Surgical gastrostomy: current indications and complications in a university hospital

Gastrostomia cirúrgica: indicações atuais e complicações em pacientes de um hospital universitário

Christophe Bezerra Anselmo[1]; Valdir Tercioti Junior, TCBC-SP[2]; Luiz Roberto Lopes, TCBC-SP[3]; João de Souza Coelho Neto, TCBC-SP[4]; Nelson Adami Andreollo, TCBC-SP[5]

A B S T R A C T

Objective: To analyze the surgical gastrostomies performed at a public University Hospital, their indications and complications. **Methods**: We conducted a retrospective, nonrandomized review of medical records of patients who underwent surgical gastrostomy from 2007 to 2011; **Results**:, In the period of studied, 86 patients underwent surgical gastrostomies for enteral nutrition. The Stamm technique was employed in all cases. Men constituted 76 (88%) of the cases and the mean age was 58.4 years, the maximum age being 87 years and the minimum 19. We observed 16 (18.60%) minor complications, 17 (19.76%) serious complications and 8 (9.3%) perioperative deaths. **Conclusion**: Surgical gastrostomy, while considered a smaller procedure, is not without complications and mortality. The Stamm technique, despite the complications reported, is easy to perform and to handle, as well as safe.

Key words: Surgical procedures, operative. General surgery. Gastrostomy. Postoperative complications. Enteral nutrition.

INTRODUCTION

In 1839, Sedillott successfully performed gastrostomies in dogs, but failed to carry out the same procedure in humans in 1846, with the death of three patients. Later, in 1876, Verneoil made the first successful gastrostomy in humans. Since then, several technical modifications have been suggested, such as the Witzel gastrostomy in 1891 [1], in which a subserosal tunnel is done above the tube. Stamm, in 1894 [2], described one of the most common techniques performed today and in the history of surgical gastrostomy, which consists in making a purse-string suture to invaginate the tube into the stomach [3]. In 1980, Gauderer *et al.* [4] described the percutaneous endoscopic gastrostomy, which radically changed the gastrostomy technique .

The indications for enteral nutrition include difficulty in swallowing by neurological conditions or facial trauma, luminal obstruction caused by malignant or benign strictures, besides hypercatabolic states such as extensive burns, cystic fibrosis and Crohn's disease [5]. In cases of limitation of food intake by a short period, nasoenteric tubes are indicated. However, these tubes also have their limitations, such as obstruction by diet residues, easy displacement, the need for periodic replacements, high cost and unavailability in some medical services. On the other hand, gastrostomies are indicated for patients with intact gastrointestinal tract but who are unable to receive adequate caloric intake by mouth for a long term. The gastrostomy may also be indicated for gastric decompression in cases of severe gastroparesis and inoperable intestinal obstructions [6].

The literature currently describes three types of gastrostomy: percutaneous fluoroscopic gastrostomy, percutaneous endoscopic gastrostomy (PEG) and surgical gastrostomy [7]. Although PEG is already known to be safer than surgical gastrostomy[3,6,7,8,] it has some limitations: the impossibility to access the stomach endoscopically caused by head and neck tumors, benign or malignant strictures of the esophagus [7], and impossibility to set the stomach adjacent to the abdominal wall and perform transillumination, which may be complicated by ascites, obesity, previous gastric resection, secondary abdominal adhesions due to previous surgeries and hepatomegaly [9].

Work conducted in the Discpline of Digestive System Diseases and Gastrocenter of the Department of Surgery at the School of Medical Sciences of the State University of Campinas – UNICAMP, Campinas, São Paulo State SP, Brazil.
1. Resident, General Surgery, School of Medical Sciences, UNICAMPSP-BR; **2.** Staff Surgeon, Discipline of Digestive System Diseases and Gastrocenter Department of Surgery, School of Medical Sciences, UNICAMP; **3.** Lecturer Full Professor, Discipline of Digestive System Diseases and Gastrocenter, Department of Surgery, School of Medical Sciences, UNICAMP; **4.** Staff Physician , Discipline of Digestive System Diseases and Gastrocenter Department of Surgery, School of Medical Sciences, UNICAMP; **5.** Full Professor, Discipline of Digestive System Diseases and Gastrocenter, Department of Surgery, Faculty of Medical Sciences, UNICAMP.

Thus, surgical gastrostomy becomes the option in the following situations: 1) when the patient will be undergoing laparotomy for some reason; 2) impossibility to perform gastroscopy to carry out PEG; 3) technical failure of PEG; 4) unavailability of funds to perform PEG or percutaneous fluoroscopic gastrostomy and difficult to introduce nasoenteral tubes or very prolonged use of such devices[10].

Surgical gastrostomy can be performed basically in two ways: 1) by laparotomy – the most frequently performed way in most hospitals in Brazil; and 2) by laparoscopy – which can even assist the endoscopic technique, as it allows an apposition of the gastric wall to the abdominal wall under direct vision [11,12].

The objective of this study was to review the surgical gastrostomies performed at a public University Hospital, their indications and complications.

METHODS

This study was a retrospective, nonrandomized review of medical records of patients who underwent surgical gastrostomy in the period from 2007 to 2012 at the Hospital of the University of Campinas (UNICAMP). Data collection from medical records was performed from June to September, 2012.

We evaluated gender, age, disease prevalence, indications for gastrostomy, as well as the surgical technique, the type of catheter used and local and systemic complications.

RESULTS

From 2007 to 2011, 86 (N) patients underwent surgical gastrostomies. All these were indicated for enteral nutrition. Procedures with indications of gastric decompression were not performed. The Stamm technique and general anesthesia were used in all cases. Men constituted 76 (88%) of the patients and women 10 (12%). Table 1 shows the distribution of patients by age and gender.

The most common diseases were esophageal squamous cell carcinomas (n=43 - 50%) and head and neck neoplasms (n=27 - 31.4%). Stenosing adenocarcinoma of the esophagogastric junction (EGJ) was also cause of dysphagia in 5.81% of patients (n=5). Six patients (6.98%) had neurological disorders that prevented oral nutritional intake. The remaining five patients (5.81%) were isolated cases of: breast cancer metastatic to the esophagus, peptic strictures of the esophagus, neuroendocrine carcinoma of the neck, hypopharynx abscess after head and facial trauma and severe sepsis of abdominal focus. This latter patient underwent closure of laparotomy and took advantage of the access to perform the surgical gastrostomy. Table 2 summarizes the indications of surgical gastrostomies.

The type of tube used in the Hospital in all cases was the indwelling urinary catheter, Foley type, with diameters varying from 18 to 24 French. Complications are listed in Table 3 and were grouped into minor and major (more severe). Six patients (6.98%) had superficial surgical wound infection treated medically, while 2 (2.33%) had surgical wound seroma. Regarding the complications related to the permanence of the tube, there were three cases (3.49%) of obstruction of the tube with the need to change it; three (3.49%) leaks of the diet by the tube hole, treated

Table 1 - Distribution of patients by age and gender.

Age (years)	Average	58.4
	Interval	19-87
Gender	Men	76 (88%)
	Women	10 (12%)

Table 2 - Prevalence of diseases in patients undergoing gastrostomy.

Diagnosis	Number (N)	Percentage (%)
Esophagus SCC*	43	50
Pharynx SCC	11	12.79
Oral cavity SCC	5	5.81
Larynx SCC	11	12.79
Adenocarcinoma of EGJ**	5	5.81
Neurological disease	6	6.98
Trauma / Abscess	1	1.16
Peptic stricture	1	1.16
Abdominal sepsis	1	1.16
Metastatic tumors	1	1.16
Neuroendocrine carcinoma of the neck	1	1.16

(SCC= Squamous cell carcinoma;*
*** EGJ=Esophagogastric junction)*

with expectant management or exchange to a tube of larger diameter; and two (2.33%) displacements of the tube.

There were three cases (3.49%) of aspiration pneumonia. In three patients (3.49%), there was the collapse of the gastrostomy with gastrocutaneous fistula. Two of these patients were treated medically and one (1.16%) had an evisceration, managed with re-suture of the abdominal wall. Two patients (2.33%) had eventration and were treated conservatively, later presenting with an incisional hernia.

Patients who subsequently died in the first 30 days after the procedure were 8 (9.3%), and 6 (6.9%) were diagnosed with malignant tumor of the head and neck or esophagus. Two patients died because of aspiration pneumonia, one because of arrhythmia and cardiogenic shock, one by probable pulmonary embolism, two by septic shock and two of unknown reasons. One patient who died of septic shock was reoperated on the 11th postoperative day with peritonitis due to a perforated gastric ulcer, dying on the 21st day after the first surgery.

Table 3 summarizes the data on the observed complications and early deaths.

DISCUSSION

In the era of percutaneous gastrostomy, there is still indication for surgical gastrostomy, whether by open or laparoscopic access. This is corroborated by similar final results of endoscopic and surgical techniques, as demonstrated by Bergstrom *et al.* [13]. Notwithstanding its greater number of complications and higher cost than endoscopic gastrostomy, surgical gastrostomy has acceptable morbidity and mortality [14].

There are few studies describing the results and complications of surgical gastrostomy, especially in the Brazilian literature. Additionally, the heterogeneity of studies renders the comparison of results difficult. The definition of complications (both what would be a complication and what are the major and minor ones), the profile of patients and the follow-up of cases are non-standard among the articles revised. Most studies, like ours, are retrospective, which further limits the value of these works.

Our results are similar to those already described in the literature, as shown in Table 4. Shellito *et al.*[15] conducted a retrospective study that analyzed 424 gastrostomies, and only 92 were for enteral nutrition. A few decades ago, the indication for postoperative decompressive gastrostomy after major abdominal surgeries was more frequent [16]. In the 92 feeding gastrostomies, the author found 2.2% of aspiration pneumonia and 1% of collapse of the gastrostomy with gastrocutaneous fistula. There were no reported cases of eventration or evisceration, while this review shows two cases of eventration and one of evisceration. Certainly, the high level of malnutrition of these three patients, all with advanced neoplasms of the head and neck or esophagus, contributed to those complications.

Grant[3], in a retrospective study comparing 88 cases of surgical gastrostomy with endoscopic gastrostomy, , found data similar to our results as for the surgery cases. Cosentini *et al.* [17] compared gastrostomy techniques and analyzed 14 cases of surgical gastrostomy. These authors reported a greater number of complications than ours, but with a much smaller sample. Moller *et al.*[7] also retrospectively compared techniques and analyzed 35 cases of surgical gastrostomy. Complications were similar to ours, however with 10 cases (29%) of deaths in the first 30 postoperative days, where 7 were related to the operation and 3 to the underlying disease. Our overall mortality was 9.3% and, in most cases, was related to the procedure,

Table 3 - Complications and early deaths of patients who underwent surgical gastrostomy.

Complications	Number	Percentage (%)
Minor	**16**	**18.60**
Diet leak through the tube hole	3	3.49
Obstruction of the tube	3	3.49
Seroma	2	2.33
Superficial surgical wound infection	6	6.98
Displacement of tube	2	2.33
Major	**17**	**19.76**
Aspiration pneumonia	3	3.49
Collapse of the gastrostomy	3	3.49
Eventration	2	2.33
Evisceration	1	1.16
Early death (within 30 days postoperatively)	8	9.30

obviously complicated by the underlying conditions of the patients.

Rustom *et al*. [18], comparing three gastrostomy techniques, studied 10 cases of surgical gastrostomy and also found a percentage of complications similar to this review, despite the smaller number of patients.

Ljungdahl *et al*. [9], in a well-designed prospective study, compared PEG with surgical gastrostomy, including 35 patients undergoing operative procedure, and found 14.3% mortality and 74% of complications. These findings may be due to the criteria used to define the complications and mainly to the fact that it is a prospective study, where patients were assessed daily following a protocol, which increased the sensitivity of the analysis.

The endoscopic gastrostomy is a specialized procedure, with technical changes in recent years, that requires specific materials and tubes and which should be performed by trained endoscopist physicians [13]. Grilo *et al*. [19], performed endoscopic gastrostomy in 17 patients in 2012 and reported the occurrence of one major complication and four minor complications.

Zorrón *et al*.[20] described the performance of Stamm gastrostomy by subcostal mini-incision, local anesthesia and intravenous sedation in 15 patients in 2005, showing the advantages and disadvantages of the technique. However, these authors reported complications in 3 cases: a colon perforation, excessive leakage of peri-tube gastric secretion and partial dehiscence of the gastric suture.

It is important to emphasize that the Hospital where the surgeries were performed is a university environment, and the surgical procedures are performed with the participation of residents under the supervision of physicians or professors. Additionally, the University Hospital treats patients of the Brazilian Unified Health System (SUS), possibly with the unavailability of material to perform endoscopic gastrostomy, which could increase the indication of surgical access to the detriment of the endoscopic access for the performance of gastrostomies. Another important factor is the advanced stage of cancer patients – most of the sample – who seek care at a public hospital. Most of these patients were at advanced stages of their neoplasms, which could explain part of the morbidity and mortality observed in this study.

The surgical gastrostomy is a simple surgical procedure, performed for more than 100 years, and which every general surgeon should be able to do. Moreover, it constitutes a mandatory procedure for carrying out the programs of residency in general surgery. With the advent of percutaneous techniques, gastrostomy for enteral nutrition became more widely indicated [13], which in our opinion has also increased surgical gastrostomies. Although simple, it is far from a procedure without mortality, as demonstrated in our study. The care and attention for the good surgical technique is essential for good results. Furthermore, patients with malignancies should, when possible, be operated earlier. In addition, like any surgical procedure, the principles and technical care should be respected in order to minimize possible complications. Therefore, we routinely recommend, when performing surgical gastrostomy, the observance of some care and technical details, such as: a) punctiform opening in the anterior gastric wall between the small and large curvature at the transition between the body and antrum, sufficient to insert the tube; b) making of a double purse-string suture when using the Stamm gastrostomy; c) adequate fixation of the gastric wall to the posterior abdominal wall, without strain, with multiple separate stitches, using nonabsorbable suture in order to prevent leakage of gastric secretion into the abdominal cavity; d) passage of the gastrostomy tube close to the abdominal wall in order to prevent leakage of peri-tube secretion in the postoperative period and subsequent chemical dermatitis; e) careful attachment of the tube on the abdominal wall in order to prevent its inadvertent displacement; f) respect of a minimum oral fasting time of 24 hours in the immediate postoperative period; g) testing with saline solution of the patency of the gastrostomy tube and absence of extravasation of fluid into the abdominal cavity after the procedure intraoperatively; h) testing of the gastrostomy tube with 5% glucose solution drip on the second day postoperatively; i) compliance with the appropriate acceptance and adaptation of the patient to the enteral nutrition postoperatively.

Unlike endoscopic gastrostomy, where silicone tubes are commonly used, in the surgical gastrostomy presented in this series latex tubes of the Foley type were used in all cases. Foley tubes are widely available in public hospitals, have low cost and are easily handled and exchanged when necessary. extravasamentoocadas_ s intra-operat da sonda _

Finally, before indicating gastrostomy, all considerations and medical and ethical guidelines must be made individually for each patient and their families in an effort to reduce the incidence of complications from this procedure and to maximize its benefits.

Concluding, the surgical gastrostomy, while considered a smaller procedure, is not without complications and mortality. The Stamm gastrostomy, despite the complications reported, is easy to perform and to handle, besides providing safety.

RESUMO

Objetivo: *revizar as indicações e as complicações observadas após a realização de gastrostomias cirúrgicas em pacientes internados em um hospital universitário público de ensino.* ***Métodos:*** *estudo retrospectivo não randomizado de revisão dos prontuários médicos dos pacientes submetidos à gastrostomia cirúrgica nos últimos cinco anos, sobre as indicações e complicações.* ***Resultados:*** *no período de 2007 a 2011, 86 pacientes foram submetidos à gastrostomias cirúrgicas para nutrição enteral. A técnica operatória utilizada foi a de* Stamm *na totalidade dos casos. Os homens constituíram 76 (88%) dos casos e a média de idade foi 58,4 anos, a idade máxima 87 anos e a mínima de 19 anos. Foram observadas 16 (18,60%) complicações consideradas menores, 17 (19,76%) complicações graves e oito (9,3%) óbitos peri-operatórios.* ***Conclusão****: as gastrostomias cirúrgicas, embora consideradas procedimentos de menor porte, não são isentas de complicações e mortalidade. A técnica operatória de* Stamm*, apesar das complicações relatadas, é de fácil execução, manuseio e oferece segurança.*

Descritores*: Procedimentos cirúrgicos operatórios. Cirurgia geral. Gastrostomia. Complicações pós-operatórias. Nutrição enteral.*

REFERENCES

1. Witzel O. Zur technik der magenfistulaeinlegung. Zbl Chir. 1891;18:601-4.
2. Stamm M. Gastrostomy: a new method. Med News. 1894;65:324.
3. Grant JP. Comparison of percutaneous endoscopic gastrostomy with Stamm gastrostomy. Ann Surg. 1988;207(5):598-603.
4. Gauderer MW, Ponsky JL, Izant RJ Jr. Gastrostomy without laparoscopy: a percutaneous endoscopic technique. J Pediatr Surg. 1980;15(6):872-5.
5. ASGE Technology Committee, Kwon RS, Banerjee S, Desilets D, Diehl DL, Farraye FA, et al. Enteral nutrition access devices. Gastrointest Endosc. 2010;72(2):236-48.
6. Herman LL, Hoskins WJ, Shike M. Percutaneous endoscopic gastrostomy for decompression of the stomach and small bowel. Gastrointest Endosc. 1992;38(3):314-8.
7. Möller P, Lindberg CG, Zilling T. Gastrostomy by various techniques: evaluation of indications, outcome, and complications. Scand J Gastroenterol. 1999;34(10):1050-4.
8. Wollman B, D'Agostino HB, Walus-Wigle JR, Easter DW, Beale A. Radiologic, endoscopic, and surgical gastrostomy: an institutional evaluation and meta-analysis of the literature. Radiology. 1995;197(3):699-704.
9. Ljungdahl M, Sundbom M. Complication rate lower after percutaneous endoscopic gastrostomy than after surgical gastrostomy: a prospective, randomized trial. Surg Endosc. 2006;20(8):1248-51.
10. Pisano G, Calò PG, Tatti A, Farris S, Erdas E, Licheri S, et al. Surgical gastrostomy when percutaneous endoscopic gastrostomy is not feasible: indications, results and comparison between the two procedures. Chir Ital. 2008;60(2):261-6.
11. Martins FP, Sousa MCB, Ferrari AP. New "introducer" PEG-gastropexy with T fasteners: a pilot study. Arq Gastroenterol. 2011;48(4):231-5.
12. Ocaña LFO, Crocifoglio VA. La gastrostomía laparoscópica como una alternative a la gastrostomía endoscópica percutánea. Rev Gastroenterol Mex. 1995;60(4):218-20.
13. Bergstrom LR, Larson D, Zinsmeister AR, Sarr MG, Silverstein MD. Utilization and outcomes of surgical gastrostomies and jejunostomies in an era of percutaneous endoscopic gastrostomy: a population-based study. Mayo Clin Proc. 1995;70(9):829-36.
14. Nicholson FB, Korman MG, Richardson MA. Percutaneous endoscopic gastrostomy: a review of indications, complications and outcome. J Gastroenterol Hepatol. 2000;15(1):21-5.
15. Shellito PC, Malt RA. Tube gastrostomy. Techniques and complications. Ann Surg. 1985;201(2):180-5.
16. Cox WD, Gillesby WJ. Gastrostomy in postoperative decompression: indications and methods. Am J Surg. 1967;113(2):298-302.
17. Cosentini EP, Sautner T, Gnant M, Winkelbauer F, Teleky B, Jakesz R. Outcomes of surgical, percutaneous endoscopic, and percutaneous radiologic gastrostomies. Arch Surg. 1998;133(10):1076-83.
18. Rustom IK, Jebreel A, Tayyab M, England RJ, Stafford ND. Percutaneous endoscopic, radiological and surgical gastrostomy tubes: a comparison study in head and neck cancer patients. J Laryngol Otol. 2006;120(6):463-6.
19. Grilo A, Santos CA, Fonseca J. Percutaneous endoscopic gastrostomy for nutritional palliation of upper esophageal cancer unsuitable for esophageal stenting. Arq Gastroenterol. 2012;49(3):227-31.
20. Zorrón R, Flores D, Meyer CAF, Castro LM, Madureira FAV, Madureira Filho D. Single-wound gastrostomy: a simple method as an option for endoscopy. Rev Col Bras Cir. 2005;32(3):153-6.

Received on 15/09/2012
Accepted for publication 18/11/2012
Conflict of interest: none.
Source of funding: none.

How to cite this article:
Anselmo CB, Tercioti Júnior V, Lopes LR, Coelho Neto JS, Andreollo NA. Surgical gastrostomy: current indications and complications in a university hospital. Rev Col Bras Cir. [periódico na Internet] 2013;40(6). Disponível em URL: http://www.scielo.br/rcbc

Address for correspondence:
Nelson Adami Andreollo
E-mail: nandreollo@hotmail.com