International Journal of Health and Life Sciences **IJHLS, 2015, 1(1):1-6**

Evaluation of the success rate of gastric bypass surgery-assisted weight loss in Iranian patients with morbid obesity

Ali Reza Tavassoli[a], Mohammad Taghi Rajabi[a], Fatemeh Rohani[b], Mahdi Haghani[c], Sahar Fallahi Shahabad[b], Majid Ghodsi[b], Reza Oskouie[c], Mohsen Nematy[d*]

[a] Endoscopic & Minimally Invasive Surgery Research Center, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[b] Department of Nutrition, School of Medicine Biochemistry and Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran
[c] Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[d] Department of Nutrition, School of Medicine Biochemistry and Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran

ARTICLE INFO

Article Type:
Research Article

Article History:
Received: 2014-05-18
Revised: 2014-08-21
Accepted: 2014-10-14
ePublished: 2014-12-08

***Keywords*:**
Obesity
Gastric bypass
Body mass index

ABSTRACT

The objective of the present study was to evaluate the success rate of gastric bypass surgery-assisted weight loss in Iranian patients with morbid obesity. This interventional study was conducted from the year 2008 to 2011 in Ghaem Hospital of Mashhad University of Medical Sciences, Iran. Convenience sampling was conducted and the significance level was set as $P < 0.05$. Data analysis was performed with the help of SPSS version 16 software and the Friedman and Kruskal-Wallis tests. All patients referred to the clinic had a body mass index (BMI) > 40 kg/m^2. Weight, height, and waist circumference were measured using standard methods and BMI was calculated. Body compositions were measured using a body composition analyzer. Other inclusion criteria were subjected to gastric bypass (GBP) surgery. All patients underwent pre-operative psychological, nutritional, and comprehensive medical evaluations. The mean body weight declined from 114.88 ± 13.64 kg before the surgery to 100.1 ± 14.5 kg, 89.65 ± 16.09 kg, 87.38 ± 14.1 kg, and 85.73 ± 12.31 kg, respectively at the first, second, third, and fourth post-operative follow-up visits. These changes were significant ($P < 0.05$). The mean waist circumference declined significantly from 110.63 ± 38.6 cm before the surgery to 109.67 ± 40.6 cm, 107.94 ± 30.3 cm, 102.07 ± 10.2 cm, and 95 ± 10.3 cm, respectively, at the first to the fourth follow-up visit ($P < 0.05$). Anthropometric indicators recorded during the follow-up visits were significantly different from those recorded before surgery ($P < 0.05$). Gastric bypass surgery significantly reduced body weight and all other anthropometric variables in Iranian patients with morbid obesity.

[*]**Corresponding author: Mohsen Nematy, E-mail:** Nematym@mums.ac.ir

Introduction

Obesity, characterized by a body mass index (weight in kilograms divided by the square of height in meters) greater than 30, has been steadily increasing over the past 20 years. In 1990, the prevalence of obesity in different states of United States was less than 15 percent, whereas in 2009, only Colorado and District of Columbia had a prevalence rate less than 20 percent. Data from the National Health and Nutrition Examination Survey indicate that 12.5 million children (17 percent) aged 2 to 19 years suffer from obesity.

This is three times the number of obese children in 1980, and mirrors the growing incidence of associated comorbidities historically considered adult diseases [1]. In the Bogalusa Heart Study [2], 70 percent of obese children presented evidence of hypertension, hyperlipidemia, or insulin resistance. Obesity is not only a significant risk factor for many comorbidities, but also is associated with an overall increase in mortality and a reduction in lifespan by 10 years [3]. Morbid obesity is a worldwide public health problem, with an estimated 1.7 billion people suffering from the disease [4,5].

Obesity-related comorbidities such as hypertension, diabetes, infertility, cardiovascular disease, and sleep apnea are very common in this population [6]. Although it is recommended that overweight and obese individuals should initially attempt to achieve weight loss through diet and lifestyle modifications, more aggressive therapies, such as bariatric surgery, are considered for those who are unable to achieve a 5 percent weight-loss [7].

Bariatric surgeries are considered as an effective therapy for morbid obesity [8]. The qualifying standards for bariatric surgery has been determined by the International Federation for the Surgery of Obesity and consists of a body mass indeed (BMI) of greater than 40 or a BMI of greater than 35 together with significant obesity-related comorbidity [9]. Because of the increasing prevalence of obesity, bariatric surgery has become one of the fastest growing fields in general surgery [10].

The mechanisms by which gastric bypass surgery induces appetite-suppression are not clear. Possible mechanisms include restriction of food intake imposed by a small gastric pouch and lack of contact between the food bolus and most of the stomach, duodenum, and first portion of the jejunum [11,12]. Bariatric surgery typically results in the loss of 50% or more body weight within the first year [13]. In most patients, this surgery is necessary to achieve substantial and sustained weight loss, and for achieving relief from obesity-related comorbidities and improvement in the quality of life [14,15]. Recent studies have shown that bariatric surgery not only leads to weight loss and relief from morbidities, but also reduces mortality, particularly from cardiovascular diseases and cancer [16-20].

The most common nutritional problems following bariatric surgery include protein malnutrition and deficiencies of vitamin B12, vitamin D, iron, calcium, and folate [21]. Because of the altered anatomy, these deficiencies are more prevalent in patients following malabsorptive procedures (Roux-en-Y gastric bypass and biliopancreatic bypass) than after restrictive procedures (adjustable gastric banding or sleeve gastrectomy). The objective of the present study was to evaluate the success rate of gastric bypass (GBP) surgery-assisted weight loss in Iranian patients with morbid obesity.

Materials and Methods

This interventional study was conducted from the year 2008 to 2011 in Ghaem Hospital of Mashhad University of Medical Sciences, Iran. All patients referred to the clinic had obesity (BMI>40 kg/m^2). Other inclusion criteria were subjected to gastric bypass (GBP) surgery.

Patients underwent pre-operative psychological, nutritional, and comprehensive medical evaluations. All (58 females and 2 males) patients aged 25–65-years with BMI>40 kg/m^2 and health confirmation were included in the study. Exclusion criteria were, unwillingness to participate in the study, medical problems, intolerance to anesthesia, pregnancy, breastfeeding, and malignancy.

Sample size was 60 (58 females and 2 males), with 95% confidence interval. All patients visited the clinic once before the surgery and three times after the surgery.

During each visit, the patient's age, education, and anthropometric indices, including arm circumference, waist circumference, being fat, belly fat, weight, height, and BMI (Weight in Kilograms/ (Height in meters×Height in meters)) were evaluated. Weight and height were measured using standard methods. After receiving their informed consent, all patients were subjected to GBP surgery under general anesthesia.

Surgical techniques

All surgeries were performed by one surgeon using a standard technique [22,23]. Typically, after creating a 30-mL gastric pouch, an antecolic gastric limb (120–150 cm) was attached to the pouch with the help of a 45-mm blue linear endostapler (Ethicon, endosurgery stapler, USA).

Following this, side-to-side jejunojejunostomy was performed using a 45-mm white linear-endostapler (Ethicon, endosurgery stapler, USA). All patients carried an abdominal drainage, located in the left subhepatic space, for 5 to 7 days after surgery.

Oral diet was started on the third post-operative day and the patients were discharged from the hospital when tolerance was good.

Follow-up appointments were scheduled for post-operative months 3, 6, 9, and 12. Data analysis was performed with the help of the Statistical Package of Social Science (SPSS) for Windows version 11.5 software and the Friedman and Kruskal-Wallis test. $P<0.05$ indicated statistical significance.

The Research Ethic Committee of Mashhad University of Medical Sciences approved the study (code 2636T).

Results

All patients (58 females and 2 males) were referred to the research team for GBP surgery. The age of the patients ranged from 26 to 65 years.

The mean age was 60.36.86 ± 15.01 years. Eighteen patients (30%) had academic education, 36 patients (60%) had diploma, and six patients (10%) had education below diploma level.

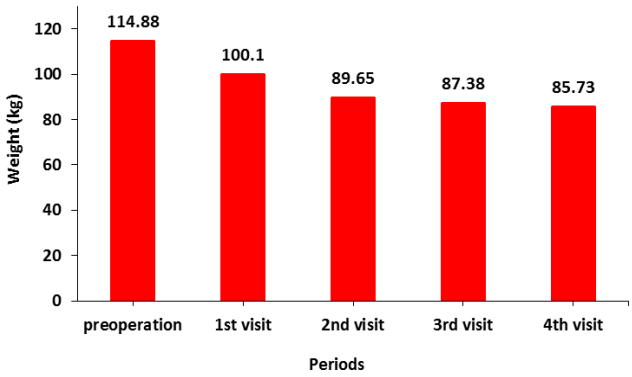

Figure 1. Loss weight after gastric bypass surgery.

The mean body weight of the patients significantly declined from 114.88±13.64 kg before the surgery to 100.1±14.5 kg, 89.65±16.09 kg, 87.38±14.1 kg, and 85.73±12.31 kg at the first, second, third, and fourth post-operative visits, respectively (P<0.05) (**Figure 1**).

The mean waist circumference significantly decreased from 110.63±38.6 cm before the surgery to 109.67±40.6 cm, 107.94±30.3 cm, 102.07±10.2 cm, and 95±10.3 cm at the first, second, third, and fourth post-operative visits, respectively ($P<0.05$).

The mean BMI also significantly declined from 50.63±38.6 kg/m^2 before the surgery to 43.50± 5.21 kg/m^2, 40.32 kg/m^2, 35.05 kg/m^2, and 32±10.25 kg/m^2 at the first, second, third, and fourth post-operative visits, respectively ($P<0.05$).

All anthropometric variables recorded during the initial visit were significantly different from those at the subsequent post-operative visits ($P<0.05$) (**Table 1**).

Table 1. Comparison of anthropometric indicator in patients fallow up.

Anthropometric measurements	Preoperative period	First visit	Second visit	Third visit	Fourth visit	P-Value
BMI kg/m^2	46.89±4.22	43.85±5.90	34.79±7.92	32.79±5.88	30.23±8.65	0.00
BMR kcal/day	2939.08±5.72	2783±5.19	2262±6.19	1963±9.02	1768±6.05	0.00
Weight kg	114.88±13.64	100.1±4.5	89.65±16.09	87.38±14.1	85.73±12.31	0.00
Fat Mass kg	45.96±13.40	43.80±7.41	34.95±12.04	30.63±1.33	28.93±5.24	0.04
FFM kg	67.04±13.36	52.34±6.61	51.40±13.23	50.22±3.86	49.54±4.27	0.004
TBW kg	36.49±11.91	35.31±11.71	34.32±10.1	30.57±4.46	28.64±3.67	0.001

Discussion

In the present study we found that in Iranian patients with morbid obesity, GBP surgery led to a significant reduction in weight, BMI, BMR, waist circumference, fat, fat mass, FFM, and all anthropometric indicators. Patients experience more weight loss in the first two months after the surgery than in the months that followed. It appears that the effects of the surgery, namely, being limited to liquid diet, contributed to the severe weight loss during the first two post-operative months. In the later months, patients were able to consume more solid food as well as high-energy liquid food. A recent meta-analysis by Buchwald et al. [6] showed a BMI reduction of 14.2 (CI = 13.3 kg) in 8,232 patients and an absolute weight loss of 39.7 kg (CI = 37.2–42.2 kg) in 7,588 patients. In most cases, weight-loss have not been differed significantly over the first visit. However, in the present study, we found a significant reduction in BMI and body weight from the pre-operative to the 4th post-operative visit. Alvarado et al. [24] reported the pre-operative weight and post-operative weight loss of patients up to the end of the follow-up period. The initial weight-loss advantage was not sustained at the 6th post-operative month.

This might have been related to the small sample size (6-month follow-up data were only available for 37 patients). A power analysis study found that a sample of 37 patients is insufficient to demonstrate the differences seen in the first 3 months. As more data become available (from 6-month and 12-month follow-up visits), we believe that this issue will be clarified further. In the present study, significant weight loss was noted during the first post-operative visit and the weight loss continued to the 4th visit. Patt et al. (2009) found that the mortality following GBP surgery was less than 1% [19]. The small sample size (12 in each group) may have influenced the results of this study. Joao Pessoa's et al. reported that BMI declined beginning from 6–9 months after the surgery [25]. However, in the present study, a significant decline in BMI was noted starting from the first visit. In a study conducted in Zanjan, patients who underwent GBP were compared with those who underwent vertical banded gastroplasty. This study found that there was no significant difference between the weight loss recorded for the two groups. The present study has confirmed these results [3]. Rafael et al. reported that the mean weight before the surgery was 138.7 ± 23.1 kg [range: 98–220 kg] and the mean BMI was 52.5 ± 7.9 kg/m^2 [range: 39–82 kg]. Nadir weight was obtained in all patients between the 1st and 2nd post-operative years [mean weight: 77.7 ± 14.2 kg (range 46–119); mean BMI: 29.3 ± 5.2 kg/m^2 (range: 18–46)]. The excess weight-loss was 86.0 ± 17.4% (range: 46–137). The mean weight and BMI recorded during the last follow-up was 89.6 ± 18.3 kg (range: 58–153) and 33.7 ± 6.3 kg/m2 (range 19–49), respectively, and the excess weight loss was 69.3 ± 20.2 % (range: 4–131) [26]. A separate study conducted in France found a median excess weight loss of 47.1% at 12 months, 55.3% at 24 months, 53.3% at 36 months, and 55.3% at 48 months. Among the patients who visited for at least 12 months (n =17) for follow-up, the median quality of life score was 1.75 and the median BAROS score was 5.75. Arterial hypertension and type II diabetes resolved or improved in all patients and sleep apnea resolved in nearly half of the patients (43%) [27].

In a study conducted by Wu et al., patients were followed up for 3–12 months. The average excess weight loss at 1, 3, 6, 9, and 12 months after the surgery was 24.2%, 45.6%, 60.1%, 66.5%, and 69.0%, respectively [28]. In a recent systematic review, an excess weight loss of 47.1% was recorded at 15 years [n = 54; 95% confidence interval (CI) = 8.3], whereas that recorded at 16 years was 62% (n = 14; 95% CI = 13.6). The authors found that the mean excess weight loss for all patients who were at or beyond 10 years of follow-up was 47.0% (n = 714; 95% CI = 1.3) [29]. A review of key results from the Swedish Obese Subjects (SOS) between the years 2004 and 2012 suggested that the follow-up period varied from 10 to 20 years in different reports. The mean changes in body weight at 2, 10, 15, and 20 years were–23%,–17%,–16%, and–18%, respectively in the surgery group, and 0%, 1%,–1%, and–1%, respectively in the control group [30].

The present study had two limitations. First, the diet and physical activity of the patients were not recorded after the surgery. Second, since the space in the stomach was limited, the patients were unable to eat normally during the first two post-operative months.

Conclusion

Results from this study showed that the gastric bypass surgery significantly reduced body weight and all other anthropometric variables in Iranian patients with morbid obesity.

Acknowledgements

This paper has been extracted from the thesis of Dr. Ghodsi Majid (title: "Evaluation of success rate in weight loss and metabolic indices by gastric bypass surgery in patient with in morbid obesity") with 2636T code. The author thank the Research Department of Mashhad University of Medical Sciences for their support.

References

[1] Gilbert EW, Wolfe BM. Bariatric surgery for the management of obesity: state of the field. Plast Reconstr Surg. 2012; 130(4):948-54.

[2] Freedman DS, Mei Z, Srinivasan SR, Berenson GS, Dietz WH. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the bogalusa heart study. J Pediatr. 2007; 150(1):12-7.

[3] Fontaine KR, Redden DT, Wang C, Westfall AO, Allison DB. Years of life lost due to obesity. Jama. 2003; 289(2):187-93.

[4] Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. Jama. 2006; 295(13):1549-55.

[5] Deitel M. Overweight and obesity worldwide now estimated to involve 1.7 billion people. Obes Surg. 2003; 13(3):329-30.

[6] Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. Jama. 1999; 282(16):1523-9.

[7] Albu J, Allison D, Boozer CN, Heymsfield S, Kissileff H, Kretser A et al. Obesity solutions: report of a meeting. Nutr Rev. 1997; 55(5):150-6.

[8] Choban PS, Jackson B, Poplawski S, Bistolarides P. Bariatric surgery for morbid obesity: why, who, when, how, where, and then what?. Cleve Clin J Med. 2002; 69(11):897-903.

[9] Buchwald H, Oien DM. Metabolic/bariatric surgery worldwide 2008. Obes Surg. 2009; 19(12):1605-11.

[10] Buchwald H. Consensus conference statement bariatric surgery for morbid obesity: health implications for patients, health professionals, and third-party payers. Surg Obes Relat Dis. 2005; 1(3):371-81.

[11] Ali MR, Fuller WD, Choi MP, Wolfe BM. Bariatric surgical outcomes. Surg Clin North Am. 2005; 85(4):835-52.

[12] Rubino F, Forgione A, Cummings DE, Vix M, Gnuli D, Mingrone G et al. The mechanism of diabetes control after gastrointestinal bypass surgery reveals a role of the proximal small intestine in the pathophysiology of type 2 diabetes. Ann Surg. 2006; 244(5):741-9.

[13] Laferrere B, Teixeira J, McGinty J, Tran H, Egger JR, Colarusso A et al. Effect of weight loss by gastric bypass surgery versus hypocaloric diet on glucose and incretin levels in patients with type 2 diabetes. J Clin Endocrinol Metab. 2008; 93(7):2479-85.

[14] Nguyen NT, Goldman C, Rosenquist CJ, Arango A, Cole CJ, Lee SJ et al. Laparoscopic versus open gastric bypass: a randomized study of outcomes, quality of life, and costs. Ann Surg. 2001; 234(3):279-89.

[15] Karlsson J, Taft C, Ryden A, Sjostrom L, Sullivan M. Ten-year trends in health-related quality of life after surgical and conventional treatment for severe obesity: the SOS intervention study. Int J Obes. 2007; 31(8):1248-61.

[16] Sjostrom L, Narbro K, Sjostrom CD, Karason K, Larsson B, Wedel H et al. Effects of bariatric surgery on mortality in Swedish obese subjects. N Engl J Med. 2007; 357(8):741-52.

[17] Adams TD, Gress RE, Smith SC, Halverson RC, Simper SC, Rosamond WD et al. Long-term mortality after gastric bypass surgery. N Engl J Med. 2007; 357(8):753-61.

[18] Peeters A, O'Brien PE, Laurie C, Anderson M, Wolfe R, Flum D et al. Substantial intentional weight loss and mortality in the severely obese. Ann Surg. 2007; 246(6):1028-33.

[19] Christou NV, Sampalis JS, Liberman M, Look D, Auger S, McLean AP et al. Surgery decreases long-term mortality, morbidity, and health care use in morbidly obese patients. Ann Surg. 2004; 240(3):416-23.

[20] Flum DR, Dellinger EP. Impact of gastric bypass operation on survival: a population-based analysis. J Am Coll Surg. 2004; 199(4):543-51.

[21] Agha-Mohammadi S, Hurwitz DJ. Nutritional deficiency of post-bariatric surgery body contouring patients: what every plastic surgeon should know. Plast Reconstr Surg. 2008; 122(2):604-13.

[22] Dillemans B, Sakran N, Van Cauwenberge S, Sablon T, Defoort B, Van Dessel E et al. Standardization of the fully stapled laparoscopic roux-en-y gastric bypass for obesity reduces early immediate postoperative morbidity and mortality: a single center study on 2606 patients. Obes Surg. 2009; 19(10):1355-64.

[23] Tavassoli A, Abdollahi A, Golmohammadzadeh H. Using electrothermal coagulator instead of stapler in resection and anastomosis of laparoscopic gastrointestinal surgery. TUMJ. 2012; 70(5):289-294

[24] Alvarado R, Alami RS, Hsu G, Safadi BY, Sanchez BR, Morton JM et al. The impact of preoperative weight loss in patients undergoing laparoscopic Roux-en-Y gastric bypass. Obes Surg. 2005; 15(9):1282-6.

[25] Burgos LA, Csendes JA, Papapietro VK. Resection gastric bypass in morbid obese patients aged less than

18 and over 65 years. Rev Med Chil. 2008; 136(10):1247-54.
[26] Laurino Neto RM, Herbella FA, Tauil RM, Silva FS, de Lima SEJ. Comorbidities remission after roux-en-y gastric bypass for morbid obesity is sustained in a long-term follow-up and correlates with weight regain. Obes Surg. 2012; 22(10):1580-5.
[27] Schwartz A, Etchechoury L, Collet D. Outcome after laparoscopic gastric bypass for super-super obese patients. J Visc Surg. 2013; 150(2):145-9.
[28] Wu HH, Liang H, Guan W, Yang SM, Miao Y. Efficacy of laparoscopic gastric bypass on simple obesity patients and analysis of influence factors. Zhonghua Wei Chang Wai Ke Za Zhi. 2012; 15(11):1120-4.
[29] O'Brien PE, MacDonald L, Anderson M, Brennan L, Brown WA. Long-term outcomes after bariatric surgery: fifteen-year follow-up of adjustable gastric banding and a systematic review of the bariatric surgical literature. Ann Surg. 2013; 257(1):87-94.
[30] Sjostrom L. Review of the key results from the Swedish Obese Subjects (SOS) trial - a prospective controlled intervention study of bariatric surgery. J Intern Med. 2013; 273(3):219-34.

