor	Swallowing solid food causes discomfort; liquids are tolerated	Possible weight loss if intake is chronically inadequate
Hiatal hernia	Asymptomatic or prolonged heartburn after heavy meals; bending over, or reclining after a meal	Possible discomfort after eating, especially after large meals and with position changes; may worsen GERD symptoms
Cancer of oral cavity, esophagus	Asymptomatic or epigastric pain when eating (more likely with gastric tumor); difficulty chewing or swallowing; delayed gastric emptying	May lead to surgical procedures, radiation therapy, chemotherapy; difficulty chewing, or swallowing; change in food textures; may require enteral feeding; weight loss is common
Ingestion/dyspepsia/gastritis	GI discomfort after eating	Abdominal discomfort; altered diet; decreased overall intake possible; increased food intolerances
Duodenal ulcer	Pain 1-3 hr after a meal; pain relief after eating	Abdominal discomfort; altered diet; decreased overall intake possible; increased food intolerances
Gastric ulcer	Vague epigastric discomfort or pain when eating	Abdominal discomfort that may lead to lowered food intake and weight loss
Gastroenteropathy	Early satiety or symptoms of nausea, bloating, or diarrhea after eating (dumping syndrome)	Smaller, more frequent meals; decreased lactose tolerance; altered composition of foods; possible weight loss; malabsorption; and diarrhea

Table 1. Upper GI disorders and nutritional consequences

Disorders of the esophagus may be caused by derangement of the swallowing mechanism, obstruction, inflammation, or abnormal sphincter function. The difficulty in swallowing (dysphagia) is often the result of a neurologic problem.

2.1. Gastroesophageal reflux disease (GERD) and esophagitis

Gastroesophageal reflux disease (GERD) is a common condition, with multifactorial pathogenesis, affecting up to 40% of the population (5). The presence of eosinophils in esophageal mucosa associated with greater sensitization to foods and the response to a restriction diet in patients with positive test results suggest that refractory GERD can represent an initial stage of eosinophilic esophagitis (5,6).

The complications of GERD include ulcers, strictures, Barrett's esophagus and

carcinoma. Recent studies have emphasized the role of obesity and genetic factors as aggravating factors in the development of GERD complications. Barrett's esophagus is the most prevalent complication of GERD and seems to be associated with an increased mortality rate (7).

The second entity is nonerosive reflux disease (NERD) with minimal or no esophagitis. Patients with NERD do not develop local mucosa complications, like stricture or Barrett's esophagus, but their symptom severity can equal that of erosive esophagitis. Acid is involved in the symptoms of many but not all NERD patients. (6,8).

Heartburn and fluid regurgitation are the characteristic symptoms of GERD(9). Although GERD is common, its subtypes and variable manifestations and natural history demand thoughtful assessment and management. Shortlasting esophageal acid reflux, usually after meals and in the upright posture, is a physiologic (or normal) phenomenon due to transient relaxation of the lower esophageal sphincter (10).

The objectives of nutritional care are:

- a) prevent esophageal reflux,
- b) prevent pain and irritation of the inflamed esophageal mucosa,
- c) decrease the erosive capacity or acidity of gastric secretions (3,11).

The most effective way to manage reflux is to avoid eating several hours before retiring. Large, high-fat meals, lowers LES pressure, delay gastric emptying, and increase latent acid production, all of which increase the risk of reflux while the person is reclined. The avoidance of consumption of foods in the evening reduces the symptoms of the patients (**Table 2**) (11). The size and timing of meals also appear to be important. Lying down after consuming meals can increase the likelihood of reflux, especially if the meal is large and high in fat and protein.

Table 2. Nutritional care guidelines for patients with reflux and esophagitis.

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1. Avoid large, high-fat meals, especially 3 to 4 hr before retiring
 2. Avoid smoking
 3. Avoid chocolate, alcohol and caffeine containing beverages, such as coffee
 4. Avoid peppermint and spearmint oils
 5. Stay upright and avoid vigorous activity soon after eating
 6. Avoid tight fitting clothing, especially after a meal
 7. Avoid acidic and highly spiced foods when inflammation exists
 8. Keep healthy body weight
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For a person who has severe esophagitis, a low-fat liquid diet may be better tolerated initially. Food with an acid pH, such as citrus juice, tomatoes, and soft drinks, may cause pain when the esophagus is inflamed. In rare circumstances, harsh foods may cause perforation (e.g. chips, crisp crackers, and husks). The role of spices in the pathology of upper GI disorders is not clear, but the use of foods that are highly seasoned with chili powder and black pepper may cause discomfort when the esophagus is inflamed. Dietary fat, alcohol, and carminatives (peppermint and spearmint) lower LES pressure. Coffee and fermented alcoholic beverages (such as beer and wine) stimulate the secretion of gastric acid (12,13). El-Seraget al. (14) found that high dietary fat intake, particularly saturated fat, was associated with an increased risk of GORD symptoms and erosive oesophagitis. These associations are independent of energy intake and therefore do not reflect a mere increase in total dietary intake.

Obesity and GERD are clearly related, both from a prevalence and causality association. GERD symptoms increase in severity when people gain weight. Obese patients tend to have more severe erosive esophagitis, because it increases intragastric pressure. Obesity is a risk factor for the development of Barrett's esophagus and also adenocarcinoma of the esophagus. Patients get improvement

in GERD when they lose weight (4,13,15,16).

2.2. Hiatal hernia

A common contributor to gastroesophageal reflux and esophagitis is hiatal hernia. The esophagus passes through the diaphragm by way of the esophageal hiatus or ring. When the acid reflux occurs with a hiatal hernia, gastric contents may remain in the esophagus above the hiatus longer than if the canal were intact. Because increases in gastric pressure force acidic stomach contents up into the esophagus, persons with hiatal hernia may experience difficulty when lying down or bending over and may experience more epigastric discomfort after large, energy dense meals (3,17-20). A giant hiatal hernia is a hernia that includes at least 30% of the stomach in the chest, although a uniform definition does not exist; most commonly, a giant HH is a type III hernia with a sliding and paraesophageal component.(21).

Dietary therapy for hiatal hernia is aimed at decreasing symptoms in those who have reflux or esophagitis. The therapy is similar to that GERD and esophagitis; consumption of smaller, low-fat meals and the avoidance of foods that may increase gastric secretions or reduce LES pressure. Surgery is not always indicated for hiatal hernia; symptom control through medications and diet is generally the preferred treatment (3,22).

2.3. Oral cavity cancer and surgery

The patients diagnosed with cancer of the oral cavity, pharynx, or esophagus may initially manifest with existing nutritional problems and eating difficulties caused by the tumor mass, obstruction, oral infection and ulceration, or alcoholism. Nutritional deficits may be compounded by the treatment, which commonly involves surgical resection, regional irradiation, or chemotherapy. Chewing, swallowing, salivation, and taste acuity are often affected. Chemotherapy

can be expected to produce nausea, vomiting, and anorexia (23,24). There are inverse associations between fruit and vegetable consumption, beta-carotene, vitamin C and selected flavonoids and the risk for oral cancers, although it remains difficult to disentangle their potential effect from that of fruit and vegetables. Whole-grain cereals, but not refined grain ones, were also favorably related to the risk of oral and pharyngeal cancer (25,26).

If the patient with oral cancer is unable to eat for prolonged periods, nutritional support may be provided by tube-feeding if the remainder of the gastrointestinal tract is functional. Gastrostomy feedings can be used if long-term feeding by tube is necessary for total or supplemental support. If oral nutrition is possible after surgery, general dietary recommendations include liquid or soft-textured, moist foods for easy mastication and swallowing, and small, frequent meals of relatively high caloric density. Complex carbohydrates are preferred over simple sugars. Current evidence supports a diet high in fruits, vegetables and plant-based foods for prevention of oral cancer. Dietary supplements-including vitamins and minerals-have not been shown to be effective as substitutes for a diet high in fruits and vegetables (3,27).

3.0. Disorders of the stomach

Dyspepsia (indigestion) is a general term that is frequently used to describe common symptoms of upper GI comfort. Dysphagia may be relatively benign and have little consequence, or it may be an indicator or more serious problems. Symptoms of prolonged dysphagia may be related to underlying problems such as gastroesophageal reflux, gastritis, peptic ulcer disease, delayed gastric emptying, gall bladder disease, cancer, malnutrition, dehydration, aspiration pneumonia, and even death (28).

Dietary modification--altering the consistency of foods and liquids--is a

fundamental aspect of dysphagia management. The degree of dietary modification should be based on each patient's swallowing capacity and must be regularly evaluated and adjusted. Recommended methods of fluid and food modification are numerous and often vary from one care setting to another (**Table 3**) (29,30). The intake of excessive volumes of food or high intake of fat, sugar, caffeine, spices or alcohol are commonly implicated in dyspepsia. Rice- and chili-containing foods are common in Asia. Studies suggest that rice is completely absorbed in the small bowel, produces little intestinal gas and has a low allergenicity. Several clinical studies have demonstrated that rice-based meals are well tolerated and may improve gastrointestinal symptoms in functional gastrointestinal disorders (FGID). Chili is a spicy ingredient commonly used throughout Asia. The active component of chili is capsaicin. Capsaicin can mediate a painful, burning sensation in the human gut via the transient receptor potential vanilloid-1 (TRPV1). Although, acute chili ingestion can aggravate abdominal pain and burning symptoms in FGID, chronic ingestion of chili was found to improve functional dyspepsia and GERD symptoms in small randomized, controlled studies (31).

1. Educate and inform patients and caregivers about the importance of dietary modifications. Bear in mind that the attitudes of nurses and other caregivers about patients' diet can influence patients' consumption.

2. Become well-informed about modification practices at your facility.

3. Recognize that some consistencies are simply less safe than others. For example, thin fluids such as coffee or juice may be the most dangerous consistency for a patient with dysphagia. Similarly, some food textures, including those that are noncohesive or that easily separate (such as rice and chunky soup), as well as "sticky" foods (such as peanut butter or dry mashed potatoes), may be harmful.

4. Remember that not all thickening agents are the same. Ask the speech-language pathologist and the dietitian about the thickening products served to patients. Make sure that fluids are thickened appropriately and prepared in a manner consistent with product guidelines. Bear in mind that thicker is not necessarily better for patients with impaired swallowing.

5. Training is essential. It's been shown training in dysphagia management, including how liquids should be thickened, results in higher caloric intake by patients, greater acceptance of some foods, and fewer calls questioning the diet modifications is important.

6. Monitor a patient's status and advocate for systematic reevaluation. Maintain communication with other members of the dysphagia team to determine if, and when, additional assessment or modifications are indicated. The nursing staff can help to ensure that patients receive liquids and foods appropriate to their needs.

7. Be an active part of the dysphagia team. The ability to eat and drink greatly contributes to a patient's physical and emotional well-being.

Table 3. Caring for a patient with dysphagia.

Dietary management of uncomplicated dyspepsia is simple and probably has been passed on for generations: eat slowly, chew thoroughly, and do not drink or eat excessively.

3.1. Gastritis and peptic ulcer disease

Peptic ulcer should no longer be regarded as a single disease entity but as a group of heterogeneous conditions, as evident epidemiologically, genetically, clinically and pathophysiologically. In duodenal ulceration, "hyperacidity" must be the major culprit since specific therapeutic reduction of gastric acidity results in ulcer healing in about 70% of patients (32). Gastritis and peptic ulcers may result when infectious, chemical, or neural abnormalities disrupt mucosal integrity. The most common cause of gastritis and peptic ulcers is *H.pylori* infection. It is responsible for chronic inflammation of the gastric mucosa, for gastric mucosa, for gastric and duodenal ulcers, and for some forms of atrophic gastritis and gastric cancer. Barrett's high-grade dysplasia and adenocarcinoma are significantly more prevalent in patients who are not infected with *H. pylori*. It appears to have a protective effect against the development of Barrett's adenocarcinoma. (33).

For several decades, dietary factors have gained and lost favor as a significant component in the cause and treatment of dyspepsia, gastritis and peptic ulcer disease. Since the identification of *H. Pylori* as the major contributor to these disorders, the role diet and nutritional status has decreased. Protein rich foods temporarily buffer gastric secretions, but they also stimulate secretion of gastrin and pepsin. Milk or cream, which in the early days of peptic ulcer management (named sippy diet) was considered important in "coating" the stomach, is no longer considered medicinal. The sippy diet is a bland diet for the treatment of peptic ulcer consisting mainly of measured

amounts of milk and cream, farina, and egg taken at regular hourly intervals for a specified period of time. The milk and cream were thought to be efficient at treating the ulcers because of their basic (non-acidic) pH levels. One of the main dangers of the sippy diet was that it did not allow the individual to receive a wide enough variety of nutrients. Because the diet did not allow for things like acidic citrus fruits that contain antioxidants and vitamins, the individual was put at risk for malnutrition and many various conditions caused by the lack of vitamins and minerals found in acidic foods (34). In America, the incidence of myocardial infarcts was more than twice as high in the ulcer patients treated with sippy diet (35).

In persons with atrophic gastritis, vitamin B₁₂ status should be evaluated because a lack of intrinsic factor and acid results in malabsorption of this vitamin (36). Consumption of large amounts of alcohol may cause at least superficial mucosal damage and may worsen existing disease or interfere with treatment of the peptic ulcer. Modest consumption of alcohol does not appear to be pathogenic for peptic ulcer unless coexisting risk factors are also present. On the other hand, alcoholic beverages such as beer and wine are well known to potently stimulate gastric acid secretion, most probably through an increase in circulating gastrin level. Wine was found to stimulate gastric acid secretion in gastric glands via two pathways, by an ethanol-induced increase in the concentration of intracellular calcium in parietal cells, and by histamine release potentially induced by constituents present in wine. (37). In contrast to pure ethanol, the effect of alcoholic beverages on the exocrine pancreas is greatly unknown. Besides ethanol, alcoholic beverages contain numerous nonalcoholic constituents which might have pathophysiological effects on the pancreas. (38). Both coffee and caffeine stimulate acid secretion and may also decrease LES pressure. In addition, many patients experience dyspepsia after

coffee ingestion. Therefore, coffee is often prohibited by physicians in patients with peptic diseases. However, the association between peptic disease and symptoms remains unclear. (39). When very large doses of certain spices are taken orally or placed intragastrically without other foods, they increase acid secretion and cause small, transient superficial erosions, inflammation of the mucosal lining, and altered GI permeability or motility (40). Diets high in polyunsaturated fatty acids may protect against duodenal ulcer, possibly through inhibiting the growth of *H. Pylori*. Because prostaglandins from omega-3 and omega-6 fatty acids are involved in inflammatory, immune, and cytoprotective physiology of the GI mucosa, they have been considered for use in management of *H. Pylori* infection and peptic damage (41).

From a practical perspective, persons being treated for gastritis and peptic ulcer disease may be advised to avoid the excessive use of specific spices, alcohol and coffee (both caffeinated and decaffeinated); to consume a good quality diet; and to use supplements to make up for dietary inadequacies as needed. Meal frequency is a controversial issue in the management of peptic ulcer disease. Frequent, small meals may increase comfort, decrease the chance for acid reflux, and stimulate gastric blood flow. Especially before retiring, consuming large size meals reduce latent increases in acid secretion. The majority of procedures for surgical management of peptic disease impairs the ability of the stomach to receive and to store food. The intake of high protein-energy content diets can improve some nutritional deficits expressed by loss of body weight and anemia (42).

In the case of stress ulcers, continuous enteral feeding and early postoperative nutrition may help maintain the mucosal barrier and GI circulation, thus reducing the risk of stress ulceration (43,44). Although nutrition unquestionably plays a role in the treatment of pressure ulcers,

very little research has been done on the supplementation of specific nutrients to prevent pressure ulcers. Theilla et al. (45) found a reduction in the development of pressure ulcers in mechanically ventilated patients with acute lung injury who were fed an enteral formula enriched with eicosapentaenoic acid, γ -linolenic acid, and vitamins A, C, and E, compared with controls fed a formula with similar macronutrient content.

3.2. Carcinoma of the stomach

Malignant neoplasms of the stomach can lead to malnutrition as a result of excessive blood and protein losses or more commonly, because of the obstruction and mechanical interference with food intake. Most cancers of the stomach are treated by surgical resection; thus the nutritional considerations are similar to those pertinent to partial or total gastrectomy. Apart of the case of *H. Pylori* positive patients, in whose long term acid suppression lead to the development of corpus predominant atrophic gastritis, precursor of cancer; the other assumed adverse events, have never been demonstrated in prospective studies. (3, 46-48).

Factors that appear to increase the risk of carcinoma of the stomach include chronic infection with *H. pylori*, smoking, heavy alcohol consumption, obesity and consumption of a diet low in fibrous foods, highly salted foods (49-51). Hu et al. (52) found in their study when compared with never adding salt at the table, always or often adding salt at the table was associated with an increased risk of stomach, lung, testicular and bladder cancer. Processed meat was significantly related to the risk of the stomach, colon, rectum, pancreas, lung, prostate, testis, kidney and bladder cancer and leukaemia; the odds ratios for the highest quartile ranged from 1.3 to 1.7.

3.3. Dumping Syndrome

The dumping syndrome is a complex physiologic response to the presence of larger-than-normal amounts of food and liquid in the proximal small intestine. Dumping syndrome usually occurs as a result of a loss of normal regulation of gastric emptying and systemic responses to a meal. Approximately 25%–50% of patients after gastric surgery develop some manifestations of dumping syndrome, with clinically significant symptoms observed in 5%–10% of them. (53). After surgical procedures in which portions of the stomach remain, the size of the remaining stomach can increase somewhat over a period of several months. Early dumping symptoms comprise both gastrointestinal and vasomotor symptoms. Late dumping symptoms are the result of reactive hypoglycemia. The first step in treating dumping syndrome is the introduction of dietary measures. Acarbose can be added to these measures for patients with hypoglycemia, whereas several studies advocate guar gum or pectin to slow gastric emptying. Somatostatin analogs are the most effective medical therapy for dumping syndrome, and a slow-release preparation is the treatment of choice. In patients with treatment-refractory dumping syndrome, surgical reintervention or continuous enteral feeding can be considered, but the outcomes of such approaches are variable (54).

Anatomical change in the anatomy of the GI after bariatric surgery leads to modification of dietary patterns that have to be adapted to new physiological conditions, either related with the volume of intakes or the characteristics of the macro- and micronutrients to be administered. Restrictive diet after bariatric surgery (basically gastric bypass and restrictive procedures) is done at several steps. The first phase after surgery consists in the administration of clear liquids for 2-3 days, followed by

completely low-fat and high-protein content (> 50-60 g/day) liquid diet for 2-4 weeks, normally by means of formula-diets. Soft or grinded diet including very soft protein-rich foods, such as egg, low-calories cheese, and lean meats such as chicken, cow, pork, or fish (red meats are not so well tolerated) is recommended 2-4 weeks after hospital discharge. Normal diet may be started within 8 weeks from surgery or even later. It is important to incorporate hyperproteic foods with each meal, such egg whites, lean meats, cheese or milk. All these indications should be done under the supervision of an expert nutrition professional to always advise the patients and adapting the diet to some special situations (nausea/vomiting, constipation, diarrhea, dumping syndrome, dehydration, food intolerances, overfeeding, etc.). The most frequent vitamin and mineral deficiencies in the different types of surgeries are reviewed, with a special focus on iron, vitamin B₁₂, calcium, and vitamin D metabolism (55).

Because of the problems that accompany eating, patients with dumping syndrome frequently do not eat enough, have diarrhea from the increased intestinal activity, and become underweight and malnourished. The prime objective of nutritional care is to restore nutritional status and quality of life. Daily food intake should be divided into at least 6 meals. Proteins and fats are better tolerated than carbohydrates because they are hydrolyzed more slowly into osmotically active substances. Simple carbohydrates such as lactose, sucrose, and dextrose, are hydrolyzed rapidly, so quantities should be limited or avoided completely. Liquids enter the jejunum quickly, so patients may have problems tolerating liquids with meals. Patients who have several problems with dumping may have fare better if they limit the amount of liquids taken with meals or if they take liquids only between meals, without solid food. The use of fiber supplements can be beneficial in managing dumping syndrome because they reduce upper GI transit time

and decrease the rate of glucose absorption, thus decreasing the insulin response. Pectin, the dietary fiber contained in fruits and vegetables, or gums may be useful in treating dumping syndrome. Several cases of obstruction have been reported with the use of guar gum and other viscous substances when large amounts have been taken, especially without adequate water (Table 4) (3, 56-58).

Table 4. Nutritional care guidelines for Dumping Syndrome.

1. Small meals, spread throughout the day, are likely to result in improved net absorption and less dramatic fluid shifts.
2. High-protein, moderate-fat foods are recommended, with sufficient dietary energy for weight maintenance or gain as needed. Complex carbohydrates are included as tolerated.
3. Intake of fibrous foods slows upper GI transit and increases viscosity.
4. Lying down and avoiding activity an hour after eating may help slow gastric emptying.
5. Taking large amounts of fluids with meals is thought to hasten GI transit, but adequate amounts of liquid should be consumed throughout the day; small amounts at a time.
6. Intake of sweets and sugar should be avoided.
7. Lactose, especially in milk or ice cream, may be poorly tolerated because of rapid transit and so may need to be avoided. Cheeses and yoghurt are likely to be better tolerated.

CONCLUSION

Treatment for disorders of the upper GI tract has changed drastically in the last century. For many years, patients were given "sippy diets" with high amounts of milk and cream because it was thought this would coat the stomach lining and reduce pain. It was later discovered, however, that this diet was ineffective. Progress in the medical management of these disorders has mostly eliminated the need for this strict level of medical nutrition therapy. Today, nutritional care for patients with upper GI disorders is more specific, and far more effective than in the past. Nutrition professionals should conduct a comprehensive assessment that includes review of nutrition intake and weight history, biochemical data, and conditions or symptoms that may affect the intake, absorption, or excretion of nutrients. Dietary modification of GI

disorders is most effective when implemented by a team, including a physician, dietitian, speech-language pathologist, nurse, and occupational therapist.

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