ARQGA/1748

PREDICTORS FOR WEIGHT LOSS FAILURE FOLLOWING ROUX-EN-Y GASTRIC BYPASS

Everton **CAZZO**, Flávio Pinto da **SILVA**, José Carlos **PAREJA** and Elinton Adami **CHAIM**

ABSTRACT - ***Context*** - Weight loss failure is a widely recognized occurrence following Roux-en-Y gastric bypass. ***Objective*** - This study aims to identify predictors associated with weight loss failure. ***Method***: It is a retrospective cohort which enrolled 187 subjects who underwent RYGB. Comparisons were made between patients' features at baseline and 24 months after surgery. ***Results*** - A weight loss failure rate of 11.2% was found. Advanced age and diabetes were statistically associated with failure. ***Conclusions*** - The results found were close to previous reports. As weight loss failure represents an important concern, there is the possibility to perform revisional surgeries, which may emphasize the restrictive or malabsorptive characteristics of RYGB, leading to varied results. It is reinforced that weight loss cannot be used as the unique outcome to evaluate the success of surgery.

HEADINGS - Bariatric surgery. Gastric bypass. Weight loss. Obesity. Biliopancreatic diversion.

INTRODUCTION

Bariatric surgery has become the standard treatment for morbidly obese subjects as it leads to significant weight loss and control of comorbidities in most cases. Overall impact of surgery on long term mortality reduction has already been observed on obese patients with 40% reduction on all causes mortality, 56% on coronary heart disease, 92% on diabetes complications and 60% on any type of cancer[1].

Nevertheless, some individuals may regain variable amounts of weight after a period of rapid weight loss, while others fail to lose significant weight despite the major structural and physiological changes brought by the surgery[22]. Hence, postsurgical weight loss failure constitutes a major concern since it is poorly understood and brings unsatisfactory outcomes and possible need of further interventions[12].

OBJECTIVE

To evaluate which preoperative predictors are associated with weight loss failure following Roux-en-Y gastric bypass.

METHODS

It is a retrospective cohort study which enrolled subjects who underwent open Roux-en-Y gastric bypass (RYGB) at Hospital de Clinicas - UNICAMP between 2009 and 2011. This study was submitted and approved by the local Research Ethics Committee. RYGB was indicated according to the National Institutes of Health Consensus Statement criteria[8]. Estimation of sample size was performed using single-proportion formula with 95% confidence interval. Precision was set at 10% and the calculated sample size was 87. Exclusion criteria were: subjects who belonged to vulnerable groups (mentally ill, institutionalized, or aged below 18 years old), postoperative follow-up below 24 months, patients who underwent other bariatric procedures after RYGB; patients who developed consumptive and/or oncologic diseases following RYGB.

The main characteristics regarding demographics, anthropometric parameters, presence of type 2 diabetes mellitus (T2DM) and hypertension, and insulin usage were assessed. Preoperative weight and body mass index (BMI) were evaluated on the day the surgery was carried out; postoperative weight and BMI were evaluated 24 months following surgery. Percentage of excess weight loss (%EWL) was calculated according to the formula below:

%EWL = [preoperative weight – follow-up weight] / [preoperative weight – ideal weight] * 100

A postsurgical percentage of weight loss below 50% of excess body weight after 24 months was considered weight loss failure as previously reported by Reinhold[19]. Comparisons were made between the groups (adequate weight loss vs weigh loss failure) in order to identify possible variables associated to this outcome.

Declared conflict of interest of all authors: none
Disclosure of funding: Flávio Pinto da Silva was funded by the Institutional Scientific Initiation Scholarship Program – Universidade de Campinas (PIBIC – UNICAMP).
Departamento de Cirurgia, Faculdade de Ciências Médicas, Universidade de Campinas – UNICAMP, Campinas, SP, Brasil
Correspondence: Everton Cazzo. Dept. de Cirurgia – UNICAMP. R. Alexander Fleming, s/n; 13083-887, Campinas, SP, Brasil. E-mail: notrevezzo@yahoo.com.br

Statistical analysis

The baseline characteristics of patients are described and then compared with postoperative period. Data were examined for normality according to the Pearson's chi-squared test. For univariate analysis of categorical variables, chi-square and Fisher's exact tests were carried out. Mann-Whitney test was used to compare continuous measures between independent groups. The significance level adopted was 5% (*P*-value <0.05). For execution of analysis it was used Statistic Analysis System (SAS) software for Windows version 9.2.

RESULTS

Of 187 patients selected for study, 154 (82.3%) were female and 33 (17.7%) were male. The mean age at surgery was 40 (range, 18-66) years. Main subject characteristics at baseline are summarized on Table 1.

Mean hospital stay was 4.2 ± 0.4 days. Overall surgical morbidity was 10.7% and the commonest complication was wound infection (6.4%). There was no mortality. Patients experienced a significant mean BMI decrease from 38.5 ± 3 kg/m^2 to 27 ± 3.7 kg/m^2 (*P*<0.001). Mean weight loss was 30.4 ± 11.2 kg (*P*<0.0001). Mean percentage of excess weight loss after surgery was 84.7 ± 27.7%.

Surgical failure (%EWL below 50%) was observed in 21 subjects (11.2%). Advanced age (*P* = 0.0209) and type 2 diabetes mellitus (*P* = 0.0460) presented a statistically significant association with weight loss failure. Table 2 shows comparisons of demographic features, anthropometric parameters, and comorbidity profile between the groups (surgical failure vs. adequate excess weight loss).

TABLE 1. Patients' characteristics at baseline

Age (years)	40 ± 10.3 (range, 18-66)
Gender	
Masculine	33 (17.7%)
Female	154 (82.3%)
BMI (kg/m^2)	38.5 ± 3 (range, 35-46.2)
T2DM	94 (50.3%)
Hypertension	110 (58.8%)
Insulin usage	21 (11.2%)

BMI: body mass index; T2DM: type 2 diabetes mellitus

DISCUSSION

Weight loss failure following classical RYGB has been recognized and its previously reported rates are highly variable, occurring in 15%-35% of cases[2, 16, 18, 23]. It is also much more prevalent in the superobese population, where failure to achieve a BMI below 35 kg/m^2 occurs in up to 60%[16, 18, 20, 24]. The prevalence observed in this study (11.2%) was slightly below those previously reported, but it is possible that it might get higher in a later evaluation; furthermore, as our population did not include any superobese subject, it might be responsible for underestimating the impact of failure following RYGB.

This study showed that advanced age and T2DM, as it has been previously identified[11, 13, 14, 17], were predictors of poorer weight loss following RYGB. This finding may be linked to metabolic changes associated to the ageing process and abnormalities in glycemic and insulinemic homeostasis related to T2DM[4]. Moreover, RYGB has previsouly shown lower improvement rates for T2DM and insulin resistance than biliopancreatic diversions[9].

Since it has a concerning prevalence in mid to long-term follow-up, several surgical interventions have been proposed as alternatives to treat it with varying reported degrees of success. No consensus has been reached on the favored operation of choice for RYGB revision[18]. There are reports of procedures that reinforced the restrictive component of the primary surgery, through endoscopic placation, surgical reduction of pouch and application of adjustable gastric banding over the dilated pouch. Although the good early results reported, these procedures have not led to significant long-term outcomes. Furthermore, surgical pouch reduction was associated with significant morbidity[9, 18]. Other groups proposed the addition of a malabsorptive component to the predominantly restrictive gastric bypass by increasing the length of the Roux limb (distal RYGB)[16, 18, 23] or conversion to biliopancreatic diversion[2, 15]. Despite the possibly durable weight loss after these procedures, it is widely accepted that this type of revisional surgery has a significantly greater risk of complications, especially the protein-calorie malnutrition (PCMN)[2, 16, 18, 23].

Hence, as it is possible to identify subgroups for which RYGB may not be the most successful intervention, it can be proposed other techniques or changes in classical RYGB,

TABLE 2. Correlation of demographic features, body mass index and comorbidity profile with weight loss failure

	Failure	Non-failure	*P*-Value
Age (years)	45.1 ± 9.8 (range, 25-58)	39.1 ± 10.1 (range, 18-65)	0.0209
Gender			0.8582
Male	4 (19.1%)	29 (17.5%)	
Female	17 (80.9%)	137 (82.5%)	
Preoperative BMI (kg/m^2)	37.8 ± 2.8 (range, 35-45.3)	38.8 ± 3 (range, 35-46.2)	0.2090
%EWL	37.6 ± 12.6% (range, 3-49.3)	87.3% ± 23 (range, 50.5-166.6)	<0.0001
T2DM	15 (71.4%)	79 (47.6%)	0.0460
Hypertension	15 (71.4%)	95 (57.3%)	0.2184
Insulin usage	5 (23.8%)	16 (9.6%)	0.0619

BMI: body mass index; %EWL: percentage of excess weight loss; T2DM: type 2 diabetes mellitus

such as distal RYGB or duodenal switch, as first surgical choice in order to avoid further interventions[7]. In regard of duodenal switch, the possibility of a slightly higher occurrence of early complications must be taken into account[7, 14]. Nevertheless, it is important to emphasize preoperatively the importance of adherence to long-term follow-up, as subjects who undergo malabsorptive procedures should be thoroughly apprised of the nutritional/metabolic risks and the need for frequent postoperative laboratory studies[2].

Although percentage excess weight loss cannot be considered a unique measurement to assess surgical success, it is an important outcome, since it is directly linked to patients' expectations and is enrolled in the process of resolution of some comorbidities[6]. On the other hand, even subjects who do not achieve %EWL above 50% may obtain benefits from the procedure. This is observed, for example, in regard of insulin resistance and diabetes, whose early improvement is clearly partially linked to the anatomical changes brought by surgery and not just to weight loss itself[3, 5, 10, 21]. Hence, weight loss outcomes and expectations should be carefully discussed preoperatively between multidisciplinary team and patients in order to bring a realistic overview of the surgical techniques, their benefits, risks, and limitations.

CONCLUSION

Advanced age and diabetes were identified as predictors for weight loss failure following RYGB.

Cazzo E, Silva FP, Pareja JC, Chaim EA. Preditores para perda de peso insuficiente após bypass gástrico em Y de Roux. Arq Gastroenterol. 2014,51(4):328-30.

RESUMO - ***Contexto*** - A perda insuficiente de peso após o bypass gástrico em Y de Roux é uma ocorrência amplamente reconhecida. ***Objetivo*** - Identificar preditores associados à falha cirúrgica na perda ponderal. ***Método*** - Estudo de coorte retrospectiva envolvendo 187 indivíduos submetidos ao bypass gástrico. As características pré-operatórias dos pacientes foram comparadas àquelas observadas 24 meses após a cirurgia. ***Resultados*** - Perda de peso insuficiente ocorreu em 11.2% dos pacientes. Idade avançada e diabetes apresentaram associação estatisticamente significativa com a falha. ***Conclusão*** - Os resultados encontrados foram próximos aos de relatos prévios. Como a perda insuficiente de peso representa uma preocupação relevante, existe a possibilidade de indicação de cirurgias revisionais, que podem enfatizar as características restritivas ou disabsortivas do bypass gástrico, levando a resultados variados. Ressalta-se que a perda de peso isoladamente não pode ser utilizada como desfecho único para avaliar o sucesso da cirurgia.

DESCRITORES - Cirurgia bariátrica. Derivação gástrica. Perda de peso. Obesidade. Desvio biliopancreático.

REFERENCES

1. Adams TD, Gress RE, Smith SC, Halverson RC, Simper SC, Rosamond WD, Lamonte MJ, Stroup AM, Hunt SC. Long-term mortality after gastric bypass surgery. N Engl J Med. 2007;357:753-61.
2. Brolin RE, Cody RP. Adding malabsorption for weight loss failure after gastric bypass. Surg Endosc. 2007;21:1924-6.
3. Buchwald H, Estok R, Fahrbach K, Banel D, Jensen MD, Pories WJ, Bantle JP, Sledge I. Weight and type 2 diabetes after bariatric surgery: systematic review and meta-analysis. Am J Med. 2009;122:248-56.
4. Carbonell AM, Wolfe LG, Meador JG, Sugerman HJ, Kellum JM, Maher JW. Does diabetes affect weight loss after gastric bypass? Surg Obes Relat Dis. 2008;4:441-4.
5. Cazzo E, Gestic MA, Utrini MP, Machado RR, Geloneze B, Pareja JC, Chaim EA. Impact of Roux-en-Y gastric bypass on metabolic syndrome and insulin resistance parameters. Diabetes Technol Ther. 2014;16:262-5.
6. Diniz MdeF, Passos VM, Barreto SM, Linares DB, de Almeida SR, Rocha AL, Diniz MT. Different criteria for assessment of Roux-en-Y gastric bypass success: does only weight matter? Obes Surg. 2009;19:1384-92.
7. Dorman RB, Rasmus NF, al-Haddad BJ, Serrot FJ, Slusarek BM, Sampson BK, et al. Benefits and complications of the duodenal switch/biliopancreatic diversion compared to the Roux-en-Y gastric bypass. Surgery. 2012;152:758-65.
8. Gastrointestinal surgery for severe obesity: National Institutes of Health Consensus Development Conference Statement. Am J Clin Nutr 1992;55:615S–619S.
9. Himpens J, Coromina L, Verbrugghe A, Cadière GB. Outcomes of revisional procedures for insufficient weight loss or weight regain after Roux-en-Y gastric bypass. Obes Surg. 2012;22:1746-54.
10. Ikramuddin S, Korner J, Lee WJ, Connett JE, Inabnet WB, Billington CJ, et al. Roux-en-Y gastric bypass vs intensive medical management for the control of type 2 diabetes, hypertension, and hyperlipidemia: the Diabetes Surgery Study randomized clinical trial. JAMA. 2013;309:2240-9.
11. Júnior WS, do Amaral JL, Nonino-Borges CB. Factors related to weight loss up to 4 years after bariatric surgery. Obes Surg. 2011;21:1724-30.
12. Magro DO, Geloneze B, Delfini R, Pareja BC, Callejas F, Pareja JC. Long-term weight regain after gastric bypass: a 5-year prospective study. Obes Surg. 2008;18:648-51.
13. Melton GB, Steele KE, Schweitzer MA, Lidor AO, Magnuson TH. Suboptimal weight loss after gastric bypass surgery: correlation of demographics, comorbidities, and insurance status with outcomes. J Gastrointest Surg. 2008;12:250-5.
14. Nelson DW, Blair KS, Martin MJ. Analysis of obesity-related outcomes and bariatric failure rates with the duodenal switch vs gastric bypass for morbid obesity. Arch Surg. 2012;147:847-54.
15. Pareja JC, Pilla VF, Callejas-Neto F, Coelho-Neto Jde S, Chaim EA, Magro DO. [Gastric bypass Roux-en-Y gastrojejunostomy--conversion to distal gastrojejunoileostomy for weight loss failure--experience in 41 patients]. Arq Gastroenterol. 2005;42:196-200.
16. Parikh M, Pomp A, Gagner M. Laparoscopic conversion of failed gastric bypass to duodenal switch: technical considerations and preliminary outcomes. Surg Obes Relat Dis. 2007;3:611-8.
17. Perugini RA, Mason R, Czerniach DR, Novitsky YW, Baker S, Litwin DE, Kelly JJ. Predictors of complication and suboptimal weight loss after laparoscopic Roux-en-Y gastric bypass: a series of 188 patients. Arch Surg. 2003;138:541-5.
18. Rawlins ML, Teel D 2nd, Hedgcorth K, Maguire JP. Revision of Roux-en-Y gastric bypass to distal bypass for failed weight loss. Surg Obes Relat Dis. 2011;7:45-9.
19. Reinhold RB. Critical analysis of long term weight loss following gastric bypass. Surg Gynecol Obstet. 1982;155:385-94.
20. Sarhan M1, Choi JJ, Al Sawwaf M, Murtaza G, Getty JL, Ahmed L. Is weight loss better sustained with long-limb gastric bypass in the super-obese? Obes Surg. 2011;21:1337-43.
21. Schauer PR, Kashyap SR, Wolski K, Brethauer SA, Kirwan JP, Pothier CE, et al. Bariatric surgery versus intensive medical therapy in obese patients with diabetes. N Engl J Med. 2012;366:1567-76.
22. Still CD, Wood GC, Chu X, Manney C, Strodel W, Petrick A, et al. Clinical factors associated with weight loss outcomes after Roux-en-Y gastric bypass surgery. Obesity (Silver Spring). 2014;22:888-94.
23. Sugerman HJ, Kellum JM, DeMaria EJ. Conversion of proximal to distal gastric bypass for failed gastric bypass for superobesity. J Gastrointest Surg. 1997;1:517-24.
24. Topart P, Becouarn G, Ritz P. Weight loss is more sustained after biliopancreatic diversion with duodenal switch than Roux-en-Y gastric bypass in superobese patients. Surg Obes Relat Dis. 2013;9:526-30.

Received 20/5/2014
Accepted 30/6/2014