

ADVANCES IN GERD

Current Developments in the Management of Acid-Related GI Disorders

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The Esophageal Pump and Fundoplication



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G&H What is a fundoplication?

CPG A fundoplication is a surgical procedure in which the barrier between the esophagus and the stomach is buttressed by taking the top part of the stomach—the fundus—and wrapping it around the bottom part of the esophagus. When this operation is performed, the surgeon may find a hiatus hernia, which is a separation between the bottom of the esophagus (lower esophageal sphincter) and the diaphragm. The hiatus hernia is also repaired during the fundoplication. When a fundoplication is complete and 360 degrees, it is referred to as a Nissen fundoplication, after the surgeon who pioneered the procedure. A partial fundoplication can also be performed and is referred to as a Toupet fundoplication when the stomach is wrapped behind the esophagus and a Dor fundoplication when the stomach is wrapped in front.

G&H When is this surgery indicated?

CPG It is usually indicated for people who experience significant gastroesophageal reflux disease, especially when there is structural disruption at the gastroesophageal junction and there is good documentation that significant reflux is the cause of the symptoms. The procedure may also be performed as part of repairing a large hiatal hernia.

G&H How effective is a fundoplication at resolving these issues?

CPG This procedure is relatively efficacious when performed in the appropriate setting. As with any operation, the preoperative planning and skill of the surgeon are important. Adequate esophageal peristaltic function is also essential for determining the fundoplication type and

the success of the surgery. That being said, the success rate is around 80% to 90% under ideal situations.

G&H What are the most common complications?

CPG Fundoplication can be associated with complications and new symptoms that did not exist prior to the surgery, especially if the operation is performed in the absence of significant disruption at the esophageal junction. Because the procedure involves the creation of a barrier, there may be issues with transit across the gastroesophageal junction during eating. Patients may experience the sensation of food sticking, a side effect that occurs soon after the procedure. Bloating can result because of the trapping of air in the stomach, which may lead to flatulence. Stomach emptying can be impacted, leading to food retention and fullness after meals; liquids may empty out rapidly, leading to abdominal pain, diarrhea, and sometimes lightheadedness, a constellation of symptoms that is referred to as dumping syndrome.

Some complications may arise later on. Late dysphagia occurs in approximately 10% to 15% of patients after a fundoplication. The wrap may slip or be disrupted, and a new hiatal hernia may form, with the return of reflux symptoms. Kinking of the lumen can cause obstructive symptoms. If mesh is used to close the diaphragmatic hiatus, there may be complications related to the long-term durability of the mesh. Hernias can develop at the site of surgical incisions.

G&H How commonly do you refer patients for this procedure?

CPG Nissen fundoplication is a fairly common surgery. In a tertiary care practice such as mine, if structural disruption is found in a patient with concomitant reflux

symptoms that are persistent despite medical therapy, then I might recommend a fundoplication. Some patients choose to undergo a fundoplication rather than take medicine for the rest of their lives. In all instances, I try to make sure that there is good evidence of reflux on testing and that the patient has adequate esophageal peristalsis, otherwise known as having an adequate esophageal pump.

G&H How does the esophageal pump affect this procedure?

CPG The esophageal pump refers to the peristaltic function of the esophagus, or the strength of the squeeze generated by the esophageal smooth muscle. The pressure generated by this squeeze has to be able to overcome the resistance caused by the fundoplication.

G&H Is there always enough pressure?

CPG In an individual with normal esophageal peristalsis, the esophagus can generate enough hydrostatic pressure to overcome the resistance created by a standard fundoplication. In this case, almost all food items that a person swallows pass through the wrap adequately, with minimal sensations of food sticking.

However, in some patients, peristalsis can be too weak or ineffective to adequately push food through the wrap. A 360-degree fundoplication cannot be performed in patients with significantly weak peristalsis. Instead, a partial (180- or 270-degree) fundoplication is performed.

G&H Are there any particular characteristics of patients who have weak peristalsis?

CPG Weak peristalsis may be part of reflux disease. It may be that reflux weakens peristalsis, and treating the reflux, even performing a fundoplication, can lead to improved peristalsis in some patients.

In other patients, weak peristalsis may be part of the reason for their reflux. Patients with collagen vascular disease, such as scleroderma, lupus, connective tissue disease, or rheumatoid arthritis, tend to have weak peristalsis as part of their systemic disease. In these individuals, reflux may develop because the tone at the gastroesophageal junction is too weak to prevent reflux, and esophageal peristalsis is too weak to clear refluxed material. However, in many patients with reflux disease, the exact reason for their weak peristalsis is not known.

G&H Can weak peristalsis worsen over time?

CPG Yes, weak peristalsis can worsen over time, especially when it is part of a systemic process, such as the

conditions mentioned earlier. When weak peristalsis is due to reflux disease itself, it is difficult to predict whether the problem will worsen over time.

However, it is still not understood what initially instigates weak peristalsis and why some people have weaker peristalsis than others. Sometimes reflux causes peristalsis to be weak, other times weak peristalsis is linked to systemic disease, but most often the mechanism is not identified.

G&H Can an individual have weak peristalsis and not be aware of the issue?

CPG Yes. We do not necessarily need adequate peristalsis for normal swallowing. Food drops into the stomach by gravity, and peristalsis is mainly responsible only for clearing the remnants. If there is no obstruction below, food is transported appropriately, and patients do not have reflux symptoms, then there may be no physical manifestation of weak peristalsis.

G&H Does this mean that this issue is not a problem if a person is otherwise healthy?

CPG That is correct. Weak peristalsis is not necessarily abnormal. We enroll healthy controls in our clinical studies, and sometimes these individuals have weak peristalsis. There is a spectrum of motor function when it comes to peristalsis, and some people have a weak pump without experiencing any untoward symptoms.

G&H How can a patient be tested for weak peristalsis?

CPG Testing for the vigor of peristalsis is fairly simple and is performed with esophageal manometry. The current technology of choice is high-resolution manometry. A barium swallow can also provide some information in this regard, but manometry gives a more accurate picture of peristaltic function.

During manometry, standard test swallows may be used, but a recent trend is to use provocative testing, in which the esophagus is challenged so that we can check for peristaltic reserve in the esophageal contraction pattern.

G&H Do the results of this test indicate whether a fundoplication may be appropriate for a particular patient?

CPG Testing the vigor of peristalsis is one of the ways of determining whether a full, 360-degree fundoplication may be performed, or if a partial fundoplication is warranted.

G&H Why is esophageal manometry needed before a fundoplication is planned?

CPG In addition to identifying weak peristalsis, this test can identify conditions that mimic or confound the diagnosis of reflux, such as esophageal outflow obstruction or achalasia spectrum disorders, in which a fundoplication would be contraindicated. These conditions are associated with a very low likelihood of reflux, but they cannot be identified by symptoms alone. In my experience, a profound esophageal body or lower esophageal sphincter disorder contraindicating fundoplication is identified 2% to 4% of the time.

G&H What other factors should be considered in this decision?

CPG The decision of whether or not to perform a fundoplication depends on the presence of significant reflux disease, the patient's symptoms, the degree of disruption at the gastroesophageal junction, and whether the symptoms are definitively tied to reflux.

Assessment of esophageal peristalsis with manometry, and especially provocative testing, can identify patients who can likely tolerate the standard Nissen fundoplication and those who may not handle it as well.

G&H Is a partial fundoplication as effective as a full fundoplication?

CPG The partial version of this surgery may not be as effective, but in certain settings it can be better than no fundoplication at all. If there is prominent disruption at the gastroesophageal junction, even a partial fundoplication may provide benefit.

G&H Can a weak esophageal pump be strengthened?

CPG At present, there are no pharmacologic interventions that are uniformly effective at improving body peristalsis.

G&H What does a gastroenterologist look for in an esophageal motility study to assess whether the motility is adequate for fundoplication?

CPG The standard approach is to look for the proportion of swallows within a 10-test swallow protocol that are effective in bolus transit. Common practice is that if 50% of the swallows in the swallow protocol are effective, then the patient has adequate esophageal body peristalsis.

G&H What defines an effective swallow?

CPG An effective swallow is one that generates adequate contraction vigor, measured as distal contractile integral. The value used as a barometer for this purpose is 450 mmHg per centimeter per second.

Therefore, if 5 sequences in a set of 10 generate a distal contractile integral of at least 450 mmHg per centimeter per second, then that individual is considered to have adequate esophageal motility for a fundoplication.

G&H What happens if an individual does not meet this criterion?

CPG Provocative swallows are useful for determining if the esophagus has peristaltic reserve. The easiest types of provocative swallows are multiple rapid swallows. In this test, 5 small swallows are made in rapid succession. After the last swallow of the sequence, a more robust swallow results. If the patient is able to augment his or her distal contractile integral after the last swallow of the multiple rapid swallow sequence, that indicates that the esophagus has peristaltic reserve, and a standard fundoplication will likely be tolerated.

Some researchers have investigated the use of large-volume water swallows, also known as a free water drinking test. Others have given patients a meal during manometry testing to assess peristaltic function. The multiple rapid swallow test is the simplest provocative maneuver in this setting.

Dr Gyawali has no relevant conflicts of interest to disclose.

Suggested Reading

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