

# **Comparison of Stapled and Hand-Sewn Sleeve Gastrectomy**

*(NCT number has not been assigned yet)*

*Document date: 26 May, 2019*

## Abstract

**Background:** Sleeve gastrectomy is a stapler dependent bariatric procedure. A hand-sewn sleeve gastrectomy can be necessary under certain circumstances. Here, we aimed to compare the outcomes of hand-sewn and stapled sleeve gastrectomies for the first time.

**Materials and Methods:** In the hand-sewn group, no staplers were used and after vertical resection of the stomach by energy devices, the remnant stomach was closed by two rows intracorporeal sutures. In the stapler group, sleeve gastrectomy was done in the usual way.

**Results:** Total of 13 patients were compared (hand-sewn:6 and stapled:7). All the sleeve gastrectomies completed laparoscopically. The operating time was longer 200 (100-300) minutes vs. 135 (60-220) minutes,  $p:0.07$ ) and amount of bleeding was higher 105 (50-190) vs. 35 (10-45) ml.,  $p:0.004$ ) in the hand-sewn group. Leakage and gastrointestinal bleeding were seen in the hand-sewn group but no complications were found in the stapler group. No statistically significant difference was found between metabolic outcomes of the two groups three years after the operation ( $p>0.05$ ). Excess of body mass index loss (EBMIL) of hand-sewn group and stapler group following three years (52.9% and 60%, respectively) were similar.

**Conclusion:** Laparoscopic hand-sewn sleeve gastrectomy can be an alternative procedure to stapled sleeve gastrectomy in certain circumstances. Longer procedure time and more blood loss were associated with hand-sewn sleeve gastrectomy.

**Keywords:** morbid obesity, surgical stapling, suture techniques, natural orifice surgery, transoral, mini-laparoscopy.

## Introduction

Nowadays, morbid obesity is a major health problem that we face in every age groups. In the treatment of morbid obesity, sleeve gastrectomy is applied more and more frequently. However, sleeve gastrectomy is a stapler dependent operation and sleeve gastrectomy without the use of staplers was very limited in the literature [1]. Hand-sewn sleeve gastrectomy can rarely be necessary in some special conditions such as technical defects of the staplers, patients allergies to titanium clips or sometimes when staplers were unusable [1]. As far as we know, there was no study that compare the results of stapled and hand-sewn sleeve gastrectomies so far. The purpose of this study was to compare the hand-sewn and stapled sleeve gastrectomies in a small case series.

## Materials and methods

In June 2013, we launched a natural orifice surgery program including several procedures. In this context, we planned natural orifice (transoral) extraction of sleeve gastrectomy specimens. Patients who were eligible and agree with participation to the hand-sewn sleeve gastrectomy combine with transoral specimen extraction study were accepted to two group. This study is conducted according to the STROCSS criteria. Total six morbidly obese patients (body mass index more than 40 kg/m<sup>2</sup>) who had undergone hand-sewn sleeve gastrectomy between the dates May-2014 and December 2014, were investigated retrospectively. In the same time period, seven another morbidly obese patients included in the control group were treated with stapled sleeve gastrectomies. Grouping was done by the acceptance of the patients. The hand-sewn sleeve gastrectomy group combined with natural orifice surgery. Patients who do not participate the hand-sewn group were treated by the stapled sleeve gastrectomy and the specimens were extracted through the trocar site. In both groups, patients' age, gender, height, weight, body mass index, comorbidity, and lifestyle properties were recorded.

Intraoperative blood loss, operating time, length of hospital stay, postoperative complications, and the metabolic/bariatric results of the two groups in one and three years were evaluated. Statistical comparisons were performed with nonparametric statistical tests (Mann-Whitney U-test and Wilcoxon Signed Rank Test to analyze numerical data, and Fisher exact test to analyze categorical data). Numerical data expressed as median and range.  $P < 0.05$  was considered as significant.

### Surgical Technique

In the hand-sewn group, following pneumoperitoneum with a Veres needle, the first 5 mm trocar was entered 14 cm down and 4 cm left from the xyphoid process. Other two 5 mm trocars were applied to the left and right upper quadrant. Last two 5 mm trocars were placed just below the xyphoid process for automatic liver retractor and through the epigastrium as a working port. A 5 mm 30° optic camera was used and the intraabdominal pressure was set to 14 mmHg. Gastrocolic and gastrosplenic ligaments were divided by 5 mm Ligasure (Force Triad, Covidien, Boulder, CO, USA) starting from 4-6 cm to pylorus till the angle of His. The greater curvature was liberated up to the left crus of the diaphragm. The anterior and posterior wall of the stomach were transected with a 5 mm Ligasure device under the guidance of a 36 F bougie, starting 4-6 cm away from the pylorus and division of both gastric leaves headed vertically in the direction of angle of His. After completion of the gastric division, the resected specimen was removed through the mouth with the help of an intraoperative peroral endoscopy using an endoscopic snare. The remaining open anterior and posterior walls of the stomach was continuously sutured each other by 3/0 polypropylene sutures. The suture length was 20 cm.

All the trocars were 5 mm in size in the hand-sewn group. The surgical technique of the stapled group has been defined in detail before (2). In short, vertical gastrectomy was applied with a 60 mm. linear stapler (Endo GIA™ Ultra, Covidien) under the guidance of 36 F bougie. These procedures were done through three 12 mm and two 5 mm trocars, that were placed to the same locations with the hand-sewn group. The specimen in the stapler group were extracted from the left upper quadrant trocar site. No supportive material or suture was use to the staple lines. Methylene blue test was done and a drain was place in all case.

After 6-8 hours postoperatively, the patients were mobilized, thromboembolic stockings were kept for five days. A liquid diet was started on day one. Prophylaxis of deep vein thrombosis was continued for 15 days.

## Results

There was no difference between the two groups in terms of demographic characteristics and concomitant diseases (Table 1). All the procedures were completed laparoscopically and no additioanl port placement was required. Duration of surgery for hand-sewn operations was 65 minutes longer than stapled ones 200 (100-300) vs.135 (60-220),  $p=0.08$ ). Total amount of bleeding was significantly higher in the hand-sewn group 105 (50-190) ml, 35 (10-45) ml,  $p: 0.003$ ). Intraoperative complications were seen in two of the hand-sewn cases. A mucosal injury was observed in the esophagus during the sending of the 36 F bougie into the stomach. The intact esophagus wall was confirmed by intraoperative endoscopy and postoperative contrast radiography. No complication occurred in this case postoperatively. This complication was not related with the selected sleeve gastrectomy technique. On the other case, the remnant posterior gastric wall was narrower than the anterior wall. However, after suturing both walls of the stomach each other , no stenosis was seen. In the early postoperative period, there was

no complications in both groups and patients were discharged uneventfully. However, there were two re-admission and both were in the hand-sewn group. One was due to upper gastrointestinal bleeding and treated successfully by conservative methods for five days. Another one had peritonitis findings 3 days after discharge. She required a laparotomy and a suture line leak was found out. Leak point was repaired by sutures again. Postoperative course was uneventful and she was discharged smoothly without any other complications 13 days after second hospitalization. There was no mortality in this study.

The mean follow-up period was 39 (34-43) months in the stapler group. It was 34 (20-46) months in the hand-sewn group. Decrease in BMI at similar rates was observed in 3<sup>rd</sup> postoperative year (hand-sewn group: 34 (29-38) kg/m<sup>2</sup> vs. stapled group: 33 (30-34) kg/m<sup>2</sup>,  $p>0.05$ ). No significant difference were found between metabolic outcomes of the two groups three years after the operation. Excess of body mass index loss (EBMIL) of hand-sewn group and stapler group (52.9% and 60%, respectively) were similar on the 3<sup>rd</sup> follow-up year. In the hand-sewn group there was only one patient with glucose intolerance and her glucose intolerance was completely relieved. In the stapled group, three patients were diabetic and one patient had glucose intolerance. Two of them completely stopped using oral antidiabetics, and one of them continued to use oral tablet at the same dose. Sleep apnea in both groups was recovered completely. Preoperative and postoperative levels of low density lipoprotein (LDL), high density lipoprotein (HDL), triglycerides, cholesterol, and HbA1c levels were similar in both groups (Table 2).

## Discussion

The popularity of sleeve gastrectomy is increasing among the patients and the surgeons. The operation constitutes more than one third of bariatric processes now performed all over the

world and more than half in the United States [3]. Sleeve gastrectomy is a stapler dependent procedure like Roux-en-Y gastric bypass, biliopancreatic diversion and duodenal switch and very limited number of data is available in the literature for sleeve gastrectomy operations without use of staplers. Himpens et al. had reported two cases of the sleeve gastrectomies without using staplers, but they did not mention the details of these cases [4]. In case of technical problems of the staplers, sometimes, hand-sewn suturing can be inevitable during sleeve gastrectomies. For example, El Geidie et al. have indicated that stapler was locked in laparoscopic sleeve gastrectomy after third firing of the stapler [5]. In such cases, hand-sewn surgery is inevitable. In 2013, Rezvani, et al. was described a robotic sleeve gastrectomy without staplers in a patient who was allergic to metallic materials. They concluded that hand-sewn sleeve gastrectomy with the robot had an advantages in terms of suturation, but also stated that the cost has increased [6].

Sleeve gastrectomy can be regarded as a restrictive process and the weight loss is compatible with the the volume of the stomach that is removed. Removal of the gastrectomy specimen by expansion of the entrance of trocar is a routine process. We were able to find only one study that remove sleeve gastrectomy specimen transorally. Gunkova et al. removed sleeve gastrectomy specimen transorally in 21 patients with the aim of decreased risk of wound related complications [7]. In our cases that we did not use staplers, opening of the stomach gave us the oppurtunity to extract the specimen through the esophagus and mouth by endoscopy. We did not need any extension of skin incision to remove the specimens and no complications were observed related with the oral specimen extraction.

Laparoscopic hand-sewn sleeve gastrectomy is a challanging process that requires experience and patience. Despite the limited number of the patients, this first comperative study of both

hand-sewn and stapled sleeve gastrectomies demonstrated that hand-sewn technique is a feasible surgical process and particularly can be an alternative procedure to the stapled sleeve gastrectomy in certain circumstances. Longer procedure time and more blood loss were associated with hand-sewn sleeve gastrectomy.

Disclosure Statement: Authors have no conflict of interest.

Sources of funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## References

- [1] Ettinger JE, Ramos AC, Azaro E, Galvao-Neto MP, Mello CA, Galvao MS, et al. Stapler-less laparoscopic gastric bypass: A new option in bariatric surgery. *Obes Surg* 2006;16(5): 638-645.
- [2] Sansal M, Saglam K, Gokler C, Sumer F, Kayaalp C. Laparoscopic Sleeve Gastrectomy Technique; How we do it?. *Laparosc Endosc Surg Sci (LESS)* 2018;25(2):76-80.
- [3] Angrisani L, Santonicola A, Iovino P, Formisano G, Buchwald H, Scopinaro N. Bariatric surgery worldwide 2013. *Obes Surg* 2015;25(10):1822-1832.
- [4] Himpens J, Leman G, Sonnevile T. Laparoscopic Roux-en-Y gastric bypass performed without staples. *Surg Endosc* 2005;19(7):1003.



- [5] El Geidie A, Gadel Hak N, Abdulla T. Stapler's malfunction during laparoscopic sleeve gastrectomy: an unusual but correctable complication. *Surg Obes Relat Dis* 2013;9(1):144-146.
- [6] Rezvani M, Sucandy I, Antanavicius G. Totally robotic stapleless vertical sleeve gastrectomy. *Surg Obes Relat Dis* 2013;9(5):79-81.
- [7] Gunkova P, Gunka I, Zonca P, Dostalík J, Ihnat P. Laparoscopic sleeve gastrectomy for morbid obesity with natural orifice specimen extraction (NOSE). *Bratisl Lek Listy* 2014;116(7):422-425.