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Gastroparesis (Delayed Gastric Emptying)

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Gastroparesis is a condition where symptoms occur and the stomach cannot empty properly. No obstruction or blockage is evident. Estimates vary of the number of people with gastroparesis, but there are probably around 100,000 adult patients in the U.S. who suffer from it. However, the incidence and severity appears to be rising. Hospitalizations and emergency room visits are increasing at an alarming rate.

Gastroparesis is a poorly understood condition. More physician awareness is needed about recognizing gastroparesis. Patients may be frustrated by delayed diagnosis and treatment. Managing the condition can be challenging to patients, family members, and health care providers.

This publication addresses frequently asked questions and provides an overview intended to help patients and family members understand gastroparesis; what it is, and how it is treated and managed.

WHAT IS GASTROPARESIS?

Gastroparesis is also called delayed gastric emptying. The term "gastric" refers to the stomach. Normally, the stomach empties its contents in a controlled manner into the small intestines. In gastroparesis, the muscle contractions (motility) that move food along the digestive tract do not work properly and the stomach empties too slowly.

Gastroparesis is characterized by the presence of certain long-term symptoms together with delayed stomach emptying in the absence of any observable obstruction or blockage. The delayed stomach emptying is confirmed by a test.

WHAT ARE THE SIGNS AND SYMPTOMS?

The symptoms of gastroparesis may often differ among persons with the condition. Symptoms usually occur during and after eating a meal.

Symptoms that are characteristic of gastroparesis include:

- Nausea and/or vomiting
- Retching (dry heaves)
- Stomach fullness after a normal sized meal
- Early fullness (satiety) – the inability to finish a meal

Bloating, as well as stomach discomfort or pain, is also noted by some persons with gastroparesis, particularly as symptoms become more severe. Weight loss may occur due to decreased appetite. Heartburn may occur as a result of reflux due to delayed stomach emptying.

Symptoms of gastroparesis can impair quality of life and well-being. The severity of gastroparesis ranges from being uncomfortable to debilitating and in some cases life-threatening. Of note, the severity of symptoms in a person with gastroparesis does not necessarily tie together with the how quickly the stomach empties.

WHAT CAUSES GASTROPARESIS?

There are a number of things that may contribute to or cause gastroparesis. In the majority of people with gastroparesis, the cause is unknown and is termed "idiopathic." Some people with idiopathic gastroparesis report symptoms following a virus infection (post-infectious or post-viral gastroparesis).
Other possible causes include:

- Diabetes
- Surgeries
- Medications
- Other illnesses
- Cellular changes

Gastroparesis may occur as a complication of other conditions. Long-standing diabetes is the most common *known* cause of

gastroparesis, although only a small percentage of people with diabetes develop gastroparesis. The cause of symptoms is probably due to damage to nerves that supply the stomach.

Gastroparesis can also result as a complication from some surgical procedures. Most often these include nerve damage following esophageal or upper abdominal surgeries.

Less frequently, gastroparesis is seen to occur after the use of certain medications. Some medications can impair motility. Examples include narcotic pain relievers, anticholinergic/antispasmodic agents, calcium channel blockers, some antidepressants, and some medications for diabetes.

> The vagus nerve transmits impulses to the stomach and intestines. Injury to the vagus nerve can impair gastric emptying.

Sometimes gastroparesis is seen in association with other illnesses. Systemic illnesses, neurologic diseases, or connective disorders, such as multiple sclerosis, Parkinson's disease, cerebral palsy, systemic lupus, and scleroderma are associated with gastroparesis. The cause and effect is unclear.

Much remains to be learned about what causes gastroparesis. In both idiopathic and diabetic gastroparesis a great deal of interest is being paid to changes in the cells which help control muscular contractions (motility) in the stomach. These are known as the interstitial cells of Cajal (ICCs). These cells probably represent the essential pacemakers of the entire gastrointestinal (GI) tract. In addition to ICCs, scientists are looking at changes in the structure and the number of nerve cells and immune cells as possible contributors to the disease process in gastroparesis.

HOW IS GASTROPARESIS DIAGNOSED?

The symptoms of gastroparesis are similar to those that occur in a number of other illnesses. When symptoms persist over time or keep coming back, it's time to see a doctor to diagnose the problem. An accurate diagnosis is the starting point for effective treatment.

Diagnosis of gastroparesis begins with a doctor asking about symptoms and past medical and health experiences (history), and then performing a physical exam. Any medications that are being taken need to be disclosed.

Tests will likely be performed as part of the examination. These help to identify or rule out other conditions that might be causing symptoms. Tests also check for anything that may be blocking or obstructing stomach emptying. Examples of these tests include:

- a blood test,
- an upper endoscopy, which uses a flexible scope to look into the stomach,
- an upper GI series that looks at the stomach on an x-ray, or
- an ultrasound, which uses sound waves that create images to look for disease in the pancreas or gallbladder that may be causing symptoms.

If – after review of the symptoms, history, and examination – the doctor suspects gastroparesis, a test to measure how fast the stomach empties is *required to confirm* the diagnosis.

Stomach Emptying Tests

The diagnostic test of choice for gastroparesis is a gastric emptying study (scintigraphy). The test is done in a hospital or specialty center. It involves eating a bland meal of solid food that contains a small amount of radiolabled material. The abdomen is scanned over the next few hours to see how quickly the meal passes out of the stomach. A radiologist will interpret the study at periodic intervals after the meal. A diagnosis of gastroparesis is confirmed when 10% or more of the meal is still in the stomach after 4 hours.

Other methods for measuring gastric emptying include a wireless motility capsule and a breath test.

The ingestible wireless motility capsule (SmartPill) is swallowed and transmits data to a small receiver that the patient carries. The data collected is interpreted by a radiologist. While taking the test people can go about their daily routine. After a day or two, the disposable capsule is excreted naturally from the body.

The breath test involves eating a meal that contains a non-radiolabled component that can be tracked and measured in the breath over a period of hours. The results can then be calculated to determine how quickly the stomach empties.

HOW IS GASTROPARESIS TREATED?

The treatment for gastroparesis in an individual depends on the severity of symptoms. Treatments are aimed at managing symptoms over a long-term. Treatment approaches may involve one or a combination of:

- dietary and lifestyle measures,
- medications, and/or
- procedures that may include surgery.

Some people with gastroparesis have mild symptoms that come and go, which can be managed with dietary and lifestyle measures. Others have moderate to more severe symptoms that additionally may be treated with medications to stimulate motility and/or reduce nausea and vomiting. Some people have severe symptoms that are difficult to treat or do not respond to initial treatment approaches. They may require additional procedures to maintain nutrition and/or reduce symptoms.

Goals of Treatment

The goals of treatment are to manage and reduce symptoms, maintain quality of daily living, and minimize related problems such as:

- Severe dehydration due to persistent vomiting
- Bezoars (solid collections of food, fiber, or other material), which can cause nausea, vomiting, obstruction, or interfere with absorption of some medications in pill form
- Difficulty managing blood glucose levels in people with diabetes
- Malnutrition due to poor absorption of nutrients or a low calorie intake

Dietary and Lifestyle Measures

Scientific research is needed to help understand what diet will work best for each person with gastroparesis. Currently, dietary advice is based on observations of what foods normally tend to promote or delay gastric emptying.

A registered dietician (RD) or nutrition support specialist (nurse or doctor) can help design a dietary plan to meet individual needs. The dietician will work with the patient to find the balance of solid, semi-solid, and liquids that works best for the individual.

Attention should be paid to ensure that proper nutritional requirements are met. Nutrients are the substances in foods needed to maintain health. They include proteins, carbohydrates, fats, vitamins, minerals, and water. The goal in treating gastroparesis is to adjust the balance of nutrients, *not* eliminate any nutrients.

In persons with diabetes, blood glucose levels will need to be controlled as well as possible. Blood glucose levels go up after stomach contents empty into the small intestine, and this is irregular in gastroparesis.

Most people with gastroparesis do well with frequent, small meals that are low in fat and fiber. Fat, fiber, and large meals can delay stomach emptying. Eating 4–6 small meals daily will help to maintain proper nutrition.

In general, eggs, peanut butter, and lean meats can provide adequate protein. Foods that can be easily chewed should be selected, and food chewed well before swallowing. If necessary, solid foods can be liquefied in a blender by adding liquid such as juice or water. Cooked or juiced vegetables are usually well tolerated.

Foods to avoid include coarse fruits and vegetables, foods with seeds, nuts, and indigestible skins or husks. Carbonated beverages can worsen distension and bloating.

Additional support can be provided by adding nutritional supplements, such as caloric drinks, protein powders, or protein bars.

Avoid or reduce alcohol and smoking tobacco. They can slow gastric emptying.

Medications

Medications are used to try to help reduce symptoms of gastroparesis. The drug categories commonly used are prokinetic (promotility) agents and antiemetic agents.

There is a lack of evidence-based information about what drugs work best for patients with gastroparesis. Drugs are often prescribed off-label by doctors, based on their clinical experience and how the drugs treat similar symptoms in other conditions. Only one drug, metoclopramide, is approved by the U.S. Food and Drug Administration (FDA) for the treatment of gastroparesis.

> Off-label use is the permissible practice by doctors to prescribe medications for other than their FDA approved intended indications.

Prokinetic/Promotility Agents – Prokinetic, or promotility, agents directly help the stomach empty more quickly and may improve symptoms such as nausea, vomiting, and bloating.

Metoclopramide, a dopamine antagonist, has been available since 1983. It is the only FDA approved medication that improves stomach emptying. Multiple clinical trials show that it

improves symptoms in about 40% of patients. Intolerable side effects are common and 20–40% of patients cannot take this drug.

The most bothersome side effect, tardive dyskinesia, is a rare but serious movement disorder that is often irreversible. The risk of developing tardive dyskinesia increases with the duration of treatment and the total cumulative dose. Treatment with metoclopramide for longer than 12 weeks should be avoided in all but rare cases where therapeutic benefit is thought to outweigh the risk of developing tardive dyskinesia.

Domperidone, a peripheral dopamine antagonist, is a prokinetic agent that has never been approved by the FDA. It is similar in effectiveness to metoclopramide, but has fewer side effects. In the U.S. it can be obtained through a doctor under special arrangements, and is available in Canada, Mexico, New Zealand, Japan, and Europe. An intravenous form of domperidone was removed from the market in 1980 because of some unexpected serious heart problems (cardiac arrhythmias). An electrocardiogram (EKG), which tests electrical activity in the heart, should be done before starting this medication. Follow-up EKG is recommended in those who are taking the drug. Caution should be used in older patients or those with known cardiac disease.

Erythromycin is an antibiotic that is structurally similar to motilin, a hormone that speeds up stomach emptying. Motilin is decreased in people with diabetes. About 40% of people with diabetic gastroparesis will improve with short courses of erythromycin. However, effectiveness of erythromycin often decreases sharply after several weeks of taking the drug. Possible side effects of erythromycin include nausea, vomiting, and abdominal cramps.

Antiemetic Agents – Antiemetic agents are used to treat nausea and vomiting, which are disabling symptoms. These agents do not improve gastric emptying.

These drugs work on a range of receptors in nervous systems in the body. There are a number of these medications, which have been developed for other conditions. For gastroparesis, doctors will make recommendations based on clinical experiences and observations, and individual patient needs. Among these drugs are certain serotonin 5-HT3 receptor antagonists, antihistamines, phenothiazines, low-dose tricyclic antidepressants, and others. Many of these drugs come in multiple formulations so that they can be taken as an oral tablet, dissolvable tablet, liquid, or intravenously (IV) as required. Possible side effects for each of these drugs should be discussed by the doctor and patient.

Botulinum Toxin Injection

Botulinum toxin (Botox) is a nerve blocking agent. Some initial research studies in small numbers of patients showed modest improvement in gastroparesis symptoms and the rate of gastric emptying following the injections of Botox into the pylorus, the opening from the stomach into the small intestine. However, other more well-designed studies have shown no improvement in symptoms compared to placebo. It is *not* a generally recommended treatment for gastroparesis, based on randomized controlled trials.

Complementary and Alternative Medicine

Some complementary and alternative medicine (CAM) therapies have been tried to treat gastroparesis. Studies are needed to determine the usefulness of CAM therapies for gastroparesis.

Ginger is a traditional Chinese treatment for nausea. Few side effects are linked to ginger when it is taken in small doses. Side effects most often reported are gas, bloating, heartburn, and nausea.

In several small studies, acupuncture has shown that it may provide benefit in gastroparesis. One short-term placebo-controlled randomized study that included 19 patients with diabetic gastroparesis suggested improvement in overall symptoms including fullness and bloating.

It is important for patients to tell all their health care providers about any CAM practices used. Doctors and other health providers need a full picture of what patients do to manage their own health. This will help ensure coordinated and safe care.

Procedures

Symptoms of gastroparesis can be so severe in some people with the condition that they cannot adequately manage with dietary changes and medications. Disabling symptoms can significantly diminish quality of life in people. Persistent symptoms resistant to treatment (refractory) sometimes result in life-threatening dehydration, loss of essential minerals (electrolyte imbalances), and malnutrition requiring hospitalizations. Special treatment measures to help manage may then be considered. These may include:

- enteral nutrition,
- parenteral nutrition,
- gastric electrical stimulation, or

- other surgical procedures.

Enteral nutrition involves the delivery of liquid food into the digestive tract through a feeding tube. It is used when oral eating does not supply adequate nutrition. Delivery into the small intestine is called a *jejunostomy*.

Jejunostomy (J-tube) is a surgical procedure that places a feeding tube through the abdominal wall directly into the small intestine, bypassing the stomach. In this procedure, the feeding delivers nutrients in a specially formulated liquid food directly into the jejunum, the part of the small intestine where most nutrients are absorbed into the body. (A temporary, nasojejunal, feeding tube should be tried first to test individual toleration of this feeding method.)

Parenteral nutrition bypasses the digestive system. It involves the delivery of fluids, electrolytes, and liquid nutrients into the bloodstream through a tube surgically placed in a vein (intravenous or IV). Parenteral nutrition is a complex therapy, used when no other treatments are working. Long-term use increases risks for infections and other complications. It may be used as a temporary treatment for gastroparesis.

Gastric electric stimulation (GES) uses a battery-operated surgically implanted device (Enterra) on the stomach to try to help reduce symptoms of nausea and vomiting in gastroparesis when other methods have failed. Low voltage pulses are too weak to excite stomach smooth muscles, but are able to excite nerves. Therapy with Enterra is FDA approved through a Humanitarian Use Device exemption. The device can be implanted laparoscopically, which helps minimize chances for complications related to surgery. Once implanted, the settings on the battery-operated device can be adjusted to determine the settings that best control symptoms. Enterra therapy is not a cure and other treatment approaches need to be continued. The device can be removed if the therapy does not work.

Humanitarian Use Device Exemption
The Enterra Therapy system for gastric electrical stimulation to treat chronic nausea and vomiting in gastroparesis is approved by the U.S. Food and Drug Administration (FDA) as a Humanitarian Use Device. What does this mean? The FDA has a specialized process, which was established by Congress for developing treatments for rare disease populations – the Humanitarian Use Device (HUD) process. Devices that receive a Humanitarian Device Exemption (HDE) are reviewed and approved by the FDA.

Other surgical procedures may sometimes be tried in patients additionally or when other treatments fail. Gastrostomy (a tube into the stomach) venting prevents excess air and fluid from building up in the stomach and may help with severe nausea and vomiting. Pyloroplasty (surgery to widen the lower part of the stomach) or gastrojejunostomy (surgical procedure that connects the stomach to the jejunum part of the small intestine) are attempts to help the stomach empty. Gastrectomy is the surgical removal of part or the whole stomach. The effectiveness of these procedures in the treatment of gastroparesis is still under investigation. These other surgical procedures should only be considered after careful discussion and review of all alternatives in selected patients with special circumstances and needs.

Manage Risk and Benefit

No single treatment helps all persons with gastroparesis. All drugs and procedures have inherent risks, some more than others. Some of the risks are unavoidable, while others can be avoided and managed. For patients and families it is important to talk to the doctor or health care team about *both* benefit and risk. As a patient, in the context of your personal illness status, consider:

- How severe is your own condition – what effect is it having on your life
- What is the possible benefit from the treatment suggested or prescribed to you
- What are the chances that you will receive benefit from the treatment
- How much benefit should you reasonably expect
- What possible side effects or complications might there be from the treatment
- What are the chances that you will experience a side effect or serious adverse event from the treatment
- What can you do to reduce the chances of side effects or complications
- How will you know when a side effect occurs
- Exactly what should you do if a side effect or complication occurs

WHAT CAN BE DONE WHEN TREATMENTS DON'T SEEM TO HELP?

Many people with gastroparesis will respond to medical management with some dietary modification. However, medication failures or side effects are common. Many physicians have little knowledge or experience with treating gastroparesis.

Some practical things to consider when treatment does not seem to help include:

- Check the diagnosis
- The cause matters
- Review the diet
- Consider other medications
- Treat the pain
- Manage the psychosocial aspects
- Know when to consider surgery
- Be persistent and be careful

Check the diagnosis – Nausea is the hallmark symptom of gastroparesis. Other medical problems should be considered when nausea is *not* a prominent symptom. Dyspepsia is characterized by pain/burning in the mid-upper abdomen and/or bothersome fullness following a normal sized meal and/or inability to complete a meal (early satiety). People with esophageal diseases such as GERD or achalasia can have abnormal gastric emptying studies.

Nausea may be a secondary symptom in people with countless other medical problems. Cyclic vomiting syndrome is a disorder where otherwise completely healthy people have stereotypical intermittent episodes of severe nausea, vomiting, and abdominal pain. People with intestinal pseudo obstruction have prominent symptoms of bloating and severe constipation. Rumination syndrome is characterized by constant regurgitation and either vomiting or re-swallowing food or drink soon after eating. Small bowel obstruction should be considered in people who have had previous abdominal surgery.

The Cause of the Gastroparesis Matters – In diabetic gastroparesis it is important to control the blood sugar, as intestinal motility is impaired when the blood sugar is elevated. Intravenous erythromycin should be considered in hospitalized patients with diabetes. Unfortunately, erythromycin seems to be beneficial for only a few days at a time.

Patients with idiopathic post-viral gastroparesis usually improve over the course of time, ranging from several months to one or two years. During that period it is important to consider that any irreversible surgical procedures *not* be performed in these patients to treat idiopathic post-viral gastroparesis

Identifying and treating any underlying systemic disorder may rarely help, and is worth the effort.

Review the Diet – Many physicians tend to skip dietary recommendations, although it is the area of most interest to patients. It is important to review the low-fat, low-fiber diet and to discuss nutritional supplements.

Rarely, feeding tubes and total parenteral nutrition are necessary. Enteral feeding tubes should be placed in the jejunum, not the stomach. These should not be considered early in the course of the patient's illness, as they are not without risk. They must be carefully managed to avoid serious complications like infection.

Consider Other Medications – The utility of the prokinetic agents is often limited by their side effects. There is a good bit of anecdotal evidence that medications like amitriptyline or nortriptyline can decrease the sensation of nausea. The typical dose is 25–50 mg at bedtime, which is well below the dose that is required to treat depression. A doctor can check blood levels, and modify the dose accordingly. Side effects, including blurry vision, urinary retention, sleepiness, and constipation are uncommon because of the low dose.

Bacterial overgrowth (SIBO) may accompany gastroparesis. The main symptom is bloating. Judicious use of antibiotics and probiotics may be helpful in the management of these symptoms.

It is difficult for patients with nausea and vomiting to tolerate oral medications. Hospitalized patients should receive intravenous medication. Outpatients may do better with medication that dissolves in the mouth.

Reports from highly specialized (tertiary) medical centers that often see people with severe gastroparesis suggest that bloating is a common symptom. Bloating impairs quality of life. Bloating severity appears related to intensity of other gastroparesis symptoms but is not affected by gastric emptying rates. Antiemetics, probiotics, and antidepressants with significant norepinephrine reuptake inhibitor activity may help.

Treat the Pain – Abdominal pain may be overlooked in gastroparesis. However, controlling abdominal pain can be the key to success in the management of many patients. Pain does not correlate with gastric emptying. Non-steroidal anti-inflammatory drugs (NSAIDs) may help. Low dose tricyclic medications, such as amitriptyline, nortriptyline, and desipramine, have been shown to reduce pain in other functional GI conditions and may reduce pain associated with gastroparesis. Other drugs found useful in treating neuropathic pain may be tried. Opiates, or narcotics, should be avoided

Manage the Psychosocial Aspects – Not surprisingly, anxiety and depression are very common in people with chronic debilitating illnesses. The physician and staff need to have compassion and patience. If necessary, psychological consultation should be considered. *Low dose* tricyclic medications do *not* treat anxiety or depression. Real emotional disorders require real psychological treatment. Appropriate treatment can lead to improvement in the GI symptoms.

Patients with an eating disorder may be given a diagnosis of gastroparesis. However, it is probably more common for patients with gastroparesis to be accused of having an eating disorder, rather than actually having one.

When to Consider Surgery – Patients failing medical therapy should have a thorough evaluation before considering surgical therapy. Surgical procedures all have inherent risks that need to be carefully weighed and understood. Most surgical treatments are irreversible, but work in carefully selected patients, having the correct surgery done, by an experienced and accomplished surgeon.

Be Persistent and be Careful – Most medications work only less than half of the time. Nonetheless, most people will respond to some therapy. If a medication causes side effects, consider a lower dose. If it doesn't work, try something else. Combining medications can be helpful. Keep hydrated and as nutritionally fit as possible.

When treatment is failing and there appear to be no other options – whether you are the patient or the physician – get another opinion. Persistence pays off, as most people with gastroparesis ultimately will do well.

RESOURCES

International Foundation for Functional Gastrointestinal Disorders (IFFGD), *www.aboutGastroparesis.org.* A nonprofit organization whose mission is to inform, assist, and support people affected by gastrointestinal disorders of function and motility, like gastroparesis.

Digestive Health Alliance (DHA), *www.dha.org*. The grassroots arm of IFFGD where individuals can interact and take action to improve treatments and help find cures for functional GI and motility disorders, like gastroparesis, through coordinated fundraising, advocacy, and awareness efforts.

Living (Well!) with Gastroparesis – Answers, Advice, Tips & Recipes for a Healthier, Happier Life*, by Crystal Zaborowski Saltrelli, C.H.C. This book is a comprehensive and easy to follow guide to navigating life after a gastroparesis diagnosis. Crystal Saltrelli is a Certified Health Counselor and gastroparesis patient-advocate. Available online at Amazon.com.*

Gastroparesis Patient Association for Cures and Treatments (G-PACT), *www.g-pact.org*. A nonprofit organization dedicated to increasing awareness of gastroparesis and chronic intestinal pseudo-obstruction.

The Oley Foundation, *www.oley.org*. A nonprofit organization whose mission is to enrich the lives of patients dependent on home intravenous (parenteral) and tube feeding (enteral) through education, outreach, and networking.

The National Institutes of Health (NIH) Gastroparesis Clinical Research Consortium (GpCRC), *www.jhucct.com/gpcrc.* A network of medical centers, sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), established to improve understanding of the cause and natural course of gastroparesis and to advance the diagnosis and treatment of this disorder.

About IFFGD

The International Foundation for Functional Gastrointestinal Disorders (IFFGD) is a 501(c)(3) nonprofit education and research organization. We work to promote awareness, scientific advancement, and improved care for people affected by chronic digestive conditions. Our mission is to inform, assist, and support people affected by gastrointestinal disorders. Founded in 1991, we rely on donors to carry out our mission. Visit our websites at: www.iffgd.org or www.aboutGastroparesis.org.