

TECHNICAL MODIFICATION FOR SLEEVE GASTRECTOMY

Modificação técnica para a gastrectomia vertical

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ABSTRACT - Introduction: The surgical technique of sleeve gastrectomy has not been fully standardized and, therefore, there are issues to be solved. There is a tendency to increase its application due to proved efficiency in weight loss, low morbidity and good postoperative results. However, gastroesophageal reflux disease, which can result from it, is still not well understood. **Aim:** To present variant technique for sleeve gastrectomy that leaves the stomach totally with the appearance of a homogeneous tube, without manipulation in pyloric and lower esophageal sphincters. **Technique:** Vertical gastrectomy starts with vessel ligation of the greater curvature at the pylorus till esophagogastric angle. Stapling also starts from the pylorus in the same direction. For modeling was used Fouchet 32 F and all the staple line was done just to it. At the end, oversuture of the staple line and "sump" drainage were done. **Results:** The procedure was used in 55 patients with BMI between 35 and 41. Complications in this group were two fistulas at the esophagogastric angle, one twist of the gastric tube and one postoperative conversion to Roux-en-Y gastric bypass due to untreatable gastroesophageal reflux disease. Fistulas were treated by endoscopic procedure with dilation and septotomy. Mild dysphagia due to tube twisting responded satisfactorily to dilatation. The longest follow-up was two years. The loss of overweight was 67.7% at one year and 69.7% in two. Patients who were suffering from type 2 diabetes mellitus showed disease control in 84.6 % in the first year and 91.6 % in the second. Comorbidities were controlled in all cases. **Conclusion:** The variant technique proposed here for sleeve gastrectomy leaves the stomach homogeneously in a shape of a tube and in small caliber, providing small free gastric cavity and keeping natural functional activity of the sphincters. However, it may lead to unwanted gastroesophageal reflux, which needs to be better measured in future research.

HEADINGS - Gastrectomy. Bariatric surgery.

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RESUMO – Introdução: A técnica operatória da gastrectomia vertical ainda não foi totalmente padronizada e, por isso, existem questões a serem resolvidas. Há tendência dela ter seu uso cada vez mais frequente, uma vez que já provou ser efetiva na perda de peso, com baixa morbimortalidade e bons resultados pós-operatórios. Contudo, a doença do refluxo gastroesofágico, que pode dela resultar, ainda não está bem elucidada. **Objetivo:** Apresentar variante técnica para a gastrectomia vertical que deixa o estômago totalmente tubulizado e sem manipulação nos esfíncteres pilórico e esofágico inferior. **Técnica:** Inicia-se a gastrectomia vertical com a ligadura dos vasos da grande curvatura tendo como referência anatômica o piloro até o ângulo esofagogástrico. O grampeamento inicia-se também a partir do piloro na mesma direção. Para modelagem é utilizada sonda de Fouchet 32 F. O grampeamento é feito justo à sonda modeladora. Finaliza-se com sobressutura da linha de grampeamento e drenagem tipo "sump". **Resultados:** O procedimento foi utilizado em 55 pacientes portadores de IMC entre 35 e 41. As complicações nesse grupo foram: duas fístulas ao nível do ângulo esofagogástrico, uma torção do tubo gástrico e uma conversão pós-operatória para derivação gástrica em Y-de-Roux por refluxo gastroesofágico intratável com medicamentos. As fístulas foram tratadas por procedimento endoscópico com dilatação e septotomia. Disfagia leve por torção respondeu satisfatoriamente com dilatação endoscópica. O maior período de seguimento foi de dois anos. A perda do excesso de peso foi de de 67,7% em um ano e de 69,7% em dois. Os pacientes que eram portadores de diabete melito tipo 2 apresentaram controle da doença em 84,6% no primeiro ano e 91,6% no segundo. Outras comorbidades tiveram controle em todos os casos. **Conclusão:** A variante técnica proposta para a gastrectomia vertical deixa o estômago totalmente tubulizado, em pequeno calibre, propiciando diminuição da cavidade gástrica livre e manutenção da atividade funcional dos esfíncteres naturais. Contudo, pode levar a refluxo gastroesofágico indesejado, que precisa ser melhor mensurado em pesquisas futuras.

DESCRITORES - Gastrectomia. Cirurgia bariátrica.

INTRODUCTION

The operative technique of sleeve gastrectomy (GV) has not been fully standardized and therefore there are issues to be resolved. It was first described by Hess and Marceau⁶ as a first step in a "duodenal switch" and has been widely deployed as a single procedure in the treatment of obesity¹⁵. Given the satisfactory weight reduction observed in several series, surgeons have decided to be limited only to the first phase, suspending the intestinal step that could be performed subsequently, if necessary^{6,14}.

The advantage of not excluding the duodenum is to preserve the absorption of iron, calcium and other nutrients, and to prevent dumping syndrome, anastomotic ulcers and internal hernia formation. These data are particularly important in patients with anemia, especially women of childbearing age³. There is an increasingly tendency to have this procedure being used more frequently, since it has proven to be effective in considerable weight loss associated with low morbidity and good postoperative results¹. However, gastroesophageal reflux disease, as a consequence of GV, is not well understood.

The surgical technique is not fully standardized in their operative times. The alternatives proposed in general leave the antropiloric area in a greater or lesser extent, vertically done, to remove most of the gastric body in the imaginary line that divides the antrum and corpus; this procedure completely eliminates the gastric fundus⁸.

From the viewpoint of physiological internal dynamics of the gastric cavity with partial resection of the body, totally the fundus and maintenance of the antrum, there will be more space to accumulation of gastric juice in the lumen of antropyloric area. As the fundus no longer exists - loosing the main mechanical element to contain the reflux - reflux to the distal esophagus becomes potential reality. The pressure of the lower esophageal sphincter becomes the only obstacle to the gastric fluid to not enter freely into the distal esophagus. In larger quantities, the liquid forces the sphincter to open¹².

The transhiatal esophagectomy make a long tubulization of the greater gastric curvature with about 2 cm wide leaving very small antral segment. Surgeons had had better understanding of postoperative gastric fluids dynamics with it, along the time. Was learned that more vertical the axis of neoesophagus is placed, less internal content remains in the lumen and, so, less reflux may exists. The pylorus over time reverts to its standard function - regardless of whether or not pyloroplasty have been done - giving passage of gastric contents into the duodenum. Even so, there are reports of Barrett's esophagus in the cervical esophagus^{4,9,10,11,12}. But, unlike the anastomosis in esophagectomy in cervical esophagus - where the anastomosis is located

few centimeters down in relationship to the upper esophageal sphincter, thus giving opportunity to proximal reflux esophagitis and Barrett's esophagus - in the case of gastric tubing for bariatric surgery, the distal segment of the esophagus is less subject to the deleterious reflux action, due to the physiological action of the lower esophageal sphincter, which remains intact, and, also, due to the small amount of liquid that would force intraluminarily the inferior esophageal sphincter. It was learned that smaller tubulized cavity leads to less potential reflux, and gastric emptying becomes faster to the duodenum¹².

Thus, through this knowledge, came the idea to apply the same reasoning to GV, which ultimately are similar procedures. The difference in favor of it is the smallest extension of the gastric tube, and the existence of the non manipulated anatomofunctional lower esophageal sphincter, maintaining its physiological action. In summary, by decreasing both - the gastric cavity as far as the intraluminal gastric liquid pressure and keeping the physiological actions of the lower esophageal and pyloric sphincters -, it is believed to decrease the potentiality of distal esophagitis with GV.

Thus, the aim of this study was to present technical variant for GV which leaves a tubulized stomach in place without manipulation of the lower esophageal and pyloric sphincters.

TECHNIQUE

The research project of this technical adaptation was approved by the Ethics Committee of the Beneficent Evangelic Society of Curitiba, PR, Brazil.

After installation of pneumoperitoneum 12 to 15 mmHg five trocars (two 12 mm, two 10 mm and one 15 mm) are introduced into the abdominal cavity (Figure 1). The surgeon stands between the legs of the patient with the 1st assistant in the optics, positioned to the right; the 2nd assistant is positioned on left to handle the liver retractor and traction forceps for stomach presentation. The scrub nurse is positioned beside the 2nd assistant.

Devascularization of the greater curvature

GV is started with the greater curvature vessel ligation having as reference point the pylorus. Devascularization, as well as gastrectomy, are initiated at the pylorus. These manouvers are made with ultrasonic energy scalpel extending from the pylorus till the esophagogastric angle. Coalescence of the posterior wall of the stomach to the nearby structures are sectioned permitting stapling symmetrically done with the posterior and anterior wall, modelling a narrow tube, and, also, avoiding gastric tube twisting (Figure 2).

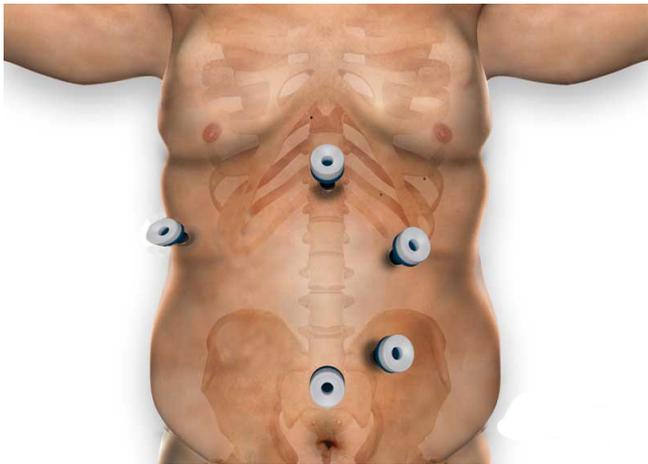


FIGURE 1 - Positioning of the trocars

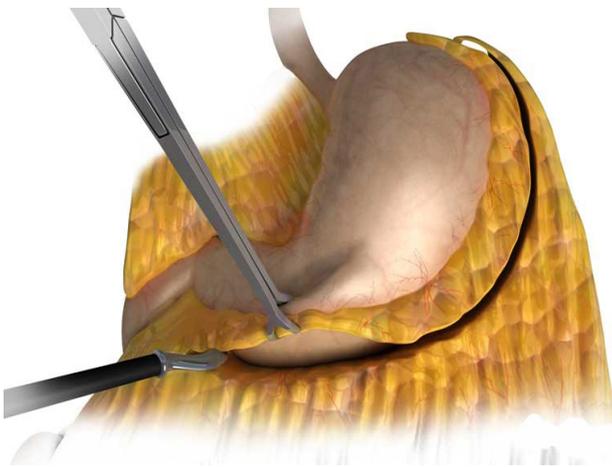


FIGURE 2- Devascularization of the greater curvature extending from the pylorus to the esophagogastric angle. Coalescence of the posterior wall of the stomach to the nearby structures

Antral stapling

The stapling starts from the pylorus going to the gastric antrum, that it is thicker; so, it needs black or green cartridge. In the manufacture of gastric tube, only the first two shots are not molded by Fouchet device, that will be placed in the next step (Figure 3).

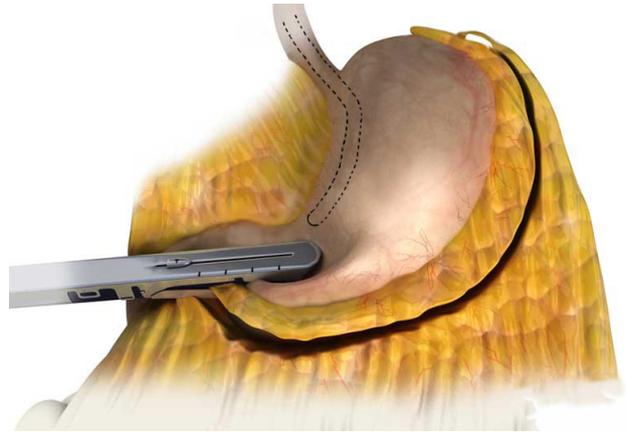


FIGURE 3 - Antral stapling done with black or green cartridge

Incisura angularis and gastric body

At this time of the operative procedure a Fouchet 32 F probe is introduced through the mouth into the duodenal lumen, thereby bypassing the pylorus. Stapling load with purple or blue cartridges are used from the incisura angularis (Figure 4), with special attention to not cause stenosis at this level; it can be avoided in making up stapling just to the probe, always observing the anterior and posterior gastric walls to make them symmetrical. The following is the section toward the cardia load Blue (Figure 5A).



FIGURE 4 - Statement to the right of the loads on the market with the size of the clips, and the thickness of the left fundus, body and antrum gastric; visible due to variation in wall thickness loads must be adjusted to it for safety stapling.

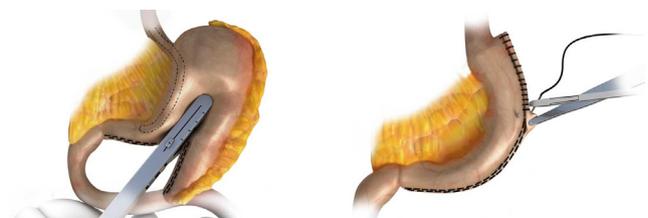


FIGURE 5 - A) Stapling and Section of the gastric body toward the gastroesophageal junction, B) final aspect of the staple line showing the tubular shape is the stomach from the pylorus to the cardia

Esophagogastric angle

The saddle-point that needs good viewing angle on placing the stapler to be avoided stenosis of the distal esophagus and excessive devascularization, providing Fistula at this level (Figure 5B).

Completion of procedure

Takes place in all cases sobressutura the staple line 3-0 prolene and drains the peritoneal cavity to drain type "sump".

RESULTS

The procedure described herein was used in 55 patients with BMI between 35 and 41. The operations started in January 2011 until July 2013. Todos form signed Informed Consent.

Complications in this group were two fistulas at the esophagogastric angle, a twist of the gastric tube and the conversion of GV for Y gastric bypass Roux-en-intractable gastroesophageal reflux with medication. Fistulas were treated by endoscopic procedure with dilation and septotomy⁷. The mild dysphagia by twisting responded satisfactorily to dilatation. The longest follow-up period is two years. The loss of overweight was 67.7% at one year and 69.7% in two. Patients who were suffering from type 2 diabetes mellitus showed disease control in 84.6% in the first year and 91.6% in the second. Other comorbidities had control in all cases

The postoperative aspect of the operation is shown in Figure 6.



FIGURE 6 - Final appearance of the operative procedure

DISCUSSION

This technical variant is part of an adjustment widely used in surgical procedures. Michalski et al.⁸ in a recent publication also is in favor of this proposal. They had series of 12 patients divided into two groups: one for removal from the antrum pylorus 2.5 cm using 36 F Fouchet probe for modeling, and other preserved with it. After scintigraphy demonstrated increased gastric emptying occurs postoperatively, when comparison

was made with the group of patients with preserved antrum. The technical proposal presented here is to start clipping at the pylorus using probe Fouchet 32 F to shape the gastric tube. It has been a constant concern of the appearance or worsening of gastroesophageal reflux in the postoperative course of GV. The panel of international consensus on it done in Coral Gables, Florida in March 2011, with the participation of 11 countries and combined experience of 12 000 operations showed incidence of gastroesophageal reflux in 12.11% + / -8.97. This consensus also indicated that the lack of standardization of the technique, with numerous variations performed by several surgeons may predispose to poor outcomes¹³.

The calibration of the tube so that it is uniform and without substenoses - mainly on the height of the notch angle - an important point in this procedure. The difficulty in positioning the stapling when the stomach verticalizes notch that is responsible for higher stenosis reported in the literature¹⁷. The gauge probe Fouchet's better to be between 32 and 36 F. It should be noted that with the use of the first can be increased chance of complications (strictures and fistulas consequential), and the second to be increased possibility of failure over time (dilation tube¹³ weight regain). Regarding the caliber there is controversy in the literature, with authors who recommend calibration with larger diameter⁵. A probe Fouchet, ease to be found in operating rooms, is what is recommended for modeling the tube. With its use, there sure the calibration is reproducible at any experience with either hand, avoiding sub-stenosis severely compromising the operation result. part of the medical literature concerning the caliber of 36 C and here was used 32 F, which showed good emptying and small enough to decrease the volume of intake of patients⁵.

Regarding den, most surgeons section starts between 4 and 8 cm from the pylorus⁵. The proposal presented here is to remove all the excess den caliber estimated at 32 F. What motivated this adaptation technique is able to minimize gastroesophageal reflux postoperatively, based on fluid dynamics intragástricos. With less light, the deposit of any intraluminal fluid is smaller and, if leakage occurs, the refluxato may be less harmful. Also, the smallest amount of water content will decrease the pressure on the lower esophageal sphincter, giving you the ability to contain the flow. It has been demonstrated recently confirmed by Michalski⁸ by scintigraphy after GV, even with this increase in intragastric pressure tube gastric emptying is faster, and this occurs even with presence of higher residual^{7,16}.

With the application of this technique in patients authorized by the Ethics Committee, there was a decrease in volume food ingested by patients, coupled with faster gastric emptying, possible developments referred to in the good results and very few complaints of reflux in postoperatively to medium term.

The reasoning above regarding the pathophysiological change that must occur with this modification, it is valid to be so interpreted. There is ample documentation with gastric tube interposition in transmediastinal esophagectomies - operation similar to this modification - whose similarity results can be expected here. However, studies should continue to prove this hypothesis, and also whether this procedure can cause gastroesophageal reflux disease and its complications. For both three lines of research should be open: 1) to check on patients while they were their own controls (pre and postoperative) are acquired reflux after this operation and whether it is acid or non-acid, 2) to study what are the components that refluxato - acid, biliopancreatic and / or mixed and in what quantities of components, 3) verify that changes occur in the esophageal mucosa of the distal esophagus.

Studies with these intentions should clarify, in future, the real changes stemming from this procedure. The authors have initiated this research with mister in three lines to contribute to clarify these points.

CONCLUSION

The variant proposed technique for GV leaves the stomach completely tubulizado in small caliber, providing decreased gastric cavity and maintenance of functional activity of natural sphincters. However it can lead to unwanted gastroesophageal reflux, which needs to be better measured in future research.

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