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# Double Barbed Purse-String Suture Laparoscopic Gastrostomy

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## 1. Abstract

We present a new technique for a laparoscopic simplified gastrostomy.

It consists in a double barbed purse-string suture gastrostomy performed by laparoscopic approach. The results of a pilot group of 4 patients is very satisfying. The percutaneous endoscopic gastrostomy still is the most common procedure to create gastrostomy, despite in the last decade many authors described PEG procedure with a higher risk of complication compared to laparoscopic approach.

In case of failure/contraindication for PEG we consider this new technique safe, easy and fast for laparoscopic gastrostomy.

## 2. Introduction

The gastrostomy has been developed as a practical alternative to naso-gastric tube for enteral feeding addressed to patients unable to take food by mouth. It's consists in the creation of an artificial external opening into the stomach for nutritional support or gastric decompression. There are three ways to create a gastrostomy: radiologically, endoscopically or surgically.

In our center, as in most of the centers around the world, the most common technique adopted is the Percutaneous Endoscopic Gastrostomy (PEG) [1-5]. For those patients who cannot undergo to PEG procedure, we propose a laparoscopic approach with a new modified Stamm technique using barbed suture.

So, in our institution, the laparoscopic approach is reserved to endoscopic failures and to malnourished patients undergoing to exploratory laparoscopy for obstructive esophageal or esophago-gastric junction cancer before neoadjuvant treatment.

The most frequent causes of endoscopic failure are tight esophageal stenosis with no way to pass for the endoscope, voluminous hiatal hernia, upper G-I adhesions, hepatomegaly, ascites and severe obesity.

Another option described less common in daily practice is the percutaneous radiological gastrostomy using the Seldinger technique under fluoroscopic guidance [6].

## 3. Technical Description (video)

The patient is placed supine, legs open and slight anti-Trendelenburg position. The surgeon is located between patient's legs and the assistant on the patient's right side. The gastrostomy site is established preoperatively is marked and it's located in the epigastric region, 3cm on the left of the abdominal midline about 10cm from the xiphoid process.

The 14mmHg pneumoperitoneum is made with a Verres needle in the left subcostal space. We use three trocars, one of 11mm on the midline about 20cm from the xiphoid process for the 0° laparoscope and two of 5mm for the instruments on the right and left quadrants (Figure 1).

The surgical procedure includes 9 easy and fast steps:

- The stomach is grasped with the locking grasper in the location where the gastrostomy tube is going to be placed on the body/antrum transition that has to be a tension-free site.

- The first non-absorbable barbed purse-string suture is made paying attention to not tightening the suture as the barbed suture has no way-back (Figure 2).

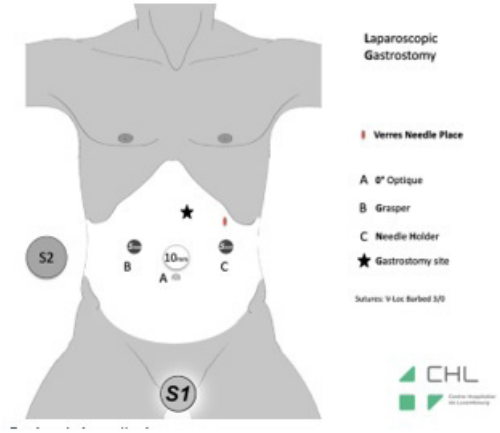


**Figure 1:** Patient's installation.

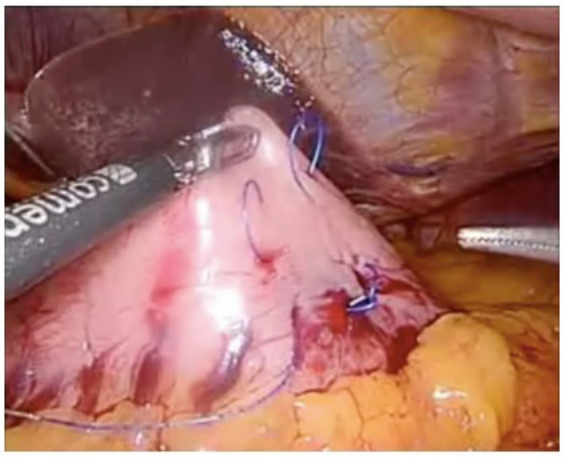

**Figure 2:** First barbed purse-string suture not tight.

- The gastrotomy is made in the middle of the barbed purse-string using monopolar cauterization checking that we have totally perforated the anterior gastric wall and we are into the gastric cavity.
- 5mm skin incision in the pre-marked site and introduction of a Bengolea forceps in order to create a transparietal tunnel for the gastrostomy tube.
- Insertion of the gastrostomy catheter into the stomach, inflation of the catheter balloons and tightening of the first barbed purse-string suture without cutting the needle.
- Shifting the pneumoperitoneum from 14mmHg to 6mmHg, very important in order to have a tension-free suture.
- The second non-absorbable barbed purse-string suture is made with the same thread as a continuous of the first suture. This is performed passing through the gastric wall and the anterior abdominal wall all around the gastrostomy tube. Passing into the gastric is important to be careful to not sting the balloon causing a rupture and consequently a balloon deflation. The second barbed purse-string suture has to be tightened only at the end of the procedure in order to guarantee a good exposition during the suture. The needle can be cut at the end of the procedure.
- Laparoscopic final check of the tension-free gastrostomy (Figure 3).

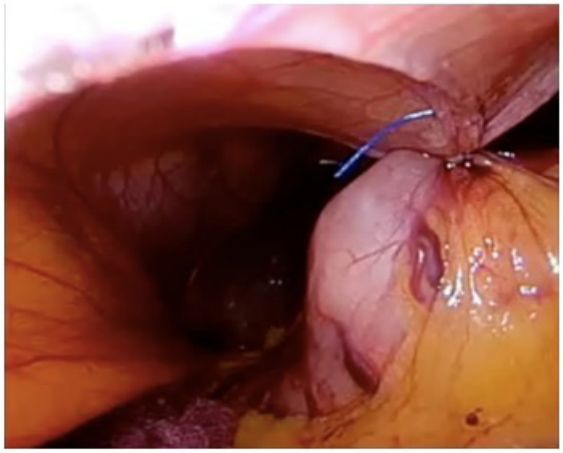

**Figure 3:** Final result – tension free gastrostomy.

- Gastrostomy irrigation in order to verify the well-functioning of the catheter. The exterior bumper is fixed with 2 single sutures.

## 4. Results

We operated 4 patients for laparoscopic gastrostomy between January and June 2020 for swallowing troubles cause of neurological problems. Three men and one woman. The mean age was 67 (46-83). The mean operative time was 25 minutes (18-33). All patients have started the enteral feeding the day of the operation and they all have been discharged the first postoperative day without complications. The mean follow-up is 167 days (98-253) and all the patients are asymptomatic, the gastrostomies are functioning and none of them had to be replaced. None of them have been readmitted following discharge from the hospital.

## 5. Discussion

One condition needed for the gastrostomy functioning is the intact and functional gastrointestinal tract. Gastrostomy can also be performed to attain sustained gastric decompression ("venting PEG") in selected patients with gastrointestinal tract obstruction [7].

Since Gauderer described it the first time in 1980, [8] the Percutaneous Endoscopic Gastrostomy still is the most common approach to gastrostomy around the world and its use continues to rise [1–5]. Despite that, in many centers the strategy is moving to laparoscopic approach as first choice after proving the higher risk of major and minor complications of the endoscopic approach [9-13].

Some authors have described an hybrid approach which is the Laparoscopic-Assisted Percutaneous Endoscopic Gastrostomy (LA-

PEG) as safe and effective option for gastrostomy [14, 15] which is, in our opinion, less suitable because it requires in the operating theatre a double team, surgical and endoscopic, and it doesn't simplify the strategy.

About the surgical approach many authors described the advantages of laparoscopy compared to open technique performing surgical gastrostomy [16-19].

There are three main differents techniques to perform a surgical gastrostomy:

- Witzel gastrostomy: consists in the catheterisation of the stomach through a seromuscular groove [20].
- Stamm gastrostomy: consists in a laparotomy and securing the stomach to the anterior abdominal wall with four sutures after having secured the feeding tube to the stomach with purse-string sutures [21].
- Janeway gastrostomy: consists in the creation of a 10cm gastric tube from the anterior gastric wall that is brought out through the abdomen to form a permanent stoma [22].

Many types of gastrostomy catheter exist and they can be classified in three different types: simples (not used anymore), with a bumper (most common used for PEG), with a balloon (most common used for surgical gastrostomy).

All these techniques have been originally described for laparotomy. With the increase of laparoscopy in all surgical fields, also the approach to gastrostomy has changed. All these technique have been described by laparoscopic approach and the more performed are the Stamm modified described by Rodenberg in 1999 and the Janeway modified described by Ritz in 1998 [19, 23-25].

Our technique is a new modified laparoscopic Stamm technique using barbed suture.

Since 2012 that we started we now perform almost all surgical digestive sutures (laparotomy/laparoscopy/robotic) with barbed suture [26–28]. So we decided to develop a new technique with double barbed purse-string suture for the gastrostomy.

The results of our little pilot patients group are extremely satisfying in term of complications (0%), hospital stay (1 night) and operating time (mean 25 minutes).

## 6. Conclusions

Laparoscopic gastrostomy with double barbed purse-string suture is safe, easy and fast procedure for the creation of a gastrostomy. It represents an excellent option in case of failure/contraindication of endoscopic approach.

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