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Factibility of open vertical gastrectomy in Brazil´s Public Health System.

Factibilidade da gastrectomia vertical aberta no Sistema Único de Saúde.

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ABSTRACT

Objective: to analyse clinical and epidemiological characteristics, postoperative complications, and weight loss in patients undergoing conventional vertical gastrectomy in a hospital under Brazil's Public Health System (SUS). **Methods:** cross-sectional longitudinal retrospective study based on data collection from medical records for variable analysis in patients undergoing open vertical gastrectomy in SUS, from July 2013 to January 2017. **Results:** we analysed 296 patients operated on during the study period, of which 54% were male. The average age was of 39.9 years ±11.4; the average body mass index (BMI) was of 43.5kg/m² in the preoperative period and of 30.3kg/m² in the postoperative period; and the excess weight loss was of 73.6% (83.24% had an excess weight loss greater than 50%). Preoperative BMI was higher in the group with weight loss below 50%. We observed a 5.4% rate of early complications requiring hospitalization and a 1% mortality rate. **Conclusion:** open vertical gastrectomy is a safe and effective weight loss technique, which can be more performed in SUS. Among the variables evaluated in our work, the previous BMI was the only one related to the postoperative success.

Keywords: Obesity. Bariatric Surgery. Gastrectomy. Postoperative Complications. Unified Health System.

INTRODUCTION

Obesity is currently considered one of the main public health problems worldwide. It is a chronic condition that can become a risk factor for other diseases, such as systemic arterial hypertension, diabetes *mellitus*, dyslipidemia, hepatic steatosis, gastroesophageal reflux disease, and cholelithiasis[1]. Individuals with body mass index (BMI) equal to or greater than 25kg/m² are considered overweight, while those with BMI equal to or greater than 30kg/m² are obese. Its a multifactorial and relapsing disease, which needs a multiprofessional approach for its prevention and treatment.

According to World Health Organization (WHO) statistics, one in nine adults worldwide is obese and the overweight population has considerably grown in recent decades. Between 1980 and 2013, the worldwide proportion of adults with BMI above 25kg/m² rose from 28.8% to 36.9% among men, and from 29.8% to 38% among women[2]. The prevalence of obesity almost tripled between 1975 and 2016[3]. In Brazil, 50% of the adult population and 15% of children are overweight. Considering the southern region, 56.08% of adults, 24.6% of individuals between ten and 19 years and 35.9% of children between five and nine years are overweight[4]. This alarming growth is reflected in the high demand for bariatric surgeries, especially when one considers that long-term weight loss through conservative treatments, such as the change of lifestyle habits, including healthy eating and physical activity, fails in more than 90% of obese patients.

Thus, bariatric surgery has proven to be an effective and safe alternative to weight reduction. In 2013, more than 460,000 bariatric surgeries were performed worldwide; 150,000 in Canada and the United States, and about 86,000 in Brazil, where the Public Health System (SUS) has offered this procedure since 2000[5,6]. Here, however, waiting time for surgery can be as long as three or four years.

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The most commonly performed surgical technique had been Roux-en-Y Gastric Bypass (RYGB), but in recent years there was a greater tendency to perform vertical gastrectomy (VG)[7], which made this procedure the most employed model in North America, representing approximately 60% of surgeries in 2017. On the other hand, RYGB fell from 36%, in 2011, to 17.8%, in 2017, according to estimates by the American Society for Metabolic and Bariatric Surgery (ASMBS)[8]. However, in Brazil, RYGB still remained as the most common procedure[9].

Effectiveness, safety, and resolution of comorbidities have made VG a unique surgery in the treatment of obesity. Studies have indicated an average loss from 50% to 70% of overweight, as a consequence of appetite reduction after gastric fundus resection[10]. With the physiological maintenance of gastrointestinal tract flow, unfavorable results, such as dumping syndrome, difficulties in diagnosing tumors in the excluded stomach, disabsorption, and severe nutritional complications, have practically been absent with this technique. VG allows revised or complementary procedures to be carried out if necessary. Improvement in diabetes mellitus and hypertension are also equivalent to RYGB rates[11]. Some authors describe this procedure as being ideal for adolescents who need surgical treatment for obesity, since it has low complication rates when compared to other surgical techniques[12].

Despite the increase in use of VG as a definitive bariatric procedure around the world, this is not the reality in SUS: between 2013 and 2018, 1,629 VG and 43,211 RYGB were performed, i.e., only 3.7% of bariatric surgeries performed during this period were VG[13,14]. The objective of this study is to analyse clinical and epidemiological characteristics, postoperative complications, and weight loss in patients undergoing VG by conventional approach in a health institution under Brazil's Public Health System.

METHODS

Cross-sectional, longitudinal, retrospective study of patients who underwent conventional VG at the Bariatric and Metabolic Surgery Service of Santa Casa de Misericórdia Hospital (HSCM), Curitiba, Brazil, from July 2013 to January 2017. Patients who had at least six-month follow-up after surgery were included in this work. The study was submitted and approved by the Research Ethics Committee (CAAE 79067317.0.0000.0020).

Data collection was performed through the analysis of medical records with information such as gender, age, operative technique, and pre- and postoperative BMI, followed-up for one year. In addition, early and late postoperative complications and deaths were investigated. All data were obtained by the researchers and recorded in the data collection instrument.

The results of quantitative variables were described by mean, standard deviation, minimum value, and maximum value. Categorical variables were described by frequency and percentage. The evaluation of weight loss was carried out by the percentage loss of excess weight (%PEP) using the formula (Preoperative BMI - BMI after one year) / (Preoperative BMI - 25). Patients were divided into two groups: Surgery Success group, with %PEP>50%, and Surgery Failure group, with %PEP<50%. The success rate of the surgery according to weight loss was compared with other variables, such as gender, age, and preoperative BMI.

For the comparison of the two groups, regarding quantitative variables, Student's t-test for independent samples was used. Categorical variables were analysed considering Fisher's exact test. Normality was assessed by Kolmogorov-Smirnov test. Values of $p<0.05$ indicated statistical significance. Data were analysed using computer software Stata/SE v.14.1. StataCorpLP, USA.

The conventional VG technique is standardized in our Service and begins with a subxiphoid median incision of approximately 12cm to 15cm. The ligature of the great vessels of the great gastric curvature is performed 3-5cm from the pylorus to the angle of Hiss with a reusable bipolar energy device and its section is made with monopolar energy. The use of metal clips for short vessel ligation is sporadically employed. For vertical stapling, we use GIA-80 linear stapler and three to five blue loads in total. In cases where the antrum is very thick, we use green load for the first stapling. An invaginant oversuture of the staple line with the use of 3-0 polydioxanone is routine in the Service.

RESULTS

We studied 296 patients. Of these, 197 (67%) had complete medical records, which could be used for the calculation of epidemiological data, complications, and weight loss. The other 99 (33%) patients had incomplete medical records or were lost to follow-up at less than six months and their pieces of information were used only for the calculation of epidemiological data and early complications.

There was a slight male predominance (54% *versus* 46%). The age of the patients was on average of 39.9±11.4 years with a variance from 16 to 78 years (Table 1).

Average preoperative BMI was 43.5kg/m² ±5.9. After one year of the surgical procedure, BMI was 30.3kg/m² ±5.0, i.e., BMI reduction in one year obtained an average of 13.1kg/m² ±4.7. The decrease in BMI values represented an excess weight loss (%PEP) of 73.6% ±22.9. Average follow-up of patients was 15.6 months ±10.5. Of the 197 patients with the required data for analysis, 85.3% had surgical success, i.e., presented %PEP>50%, and only 14.7% remained with %PEP<50%.

The comparison between the epidemiological data of the groups (Surgery Success group and Surgery Failure group) can be seen in table 2. Considering the Surgery Success group, the average of BMI was 42.9kg/m² ±5.4 against 46.4kg/m² ±7.0 of the Surgery Failure group ($p<0.003$). With VG, 88.8% of men and 81.1% of women had surgical success. Gender and age were not statistically significant variants between the two groups.

Table 1. *Epidemiological profile of patients undergoing vertical gastrectomy and follow-up time.*

Variable	n	Classification	Results*
Age (years)	296		39.9±11.4 (16.3-78.5)
Gender	296	Male	158 (53.4)
		Female	138 (46.6)
Follow-up time (months)	287		15.6±10.5 (0.1-102.2)

** Described by mean ± standard deviation or by frequency (percentage).*

Table 2. *Comparison between epidemiological data of the groups which had and did not have surgical success in weight loss after vertical gastrectomy.*

Variable	Classification	Success		p*
		No (n=29)	Yes (n=169)	
Age (years)		43.7±14.0 (18.4-67)	40.8±11.0 (16.3-78.5)	0.208
Preoperative BMI (kg/m^2)		46.4±7.0 (35-61.9)	42.9±5.4 (34.7-62.5)	0.003
Gender	Male	12 (11.2%)	95 (88.8%)	0.159
	Female	17 (18.9%)	73 (81.1%)	

** Student's t-test for independent samples (age and BMI), Fisher's exact test (gender); p<0.05.*

Sixteen (5.4%) patients required readmission or prolongation of primary hospitalization due to early complications (up to 60 days after surgery). The causes of these complications were surgical site infection, surgical wound dehiscence, urinary tract infection, pulmonary focus sepsis, deep vein thrombosis (DVT), pulmonary thromboembolism (PTE), and gastric stump dehiscence. Of these readmissions, 11 (3.7%) patients needed to be reoperated, being seven (2.3%) due to gastric stump dehiscence. All cases of gastric stump dehiscence were initially treated by videolaparoscopy for surgical drainage of the cavity: in four cases jejunostomy was performed and in three cases intraoperative placement of nasoenteral catheter (NEC) was carried out. Upper digestive endoscopy was required in many of these cases for NEC repositioning or dilation of incisura *angularis* substenosis. Two of these patients developed chronic gastro cutaneous fistula and conversion to RYGB was necessary. One patient had a favorable outcome and the other died. The other five patients with gastric stump dehiscence showed complete improvement of symptoms. Three deaths due to early complications were accounted for in our series, which represented a mortality rate of 1%.

Among the late complications (60 days after surgery), the most prevalent were gastroesophageal reflux disease, cholelithiasis, and incisional hernia.

DISCUSSION

In Brazil, between July 2013 and January 2017, the period of our study, 27,409 bariatric surgeries were performed by SUS, of which 1,384 were VG and the remaining, RYGB[15]. Thus, our sample of 296 VG performed at HSCM, Curitiba, represented 21.3% of the national volume.

The group of surgeons of the present study tends to indicate more the VG technique for men, believing that they have a higher weight loss rate due to more quantitative eating habits associated with a sedentary lifestyle. Studies show that men seek bariatric surgery when obesity affects their routine activities[16]. VG tends to be more suitable for these patients, since the restrictive component allows greater weight loss in less time. On the other hand, women, who more often do this type of procedure, seek treatment for aesthetic motivation[17,18]. In the present study, the difference between success rates according to gender was not statistically significant. In addition, it was not possible to analyse the food profile of the patients involved in the study, a fact that could contribute to the elucidation of the different success rates.

In previous studies, it has been shown that the average age of patients undergoing VG has been of 41.5±11.9 years, in agreement with our results[18]. By statistical analysis, the age of the patient has not influenced weight loss.

In this study, the average of %PEP was of 73.6%, higher than that observed in another Brazilian study in which follow-up after one year of procedure has shown a %PEP result of 67%[19]. A total of 168 patients, out of 197 evaluated, had a %PEP>50%, representing 85.27% of surgical success. When we compare our results with those of other authors, we observe %PEP>50% in 94.7% and 86.5% of the evaluated patients[20,21].

When evaluating BMI and %PEP in this study, it was possible to observe that the average of BMI was higher in patients who did not have surgical success when compared to the surgery success group. This is consistent with multiple studies in literature, which have observed the following: the lower weight loss, the higher the initial BMI. Although bariatric surgery by the VG technique is a well-established procedure within the specialty, the exact reason why some morbidly obese patients are unable to achieve adequate weight loss after surgery is not known yet. Some studies emphasize the relationship between surgeon and patient, and make an individual treatment plan, both pre and postoperatively, that includes follow-up visits, exercises, and nutritional follow-up[22]. The implementation of individualized protocols can help patients' postoperative success.

VG is known to show lower rates of perioperative complications. Literature presents a mortality risk of 1% to 2%, with PTE as the main cause[23]. The present study had two cases of PTE, which required readmission, but without mortality. A comprehensive literature review found only two deaths after one month of surgery[24]. In the present study, three patients died and had chronic gastro cutaneous fistula, portal vein thrombosis and soft tissue infection as the causes. These three cases represent 1% of the total cases, in agreement with the percentage found in literature and showing that VG represents a safe surgical procedure regarding the mortality rate[24].

One of the complications of VG is the dehiscence of the duodenal stump which occurs mainly at the angle of Hiss and is present in 0.7% to 5.3% of cases[24]. It is one of the most feared complications, requiring complex and multidisciplinary treatment[25]. In some cases, conversion to RYGB or use of endoscopic prosthesis may be performed[25]. Incisura *angularis* stenosis occurs in up to 4% of operations, in which the treatment consists mainly of endoscopic dilation. In cases of severe stenosis or gastric tube torsion, surgical intervention with conversion to RYGB may be necessary[26].

Other possible late complications are incisional hernias, gastroesophageal reflux disease, anemia, and weight regain[27]. In this study, the most prevalent ones were gastroesophageal reflux, cholelithiasis, and incisional hernia.

We believe that conventional VG has been less used in SUS due to three factors. Firstly, due to the technical difficulty of exposure of gastric fundus during the laparotomic approach in obese patients. VG requires a longer learning curve than RYGB. In addition, SUS patients elected for bariatric surgery are of a lower socioeconomic level and tend to have a worse qualitative food profile, which is unfavorable for a purely restrictive technique. Finally, the short follow-up offered by SUS, of only 18 months, would also be one of the factors for the limited indication of VG[16].

The present study has in its retrospective design its greatest limitation. In addition, the short follow-up (of an average of 15 months) does not allow the verification of late complications, such as weight regain.

The study has a considerable number of patients, but it was not possible to correlate success with demographic data, such as age and gender. Comparative studies among techniques of reduction surgeries are of paramount importance for the implementation of new surgical protocols. Further studies with prospective designs and longer follow-ups should be performed for more reliable comparisons and follow-up of late complications.

Through the present study, it was possible to conclude that open VG is an effective and safe technique for weight loss and that it can be more used in SUS.

R E S U M O

Objetivo: *analisar as características clínicas e epidemiológicas, as complicações pós-operatórias e a perda de peso em pacientes submetidos à gastrectomia vertical por via convencional, em uma instituição de saúde do Sistema Único de Saúde (SUS).* **Métodos:** *estudo transversal, longitudinal, retrospectivo realizado a partir da coleta de dados de prontuários para análise de variáveis em pacientes submetidos à gastrectomia vertical aberta, no SUS, no período de julho de 2013 a janeiro de 2017.* **Resultados:** *foram analisados 296 pacientes operados no período do estudo, dos quais 54% eram do sexo masculino; a média de idade foi de 39,9 anos ±11,4; o índice de massa corporal (IMC) médio no pré-operatório foi de 43,5kg/m² e no pós-operatório, de 30,3kg/m²; a perda de excesso de peso foi de 73,6%; 83,24% apresentaram uma perda de excesso de peso maior do que 50%; o IMC pré-operatório foi maior no grupo com perda de peso menor do que 50%. Observou-se uma taxa de complicações precoces com necessidade de internamento de 5,4% e um índice de mortalidade de 1%.* **Conclusão:** *a gastrectomia vertical aberta é uma técnica segura e eficaz para a perda de peso e que pode ser mais realizada no SUS. Dentre as variáveis avaliadas, o IMC prévio foi a única relacionada com o sucesso pós-operatório.*

Descritores: *Obesidade. Cirurgia Bariátrica. Gastrectomia. Complicações Pós-Operatórias. Sistema Único de Saúde.*

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