

Laparoscopic hiatal hernia augmentation following sleeve gastrectomy using a “mesh sling” tethered to ligamentum teres – Case report of a novel technique

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ABSTRACT

Symptomatic hiatal hernia following sleeve gastrectomy is a well known and documented complication. The gold standard for its treatment is to perform a hiatal hernia repair combined with conversion of the sleeve to a gastric bypass. However, in some patients a gastric bypass may not be indicated or the patient may be unwilling for the conversion. In these situations, the ligamentum teres augmentation combined with hiatal hernia crural repair seems to be the most effective and popular, according to a literature survey. To avoid damaging the sleeve, the use of prosthetic materials to augment the hiatal repair is generally not recommended. In this case report, for a patient who presented with a hiatal hernia with severe reflux following a sleeve gastrectomy, we describe a novel technique where a sling composed of a strip of composite mesh was loosely placed around the gastroesophageal junction and tethered to a shortened ligamentum teres.

Key Words: *Hiatal hernia; sleeve gastrectomy; ligamentum teres augmentation; mesh sling; case report*

INTRODUCTION

Hiatal hernia and reflux symptoms are not uncommon following a sleeve gastrectomy for morbid obesity. In these patients, the initial line of therapy is the maximum allowed dosage of proton-pump inhibitors for 8 weeks. If this fails, conversion of the sleeve to a gastric bypass is an accepted and proved surgical solution [1]. However, if the patient declines this procedure or if a gastric bypass is not indicated, the most popular surgical option is the use of

the ligamentum teres for augmentation with hiatal hernia repair [2]. The other viable options are hiatal augmentation using the LINX® system and the posterior rectus sheath flap technique [3,4]. In hiatal hernias following a gastric bypass, the fundus of the remnant stomach can be mobilized and used for plication. Several papers have been published on the favorable outcomes of the ligamentum teres augmentation technique in the literature over the last decade [5,6]. However, in some patients the ligamentum teres may be unavailable due to its shorter length or distorted due to adhesions. We hereby describe a novel surgical alternative in our patient who presented with a symptomatic hiatal hernia following sleeve gastrectomy. A sling prepared with a composite mesh was placed around the gastroesophageal junction and tethered to a shortened ligamentum teres, as the entire length of the ligamentum teres was unavailable to fully encircle the gastroesophageal junction.

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CASE REPORT

The patient was a 45-year-old woman that presented to the ER with a sudden, severe central chest pain and difficulty in breathing for the past six hours. She had no previous history of cardiac conditions. Her ECG, ECHO and cardiac enzymes were found to be within normal limits, essentially eliminating any acute cardiac event. She had a history of gastroesophageal reflux disease (GERD) and had undergone an endoscopy two months ago that showed a ‘large hiatal hernia’. She has been on proton pump inhibitors and was following a controlled diet. She suffered from acute episodes of reflux one -two times per week. She confirmed that she did not have GERD or a hiatal hernia prior to the laparoscopic sleeve gastrectomy that she underwent in another center in 2016. Her BMI was 23.20 on presentation to the ER. An abdominal CT scan was obtained, which revealed a ‘Small hiatus hernia with suture material/staplers along the lateral aspect of the gastric fundus.’ All of this was explained to the patient, including the need for a semi-urgent surgery to address the hiatal hernia, which was the cause for her current acute symptoms. The options offered to her were a hiatal hernia repair with ligamentum teres augmentation (strongly preferred option) OR hiatal hernia repair with conversion of the sleeve to a gastric bypass (less preferred option as she did not need further weight loss). She readily consented for the hiatal hernia repair with Ligamentum teres augmentation option.

Surgical technique

The patient was positioned in the reverse Trendelenburg position after intubation. The pneumoperitoneum was achieved via a Veress needle and maintained at 12 mmHg. All four ports (one 12 mm for camera and three 5 mm for instruments) that were used were placed in the left upper and lateral quadrants. A 30-degree angled laparoscope was placed in the 12-mm port. Next, a Nathanson retractor was placed just below the xiphoid process for liver retraction, providing adequate visualisation. Adhesions to the ligamentum teres and posterior surface of the left lobe of liver due to the previous surgery were identified and taken down with sharp dissection. A 5-mm-long Ligasure was used to enter the lesser sac via division of the gastrohepatic ligament. The right crus was identified and dissected free from the oesophagus and left crus. Part of the sleeve was seen to be stuck in the hiatal hernia, which was circumferentially dissected and reduced back into the abdomen after widening the hiatus anteriorly (Figure 1). The lower oesophagus was then mobilized for about 4 cm into the abdomen from within the mediastinum. Using

monofilament non-absorbable sutures, both the crura were stitched together posterior to the oesophagus. Two stitches were also placed anteriorly. Since the ligamentum teres was involved in the dense adhesions as mentioned above, its full length could not be harvested to encircle the gastroesophageal junction to provide the buttress. So a sling was fashioned using a 6 x 2cm long strip of composite mesh, which was then encircled around the gastroesophageal junction and fixed to the short ligamentum teres using several interrupted non-absorbable monofilament stitches (Figure 2). Fatty tissue in the vicinity was also interposed between the mesh sling and the lower oesophagus to avoid direct contact (Figure 3).

A 38 Fr-size gastric calibration tube was then passed through the mouth and used to determine the tightness of the crural repair and the sling repair. The attending gastroenterologist was called in to do an endoscopy to confirm that the gastroesophageal junction was well within the abdominal cavity and the adequacy of the repair. All the port sites were closed after haemostasis was confirmed (Figure 4).

RESULTS

In the postoperative period, the patient recovered uneventfully. Her symptoms at presentation were relieved. She was discharged on postoperative day 3. In a recent communication with the patient 3 months after the surgery, she complained that she had an episode of vomiting following a rapid intake of food. She was advised to watch her food/liquid intake and to inform if vomiting occurs again. She had no more similar incidents so far.

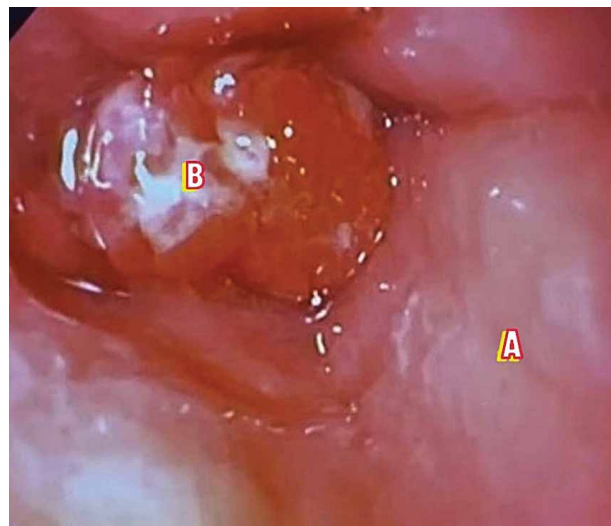


FIGURE 1. Endoscopy showing the gastro-esophageal junction (A) with a hiatal hernia (B).

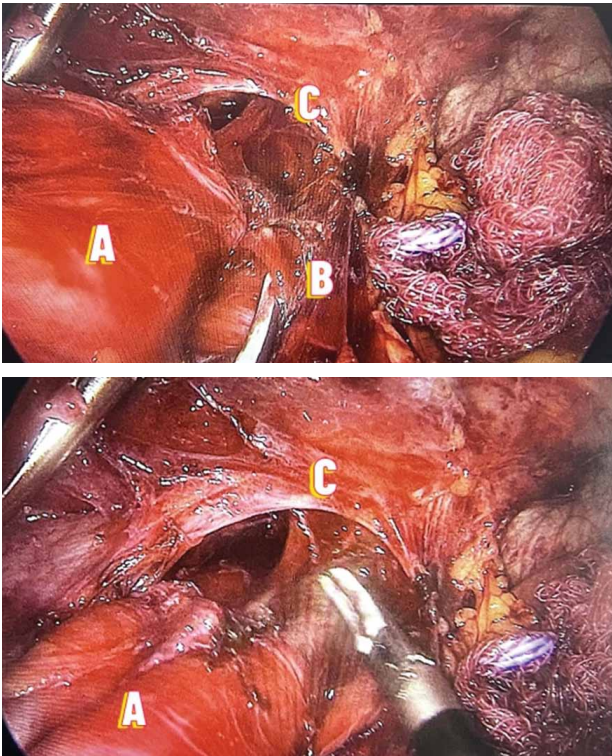


FIGURE 2. Proximal sleeve (A) was seen to be stuck in the hiatal hernia (C); left crus dissection (B).

She was followed again up after 12 months and remains symptom-free.

DISCUSSION

GERD is well known and documented complication following a sleeve gastrectomy in patients who did not have a hiatal hernia prior to the surgery. Studies have shown 15% - 33% of people who undergo a sleeve gastrectomy experience reflux symptoms, out of which 3.5% have a hiatal hernia [8]. It must also be remembered that a migrated sleeve is usually not reducible spontaneously because the staples cause adhesions that prevent its return into the abdominal cavity. Therefore, it is prudent to repair a hiatal hernia that is identified preoperatively concomitantly with the sleeve gastrectomy. Some surgeons have proposed a technique called Nissen sleeve gastrectomy to avoid or prevent post-sleeve hiatal hernia in the absence of a hiatal hernia during the initial operation. This technique was shown to be effective to control GERD following a sleeve gastrectomy but was associated with poor weight loss and other postoperative complications [10,11]. A newer technique is the Sleeve-Collis-Nissen Gastroplasty described by da Silva et al, which is a complex procedure and not thoroughly evaluated yet [12].

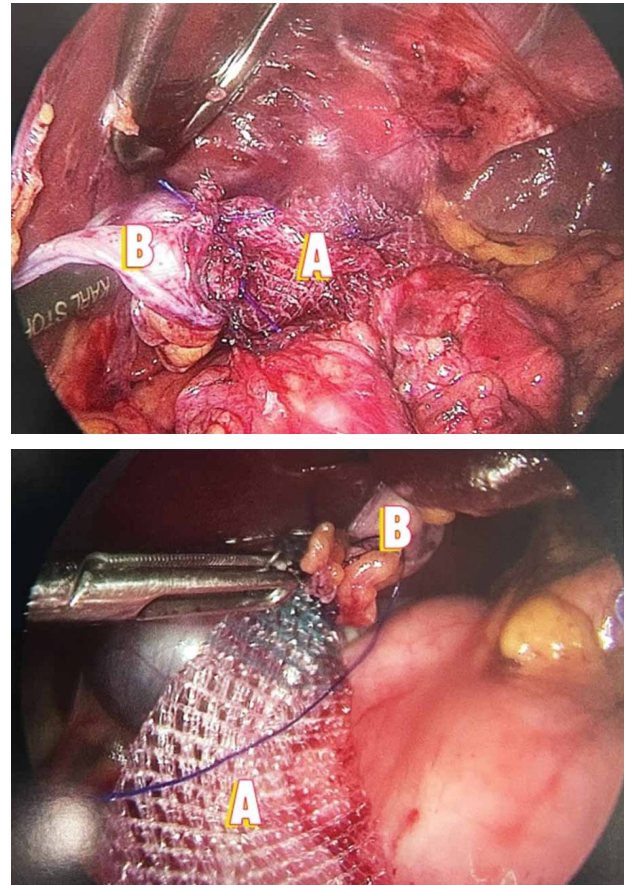


FIGURE 3. Composite mesh sling 6 x 2cm length (A); fixed to the short ligamentum teres (B).

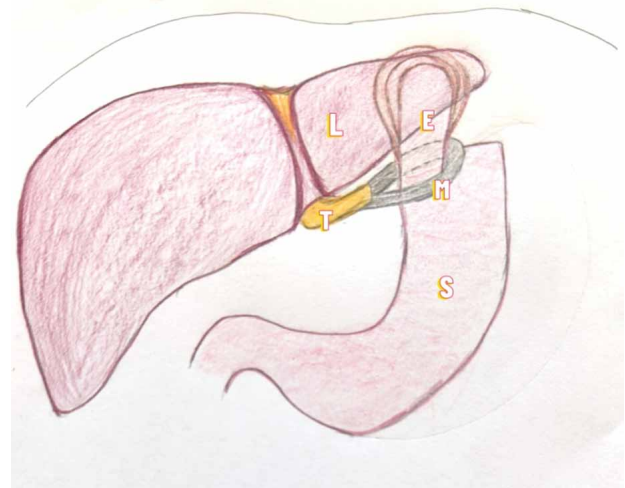


FIGURE 4. Diagram showing the completed procedure (L – left lobe of liver; E – lower esophagus; T – ligamentum teres; M – mesh sling; S – gastric sleeve).

The ligamentum teres augmentation of a hiatal hernia repair not associated with bariatric surgery is not a new

technique. Between 1964 and 1967, Rampal, Pedinielle and Marchal described in French publications the technique of using the ligamentum teres to augment a hiatal hernia repair in 1964 [13,14,15]. By 1990, Narbona et al had published a large series of their experience with 100 patients using this technique and long term follow-up [16]. The benefit of this method is the use of the patient's own tissue to augment the hiatal hernia repairs. Of course at that time this procedure was performed in patients with primary hiatal hernia and not following bariatric surgery.

In our patient, the ligamentum teres repair option was preferred over a gastric bypass given that she did not need further weight loss, unwillingness of the patient to undergo a gastric bypass and dealing with the inherent complications of a bypass. Obviously a fundoplication could not be performed in this situation since the fundus was resected during the sleeve gastrectomy. The entire length of the ligamentum teres was unavailable due to the dense postoperative adhesions. So a sling made of a thin long strip of composite mesh was constructed to extend the ligamentum teres length. The mesh sling augmentation works in two ways:

1. The ligamentum teres with mesh sling lies posterior to the lower oesophagus in direct contact with the crural suture repair, where adhesions will form.
2. The pulling/tugging effect of the sling on the gastroesophageal junction keeps it within the abdominal cavity and reduces chance of upward migration; much like a fundal wrap would function.

Using synthetic meshes to augment hiatal repair may cause dysphagia, odynophagia, oesophageal erosions or damage to the sleeve. Biologic meshes are expensive and studies show no real difference in long-term recurrence rates [17]. In our technique, the composite mesh sling was folded in such a way that the smooth film surface was in contact with the gastroesophageal junction in order to avoid mesh erosion or dense adhesions leading to stricture formation. Nearby fatty tissue was interposed between the mesh sling and the lower oesophagus to further avoid direct contact.

The ligamentum teres buttress technique was found to be useful in hiatal hernias after gastric bypass and for recurrent hiatal hernias following sleeve gastrectomy as well [18,19]. Dore et al published a very interesting paper comparing two procedures for the relief of reflux symptoms after sleeve gastrectomy [20]. The Roux-N-Y gastric bypass was compared to a ligamentum teres repair, and they concluded that short term outcomes of ligamentum teres repair are comparable, if not better, than bypass. Chaudhry et al evaluated this technique for hiatal hernia after mini-gastric bypass and reported favorable outcomes

[21]. More recently, another novel technique described by Vigneswaran et al using the posterior rectus sheath as a pedicle flap to augment hiatal hernia repair was published [4]. This technique seems to be a viable alternative to the ligamentum teres repair, where the patient's own tissue is utilized. A comparative study between these two techniques regarding long term outcomes would be productive and provide more clarity.

In conclusion, for symptomatic hiatal hernias following sleeve gastrectomy when there is no fundus available to wrap and if the entire length of the ligamentum teres is also unavailable, our novel technique with a composite mesh sling is a useful and easily reproducible alternative.

Approval by Ethics Committee: Yes

Informed Consent Obtained: Yes

Conflict of Interest: NIL

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