

# Nutritional Management of Gastroparesis in People With Diabetes

Carol Rees Parrish, RD, MS, and Joyce Green Pastors, RD, MS, CDE

Gastroparesis, or slow emptying of the stomach, is a debilitating disease process that affects an estimated 4% of the population.<sup>1</sup> The most common etiologies preceding the development of gastroparesis symptoms are diabetes (50%), status post vagotomy or gastric resection, and a viral episode before symptom development. Before the diagnosis can be made, however, mechanical or structural disorders of the gastrointestinal tract must be ruled out.

Clinically, patients with gastroparesis are at risk for fluid, electrolyte, and nutrient deficits and, in patients with diabetes, erratic glycemic control. Treatment is targeted at correcting fluid, electrolyte, and nutritional deficiencies, reducing symptoms, and correcting the precipitating cause of gastroparesis, if possible. Although the mainstay of treatment for gastroparesis is anti-emetic and prokinetic therapy,<sup>1</sup> this article will focus on nutrition interventions.

## Nutrition Assessment

Stratifying the nutrition status of patients with gastroparesis into mild, moderate, or severe malnutrition is an important first step in the treatment of gastroparesis. This will help identify those who need aggressive nutritional support early on versus those who might benefit from some initial adjustments in oral food selections.

Unintentional weight loss over time is one of the first and most important parameters to assess regardless of the patient's overall appearance. A 5–10% unintentional loss of weight over a 3- to 6-month period signifies severe malnutrition.<sup>2</sup>

Most guidelines identify patients at nutritional risk if they:

- Are < 80% of ideal weight
- Have a BMI < 20 kg/m<sup>2</sup>
- Have lost 5 lb or 2.5% of baseline weight in 1 month
- Have lost 10 lb or 10% of usual body weight in 6 months

One often-overlooked population includes patients requiring hemodialysis. Given the percentage of hemodialysis patients who have a longstanding history of diabetes, gastroparesis can frequently be found if clinicians know what to look for.<sup>3,4</sup>

Because of the chronic fluid issues in hemodialysis patients, drastic weight changes may not be readily apparent early on, but may show up weeks later, when the target weight stabilizes below the patient's usual body weight. If a patient with diabetes has a declining target weight and complains of early satiety, especially in the morning after an overnight fast, gastroparesis should be suspected.

If unintentional weight loss has occurred in any patient with gastroparesis, it is important for the clinician and patient to set a goal weight. If the patient falls below the goal weight or fails to achieve an agreed-on weight, nutrition support should be seriously considered.

## Nutrition Factors That May Slow Gastric Emptying

Although there are many factors, including those discussed below, that theoretically can slow gastric emptying, there have been no controlled clinical trials in patients with gastroparesis to determine the success of any particular nutrition intervention.

**Volume.** Large meals not only slow gastric emptying, but also can decrease the lower esophageal sphincter pressure, which enhances reflux of gastric contents and adds insult to injury. Some suggestions for decreasing gastric reflux include:

- Eat smaller, more frequent meals.
- Avoid large, high-fat meals.
- Avoid late-evening snacks.
- Avoid CATS: caffeine, alcohol, tobacco, and stress.
- Avoid chewing gum, which increases air swallowing.
- Avoid foods that lower esophageal sphincter pressure: peppermint, chocolate, fat, and caffeine.
- Eat slower (30-minute meals).
- Avoid eating on the run.
- Do not lie down immediately after eating.
- Eat and drink all foods and beverages while sitting up.
- Sit up after meals for ~ 1 hour.
- Lose weight if you are overweight.
- Elevate the head of the bed 6–8 inches to prevent reflux when sleeping; put pillows between mattress and box springs.
- Avoid clothing that fits tightly around the abdomen.

**Fiber.** Because patients with gastroparesis are prone to bezoar formation (an indigestible concretion of foods) that decrease their ability to clear indigestible fiber from the stomach, low-fiber foods are recommended.<sup>5</sup> For patients who have difficulty with small bowel bacterial overgrowth, fiber-containing foods and even enteral formulas may aggravate symptoms because of fermentation in the upper gut, which causes gas, cramping, and bloat-

**Table 1. High-Fiber Foods/Medications Associated With Bezoar Formation**

High-Fiber Foods
<ul style="list-style-type: none"> <li>• Legumes/dried beans               <ul style="list-style-type: none"> <li>○ Refried beans, baked beans, black-eyed peas, lentils, black beans, pinto beans, northern beans, fava beans, navy beans, kidney beans, garbanzo beans, soy beans</li> </ul> </li> <li>• Bran/whole-grain cereals               <ul style="list-style-type: none"> <li>○ Bran cereals, Grape-Nuts, shredded wheat cereals, granolas</li> </ul> </li> <li>• Nuts and seeds               <ul style="list-style-type: none"> <li>○ Pumpkin seeds, soy nuts, chunky nut butters</li> </ul> </li> <li>• Fruits               <ul style="list-style-type: none"> <li>○ Dried fruits (apricots, dates, figs,* prunes, raisins), blackberries,* blueberries,* raspberries,* strawberries,* oranges, apples,* kiwi, coconuts,* persimmons*</li> </ul> </li> <li>• Vegetables               <ul style="list-style-type: none"> <li>○ Green peas, broccoli, brussels sprouts,* green beans,* corn,* potato skins,* tomato skins,* sauerkraut*</li> </ul> </li> </ul>
High-Fiber Medications/Bulking Agents
<ul style="list-style-type: none"> <li>• Acacia fiber</li> <li>• Benefiber</li> <li>• Citrucel</li> <li>• FiberChoice</li> <li>• Fibercon</li> <li>• Konsyl</li> <li>• Metamucil</li> <li>• Perdiem</li> </ul>

\*Foods known to cause bezoars.  
Reprinted with permission from Ref. 12.

ing.<sup>6</sup> Table 1 includes a list of high-fiber foods and medications/bulking agents that should be reevaluated for any patient with gastroparesis because of the risk of bezoar formation.

**Fat.** Fat is often restricted in patients with gastroparesis, yet there is no clinical evidence to support the necessity of this intervention. The real problem may be the solid food that accompanies the fat. Fat-containing liquids will empty by gravity over time. Because fat provides a significant source of calories, which patients often need, fat sources should be allowed if patients tolerate them. For patients with diabetes, alternatives to saturated and trans fat sources should be encouraged.

**Medications.** All medications should be reviewed to identify any

that might have a negative impact on gastric emptying.<sup>7</sup> In particular, bulk-forming agents used to treat constipation may not empty well from the stomach in patients with gastroparesis<sup>5</sup> (see Table 1). Narcotics delay gastric emptying and should be decreased or avoided altogether.

#### Oral Guidelines

**Smaller meals and liquids.** Because large meals empty slowly from the stomach in patients with gastroparesis, the first step is to start with smaller-volume meals. To meet nutrition requirements, more frequent meals and snacks will be necessary. Consumption of a greater percentage of calories in liquid form may help. On occasion, a trial of liquids as the sole source of calories may prove beneficial because liquid emptying is

almost always preserved until gastroparesis is far advanced.<sup>8-10</sup>

**Vitamins and minerals.** Any patient who has experienced a considerable, unintentional weight loss is at risk for total nutrient deficiency. To date, there have been no large, comparative studies evaluating vitamin and mineral status in patients with gastroparesis. Ferritin, 25-OH vitamin D, and B<sub>12</sub> levels are useful parameters to check as indicators of potential nutrient deficiencies in this patient population, especially if there is a history of subtotal gastrectomy. If these levels indicate deficiency, chewable or liquid supplements may be better tolerated than supplements in tablet form.

#### Guidelines for Enteral Nutrition

For patients who fail to stabilize their weight loss or those who cannot gain weight with oral feedings, enteral nutrition support may be indicated. Enteral nutrition not only allows patients to be consistently hydrated and nourished, but also provides ready access for reliable medication delivery. Parenteral nutrition should be reserved only for those who have a dysmotility that extends throughout much of the small bowel and colon or those who fail enteral therapy. This is because parenteral nutrition is associated with more infectious complications (especially in patients with diabetes) and is significantly more expensive. The criteria listed in Table 2 can help identify patients who are candidates for enteral nutrition support. A more detailed review of all aspects of nutrition intervention in patients with gastroparesis is available elsewhere.<sup>7</sup>

#### Improving Glucose Control and Nutritional Adequacy

The following guidelines may be useful to assist patients in improving glucose control and nutritional adequacy:

- Eat smaller, more frequent meals that are as consistent as possible in carbohydrate content. Generally, a person needs ~ 14–16 choices of carbohydrate (15 g = 1 carbohydrate choice) or 210–240 g of carbohydrate per day. If six small meals were eaten through-

**Table 2. Criteria for Enteral Nutrition**

- Severe weight loss > 5–10% of usual body weight over 3–6 months
- Repeated hospitalizations for refractory gastroparesis requiring intravenous hydration and/or medication delivery
- Patient would benefit from gastric decompression
- Patient has maintained usual body weight but experiences significant clinical manifestations, such as diabetic ketoacidosis, cyclic nausea, and vomiting, and overall poor quality of life because of gastroparesis symptoms
- Inability to meet weight goals set by physician, dietitian, and patient

*Reprinted with permission from Ref. 12.*

out the day, each small meal should consist of approximately two to three carbohydrate choices (30–45 g). The 2006 American Diabetes Association nutrition recommendations do not suggest a specific amount for total carbohydrate.<sup>11</sup> They do, however, state that there is a strong relationship between the premeal insulin dose and the postmeal glucose response to the carbohydrate content of the meal. The total carbohydrate in the meal does not influence the glucose

response if the premeal insulin is adjusted for the carbohydrate content of the meal. For people receiving fixed doses of short- and intermediate-acting insulin, day-to-day consistency in the amount of carbohydrate is associated with a lower hemoglobin A<sub>1c</sub> level. Table 3 includes a semi-liquid sample meal plan and menu for three meals and snacks with the appropriate carbohydrate content.

- Solid foods may be better tolerated earlier in the day, with a

switch to liquid meals later in the day if the patient begins to feel full. Monitor blood glucose before the small meal or snack is eaten, and adjust the insulin dose according to the blood glucose level and the anticipated amount of carbohydrate to be eaten. Table 4 includes suggestions for how to increase liquid calories when that is the only type of oral nutrition tolerated.

- An insulin regimen including a basal dose of insulin (intermediate-acting NPH or long-acting glargine or detemir) at bedtime or in the evening and bolus or supplemental doses of insulin (short-acting regular or rapid-acting aspart, lispro, or glulisine) before meals or snacks would be the most ideal to promote optimal glucose control. Some patients may need to take bolus doses of insulin ~ 30 minutes after their meal, once they are sure the meal will stay down.

Information about comprehensive meal planning for patients with diabetes and gastroparesis can be found online at [www.uvadigestivehealth.org](http://www.uvadigestivehealth.org). Scroll down to “Nutrition Support Team Medicine” in the far left column, click on the pull-down menu, and find “Patient Educational Materials.” Scroll down to the heading for gastroparesis to find four different meals plans listed for patient use.

**Conclusion**

Treating patients with gastroparesis remains a very challenging task. Chronic nausea and vomiting not only can precipitate dehydration, electrolyte disturbances, hyperglycemia, malnutrition, and inadequate medication delivery, but also have a serious impact on overall quality of life. Identifying and stratifying patients into level of nutrition risk will help clinicians identify those who would benefit from early nutrition support to restore nutrition and hydration status and, ultimately, improve quality of life. Because the goal of glycemic control is still primary, adjustments in the amount and timing of insulin, increased monitoring of food intake and/or

**Table 3. Sample Semi-Liquid Meal Pattern**

**BREAKFAST (three carbohydrate choices)**

- Citrus juice (1/2 cup: 15 g carbohydrate)
- Thinned cooked cereal (1/2 cup cooked cereal: 15 g carbohydrate)
- Milk (1 cup: 15 g carbohydrate)
- Coffee or tea (unsweetened: 0 g carbohydrate)

**MID-MORNING SNACK (two carbohydrate choices)**

- Liquid supplement or milkshake (10 oz milkshake: 30 g carbohydrate)

**LUNCH AND DINNER (three carbohydrate choices)**

- Thinned soup (1 cup chicken broth: 1 g carbohydrate)
- Thinned or puréed meat or substitute
- Thinned potato or substitute (3 oz potato: 15 g carbohydrate)
- Thinned or puréed vegetable
- Thinned dessert or puréed fruit (1/2 cup fruit: 15 g carbohydrate)
- Milk (1 cup: 15 g carbohydrate)
- Coffee or tea (unsweetened: 0 g carbohydrate)

**MID-AFTERNOON SNACK (two carbohydrate choices)**

- Liquid supplement or milkshake (10 oz milkshake: 30 g carbohydrate)

**BEDTIME SNACK (two carbohydrate choices)**

- Liquid supplement or milkshake (10 oz milkshake: 30 g carbohydrate)

*Reprinted with permission from Ref. 12.*

Table 4. Suggestions for Increasing Liquid Calories

- Fortified milk can be substituted to increase protein, if needed. (To make fortified milk, pour 1 quart of whole milk into a deep bowl. Add 1 cup of nonfat instant dry milk. Beat slowly with a beater until dry milk is dissolved. Refrigerate and serve cold.)
- Soy or rice milks can be substituted for milk in any recipe.
- Flavor extracts, such as vanilla, almond, or coffee, can be added to enhance flavor.
- Other flavorings, such as dry gelatin or pudding mixes or syrups, can be added for additional flavor or extra calories.
- Ice/ice chips can always be blended in if desired.
- Frozen yogurts, ice creams, sorbets, sherbets, and frozen soy and rice products can be substituted in any recipe.
- For extra flavor, texture, and calories, add a frozen banana. (When bananas are ripe, peel, cut in half, and place in a covered container or plastic freezer bag. Freeze overnight).

Reprinted with permission from Ref. 12.

food manipulations, and increased monitoring of blood glucose level need to be considered.

## References

<sup>1</sup>Abell TL, Bernstein RK, Cutts T, Farrugia G, Forster J, Hasler WL, McCallum RW, Olden KW, Parkman HP, Parrish CR, Pasricha PJ, Prather CM, Soffer EE, Twillman R, Vinik AI: Treatment of gastroparesis: a multidisciplinary clinical review. *Neurogastroenterol Motil* 18:263–283, 2006

<sup>2</sup>Russell MK, Mueller C: Nutrition screening and assessment. In *The A.S.P.E.N. Nutrition Support Core Curriculum: A Case-Based Approach: The Adult Patient*. Gottschlich MM, Ed. Silver Spring, Md., American Society for Parenteral and Enteral Nutrition, 2007, p. 163–186

<sup>3</sup>Ross EA, Koo LC: Improved nutrition after the detection and treatment of occult gastroparesis in nondiabetic dialysis patients. *Am J Kidney Dis* 31:62–66, 1998

<sup>4</sup>De Schoenmakere G, Vanholder R, Rottey S, Duym P, Lameire N: Relationship between gastric emptying and clinical and biochemical factors in chronic haemodialysis patients. *Nephrol Dial Transplant* 16:1850–1855, 2001

<sup>5</sup>Sanders MK: Bezoars: from mystical charms to medical and nutritional management [article online]. *Pract Gastroenterol* Vol. 24, 2004. Available online at: <http://www.healthsystem.virginia.edu/internet/digestive-health/nutrition/resources.cfm>. Accessed 5 September 2007

<sup>6</sup>Zaidel O, Lin HC: Uninvited guests: the impact of small intestinal bacterial overgrowth on nutritional status [article online]. *Pract Gastroenterol* Vol. 27, 2003. Available online

at: <http://www.healthsystem.virginia.edu/internet/digestive-health/nutrition/resources.cfm>. Accessed 5 September 2007

<sup>7</sup>Parrish CR, Yoshida CM: Nutrition intervention for the patient with gastroparesis: an update [article online]. *Pract Gastroenterol* Vol. 29, 2005. Available online at: <http://www.healthsystem.virginia.edu/internet/digestive-health/nutrition/resources.cfm>. Accessed 5 September 2007

<sup>8</sup>Corinaldesi R, Stanghellini V, Paparo GF, Paternicò A, Giulia Rusticali A, Barbara L: Gastric acid secretion and gastric emptying of liquids in 99 male duodenal ulcer patients. *Dig Dis Sci* 34:251–256, 1989

<sup>9</sup>Couturier O, Bodet-Milin C, Querellou S, Carlier T, Turzo A, Bizais Y: Gastric scintigraphy with a liquid-solid radio-labelled meal: performances of solid and liquid parameters. *Nucl Med Commun* 25:1143–1150, 2004

<sup>10</sup>Maurer AH, Parkman HP: Update on gastrointestinal scintigraphy. *Semin Nucl Med* 36:110–118, 2006

<sup>11</sup>American Diabetes Association: Nutrition recommendations and interventions for diabetes—2006 [Position Statement]. *Diabetes Care* 29:2140–2157, 2006

<sup>12</sup>Parrish CR, Krenitsky J, McCray SF: University of Virginia Health System nutrition support syllabus [article online]. Available online at: <http://www.healthsystem.virginia.edu/internet/dietitian/dh/traineeship.cfm>. Accessed 5 September 2007

*Carol Rees Parrish, RD, MS, is a nutrition support specialist at the University of Virginia Health System Digestive Health Center of Excellence, and Joyce Green Pastors, RD, MS, CDE, is an assistant professor of education in internal medicine at the University of Virginia Health System Division of Endocrinology and Metabolism in Charlottesville.*