

Endoscopic Therapeutics for the Management of Obesity

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ABSTRACT

BACKGROUND: Obesity is a chronic, multifactorial disease associated with significant comorbidities and rising global prevalence. Lifestyle interventions alone often fail to achieve sufficient or durable weight loss, while pharmacologic and surgical therapies face limitations in cost, access, or patient acceptance.

OBJECTIVE: To review the role of endoscopic bariatric and metabolic therapies (EBMTs) in the management of obesity, highlighting efficacy, safety, and clinical applications.

METHODS: A narrative review of current EBMTs, including intragastric balloons (IGBs), endoscopic sleeve gastroplasty (ESG), duodenal mucosal resurfacing (DMR), and duodenal-jejunal bypass liners, with emphasis on FDA-approved and investigational devices.

RESULTS: IGBs achieve 7–14% total body weight loss but are temporary and limited by tolerability. ESG provides 15–25% weight loss as a durable, minimally invasive alternative to surgery, with some metabolic benefits. DMR improves glycemic control in type 2 diabetes with modest weight loss effects. Duodenal-jejunal bypass liners demonstrate weight loss and HbA1c reduction but remain investigational due to device migration and safety concerns.

CONCLUSIONS: EBMTs bridge the treatment gap between lifestyle, pharmacologic, and surgical options. They offer safe, minimally invasive, and effective strategies for weight loss and metabolic improvement, expanding access to obesity care.

KEYWORDS: Obesity, Endoscopic bariatric and metabolic therapies, Intragastric balloon, Endoscopic sleeve gastroplasty, Duodenal mucosal resurfacing, Duodenal-jejunal bypass liner

INTRODUCTION

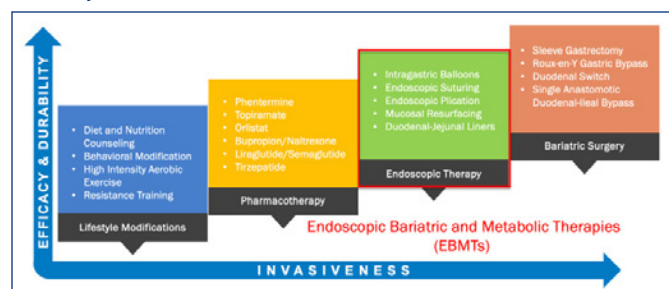
Obesity rates continue to rise worldwide. According to the World Health Organization (WHO), as of 2022, one in eight adults were living with obesity – a rate that has more than doubled since 1990.¹ The disease of obesity is associated

with a host of other diseases including hypertension, hyperlipidemia, diabetes, coronary artery disease, and obstructive sleep apnea, which can lead to further cardiac disease.² When defined by a BMI greater than or equal to 30, the prevalence of obesity among adults in the United States was 40.3%.³ While diet and increased activity are the backbone of any successful weight-loss regimen, they alone are often not enough to lose a significant amount of weight and keep it off in the long-term. In a meta-analysis of 29 long-term weight loss studies, most of the weight lost was regained within two years.⁴ Diet and exercise do work, but often they are not powerful enough for advanced stages of obesity. A patient with a BMI of 40 would need to lose 15 BMI points to be within the health BMI range (18.5–24.9). This 15 point weight loss would be 37.5% weight loss, which is a very large number. Many studies illustrate success with diet and exercise are losing far less weight than many truly need, around 3–10%.

To really combat the disease of obesity and the plethora of harmful risks that come along with it, we need to increase the amount of weight loss patients achieve and increase the durability of that weight loss. There are now many tools to amplify weight loss and treat obesity, including pharmacotherapies, endoscopic therapies, and surgical therapies. We have seen enormous success seen with the glucagon-like peptide 1 and dual GLP-1/glucose-dependent insulinotropic polypeptide (GIP) receptor agonists; however, their success is limited due to expense, uncertain reimbursement rates, and weight regain with cessation of the medications. On the flip side, many patients may perceive weight loss surgery as dangerous. To bridge this gap, endoscopic therapies for the treatment of obesity have become more popular due to their success and safety profiles. Endoscopy is performed through the mouth and the complication rates are very low. This category of therapies is procedure-based and ultra-minimally invasive, allowing us to reach more patients in a less invasive way.⁵

Endoscopic bariatrics and metabolic therapies (EBMTs) can be the primary treatment option for patients with obesity or may serve as a treatment option for weight regain after bariatric surgery.⁶ There are many types of endoscopic procedures for weight loss worldwide, with a handful being approved by the US Food and Drug Administration (FDA). The main categories of endoscopic therapies for weight loss

Figure 1. Obesity treatments in order of advanced invasiveness and durability.



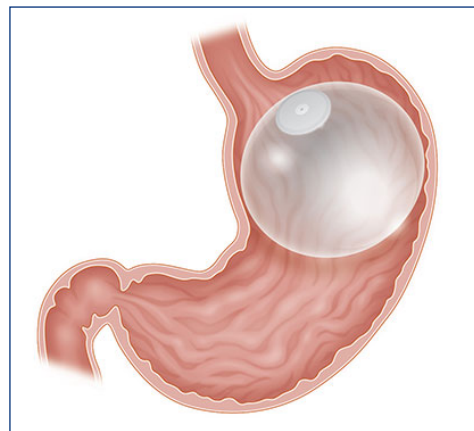
Allencherril, R. P., & McCarty, T. R. (2025). Strategies to Manage Obesity: Endoscopic Bariatric and Metabolic Therapies. *Methodist DeBakey cardiovascular journal*, 21(2), 74–83. <https://doi.org/10.14797/mdcvj.1518>

management are Intragastric Balloons (IGBs), endoscopic suturing techniques such as endoscopic sleeve gastrectomy (ESGs), duodenal mucosal resurfacing, and duodenal-jejunal bypass liner (endobarrier). All these therapies can be used as a primary treatment in patients with Class 1 obesity (BMI >30) or higher, who do not wish to undergo bariatric surgery, who are poor surgical candidates, or who do not wish to use pharmacotherapy for a long duration of time [Figure 1].

Intragastric Balloons (IGBs)

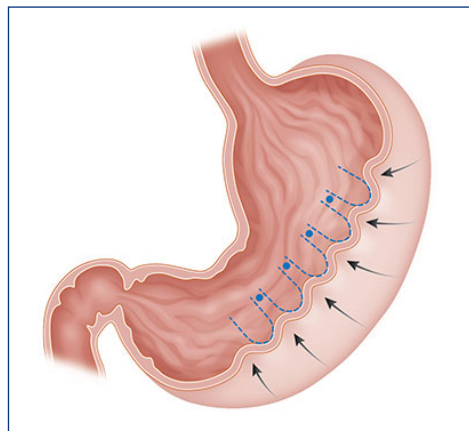
Intragastric balloons (IGBs) are endoscopically placed devices that occupy space within the stomach [Figure 2]. They work by limiting the volume of food that can occupy the stomach and are generally categorized as restrictive in their function by reducing oral intake. IGBs lead to early feelings of fullness or early satiety, and staying full for longer, also known as delayed gastric emptying. They can be placed as an outpatient endoscopic procedure, meaning the patient comes in, undergoes the endoscopic placement, and goes home the same day. There are multiple types of IGBs on the

Figure 2. Intragastric balloon weight loss procedure – Brigham and Women's Hospital.



<https://www.brighamandwomens.org/cwmw/intragastric-balloon-weight-loss-procedure>

Figure 3. Endoscopic Sleeve Gastropasty – Brigham and Women's Hospital.



<https://www.brighamandwomens.org/cwmw/endoscopic-sleeve-gastropasty>

market, but only a few approved in the US by the FDA. Most of the current balloons are inserted into the stomach and then insufflated with sterile water, saline, or air. The volume of fluid placed within the balloons varies by manufacturing and by patient – how well they tolerate the volume, their symptoms, and their weight loss goals. The balloon is left in place within the stomach for 4–12 months. The benefits of this procedure are that it can be easily placed and removed, can lead to 7–14% total weight loss,⁷ and can be widely adopted. Disadvantages include how well it is tolerated – some patients report significant nausea or other related unwanted symptoms, durability as it is temporary and must be removed, and side effects such as the balloons popping and migrating. This endoscopic weight loss modality is only currently recommended as a primary treatment and not in patients who have had previous foregut or bariatric surgery. Compared with lifestyle modifications alone such as diet and exercise, these IGBs are more effective at short-term weight loss, with some studies illustrating 25% excess weight loss (EWL).⁸ All in all, this is a great option for patients who want more powerful weight loss and improvement in comorbidities than weight loss and exercise alone, with a short duration in therapy.

Endoscopic Sleeve Gastrectomy

This is a procedure that uses endoscopic suturing to plicate the stomach from the inside, meaning sewing it from the inside down into a smaller pouch. Using a special endoscopic instrument, the apollo overstitch, circumferential bites of stomach lining or gastric mucosa are taken and synched down [Figure 3]. This works as a weight loss tool in a similar way to the balloons – the suturing of the stomach from the inside makes the stomach much smaller, limiting the amount of food one can eat at a given time and increasing the sensation of fullness. As most of the other endoscopic procedures, this is often

a same-day procedure, where the patient can come into the endoscopy suite or operating room, has the endoscopic sleeve created, and go home the same day. An ESG is considered semi-permanent with restriction effects that can last, and a version of this technique can be performed in patients who've had previous foregut or bariatric surgery. However, some of the sutures can open over-time, leading to an increase in size of the stomach again, so it is surely not as permanent or durable as its sister surgical option, the sleeve gastrectomy.

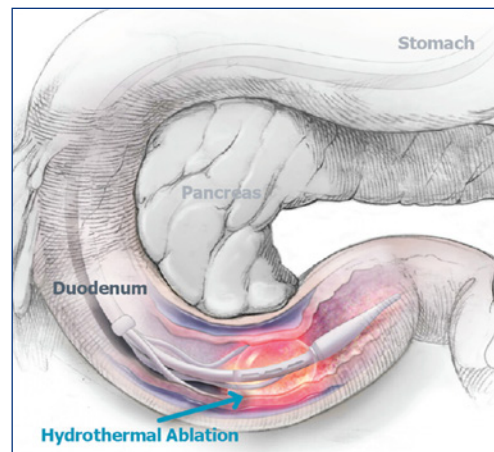
Total weight loss has been measured from 15–25% in literature when performed as a primary procedure. The MERIT trial illustrated great efficacy of ESG compared to lifestyle modifications and these results were durable.⁹ At 52 weeks, 80% of patients who underwent an ESG has improvement in one or more of their comorbidities. At two years, 68% maintained 25% or more of their EWL. Another study illustrated 17.6% and 20.9% total weight loss at 12 and 24 months after the ESG,¹⁰ proving it to be a pretty powerful and semi-durable treatment tool. Besides not being completely permanent, it also is a relatively complex procedure, more so than balloon placement, so that does limit the ESGs overall availability and widespread use. Despite the hefty learning curve, endoscopic suturing is by far the most widely used endoscopic bariatric and metabolic therapy in the United States. As a primary, stand-alone procedure, the ESG can provide significant weight loss and improvement in comorbidities such as diabetes, blood pressure, and hypertriglycerides.¹⁰

Endoscopic suturing may also be used to achieve weight loss after previous surgery has already been performed, such as after a laparoscopic sleeve or bypass. Multiple post-surgical anatomic findings have been linked to weight regain after bariatric surgery, such as retained fundus or stretching of the sleeve after a sleeve gastrectomy, or an enlarged gastric pouch or enlarged gastrojejunal anastomosis after surgical gastric bypass. In all of these scenarios, endoscopic suturing may be used to suture the spaces from the inside, making them smaller and more restrictive, leading to decreased intake and weight loss. Studies have demonstrated, however, that primary endoscopic procedures have more successful weight loss than revisional procedures, with a TWL of 8–12% seen with revisional procedures.⁶

Duodenal Mucosal Resurfacing (DMR)

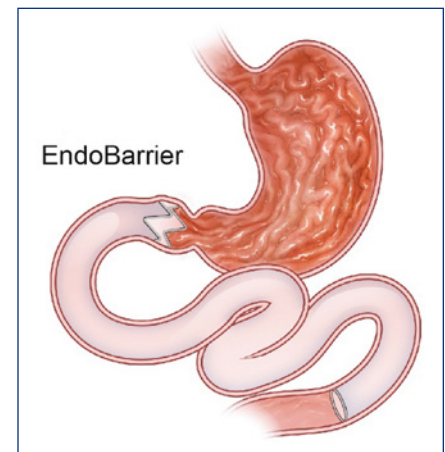
This procedure is not yet FDA-approved but is being performed at some large centers throughout the country and even here in the New England area. In this procedure, the first part of the small intestine, the duodenum, is the target of therapy. The inner lining of the duodenum, or the mucosa, is ablated to improve insulin sensitivity and aid in weight loss [Figure 4]. This procedure is performed as a one-time treatment, with some centers performing it same day and others requiring a brief post-procedure stay. Although still under investigation, early results indicate promising

Figure 4. Duodenal mucosal resurfacing.



Hoyt JA, Cozzi E, D'Alessio DA, Thompson CC, Aroda VR. A look at duodenal mucosal resurfacing: Rationale for targeting the duodenum in type 2 diabetes. *Diabetes Obes Metab.* 2024; 26(6): 2017–2028. doi:10.1111/dom.15533

Figure 5. EndoBarrier.



McCarty TR, Thompson CC. The current state of bariatric endoscopy. *Dig Endosc.* 2021;33:321–34

outcomes, with several studies illustrating improved glycemic control and insulin sensitivity. HbA1c was reported to have improved by 1.2%.^{11,12} This procedure is mostly focused on the obesity-related comorbidity of diabetes, seeking to improve the condition in poorly controlled diabetes, and not so much a tool for weight loss. The reported weight loss is 2–8% total weight loss and considered modest, aligning with changes seen with lifestyle modifications alone. Overall, DMR may be a useful tool for diabetes management, but more data is needed to better understand the durability and efficacy of the treatment.

Duodenal-jejunal Bypass Liner (RESET or EndoBarrier)

This device is another investigational device that acts as an endoscopic bypass. The device is a 60cm long fluoropolymer liner that lines the intestines and blocks them from absorbing nutrients, leading to improved glycemic control and weight loss [Figure 5]. The liner is placed endoscopically under direct vision and with the aid of fluoroscopy with the hopes that it stays in place for one year. Early studies have illustrated improvement in HbA1c.¹³ In a study from Brigham and Women's, the bypass liner was found to demonstrate an average decrease in BMI by about four points, and 18.9 % total body weight loss.¹⁴ The intestines are designed to push food forward, eventually ending in the large intestine, the colon, and leaving the body in the form of stool. In these studies, the bypass liner device did sometimes do just that – it migrated downstream, and needing to be removed early in some patients. All things considered, this device requires more studies and data before it becomes approved and readily available as a weight loss and commodity management tool.

CONCLUSION

Many endoscopic therapies are out there for the treatment of obesity and its related comorbidities. These options have demonstrated success in both treatment naïve patient and those with a history of previous foregut or weight loss surgery. All of these endoscopic procedures provide longer lasting weight loss and, in some cases, more durable glycemic control than medications or lifestyle medications alone.

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Disclosures

The author has no disclosures.

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