

# ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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## Intragastric Balloons for Obesity Management



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### G&H What endoscopic options are available for the treatment of obesity?

**BAD** In the United States, the endoscopic options that are currently available for the management of obesity can be divided into 2 categories. The first category consists of space-occupying devices within the stomach known as intragastric balloons. Right now, there are 3 intragastric balloons approved by the US Food and Drug Administration (FDA). Two intragastric balloons are filled with a saline solution: a single balloon (Orbera, Apollo Endosurgery, Inc) that is endoscopically implanted and remains in the stomach for up to 6 months, and a double balloon system connected in the middle by a tube (ReShape Integrated Dual Balloon System, ReShape Medical, Inc) that also requires endoscopic placement and removal after 6 months. The third balloon (Obalon, Obalon Therapeutics, Inc) is filled with nitrogen gas and is a 3-balloon treatment in which a patient swallows a balloon every 4 weeks for a total of 12 weeks. Endoscopy is only required for balloon removal, and all balloons must be removed 6 months after the first balloon is swallowed.

The second category also targets the stomach and consists of gastric remodeling devices. One device utilizes endoscopic suturing (OverStitch, Apollo Endosurgery, Inc) in order to reduce the volume of the stomach by approximately 70%. The greater curvature of the stomach is folded onto itself to create a banana-sized tube within the stomach.

Outside of the United States, a third category consists of devices that work in the small intestine. One device

(EndoBarrier, GI Dynamics) is placed under endoscopic and radiographic guidance and bypasses approximately 65 cm of the small intestine, from the duodenum to the proximal jejunum. Its purpose is to prevent food from mixing with bile and pancreatic secretion until it reaches the small intestine. This device capitalizes on similar pathways as those used in gastric bypass surgery. In addition to the benefit of weight loss, this device seems to have a benefit on diabetes and fatty liver disease. A duodenal resurfacing technology (Revita, Fractyl Laboratories, Inc) produces hydrothermal ablation of the duodenal mucosa; once the duodenum regenerates, it is hypothetically healthier, with improved metabolic parameters. Again, these small intestine interventions are currently not available in the United States, but can be used elsewhere in the world.

### G&H What advantages and disadvantages are associated with intragastric balloons?

**BAD** The major advantage of intragastric balloons is that they preserve the anatomy of the stomach. The fluid-filled balloons work by delaying the rate of gastric emptying from the stomach; thus, patients consume a smaller meal and feel satiety longer. The air-filled balloon does not seem to delay gastric emptying as much, but it is thought to affect the stretch receptors of the stomach. The intragastric balloon procedures are also safe, and the risk of serious adverse events is low. Although the balloons are good weight loss tools, they are not intended to be weight maintenance tools. Compared with other endoscopic or

surgical treatment modalities, intragastric balloons are temporary, and the stimulus that resulted in weight loss is removable. However, the balloons can be combined with lifestyle interventions and medications to create an effective weight loss strategy. According to the literature, between 6% and 15% of patients will not tolerate the balloon, requiring early removal due to persistent nausea, vomiting, and abdominal pain or cramps.

### G&H What adverse events are associated with any of the intragastric balloons?

**BAD** The nausea, vomiting, and abdominal cramps mentioned previously are common adverse events, as the stomach has to adjust to a grapefruit-sized object. These symptoms will resolve within 2 weeks for approximately 90% of patients, and treatment is well tolerated. The air-filled balloon seems to be associated with less nausea and abdominal cramps than the fluid-filled balloons; however, it also appears to be less effective than fluid-filled balloons at weight loss. Serious but rare adverse events associated with intragastric balloons include balloon migration causing small bowel obstruction, perforation (mostly limited to patients who previously underwent surgeries to their stomach), and worsening of acid reflux.

The FDA issued a warning about intragastric balloons for 3 concerns: (1) hyperinflation, in which the balloon becomes large in size due to air mixing with the liquid in the balloon and which requires early removal; (2) a reported risk of pancreatitis; and (3) the association with 7 deaths worldwide since introduction to the US market. However, the American Society for Metabolic and Bariatric Surgery, the American Gastroenterological Association, and the American Society for Gastrointestinal Endoscopy (ASGE) emphasized that the denominator was unknown, and these deaths could not be attributed to the balloons directly. Thus, intragastric balloons are a very safe intervention when used in the appropriate setting and followed up with proper patient care.

### G&H What have studies shown regarding the short- and long-term efficacies of intragastric balloons?

**BAD** The ASGE, as part of the Bariatric Endoscopy Task Force, conducted a meta-analysis of more than 8000 single-balloon implantations. The ASGE concluded that the single fluid-filled balloon met the short-term efficacy threshold placed by societies and resulted in significant weight loss (approximately 13%) at 6 months. Additionally, most of this weight loss appeared to be persistent up to 1 year. A study published in *Surgery for Obesity and Related Diseases* that evaluated 40,000 single-balloon

implantations corroborated the meta-analysis, with approximately 11% to 15% total body weight loss at 6 months and weight maintenance at 1 year.

All 3 of the FDA-approved balloons have undergone randomized, pivotal trials in the United States. The weight loss results for the single balloon were similar to the results of the previous studies, averaging an 11% total body weight loss at 6 months; approximately 70% of that weight was maintained at 1 year. The double balloon and air-filled balloon were found to have a weight loss of approximately 7% at 6 months, but weight loss with both devices was maintained at 1 year. It is important to note that the double balloon and the air-filled balloon were studied in a sham-controlled trial, whereas the single balloon was studied in an open-label, randomized, controlled trial. In general, the evidence both from and outside of the United States indicates that intragastric balloons as a whole resulted in an approximately 10% to 15% total body weight loss. The data that extend to 1 year (ie, 6 months after balloon removal) demonstrate weight maintenance.

Long-term data are very limited, but the balloons are not anticipated to maintain weight beyond 1 year. Therefore, the societal recommendations are to use intragastric balloons as a weight loss strategy and combine them with intensive lifestyle and behavioral interventions, physical activity, and possibly obesity pharmacotherapies or medications in order to extend the weight loss durability for the long term after balloon removal.

### G&H Who is the ideal candidate for an intragastric balloon? In whom should these balloons be avoided?

**BAD** The ideal candidate for the intragastric balloon is someone with a body mass index between 30 and 40, meaning that he or she is not a candidate for bariatric surgery or is not interested in pursuing surgical options. Additionally, he or she should be committed to being compliant with an aggressive lifestyle and behavior intervention program. Patients with a history of surgeries to their esophagus or stomach, any inflammatory disorders of the stomach (eg, ulcers, inflammatory bowel disease), or a large ( $\geq 3$  cm) hiatal hernia should not undergo placement of an intragastric balloon.

### G&H What training and experience are needed to perform these procedures?

**BAD** Placement and removal of intragastric balloons are very easy procedures to master; thus, endoscopists with general endoscopy skills could safely perform them. The bigger issue is endoscopists who want to embark on

introducing intragastric balloons to their practice, as they need to have a program to support their patients and administer appropriate follow-up, lifestyle interventions, and behavioral interventions. In order to troubleshoot symptoms that may occur with the balloon and to ensure good results in the long term, a prerequisite is to have access to a multidisciplinary program that includes registered nutritionists or dietitians and staff.

### G&H Are any balloons currently in development or awaiting FDA approval?

**BAD** Yes. An adjustable, longer-term balloon (Spatz3 Adjustable Balloon, Spatz FGIA, Inc) is currently under investigation in an FDA-approved, pivotal, randomized, controlled trial. The balloon has an adjustable volume that can be lowered in patients who cannot tolerate a higher volume, and an upward adjustment to enhance weight loss (which tends to plateau after a few months). It also stays in the stomach for 8 to 12 months, as compared to the 6 months currently used in the available balloons. Trial results should be available in approximately 1 year. Another balloon (Elipse Balloon, Allurion Technologies) is scheduled to begin its US pivotal trial soon. The balloon is swallowed and excreted after 4 months, and does not require endoscopy.

### G&H What are the priorities of research in this field?

**BAD** The major priority for research in this field is identifying responders and nonresponders. Although these procedures are safer than surgery, not everybody will respond; tools such as physiologic measurements (eg, rate of gastric emptying) may help identify who will respond to the balloon at baseline. In patients we know are not going to respond, we can avoid associated risks.

The other area of research is in combination treatment. Obesity is a chronic disease, and it is unlikely that a single intervention, device, or surgery will be effective in the long term. Therefore, combining endoscopic tools, such as intragastric balloons that allow for weight loss, with 1 or more of the 6 FDA-approved medications currently available is the way of the future for long-term obesity management.

*Dr Abu Dayyeh is a consultant for Apollo Endosurgery, Metamodix, and Boston Scientific. He has received grant support from Apollo Endosurgery and Aspire Bariatrics and research support from GI Dynamics and Medtronic.*

### Suggested Reading

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