



Alternative Method of Mesenteric Defect Closure after Roux-en-Y Gastric Bypass

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Abstract

Background Roux-en-Y gastric bypass is the gold standard for weight loss surgery. This procedure creates two to three mesenteric defects, depending on ante-colic versus retro-colic technique. Current literature supports mesenteric defect closure, but there is no consensus on how to best close these defects. Described options include running separate suture lines for each defect, or employing endoscopic staplers for defect closure.

Methods This is a video/dynamic manuscript on operative technique.

Results We describe an alternative technique that does not require an extra laparoscopic instrument and is more efficient than traditional suture lines due to less suturing.

Conclusions The technique maintains low gastric bypass complication rates by closing mesenteric defects, while keeping intra-operative costs low, and minimizing time spent on the defect closures.

Keywords Mesenteric defect · Internal hernia · Gastric bypass · Closure · Technique · One suture

Introduction

From 2003 to 2016, bariatric surgery volume has more than doubled in the USA, from 103,000 to 216,000 procedures performed [1]. The surgical technique with the most data for weight loss and improvement of medical co-morbidities is the Roux-en-Y gastric bypass. Important complications related to the Roux-en-Y gastric bypass include: anastomotic leak, bleeding, obstruction, anastomotic strictures, marginal ulcers, and hernias through mesenteric defects [2, 3].

Mesenteric defect hernias after Roux-en-Y gastric bypass can occur in two or three sites, depending on if the gastro-jejunostomy is created in an ante-colic or retro-colic manner, respectively. The mesenteric defect sites that can present in both gastric bypass techniques are (1) the defect between the

jejunostomy mesenteries, and (2) the defect between the alimentary limb mesentery and the transverse mesocolon. The third mesenteric defect site can only occur with retro-colic gastric bypasses, and is located along (3) where the alimentary limb is brought up through the transverse mesocolon.

Rates of mesenteric defect hernias after laparoscopic gastric bypasses have ranged from 0.2% to 9% [4]. The vast majority of studies suggest that mesenteric defect closure decreases hernia rates, and this has been confirmed with both randomized control studies compared to national registries [5–7]. Geubbels et al. has performed a meta-analysis that calculated a 2% hernia rate in ante-colic gastric bypasses with defects left open, and the hernia rate is statistically significantly halved to 1% when the ante-colic gastric bypass defects are all closed [6]. In addition, closure of mesenteric defects has also been shown to decrease hernia rates after Roux-en-Y reconstruction for gastric cancer [8].

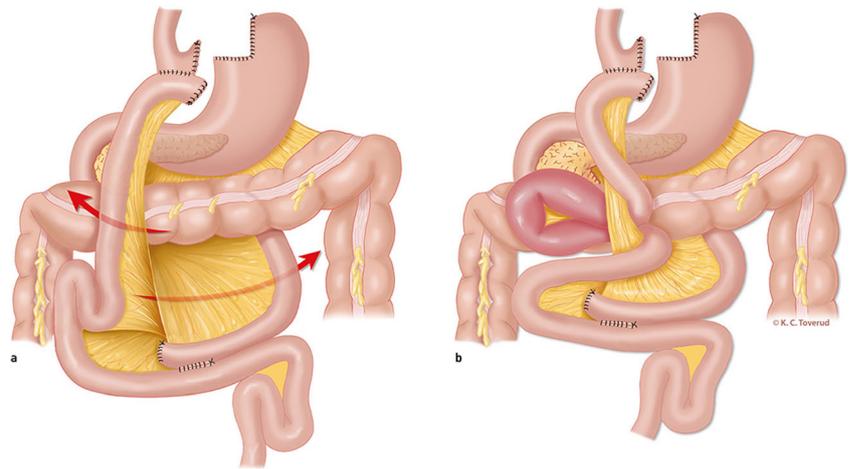
The literature on techniques for closing mesenteric defects is not abundant. Based on common schematics, the two mesenteric defects created after an ante-colic gastric bypass are located far apart and require surgeons to perform two separate closures. Multiple sources describe using non-absorbable suture in a running fashion to close all mesenteric defects [4, 9]. Aghajani et al. have reported their technique in facilitating this portion of the procedure with laparoscopic stapling along the two

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Fig. 1 Common schematic of ante-colic Roux-en-Y gastric bypass with two potential mesenteric defects: (1) between the alimentary limb mesentery and the transverse mesocolon, (2) between the jejunum-jejunostomy mesentery



mesenteric defect sites [10]. We provide an alternative technique in closing these two mesenteric defects with one suture that is cost-effective, time efficient, and easy to replicate.

Technique

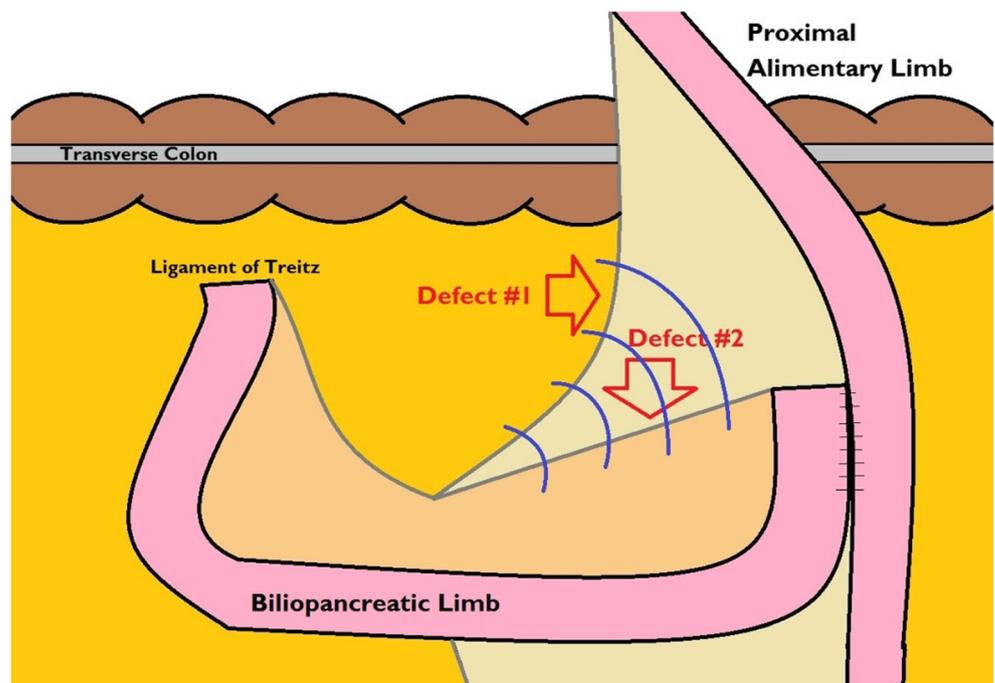
In common schematics representing mesenteric defects after Roux-en-Y gastric bypasses (Fig. 1), the alimentary limb is on the patient's right side, and the biliopancreatic limb is on the left side, with the two mesenteric defects relatively distant from each other, and requiring two separate sutures or staple lines for closure. Our technique in closing the mesenteric defects after a Roux-en-Y gastric bypass is represented in Fig. 2 and is also demonstrated in the video link. In our method, the alimentary

limb is placed on the patient's left side, and the biliopancreatic limb is placed on the right side, the opposite of the common schematics available in the literature. This positions both mesenteric defects close together for re-approximation with one suture.

With our ante-colic, ante-gastric Roux-en-Y gastric bypass, there are two mesenteric defects to close: (1) the defect between the mesentery of the proximal alimentary limb and transverse mesocolon near ligament of Treitz, and (2) the defect between the cut edge of the biliopancreatic limb with the proximal alimentary limb mesentery.

We close both of these defects with one suture. Our silk suture first goes through a superficial bite of the proximal alimentary limb mesentery, then of the transverse colon mesentery near ligament of Treitz, then of the bilio-pancreatic limb mesentery near the staple line, and finally back through

Fig. 2 Alternative method in closing both mesenteric defects: a single suture closing (1) the defect between the alimentary limb mesentery and the transverse mesocolon, and (2) the defect between the jejunum-jejunostomy mesentery



the proximal alimentary limb mesentery. This effectively closes both the mesenteric defect between (1) the jejunal mesentery and transverse colon mesentery, and (2) the mesenteric defect at the jejuno-jejunostomy.

Discussion

The current literature supports mesenteric defect closure after gastric bypasses [6, 7]. Aghajani et al. have described their method in closing mesenteric defects with a 4.8-mm stapler catching the mesenteric serosa [10]. The groups' prospective 5-year results ($n = 4013$) demonstrated a significantly lower internal hernia rate when defects were closed (2.5%), compared to non-closed defects (11.7%) [11]. The average time used to close both mesenteric defects was 1 min and 49 s. Cost of the Endo Universal™ 4.8 mm stapler (Autosuture) is \$175 for the device, and \$65 per box of 10 clips. Kristensen et al. have similarly used the stapling technique to close the mesenteric defects, and are now performing a randomized controlled trial to compare hernia rates between their technique and a non-closure group [12].

To our knowledge, our technique in closing both mesenteric defects after gastric bypasses with one suture is the first to be described. Our method does not require a laparoscopic stapler or any other specialized instrument, and thus saves on operative costs. Because it requires only a silk suture, we believe this is an easily applicable technique that only requires proper positioning of the alimentary and bilio-pancreatic limb prior to defect closure. The positioning of these limbs is the key because it obviates the need to run two separate suture lines in traditionally described mesenteric defect closure. We have not encountered kinking or pulling of the mesentery when we used this technique, and we have performed over 1000 cases in this fashion. The use of permanent braided suture does not loosen over time, but as with all bariatric surgery patients losing weight, the mesentery itself changes and the opening may become larger. We plan to prospectively follow our patients who undergo this alternative method of mesenteric defect closure.

In conclusion, the literature suggests that closure of mesenteric defects decreases hernia rates; however, there is still no gold standard on how to close these spaces. Currently, there are no studies comparing running suture closure of mesenteric defects to stapled closures of mesenteric defects. Our technique should also be compared to both traditional running suture lines and stapled lines for mesenteric defect closure. These three techniques should be compared in terms of cost, time to perform, and long-term complication rates.

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Compliance with Ethical Standards

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