ORIGINAL ARTICLE

doi.org/10.1590/S0004-2803.202302023-34

Weight loss and quality of life after one anastomosis gastric bypass: a 2-year follow-up study

João Gabriel Romero **BRAGA**, Almino Cardoso **RAMOS**, Francisco **CALLEJAS-NETO**, Elinton Adami **CHAIM** and Everton **CAZZO***

* Universidade Estadual de Campinas, Departamento de Cirurgia, Campinas, SP, Brasil.

HIGLIGHTS

- One anastomosis gastric bypass (OAGB) led to significant weight loss after 2 years.
- OAGB associated was well-succeeded in regards to weight loss in most individuals.
- OAGB led to significant improvement of quality of life (QoL) assessed by the BAROS system.
- "Self-steem" and "work capacity" were the most positively affected QoL domains after OAGB.

Received: 27 February 2023
Accepted: 27 April 2023

Declared conflict of interest of all authors: none
Disclosure of funding: Scitech provided disposable trocars, staplers and cartridges for the procedures performed in the study protocol.
Corresponding author: Everton Cazzo. E-mail: notrevezzo@yahoo.com.br

ABSTRACT – Background – Studies assessing quality of life (QoL) after one anastomosis gastric bypass (OAGB) are currently scarce. **Objective –** To analyze the main weight loss outcomes and QoL in individuals undergoing OAGB during a 2-year follow-up. **Methods –** This is a retrospective study based on a prospectively collected database including individuals which underwent OAGB at a tertiary-level university hospital. After 2-years, excess weight loss was assessed, and post-surgical therapeutical success was determined using Reinhold's criteria. QoL was assessed through the Bariatric Analysis and Reporting Outcomes System (BAROS). **Results –** Out of 41 participants, 90.2% were female and the average age was 38±8.3 years old. The average body mass index significantly decreased from 37.1±5.6 kg/m² to 27±4.5 kg/m² after 2-years ($P<0.001$). The mean percentage of excess weight loss was 84.6±32.5%. Regarding weight loss outcomes, 61% were considered "excellent", while 26.8% were "good" according to Reinhold's criteria. With regards to QoL assessed by BAROS, most individuals achieved a score classified as either "excellent" (26.8%), "very good" (36.6%), or "good" (31.7%). The highest degrees of satisfaction achieved were in the domains "self-esteem" and "work capacity", in which 75.6% and 61%, respectively, were classified as "much better". **Conclusion –** OAGB associated with significant weight loss and resolution of obesity-related medical conditions, as well as relevant QoL improvement assessed by the BAROS system.

Keywords – Bariatric surgery; gastric bypass; obesity; quality of life; weight loss.

INTRODUCTION

The one anastomosis gastric bypass (OAGB) is based on a simplification of the Roux-en-Y gastric bypass (RYGB), through the performance of a gastroplasty alongside a loop intestinal bypass by means of a single anastomosis (gastroenterostomy). Thus, it reportedly associates with significant reductions in technical complexity and operative morbidity compared to RYGB[1,2]. Currently, it is considered the third most common bariatric procedure worldwide, including being the most common surgery in the Middle East and the second most common in India[3,4].

Systematic reviews which compared OAGB with RYGB demonstrated a significantly abbreviated surgical time in OAGB, as well as no differences regarding perioperative complications. In relation to late complications, internal hernias and intestinal obstructions were far more common after RYGB, whereas malnutrition is more prominent after OAGB. Weight loss and diabetes resolution were also significantly greater after OAGB[5-7].

There is extensive evidence showing increase in quality of life (QoL) after several bariatric surgical techniques, such as RYGB and sleeve gastrectomy[8-10]. Nevertheless, because of its novelty, studies which aimed to analyzed quality of life after OAGB are still scarce.

The current study aims to analyze the main weight loss outcomes and QoL in individuals undergoing OAGB during a 2-year follow-up.

METHODS

Study design

A retrospective study was carried out based on a prospectively collected database including individuals which underwent OAGB from May 2017 through December 2019 at a tertiary-level university hospital. Comparisons were made between two time periods: at surgery (T0) and 24 months afterwards (T1).

The study protocol was approved by the local institutional review board under the opinion 3.997.022/CAAE: 30652820.0.0000.5404/FCM-UNICAMP. All participants provided informed consent.

Study population

We included individuals which underwent OAGB indicated according to the National Institutes of Health criteria (body mass index [BMI] ≥40 kg/m^2 and/or 35 kg/m^2 with any obesity-related comorbidity), of any gender, aged 18 through 65 years old. Exclusion criteria included non-compliance to post-operative follow-up; individuals who belonged to vulnerable groups (people with significant intellectual or mental disabilities and/or underaged); non-agreement with the study protocol.

Out of 54 individuals who underwent OAGB during the study period, 41 that were in regular postoperative follow-up were included. A flowchart of the study population is shown in FIGURE 1.

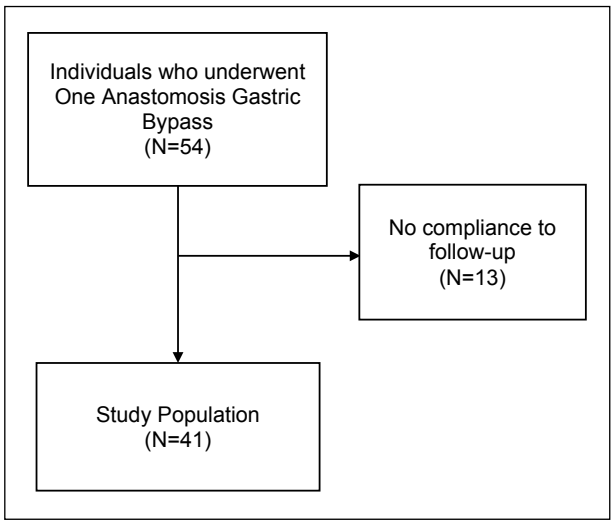

FIGURE 1. Flow diagram of the study population.

Demographic, anthropometric, and clinical variables

Data were collected regarding demographic (age and gender), anthropometric (BMI), and clinical variables (comorbidities before and after surgery).

Weight loss and therapeutical success assessment

Weight loss was measured using percentage of total weight loss (%TWL) and percentage of excess weight loss (%EWL), which is calculated considering an ideal BMI of 25 kg/m^2. Results obtained were classified according to Reinhold's criteria, which considers "excellent" when the %EWL is greater than or equal to 75%, "good" when %EWL is 50 to 75%, "intermediate" when %EWL is 25 to 50% and "failure" when %EWL is less than 25%[11,12].

Bariatric surgery-related quality of life assessment

Participants underwent the application of the specific bariatric surgery-related QoL questionnaire Bariatric Analysis and Reporting Outcomes System (BAROS)[13]. It is determined by the sum of scores obtained through the Moorehead-Ardelt questionnaire and included five main domains: self-esteem, ability to perform physical activity, willingness to social involvement, ability to work, and interest in sex. Furthermore, there were specific scoring regarding resolution or improvement of obesity-associated medical conditions (-1 to 3), excess weight loss (-1 to 3), perioperative complications (-1 to 0), and reoperations (-1 to 0). Individuals could obtain a maximum score of nine positive points. The greater the score, the better the post-operative improvement of QoL. The outcome groups according to scoring were: "failure" (≤1 point); "fair (1–3); "good" (3–5); "very good" (5–7); and "excellent" (7–9)[13].

Surgical technique

All operations were laparoscopically performed by the same surgical team, whose head surgeon was one of the authors of this study and followed a previously published description[14]. The main features were as follows: a 15- to 18-cm gastric pouch (50–150 mL) and a loop antecolic stapler side-to-side 3-cm gastroenterostomy performed 200 cm further from the duodeno-jejunal flexure (biliopancreatic limb).

Pre-operative weight loss

All individuals who undergo bariatric surgery at this facility undergo a pre-operative multidisciplinary weight loss program before the procedure. It comprises weekly consultations with a multidisciplinary team (surgeon, nurse, psychologist, and nutritionist), in which they receive general counseling, along with dietary advice and general guidance. Individuals undergo surgery when they achieve an approximate loss of between 10% and 20% of their initial weight or when they reach a minimum BMI close to 35 kg/m^2[15].

Statistical analysis

Descriptive analysis was performed by presenting frequency tables for categorical variables, and measures of dispersion for numerical variables. To compare proportions, the chi-square test or Fisher's exact test was used, when necessary. To compare continuous measures between the two groups, the Mann–Whitney test was used. For comparisons of continuous variables between three groups, the Kruskal–Wallis test was used. The significance level used for the statistical tests was 5% (P<0.05). SAS System for Windows (Statistical Analysis System), version 9.2; SAS Institute Inc., 2002–2008, Cary, NC, USA, was used to perform the analyses.

RESULTS

Out of 41 participants, 90.2% were female and the average age was 38±8.3 years old. The average BMI significantly decreased from 37.1±5.6 kg/m^2 to 27±4.5 kg/m^2 after 2 years (P<0.001). The mean %TWL was 27.7±10.7% and the average %EWL was 84.6±32.5%. With regard to comorbidities, the prevalence of hypertension significantly decreased from 36.6 to 7.3% (P=0.001) and the prevalence of diabetes significantly decreased from 31.7 to 9.8% (P=0.008); thus, the resolution rates of hypertension and diabetes were 80% and 71.4%, respectively. There were no intra-operative complications or major peri-operative morbidity. No patient required reoperation during the 2-year follow-up.

Regarding therapeutical success assessed through the Reinhold's criteria, 61% were classified as "excellent", while 26.8% were "good", and 9.8% were "intermediate". There was one single case of "failure". BAROS score was significantly higher in the group with "excellent" weight loss compared to the "intermediate or failure" group (P<0.05). No other variable significantly differed among the three groups (TABLE 1).

The average overall BAROS score observed was 5.8±1.8. Most individuals achieved a score classified as either "excellent" (26.8%), "very good" (36.6%), or "good" (31.7%). Just 4.9% achieved "fair" scores and no participant was classified as "failure". With regards to the qualitative domains assessed by BAROS, the highest degrees of satisfaction achieved were "self-esteem" and "work capacity", in which 75.6% and 61%, respectively, were classified as "much better". The complete distribution of the obtained answers to the questionnaire is presented in TABLE 2.

TABLE 1. Comparison of study variables according to Reinhold's surgical outcomes' success classification

	Excellent (EWL >75%)	Good (EWL 50–75%)	Intermediate or failure (EWL <50%)	Value of *P*
N	25 (61%)	11 (26.8%)	5 (12.2%)	NA
Age (years)	38.9±9.8	35.7±5.4	38±5.1	0.6
Gender				
Feminine	22 (88%)	11 (100%)	4 (80%)	0.3
Masculine	3 (12%)	0	1 (20%)	
BMI (kg/m^2)	36.7±5.8	39.4±5.9	39.4±3.1	0.3
Comorbidity profile				
T2D – N (%)	8 (32%)	2 (18.2%)	4 (80%)	0.1
Hypertension – N (%)	8 (32%)	5 (45.5%)	2 (40%)	0.7
BAROS score	6.3±1.8	5.4±1.4	4.1±1.5	0.03 (>75% vs <50%: *P*<0.05)

N: number of individuals; BAROS: Bariatric Analysis and Reporting Outcomes System; T2D: type 2 diabetes; BMI: body mass index.

TABLE 2. Distribution of the answers obtained after the application of the Moorehead-Ardelt questionnaire 2 years after one anastomosis gastric bypass.

Domain	Much worse	Worse	Equal	Better	Much better
Self-esteem	0	1 (2.4%)	0	9 (22%)	31 (75.6%)
Physical activity	0	2 (4.9%)	1 (2.4%)	14 (34.1%)	24 (58.5%)
Social relationships	0	2 (4.9%)	3 (7.3%)	14 (34.1%)	22 (53.7%)
Work	1 (2.4%)	1 (2.4%)	4 (9.8%)	10 (24.4%)	25 (61%)
Sex interest	3 (7.3%)	2 (4.9%)	13 (31.7%)	15 (36.6%)	8 (19.5%)

DISCUSSION

The current study demonstrated an average %EWL of 88% in 2-years, which is considered a highly satisfactory outcome that endorses the magnitude of weight loss caused by this procedure. In a prospective study carried out by Ruiz-Tovar et al.[16], comparisons were carried out among sleeve gastrectomy, RYGB, and OAGB 1, 2, and 5 years after surgery. OAGB showed better mid- and long-term weight loss compared to the other techniques, with a %EWL of 98% at 5 years. In another prospective comparison performed by Jammu et al.[17], 7-year %EWL was 92.2% after OAGB, 72.3% after RYGB and 53.6% after SG. Lee et al.[18] showed comparable 5-year results, with OAGB leading to a mean %EWL of 72.9% vs 60.1% after RYGB. There were no differences regarding complication rates alongside a significantly shorter operative time.

Our study also showed that OAGB associates with a relevant control of comorbidities. The remission rates of hypertension and type 2 diabetes were 80% and 91.7%, respectively. These findings are comparable with the previous literature, such as the study of Jammu et al.[17], which also reported a diabetes remission rate over 90%.

An interesting finding of the present study was the high level of QoL improvement reported by individuals through the BAROS scoring system. The improvement in QoL was observed alongside a high rate of resolution of comorbidities, and weight loss maintained at 2 years and corroborate data from the current literature. Jain et al.[19], comparing BAROS scores between OAGB and SG during a 5-year follow-up, also observed high levels of QoL, more significantly among individuals which previously presented with comorbidities, pointing out the importance of the metabolic and clinical improvement achieved after OAGB in the perception of QoL. In another study with 5 years of follow-up carried out by Miller et al.[20], overall QoL significantly improved as early as 6 months and was maintained over the 5 years of follow-up. Miller et al. also shown that the BAROS score increased significantly over time and this effect was largely driven by parallel significant increases in excess weight loss and resolution of comorbidities.

There is still controversy surrounding OAGB in

regard to its anatomical characteristics, which generate bile reflux to the gastric pouch. Bile reflux has long been associated with chronic inflammation and potential carcinogenesis, as experienced by patients who underwent Billroth II gastrectomy in the past[21,22]. However, OAGB has been performed since at least 1997 and, to date, cases of esophagogastric cancer after this technique are anecdotally reported, similarly to what is observed after RYGB[23]. A recent study carried out by our group demonstrated low rates of severe endoscopic and histopathological abnormalities 2 years after OAGB, but also emphasized that long-term surveillance is essential because of the lack of longer-term data[24]. Evidently, large prospective and randomized studies are needed to ultimately discard an increased risk, but available evidence does not point at such an ominous situation.

The current study has some limitations that should be take into consideration. Its small sample size and non-comparative design does not allow further extrapolations, as well as the follow-up time does not permit to apply our observations on longer-term contexts. Nonetheless, it was appropriate to support conclusions regarding to the consistent results observed after the proposed 2-year follow-up. Furthermore, there is also criticisms reported towards the BAROS scoring system, such as its subjective nature and the difficulty to establish hierarchies of importance to determine QoL regarding its domains[25]. However, it is widely used and validated, and its outcomes are considered reliable.

Therefore, according to the currently available evidence, OAGB is a feasible and highly reproducible technique that, compared to RYGB, is performed with less operative time, lower complication rates (less bleeding, less intestinal obstruction, and internal hernias), in addition to presenting better results in relation to control and remission of comorbidities and weight loss alongside an equal or better postoperative QoL. It should be noted that its better results in terms of weight loss and control of comorbidities may be obtained at the expense of a greater risk of malnutrition. Moreover, the occurrence of biliary reflux requires endoscopic surveillance over time, until more consistent evidence allows definitive conclusions about its real risk. Thus, regular follow-up of patients must be carried out rigorously, with periodic laboratory and endoscopic examinations.

CONCLUSION

OAGB associated with significant weight loss and resolution of obesity-related medical conditions, as well as relevant QoL improvement assessed by the BAROS system.

Authors' contribution

Braga JGR: data curation; investigation; visualization; writing – original draft. Ramos AC and Callejas-Neto F: data curation; investigation; visualization; supervision. Chaim EA: data curation; investigation; visualization; resources. Cazzo E: conceptualization; methodology; formal analysis; writing – review and editing.

Orcid

João Gabriel R Braga: 0000-0001-5563-4244.
Almino Cardoso Ramos: 0000-0001-6805-1750.
Francisco Callejas-Neto: 0000-0001-6023-187X.
Elinton Adami Chaim: 0000-0003-4627-0631.
Everton Cazzo: 0000-0002-5804-1580.

Braga JGR, Ramos AC, Callejas-Neto F, Chaim EA, Cazzo E. Perda de peso e qualidade de vida após o *Bypass* Gástrico de Anastomose Única: resultados de um seguimento de 2 anos. Arq Gastroenterol. 2023;60(2):241-6.

RESUMO – Contexto – Existem poucos estudos que analisaram a qualidade de vida (QV) após o *bypass* gástrico de anastomose única (BGAU). **Objetivo** – Analisar os principais resultados de perda de peso e QV em indivíduos submetidos ao BGAU ao longo de 2 anos de seguimento. **Métodos** – Este é um estudo retrospectivo baseado em um banco de dados coletado prospectivamente que incluiu indivíduos submetidos ao BGAU em um hospital universitário de nível terciário. Após 2 anos, foi analisado o percentual de perda do excesso de peso (%PEP) e o sucesso terapêutico pós-cirúrgico foi classificado através critérios de Reinhold. A qualidade de vida foi avaliada por meio do *Bariatric Analysis and Reporting Outcomes System* (BAROS). **Resultados** – Dos 41 participantes, 90,2% eram do sexo feminino e a idade média foi de 38±8,3 anos. O índice de massa corporal médio diminuiu significativamente de 37,1±5,6 kg/m² para 27±4,5 kg/m² após 2 anos (P<0,001). O %PEP médio foi de 84,6±32,5%. Quanto à avaliação dos resultados de perda de peso, 61% foram considerados "excelentes", enquanto 26,8% foram "bons" segundo os critérios de Reinhold. Com relação à QV avaliada pelo BAROS, a maioria dos indivíduos obteve escores classificados como "excelente" (26,8%), "muito bom" (36,6%) ou "bom" (31,7%). Os maiores graus de satisfação alcançados foram nos domínios "autoestima" e "capacidade para o trabalho", nos quais 75,6% e 61%, respectivamente, foram classificados como "muito melhor". **Conclusão** – O BGAU associou-se à significativa perda de peso e resolução de comorbidades, bem como melhora relevante da qualidade de vida avaliada pelo sistema BAROS.

Palavras-chave – Cirurgia bariátrica; derivação gástrica; obesidade; qualidade de vida; perda de peso.

REFERENCES

1. Rutledge R. The mini-gastric bypass: Experience with the first 1,274 cases. Obes Surg. 2001;11:276-80.
2. Rutledge R, Kular K, Manchanda N. The Mini-Gastric Bypass original technique. Int J Surg. 2019;61:38-41.
3. Welbourn R, Hollyman M, Kinsman R, Dixon J, Liem R, Ottosson J, et al. Bariatric Surgery Worldwide: Baseline Demographic Description and One-Year Outcomes from the Fourth IFSO Global Registry Report 2018. Obes Surg. 2019;29:782-95.
4. Inocian EP, Nolfi DA, Felicilda-Reynaldo RFD, Bodrick MM, Aldohayan A, Kalarchian MA. Bariatric surgery in the Middle East and North Africa: narrative review with focus on culture-specific considerations. Surg Obes Relat Dis. 2021;17:1933-41.
5. Magouliotis DE, Tasiopoulou VS, Tzovaras G. One anastomosis gastric bypass versus Roux-en-Y gastric bypass for morbid obesity: a meta-analysis. Clin Obes. 2018;8:159-69.
6. Jia D, Tan H, Faramand A, Fang F. One Anastomosis Gastric Bypass Versus Roux-en-Y Gastric Bypass for Obesity: a Systematic Review and Meta-Analysis of Randomized Clinical Trials. Obes Surg. 2020;30:1211-8.
7. Magouliotis DE, Tasiopoulou VS, Tzovaras G. One Anastomosis Gastric Bypass Versus Roux-en-Y Gastric Bypass for Morbid Obesity: an Updated Meta-Analysis. Obes Surg. 2019;29:2721-30.
8. Sierżantowicz R, Ładny JR, Lewko J. Quality of Life after Bariatric Surgery-A Systematic Review. Int J Environ Res Public Health. 2022;19:9078.
9. Khaitan M, Gadani R, Pokharel KN, Gupta A. Good to excellent Quality of Life in patients suffering from severe obesity post bariatric surgery - A single-center retrospective study report using BAROS Questionnaire. J Minim Access Surg. 2022;18:284-8.
10. Fiorani C, Coles SR, Kulendran M, McGlone ER, Reddy M, Khan OA. Long-Term Quality of Life Outcomes After Laparoscopic Sleeve Gastrectomy and Roux-en-Y Gastric Bypass-a Comparative Study. Obes Surg. 2021;31:1376-80.
11. Reinhold RB. Critical analysis of long term weight loss following gastric bypass. Surg Gynecol Obs. 1982;155:385-94.
12. Cazzo E, Da Silva FP, Pareja JC, Chaim EA. Predictors for weight loss failure following Roux-en-Y gastric bypass. Arq Gastroenterol. 2014;51:328-30.
13. Oria HE, Moorehead MK. Bariatric Analysis and Reporting Outcome System (BAROS). Obes Surg. 1998;8:487-99.
14. Chaim EA, Ramos AC, Cazzo E. Mini-Gastric Bypass: Description of the Technique and Preliminary Results. Arq Bras Cir Dig. 2017;30:264-6.
15. Cazzo E, Gestic MA, Utrini MP, Machado RR, Pareja JC, Chaim EA. Control of hypertension after Roux-en-y gastric bypass among obese diabetic patients. Arq Gastroenterol. 2014;51(1):21-4.
16. Ruiz-Tovar J, Carbajo MA, Jimenez JM, Castro MJ, Gonzalez G, Ortiz-de-Solorzano J, et al. Long-term follow-up after sleeve gastrectomy versus Roux-en-Y gastric bypass versus one-anastomosis gastric bypass: a prospective randomized comparative study of weight loss and remission of comorbidities. Surg Endosc. 2019;33:401-10.
17. Jammu GS, Sharma R. A 7-Year Clinical Audit of 1107 Cases Comparing Sleeve Gastrectomy, Roux-En-Y Gastric Bypass, and Mini-Gastric Bypass, to Determine an Effective and Safe Bariatric and Metabolic Procedure. Obes Surg. 2016;26:926-32.
18. Lee WJ, Ser KH, Lee YC, Tsou JJ, Chen SC, Chen JC. Laparoscopic roux-en-Y Vs. Mini-gastric bypass for the treatment of morbid obesity: A 10-year experience. Obes Surg. 2012;22:1827-34.
19. Jain M, Tantia O, Goyal G, Chaudhuri T, Khanna S, Poddar A, et al. LSG vs MGB-OAGB: 5-Year Follow-up Data and Comparative Outcome of the Two Procedures over Long Term—Results of a Randomised Control Trial. Obes Surg. 2021;31:1223-32.
20. Miller KA, Radauer M, Buchwald JN, McGlennon TW, Ardelt-Gattinger E. 5-Year Results of Banded One-Anastomosis Gastric Bypass: a Pilot Study in Super-Obese Patients. Obes Surg. 2020;30:4307-14.
21. Kondo K. Duodenogastric reflux and gastric stump carcinoma. Gastric Cancer. 2002;5:16-22.
22. Northfield TC, Hall CN. Carcinoma of the gastric stump: Risks and pathogenesis. Gut. 1990;31:1217-9.
23. Chemaly R, Diab S, Khazen G, Al-Hajj G. Gastroesophageal Cancer After Gastric Bypass Surgeries: a Systematic Review and Meta-analysis. Obes Surg. 2022;32:1300-11.
24. Braga JGR, Callejas GH, da Silva Costa LC, Montes CG, Chaim FDM, Gestic MA, et al. Endoscopic and histopathological assessment of individuals undergoing one anastomosis gastric bypass: a 2-year follow-up. Surg Endosc. 2023;37:3720-7. doi: 10.1007/s00464-023-09884-0.
25. Nicareta JR, de Freitas AC, Nicareta SM, Nicareta C, Campos AC, Nassif PA, et al. BAROS method critical analysis. Arq Bras Cir Dig. 2015;28(Suppl 1):73-8.