

## The descending gastric fundus in endoscopic sleeve gastroplasty: implications for procedural technique and adverse events



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Endoscopic sleeve gastroplasty (ESG) is performed in patients with obesity to reduce gastric volume and delay gastric emptying, resulting in weight loss. ESG is performed with the use of full-thickness suture placement aided by a tissue helix device to pull the gastric wall into the suturing arm of an over-the-scope suturing attachment. ESG begins with distal suture placement and proceeds proximally to just below the fundus. Transfundic sutures are a known risk factor for adverse procedural events, including perigastric abscess formation<sup>1</sup>; therefore, avoidance of suture placement in the fundus is critical.

At the start of the procedure, argon plasma coagulation (APC) is used to mark the anterior and posterior walls of the stomach, extending from the incisura to the cardia. This will guide subsequent suture placement. An additional APC marking is placed at the level of the gastroesophageal junction, extending horizontally across the gastric body. This will serve to mark the lower margin of the fundus, which will be the most proximal extent of the ESG procedure (Video 1, available online at [www.VideoGIE.org](http://www.VideoGIE.org)). With the endoscope in retroflexion, the demarcation can be seen at the level of the gastroesophageal junction before suture placement (Fig. 1). Suturing above this line should be avoided. After APC, 3 distinct lines can be seen demarcating the anterior gastric wall, gastric fundus, and posterior gastric wall.

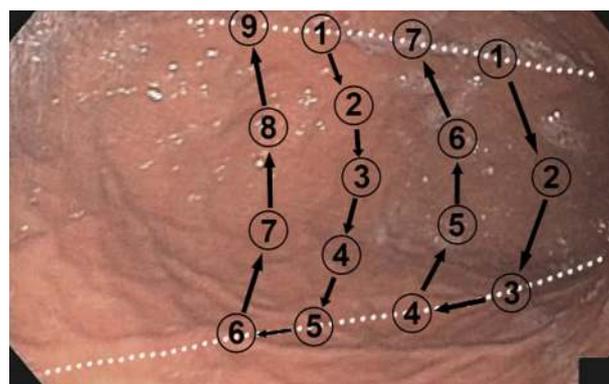
The average tissue thickness in the fundus is 2.6 mm, compared with 5.1 mm in the antrum, and 4.1 mm in the body.<sup>2</sup> The relatively thin wall of the fundus increases the risk of adjacent-organ injury when transmural sutures are placed, including injury to the diaphragm, short gastric arteries, and gastrosplenic ligament, along with the associated potential for abscess formation.<sup>3</sup> Anecdotally, postprocedural discomfort is substantially less when the fundus is avoided.<sup>4</sup>

The fundus position is not static during ESG, and it changes dynamically with each suture. It is well known that the stomach foreshortens significantly with ESG, decreasing in length by over 40%—a feature of the procedure that likely contributes to satiety and weight loss. Sutures are placed in a U-shaped pattern, beginning with the anterior wall, proceeding to the posterior wall, and returning to the anterior wall (Fig. 2). The distance between the parallel lines of the U shape corresponds to the reduction in stomach length with each suture. Here the suturing technique is demonstrated: the gastric wall is captured with the tissue helix, the curved needle arm is passed through the gastric wall, and the needle is reloaded. The process is continued until the U shape is complete.

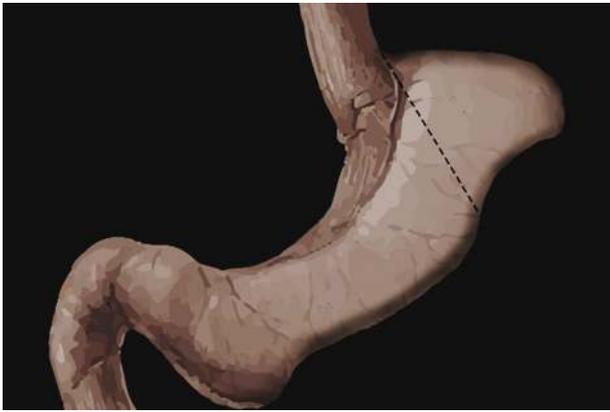
With each plication, the stomach is reduced in length by approximately 2 to 3 cm. The reduction in length leads to distal migration of the fundus (Fig. 3). At the conclusion of



**Figure 1.** Demarcation of the fundus at the level of the gastroesophageal junction before endoscopic sleeve gastroplasty.



**Figure 2.** Suture pattern with full-thickness endoscopic plication beginning distally and proceeding proximally.



**Figure 3.** Stomach shape after endoscopic sleeve gastropasty with descent of fundus below the gastroesophageal junction.

the procedure, the lower margin of the fundus is no longer at the level of the gastroesophageal junction but is as much as 10 to 15 cm distal to the junction (Fig. 4).

In conclusion, ESG is a safe nonsurgical option for the treatment of patients with obesity.<sup>5</sup> However, procedure-related adverse events may occur if there is inadvertent suturing of the fundus. Although gastric foreshortening during ESG has been well known, descent of the gastric fundus has not been previously described. Recognition of the dynamic change in fundus position during ESG is critical to avoid postprocedural adverse events, including perigastric abscess formation.<sup>5</sup> Demarcation of the distal fundus margin with APC is a useful technique to guide suture placement.

## DISCLOSURE

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*Abbreviations: APC, argon plasma coagulation; ESG, endoscopic sleeve gastropasty.*



**Figure 4.** Demarcation of the fundus 6 to 8 cm below the gastroesophageal junction at the completion of endoscopic sleeve gastropasty.

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