

# An Anatomical Point to Start Transection in Laparoscopic Sleeve Gastrectomy

**Keywords:** Sleeve gastrectomy; Landmark; Antrum

## Abstract

**Introduction:** Laparoscopic Sleeve Gastrectomy (LSG) has become a preferred primary bariatric surgical approach. However, some technical aspects still lack standardization, including the distance from the pylorus at which the resection should start. The goal of this study was to identify an anatomical landmark to aid surgeons in identifying a reference point.

**Materials and methods:** Patients undergoing bariatric surgery were enrolled prospectively. Inclusion criteria were age over 18, BMI > 35 kg/m<sup>2</sup>, and the absence of any prior upper abdominal surgery. After liver retraction, an imaginary line was drawn from the right side of the esophagus through the incisura angularis to the greater curvature, and the distance from this point to the pylorus was recorded. The measure and its correlations with gender, BMI and height were analyzed.

**Results:** Out of 129 patients, 101 (78.3%) were female. Mean BMI was 45.4 kg/m<sup>2</sup>. The average distance measured was 6.95 cm (5-9, SD=0.75). There was no correlation between this distance and either BMI ( $r=0.06$ ) or height ( $r=0.2$ ). There was a 0.4 cm difference between men and women (7.3 vs. 6.9 cm),  $p=0.03$ . In 93.8% of the cases, the distance was between 6 and 8 cm.

**Conclusion:** A line starting on the right side of the esophagus through the incisura angularis to the intersection with the greater curvature establishes a point that can be used reliably as a reference to start transection for LSG. It also may be useful when the pylorus is difficult to visualize, as in patients who are super obese or have adhesions.

## Introduction

Bariatric procedures have emerged as the only effective and durable treatment for morbid obesity [1]. Among them, Laparoscopic Sleeve Gastrectomy (LSG) has become a preferred primary weight loss surgery [2,3]. However, the technique is not performed the same way by different bariatric surgeons [4]. The size of the bougie used for calibration, the necessity and options for reinforcing the staple line, and the section shape at the gastroesophageal junction has not been standardized. The distance from the pylorus to the first line of section also varies, with most preferring 2 to 8 cm [5-9].

Surgeons may choose where to start stapling by using a measuring device like a ruler, a length of suture, or an instrument of known length like a laparoscopic grasper [10].

The goal of this study was to analyze an anatomical point to help surgical teams to determine the starting point for stapling in LSG.

## Materials and Methods

From January 2014 to July 2014, 125 patients were recruited for this trial. Inclusion criteria were a BMI over 35 kg/m<sup>2</sup>, age over 18, and the absence of prior upper abdominal surgeries.



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All patients received dietary counseling for at least four months and underwent a 2 weeks low-calorie diet. The pre-surgical goal was 10% total body weight reduction.

After pneumoperitoneum was achieved, 5 trocars were placed and the liver was retracted. Prior to any gastric manipulation, a 10 cm ruler graded at 5 mm intervals was inserted and an edge placed on the proximal side of the pylorus, running over the greater curvature. An imaginary line was then drawn starting on the right side of the esophagus through the incisura angularis to the intersection with the greater curvature, where the measurement was taken (Figure 1).

All measures were performed by two surgeons with personal experience performing over 1000 bariatric surgeries. A written consent was obtained from all patients.

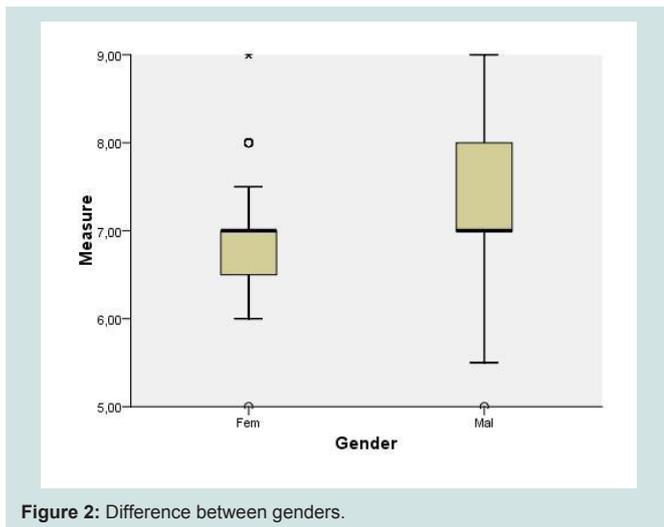
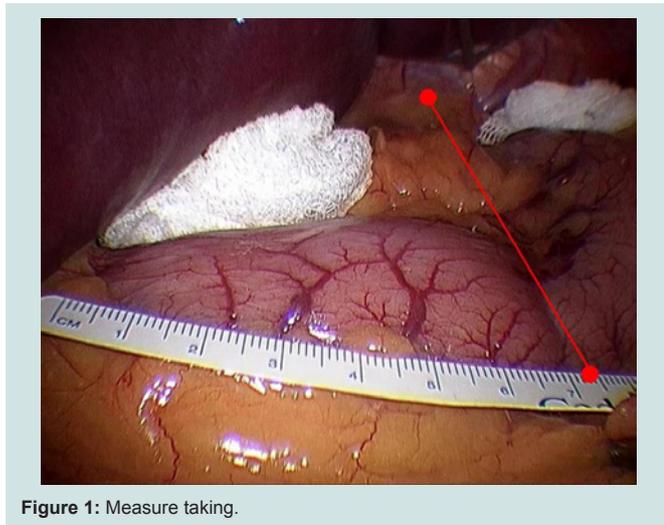
Data collected included the recorded measurement and the patient's gender, height and BMI. Continuous variables were described as means, plus range and SD. Categorical values were expressed using absolute values and percentages. Differences between groups were tested using independent samples t-tests. Spearman's correlation coefficients were calculated to identify and quantify any correlations. A  $p$ -value less than 0.05 was considered statistically significant. PAWS v.18 was used as the statistical software.

## Results

A total of 129 patients were included: 101 women (78.3%) and 28 men (21.7%). Anthropometric data are summarized in Table 1. The mean BMI was 45.4 kg/m<sup>2</sup> (35.9-79.5), age 42.4 (35.9-79.5), weight

**Table 1:** Antropometric data.

	Mean	Range	SD
Weight	122.4	88.5-206	23.9
Height	1.64	1.48-1.97	0.09
BMI	45.4	35.9-79.5	6.8
Age	42.4	16-66	10.2
Gender (M:F)	79.5:20.5		



122.4 kg (88.5-206) and height 1.64 m (1.48-1.97). The recorded measurement was a mean 6.95 cm (5-9 cm, SD=0.75) in length. There was no correlation between this distance and either BMI ( $r=0.06$ ) or height ( $r=0.20$ ). The mean distance in males was 7.3 cm (SD=0.99) versus 6.9 cm in females (SD=0.64),  $p=0.03$  (Figure 2). Dividing patients into three groups according to height (<1.60 m, 1.60-1.65 m, >1.65 m), the distance was 6.8, 7.0 and 7.0 cm, respectively (NS). Categorizing patients into three groups by BMI (<41, 41-47, >47), the mean distance measured was 6.9, 6.9 and 7.0 (NS). In 93.8% of patients, the distance was between 6.0 and 8.0 cm.

### Discussion

LSG has proven to be an effective bariatric surgery, with acceptable morbidity and long-term weight loss relative to other procedures [11,12]. Its mechanism of action seems to involve a combination of gastric restriction, hormonal effects, and changes in gastric motility and eating habits [13].

Certain technical issues remain controversial with this surgery, however. One of the controversies is the distance from the pylorus at which gastric sectioning should begin [4].

The most conservative surgeons prefer to initiate it more than 4 cm from the pylorus [7-9]. This would improve gastric emptying by preserving its contractile function, also decreasing intraluminal pressure. As the integrity of the vagal nerve remains, and no pyloroplasty is performed, it would appear safer to resect the antrum farther from the pylorus [4].

Other authors begin the division 2 cm from the pylorus. They assume that, since this a restrictive technique, resection should be more aggressive [6].

Three recent studies compared 2 cm vs. 6 cm antral resection. Both Abdallah et al. and Obeidat et al. found better weight loss and less weight regained at 2 years when starting resection 2 cm from the pylorus, whereas ElGeide et al. failed to identify any differences over one year of follow up [14-16]. ElGeide et al. also described a higher incidence of vomiting within the more extensive resection group over the first 6 post-operative months [15].

GERD is also a concern when performing this surgery [17-21]. By reducing intra-abdominal pressure and acid production, and increasing gastric emptying, LSG tends to improve reflux [22-25]. However, technical errors, decreased lower esophageal sphincter pressure, and increased pyloric or intraluminal pressure could increase GERD [21,22,24,25]. The implications behind the amount of antrum resected are unknown. Abdallah et al. described no significant impact of extent of antral resection on GERD [14]. Obeidat et al. reported more reflux (11.1% vs. 7.1%) when a larger antrum was left in place [16].

There are different ways in which a surgeon may determine where to start a sleeve gastrectomy. Using a ruler, a piece of suture, or an instrument of known length are some of the alternatives. However, identifying the pylorus is not always possible, especially in patients with prior surgeries. Also, introducing a ruler and directly measuring distances is time consuming. Previously, Clapp described the second branch of the right gastroepiploic vessel as a relatively constant anatomical landmark, at a mean of 4.6 cm from the pylorus [10]. However, vessels are sometimes hard to visualize in obese patients, and adhesions are an obstacle to ensuring which vessel is being seen.

The current study located an anatomical point that can be trusted as a reference. Our practice includes using this mark to determine where to place the first staple [26]. It has been easy to visualize and practical in the super obese and patients with prior biliary surgeries. Although the importance of the extent of antrum resection is yet to be defined, our proposed landmark might be useful in everyday practice.

### Conclusion

A line starting on the right side of the esophagus through the incisura angularis to the intersection with the greater curvature establishes a point that can be used reliably as a reference to start transection for LSG. It also may be useful when the pylorus is difficult to visualize, as in patients who are super obese or have adhesions.

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