

GUIDELINE



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Nutritional Management in Gastroparesis – An Overview of Guideline Recommendation

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Abstract

Gastroparesis or slow emptying of the stomach is a debilitating disorder of G.I motility characterised by delayed gastric emptying of especially solid foods in the absence of mechanical obstruction. Gastroparesis (GP) or delayed gastric emptying (GE), is a debilitating disease process that affects an estimated 4% population and more common among diabetic population with evidence of about 30 -40%. Though this condition is increasingly encountered in clinical practice, there is not much evidence-based guidelines pertaining to nutritional management, current dietary recommendations are based on clinical practice. The purpose of dietary management in GP is to reduce the symptoms, maintain nutritional status and to improve the quality of life. This article will give an overview on symptoms, diagnosis, nutritional assessment, and nutritional management in gastroparesis.

Keywords: Delayed gastric emptying; Nutrition; Gastroparesis; Diabetic gastroparesis

1 Introduction

Gastroparesis is a chronic disorder where the gastric emptying is delayed even in the absence of any mechanical obstruction or structural abnormality. It can affect the people of all ages, but it is more evident in adults and women.⁽¹⁾ The common symptoms of gastroparesis include nausea, feeling of fullness after eating a small quantity of food, abdominal pain, vomiting of undigested food particle even after several hours of ingestion, gastroesophageal reflux (GERD), bloating and loss of appetite.⁽²⁾ Severity of symptoms may vary from person to person, mild to

severe and week to week or even day to day.

The major causes include diabetes, post-surgical status where the vagus nerve injury is associated with surgical procedure like vagotomy and gastric resection and idiopathic. Cause remains idiopathic in nearly 50% of the cases. Diabetic gastroparesis account for about 30-40% of the patients. Some people may develop gastroparesis after a viral infection. In such cases the severity of symptom is less and may resolve spontaneously. In some case gastroparesis is associated with other neurologic disorders including Parkinson's disease,

paraneoplastic disorders, and scleroderma⁽³⁾. In post-surgical gastroparesis damage to vagus nerve cause defect in contractile function leading to delay in gastric emptying particularly solid foods. Use of opioids in pain management is associated with impaired gastric as well as pyloric function resulting in gastroparesis.

In ICU settings around 60% of the patient have gastrointestinal dysfunction. Gastroparesis in critically ill patients is a major risk factor for discontinuation of feeding. Delayed gastric emptying is associated aspiration, bacterial overgrowth and feeding intolerance and finally results in altered nutritional status⁽⁴⁾. Timely nutritional assessment and nutritional intervention are important factors in the management of gastroparesis. Although many factor contribute to delay gastric emptying, nutritional management in patients with gastroparesis remains challenging as there is not much evidence-based guidelines on nutritional management in gastroparesis and very few studies were conducted on these patients. Current recommendations are based on clinical experience and experts understanding towards the function of G.I tract. However, presents findings states that early nutritional support can reverse significant malnutrition⁽⁵⁾. Nutrition goals pertaining to treatment of gastroparesis include maintaining adequate nutrition in terms of calories, proteins, and essential vitamins and minerals and to stay hydrated in most of the cases nutritional status can be managed with dietary changes.

1.1 Objective

There are no evidence-based guidelines pertaining to the nutrition care process of the GP and the current dietary recommendations are based on expert opinions or observational studies. The main objective of this review is to provide a practical guideline for the nutritional management of gastroparesis based on the severity of malnutrition and kind of upper GI symptom, which is suitable in Indian scenario based on the recommendations and suggestions.

2 Methodology

Embase, Medline, PubMed and Cochrane databases were searched using keywords such as gastroparesis, delayed gastric emptying, diabetic gastroparesis, nutrition in gastroparesis etc. to identify the guideline to be followed in relation to symptoms, diagnosis, nutritional assessment, and medical and nutritional management of Gastroparesis. As of now the recommendations of practical guidelines are limited in literature, we are trying to make guidelines for the same.

2.1 Diagnosis of gastroparesis

Disorder of gastric motility include impaired accommodation, gastroparesis, functional dyspepsia, GERD and dumping syndrome. Diagnosis and screening of gastric and diges-

tive disorder is challenging as most symptoms that occur in patients with gastric motor disorders are non-specific, and they consist of poor appetite, postprandial fullness, and bloating, vomiting, epigastric pain, and early satiety⁽⁶⁾. Gastroparesis is diagnosed based on the presence of upper G.I symptoms related to delayed gastric emptying without any mechanical obstruction. To rule out the presence of mechanical obstruction, abdominal X-ray, computed tomography, and magnetic resonance imaging is used, an upper G.I endoscopy is performed to exclude any stricture, mass or ulcer⁽⁷⁾.

Once mechanical obstruction is excluded, other diagnostic option like gastric emptying scintigraphy, wireless motility capsule or stable isotope breath test is performed to demonstrate delayed gastric emptying. Gastric emptying scintigraphy (GES) is considered as the gold standard test for diagnosis of gastroparesis. In gastric emptying study, a small amount of radioactive isotope is mixed with ingested food and the rate at which the food is emptied from the stomach is measured. Retention of more than 10% of ingested food after 4hours shows gastroparesis⁽⁸⁾. Another method used to test gastric emptying is stable isotope breath test, where meal containing carbon-13 is used to show delayed emptying. Patient's exhaled air is measured for isotope at regular interval to demonstrate the rate of gastric emptying. This test can be performed at the bedside, even in ICU setting. In wireless motility capsule test, delayed gastric emptying is diagnosed by the time taken by the capsule to enter duodenum. If it takes more than 5 hours for the capsule to pass through duodenum, then gastroparesis is confirmed⁽⁹⁾.

2.2 Complications of gastroparesis

Malnutrition – clinical symptoms related to gastroparesis such as vomiting, and loss of appetite can lead to intake of calorie deficient diet. Due to loss of appetite, food intake is reduced, and vomiting may reduce the absorption of nutrients. Patient with gastroparesis at high risk of micronutrient deficiencies due poor intake and malabsorption⁽¹⁰⁾.

The major life-threatening complication of gastroparesis is dehydration due to frequent vomiting.

Small bowel bacterial overgrowth (SBBO) – Fermentation of food material results when food stays for long period in the stomach leading to bacterial overgrowth in small bowel. Under normal condition peristalsis and normal acid production in the stomach prevents the bacterial growth in small intestine⁽¹¹⁾. During impaired gastric motility, colonization of bacteria occurs in the small bowel which results in mucosal inflammation and impaired nutrient absorption. SBBO is associated with symptoms like bloating, abdominal distention, nausea, vomiting, diarrhea, weight loss and result in overall decline in nutritional status⁽¹²⁾.

Bezoar formation- patient with gastric dysmotility are at risk of developing bezoar. Bezoars are solid mass formed

by the accumulation of indigestible food materials which may eventually lead to mechanical obstruction⁽¹³⁾. Bezoar formation is associated with loss of appetite, nausea, vomiting, weight loss and early satiety. Phytobezoars are formed of nondigestible fibers especially cellulose, hemicellulose, lignin etc. High fiber foods should be avoided to prevent bezoar formation⁽¹⁴⁾.

Poor glycemic control – the vagus nerve gets damaged after years of poor blood glucose control which results in diabetic gastroparesis and in turn gastroparesis can lead to erratic changes in blood sugar levels due frequent changes in the rate and amount of food passing into the small bowel making diabetic worse⁽¹⁵⁾.

2.3 Management of gastroparesis

The management of gastroparesis should include a holistic approach which would target on different aspects of the disease condition. Even though the front-line therapy for gastroparesis is prokinetic agents and antiemetics, the treatment plan should include assessment of nutritional status, measures to correct fluid, electrolyte and nutritional deficiencies, measures to reduce the symptoms, treat the underlying causes like diabetes to prevent further progression of the disease⁽¹⁶⁾. Although prokinetic agents and antiemetics play a major role in the management of gastroparesis, the main purpose of this article is to provide an insight into the nutritional aspect to be taken into consideration during the treatment and restore the nutritional status of the patients along with managing the symptoms.

2.4 Nutritional assessment

Patients with gastroparesis are at high risk of developing nutritional abnormalities, as such it is essential to screen and diagnose malnutrition. Nutritional screening and evaluation in patients with gastroparesis help to differentiate nourished patients who can pursue further gastrointestinal evaluation and/or prokinetic trials, from a malnourished patient who requires immediate nutritional support⁽¹⁷⁾.

2.5 Anthropometry

Height, weight, and BMI can be used to assess the overall nutritional status in the patient with gastroparesis. Unintentional weight loss over a period is an important indicator of severe malnutrition. Unintentional weight loss of 5% in one month or 10% of usual body weight in six month indicates malnutrition. BMI can be used as a tool to identify nutritional risk. A BMI below 20 is considered as nutritional risk and indicate a need for nutritional intervention⁽¹⁸⁾.

2.6 Laboratory assessment

Biochemical parameters are useful in identifying nutritional deficiencies particularly those resulting in anemia and metabolic bone disease, that require monitoring and supplementation. Glycemic control is critical in the management of gastroparesis. High blood sugar level may cause transient gastroparesis and the delay in gastric emptying will respond positively to normalization of blood sugar levels. Regular monitoring of glycemic control is essential in managing diabetic gastroparesis.

There is a greater prevalence of iron, vitamin D and vitamin B12 deficiencies in both diabetic and non-diabetic gastroparesis patients⁽¹⁹⁾. Therefore, initial assessment of patient with gastroparesis should include:

1. Serum glucose and glycosylated hemoglobin in case of diabetic gastroparesis: glycemic control plays a vital role in the management of gastroparesis. Hyperglycemia (>200mg%) can cause transient gastroparesis which responds immediately to normalization of serum glucose levels. Serum glucose must therefore be carefully evaluated at the initial assessment and monitored regularly⁽²⁰⁾.

2. Serum ferritin – serum ferritin level is an accurate indicator of iron store overtime. As serum ferritin is an acute phase reactant, it should be checked in the absence of infection, inflammation etc. Ferritin levels may low despite normal hematocrit, as the body utilizes iron stores while preserving hemoglobin and hematocrit⁽²¹⁾.

3. Serum vitamin B₁₂ – Around 30% of the patient with diabetic gastroparesis are found to have low levels of vitamin B₁₂. Reduced levels of intrinsic factor and gastric acid following gastrectomy impairs the cleavage of protein bound B₁₂ resulting in little or no intestinal absorption. Bacterial overgrowth and reduced intake of vitamin B₁₂ rich foods also lead to deficiency⁽²²⁾. Clinical features are non-specific and often absent in deficient patients. Initial assessment and regular monitoring of vitamin B₁₂ levels are therefore important.

25-OH vitamin D: A study conducted by Amjad W et al in 320 patients with gastroparesis, 49.7% of the patient were found to have vitamin D deficiency. Studies shows that patients with gastrectomy either sub-total or total are found to have accelerated bone loss, therefore prone to risk of osteoporosis. Low bone mineral density (BMD) has been found in 27%–44% of the patients with gastroparesis, many of whom had normal serum calcium and alkaline phosphatase levels. The aetiology of bone disease in this population may be due to decreased intake of calcium, vitamin D and lactose-containing foods coupled with altered absorption and metabolism. Hence evaluation of vitamin D level and bone mineral density will be helpful in these patients to identify and treat high risk patient in order to reduce the risk of incident fracture. Dual x-ray absorptiometry (DXA) will provide accurate data on BMD⁽²³⁾.

2.7 Diet history

Thorough diet history of the patient helps us to understand the nature of nutritional modification required by the individual patient, as some patients develop nausea while eating the usual, three large meals per day, may show reduction in symptoms with smaller, more frequent meals⁽²⁴⁾. Patients who have severe vomiting even after ingestion of water may require nutritional support to provide symptom relief and essential nutrients, fluids, and electrolytes.

Diet history should include changes in appetite, patient's typical daily dietary intake, severity of symptoms in association with food intake, food tolerance or allergies, medications known to cause delayed gastric emptying, if any, etc.

2.8 Nutritional management

Major factor affecting nutritional intake in patients with gastroparesis are nausea and vomiting. Antiemetics and prokinetics play a vital role in treatment of gastroparesis. Providing correct and regular dosage especially in liquid form will improve the efficacy of the drugs and help to control the symptoms⁽²⁵⁾. Treatment of nausea and vomiting will improve the oral intake.

Based on the recommendation made by ACG (American College of Gastroenterology) clinical guidelines, small particle, low fat diet is well tolerated, reduce symptoms, and enhance gastric emptying compared to three large meals^(24,26).

The diet history of the patient will help to decide on the factor which affects the dietary intake for a particular patient and accordingly dietary modification can be made.

The rate of gastric emptying depends on the volume and type of food. Greater the volume, slower the rate of emptying, hence smaller frequent meals may be well tolerated and help to achieve adequate calorie intake than three large meals per day. Compared to fats carbohydrates leave the stomach more quickly⁽²⁷⁾. Fats delay gastric emptying⁽²⁸⁾. Fat in liquid forms like milkshake, whole milk, nutritional supplements, meat broth, etc. are great source of energy so fat should not be completely avoided unless fat containing foods or liquids worsen the condition⁽¹²⁾.

Liquids leave the stomach by gravity whereas solids need antral contraction. Most of the patients with gastroparesis tolerate liquid than solids, even high caloric liquids will empty from the stomach. Pureed diet or liquid diet can be planned to meet the nutritional requirement⁽²⁹⁾.

Patients may report increased fullness and bloating with subsequent meals over the day. Because of worsening of symptoms during the end of the day patients may decrease their intake which can exacerbate malnutrition. Hence it is advised to take nutrient dense food in the first of the day and liquid calories towards the end of the day which may help in reducing the symptoms while providing sufficient

nutrients⁽³⁰⁾. Avoiding carbonated or fizzy drinks may help reduce symptoms of bloating.

Fibre is poorly digested and slow to empty from stomach. Undigestible fibre including pectin, cellulose, hemicellulose, lignin, and fruit tannins may increase risk of forming compact indigestible mass called bezoar. Presence of bezoars may further decrease the intake. High fibrous food for example whole grains, whole pulses, raw vegetables, celery, pumpkin, green peas, strawberry, citrus fruits, grapes, apple, coconut, dried fruits like dates, fig, prunes, and raisins can be avoided or restricted. Use of commercial high fibre formulas or bulk forming laxatives should be avoided.

Monitor and supplement iron, vitamin B12, vitamin D and calcium when needed. In case of severely malnourished patients' multivitamin and mineral supplement should be given for a month or more till the store is replenished. Liquid form of iron is well tolerated compared to tablets⁽⁴⁾.

2.9 Nutrition support

Poor oral intake and malabsorption are the major concern in the nutritional management of the gastroparesis. Adequate nutritional intake should be managed through oral dietary modification along with oral nutritional supplements if necessary. When oral intake is not adequate to meet the requirement and patient fails to gain weight or continues to lose weight, then enteral nutrition should be initiated⁽³¹⁾.

Enteral nutritional delivery below pylorus is well tolerated and seems to be more effective in providing sufficient nutrition and hydration as well as medication. In more severe cases where long term enteral nutrition support is needed, percutaneous endoscopic gastrostomy with jejunal extension is advised as it is found to be associated with lower symptoms than other enteral routes. Standard polymeric formulas are well tolerated and no need of any special formulas. Exclusive long term parenteral nutrition is considered in most advanced cases⁽³²⁾.

2.10 Gastroparesis in intensive care unit

Gastric dysmotility is a very common problem in critically ill patients and is associated with feeding intolerance, risk of aspiration pneumonia and progressive malnutrition. Feeding intolerance may be associated with the presence of symptoms such as increased abdominal circumference, bowel distension, vomiting or abdominal pain. According to the recommendation made by ESPEN and ASPEN on nutrition therapy in ICUs^(33,34).

1. Enteral nutrition is the preferred route of nutritional support, if enteral feeding intolerance continues even after optimal pharmacotherapy, the supply of nutrition below pylorus is recommended.
2. The measurement of gastric residual volume (GRV) is used to assess the gastric emptying in ICUs. The GRV

above 500ml within 6 hours of feeding are an indication to withhold the supply of feeding.

3 Conclusion

Gastroparesis is a debilitating disorder often affects the patient's quality of life and can result in frequent hospitalization indication long term medical care. Malnutrition is one major problem associated with gastroparesis. Identifying the patients who are at nutritional risk and providing appropriate nutritional support, maintaining glucose levels, and treating nutrient deficiencies is very crucial and challenging. Nutritional intervention can restore nutrition and hydration status and ultimately, improve quality of life. Current evidence on nutritional intervention for gastroparesis is very less and recommendation are based on personal understanding and clinical experience emphasizing on need for more research on this area.

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