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CLINICAL & BASIC RESEARCH

Short-Term Weight Loss Outcomes of 104 Mini-Gastric Bypass or One-Anastomosis Gastric Bypass Operations

Retrospective study

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abstract: ***Objectives:*** This study aimed to examine the short-term effects of mini-gastric bypass (MGB) or one-anastomosis gastric bypass (OAGB) procedures on weight loss in individuals with obesity. ***Methods:*** This retrospective study was conducted in Medicano Hospital, Erbil, Iraq, from January 2019 to May 2020. Preoperative body mass index (BMI), age, height and preoperative weight were recorded as baseline measures. Weight-related changes were evaluated during a follow-up phase of 48 weeks. ***Results:*** A total of 104 patients with obesity underwent MGB or OAGB surgery. The mean baseline parameters of the subjects before surgery included 1.64 m for height, 122.9 kg for weight and 45.6 kg/m^2 for BMI. During the 48-week follow-up period, there was a substantial reduction in mean weight, which dropped from 122.9 kg at baseline to 75.5 kg at week 48. The weight change (in percentage) gradually increased from −11.8% at week 12 to −37.9% at week 48, without statistically significant association with demographic factors or chronic diseases. From week 12 to week 48, the percentage of excess weight loss (%EWL) increased substantially from 26.8% to 86.1%. The results of the subgroup analysis indicated that the %EWL was considerably higher among those aged 30 or older at week 36 and singles at week 48. ***Conclusion:*** This study's results illustrate the efficacy of MGB or OAGB procedures in significantly reducing weight in the short term. The %EWL increased with the follow-up time and was significantly associated with age and marital status.

Keywords: Gastric Bypass; Anastomosis; Obesity; Weight Reduction; Bariatric Surgery.

Advances in Knowledge

- *Mini-gastric bypass or one-anastomosis gastric bypass procedures significantly reduced weight in the short term and increased the percentage of excess weight loss at follow-up.*
- *The percentage of excess weight lost was significantly associated with age and marital status.*

Applications to Patient Care

- *Knowing and addressing the factors that significantly affect the percentage of excess weight loss among the patients with obesity who underwent the mini-gastric bypass or one-anastomosis gastric bypass procedure will help in selecting the patients for a better weight loss group.*

Globally, sleeve gastrectomy has emerged as the predominant bariatric intervention of choice for the treatment of morbid obesity. Morbid obesity is a complex chronic disease where a person has a body mass index (BMI) of ≥40 or of ≥35 with obesity-related health conditions such as type-2 diabetes mellitus (T2DM), cardiovascular diseases and certain cancers. Sleeve gastrectomy has exhibited encouraging results throughout its initial years, significantly bolstering the appeal of this procedure. However, recent criticism has focused on surgery in light of moderate long-term weight reduction and/or increased incidence of postoperative reflux.[1,2]

One-anastomosis gastric bypass (OAGB) has become a well-recognised standard operation in bariatric surgery, which is currently ranked as the third most frequently performed bariatric procedure internationally.[3] An increasing body of research has documented favourable and lasting outcomes with weight reduction and resolution of comorbidities.[4] Parikh *et al.*'s literature review revealed that OAGB is safe and feasible, with short operative times, low complication rates and excellent weight loss outcomes.[5] Moreover, several randomised controlled trials have reported outstanding weight loss results following primary OAGB at 12 months, 2 years and 5 years follow-up.[6,7] In addition, several comparative studies have been carried out between OAGB and other common procedures, including sleeve gastrectomy and Roux-en-Y gastric bypass (RYGB).[8,9] For example, Vrakopoulou *et al.* supported the use of OAGB over sleeve gastrectomy in patients with T2DM and super-obesity (BMI > 50 kg/m^2) during short-term follow-up.[10]

Surgical procedures have emerged as crucial tools in the ongoing fight against obesity, offering effective

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resolution to people who are grappling with serious health complications associated with their weight. Mini-gastric bypass (MGB) or OAGB has surfaced among the diverse array of bariatric surgeries as pioneering and effective methods, with prospects for enduring weight reduction and enhanced general well-being. MGB is a simplified alternative to traditional gastric bypass surgery.[11] During this minimally invasive operation, a slender tube-shaped structure is created from the stomach and directly attached to the small intestine. By rerouting the digestive system, MGB significantly affects nutritional absorption and reduces the amount of food consumed, leading to substantial weight loss.[11,12]

The possibility of MGB surgery producing results comparable to conventional gastric bypass surgery while reducing operating complexity has attracted attention among the medical community due to its streamlined design. OAGB represents an additional notable progression within the domain of bariatric surgery.[13] This method establishes a single anastomosis or connection between the stomach and the small intestine. By simplifying the surgical procedure, OAGB aims to preserve the efficacy of gastric bypass while reducing the hazards typically associated with more intricate treatments. However, there is a dearth of research-based evidence on its exact mechanisms of action, which has led to often dangerous technical practices. Several surgeons believe malabsorption is a key action mechanism in this procedure and that, similar to MGB, OAGB promotes weight loss through dietary restriction and modification of nutrient absorption in the digestive tract.[12,13] Research has demonstrated that multiple factors affect weight loss success following MGB or OAGB surgery. Structural modifications, such as stomach restriction and altered nutritional absorption, are crucial for reducing calorie intake and promoting weight loss.[14] Additionally, favourable hormonal changes post-surgery, such as increased satiety hormones and decreased appetite hormones, contribute to sustained weight loss in these procedures.[15]

MGB or OAGB is often characterised as a promising surgical treatment for rapid weight reduction and management of obesity-related health conditions. However, research has reported different complications and side-effects following MGB and OAGB, including (1) intraoperative complications; (2) immediate, early and late postoperative complications; and (3) other complications and side-effects. Early complications that range from 3.5% to 7.5% are considered acceptable.[16,17] Major complications that might require reoperation or prolonged hospital stay are reported at a rate of 2–3% of patients with MGB and OAGB.[18] Notably, leaks and haemorrhage can occur in the early postoperative period. The occurrence rate of these complications during the first couple of postoperative weeks is 0.7–2%.[17]

Both MGB and OAGB have attracted attention due to their potential to treat comorbidities such as sleep apnoea, hypertension and T2DM, in addition to obesity. According to recent studies, MGB and OAGB have shown promise as alternative surgical interventions for the effective management of obesity and its associated comorbidities with less surgical complexity.[19] Thus, this study aimed to examine the short-term effects of MGB or OAGB procedures on weight loss in patients with obesity.

Methods

This retrospective cohort study was carried out in Medicano Hospital, Erbil, Iraq, from January 2019 to May 2020. During this study period, 240 bariatric surgeries were carried out at this medical facility, including 115 MGB or OAGB surgeries. All the individuals aged 20–65 years who underwent MGB or OAGB surgery for morbid obesity at this specific centre during the study period were included in the study. This age group was specifically selected as the ideal age for such a procedure. A total of 11 patients were excluded from the study. Exclusion criteria included loss to follow-up, pregnancy during follow-up periods and revisional or conversational MGB/OAGB. Pregnant women were excluded from the study as the change in weight did not reflect the actual change in weight related to the procedure. The sample size was calculated based on an average mean percentage of excess weight loss (%EWL) of 80, standard deviation of 20 and a margin of error of 4.[20]

Moreover, patients' medical records from 6 August to 14 September 2023 were accessed. These records included the standardised paper forms used to record the patient data at the hospital and the follow-up data. These data were directly recorded by entering into an electronic Excel (Microsoft Corp., Redmond, Washington, USA) sheet. The authors had no access to information that could identify individual participants during or after data collection. Demographic information for each participant, as well as their clinical history, was meticulously recorded. Measurements taken at the beginning of the study comprised the patient's age (in years), height (in m), presurgery weight (in kg) and body mass index (BMI; in kg/m^2). These parameters were methodically documented to develop an in-depth profile of the study participants.

The postoperative follow-up phase lasted 48 weeks and the patient visited the hospital/clinic. The first visit was scheduled 2 weeks after bariatric surgery, the second visit 4 weeks after surgery and the third visit 12 weeks after surgery. Subsequent visits were scheduled at 12-week intervals for the first year after surgery. Postoperative dietary advice was given to the patients, which included suggestions regarding eating and drinking slowly, chewing food thoroughly, keeping meals small, drinking liquids between meals and taking recommended vitamin and mineral supplements.

To determine whether surgical treatments were successful, researchers measured the patients' weight throughout the study period (i.e. weeks 12, 24, 36 and 48). Throughout the follow-up period, participants' average body weight was monitored at set intervals so that researchers could detect swings and patterns in their weight reduction. The weight was measured by a professional physician-grade digital scale, which was placed on firm flooring. After the patients removed their shoes and heavy clothing, they were weighed by standing while positioning both feet on the centre of the scale. The weight was recorded to the nearest decimal fraction.

The most important indicator of success was determined to be the decrease in the overall weight of the participant during the study's 48-week follow-up. The main outcome measures included the percentage of weight change and %EWL. The percentage of weight change refers to the amount of weight lost by an individual following the surgical procedure, typically expressed as a percentage of their initial body weight. It was calculated using the following formula:

$$\frac{\textit{follow up weight} - \textit{presurgery weight}}{\textit{presurgery weight}} \times 100$$

Notably, %EWL is a metric used to quantify the amount of weight lost by an individual in relation to their excess weight. It is commonly utilised in the context of weight loss interventions, such as bariatric surgery, to assess the effectiveness of the treatment. It is calculated by dividing the difference between initial and final weight by the difference between initial weight and a 'normal' target weight. The 'normal' target weight is based on a BMI of 25 kg/m^2, which is the upper limit of a 'normal' BMI. Thus, the following formula was used to calculate %EWL:

$$\frac{\textit{initial weight} - \textit{follow up weight}}{\textit{ideal weight} - \textit{initial weight}} \times 100$$

The ideal weight was determined by taking the patient's presurgery weight and dividing it by 25, which is the weight required to have a maximum normal BMI (i.e. 25 kg/m^2).

The test-retest approach was used to assess the reliability of the questionnaire, and the Kappa statistic was calculated, which showed a reliability coefficient of 0.82. In total, 10 experts in the field evaluated the content and face validity of the questionnaire. The calculated content validity index and content validity ratio were 0.87 and 0.89, respectively.

Using descriptive statistics, a summary of the study participants, including their demographic and clinical information, was created. Means and standard deviations were used to describe continuous variables. The presentation included the frequencies and percentages of the categorical variables, the percentage of weight change and %EWL.

The distribution of continuous variables was assessed using the Kolmogorov–Smornov and Shapiro–Wilk tests, which demonstrated that the data were normally distributed. Therefore, a paired t-test was used to compare mean weight, mean percentage of weight loss and mean %EWL at several time intervals. Furthermore, the Student's t-test was used to compare the mean percentage of weight loss and the mean %EWL between two groups, while ANOVA was used to compare the means among three or more groups, with P <0.05 being considered statistically significant.

The research was carried out in accordance with the ethical standards and precepts outlined in the Declaration of Helsinki. The research ethics committee of Catholic University in Erbil approved the research protocol for the study (Ethical approval code 791). No consent was required as secondary data were analysed anonymously.

AI tools, specifically ChatGPT and Grammarly, were used to improve the language and clarity of this manuscript.

Results

This study included 104 patients with obesity who underwent MGB or OAGB surgery. Most of the participants were women (72.1%) who were 31–40 years of age (42.3%) and married (76.9%). Approximately 83% of them had chronic diseases [Table 1].

The presurgery age, height, weight and BMI measures of patients who underwent MGB or OAGB due to obesity are presented in Table 2. The mean age ± standard deviation (SD) at baseline was 35.3 ± 10.7 years (range: 20–64), the mean ± SD height was 1.6 ± 0.1 m (range: 1.5–1.9), the mean ± SD presurgery weight was 122.9 ± 20.9 kg (range: 88.0–201.0) and the mean ± SD presurgery BMI was 45.6 ± 6.4 kg/m^2 (range: 37.1–72.7).

Table 1: Demographic characteristics of patients with obesity who underwent mini-gastric bypass or one-anastomosis gastric bypass surgery (N = 104)

Characteristic	n (%)
Gender	
Male	29 (27.9)
Female	75 (72.1)
Age group in years	
20–30	31 (29.8)
31–40	44 (42.3)
>40	29 (27.9)
Marital status	
Single	24 (23.1)
Married	80 (76.9)
Chronic diseases	
No	18 (17.3)
Yes	86 (82.7)

The mean weight of the participants decreased remarkably from 122.9 kg at baseline to 108.1 kg at week 12, 94.5 kg at week 24, 83.1 kg at week 36 and 75.5 kg at week 48. The weight loss was statistically significant from one follow-up time point to another at *P* <0.001 [Table 3].

The weight change (%) was −11.8% at week 12 and increased remarkably during the follow-up period to −22.7% at week 24, −31.8% at week 36 and −37.9% at week 48. The weight change (%) was statistically significant from one follow-up time point to another at *P* <0.001. The weight change (%) was not significantly associated with demographic variables or the presence of chronic diseases [Table 4].

The %EWL was 26.8% at week 12, which increased remarkably during the follow-up period to 51.5% at week 24, 72.3% at week 36 and 86.1% at week 48. The increase in %EWL was statistically significant from 1 follow-up time point to another at *P* <0.001. The %EWL at week 36 was significantly higher among age groups 20–30 than among the 31–40 and >40 groups (75.9% versus 71.4% and 69.7%; *P* = 0.048). Additionally, %EWL at week 48 was significantly higher among single than among married patients (90.1% versus 84.9%; *P* = 0.022) [Table 5].

Table 2: Baseline characteristics of patients with obesity who underwent mini-gastric bypass or one-anastomosis gastric bypass surgery

Variable	Mean ± SD	Minimum	Maximum
Age at baseline in years	35.3 ± 10.7	20.0	64.0
Height in meters	1.6 ± 0.1	1.5	1.9
Presurgery weight in kg	122.9 ± 20.9	88.0	201.0
Presurgery BMI in kg/m^2	45.6 ± 6.4	37.1	72.7

SD = standard deviation; BMI = body mass index.

Table 3: Changes in mean weight during the follow-up period for patients with obesity who underwent mini gastric bypass or one anastomosis gastric bypass surgery.

Weight in kg	Mean ± SD	*P* value*
Baseline	122.9 ± 20.9	
Week 12	108.1 ± 17.3	<0.001
Week 24	94.5 ± 13.9	<0.001
Week 36	83.1 ± 10.9	<0.001
Week 48	75.5 ± 9.9	<0.001

SD = standard deviation
**The P value compares each follow-up period with the previous period.*

Discussion

In the current study, the significant decrease in mean weight observed in participants who received MGB or OAGB surgery over the 48-week follow-up period is consistent with the expected effects of bariatric procedures. These findings are consistent with previous research on the effectiveness of these methods in achieving significant weight loss. The decrease in mean weight from 122.9 kg at baseline to 75.5 kg at week 48 is considered a significant and constant weight loss, demonstrating that the MGB or OAGB operations effectively support short-term weight management. Comparable studies, such as the 5-year prospective study conducted by Magro *et al.*, revealed comparable weight loss patterns after bariatric surgery, highlighting the long-term success of these therapies.[8]

The observed weight loss trajectory, with consistent declines in each follow-up period, reflects the expected pattern of steady weight loss after bariatric surgery. This is consistent with the findings of Schauer *et al.*, who highlighted the gradual nature of weight loss after gastric bypass surgery in a five-year prospective outcome study.[21] The findings are also consistent with those of Adams *et al.*, who reported sustained weight loss during a similar follow-up in a prospective cohort study.[22]

While there was a significant and gradual decrease in mean weight post-MGB-OAGB surgery, potential confounders such as adherence to postoperative dietary care and lifestyle changes should be considered, as these significantly impact weight loss outcomes. Research has shown that patient compliance with dietary modifications has an essential role in sustaining long-term weight loss post-surgery.[23]

Several factors influence the success of weight loss after MGB or OAGB surgery. The structural modifications of these treatments, such as stomach restriction and altered nutritional absorption, play a critical role in reducing calorie intake and facilitating

Table 4: Change in weight (%) during the follow-up period for patients with obesity who underwent mini-gastric bypass or one-anastomosis gastric bypass surgery and association with different demographic variables

Variable	Weight change in % Mean ± SD			
	Week 12	Week 24	Week 36	Week 48
Total	−11.8 ± 4.1	−22.7 ± 5.0	−31.8 ± 5.6	−37.9 ± 6.0
P value*	-	<0.001	<0.001	<0.001
Age group in years				
20–30	−12.4 ± 3.9	−22.9 ± 4.4	−32.5 ± 4.6	−38.2 ± 5.9
31–40	−11.5 ± 4.4	−22.2 ± 5.4	−31.0 ± 5.9	−37.4 ± 6.5
>40	−11.5 ± 4.0	−23.1 ± 5.0	−32.2 ± 6.0	−38.4 ± 5.4
P value	0.248	0.280	0.680	0.678
Gender				
Male	−12.0 ± 4.3	−23.1 ± 5.6	−31.9 ± 6.1	−38.3 ± 6.5
Female	−11.7 ± 4.1	−22.5 ± 4.7	−31.7 ± 5.4	−37.8 ± 5.8
P value	0.719	0.563	0.860	0.677
Marital status				
Single	−12.3 ± 4.0	−22.7 ± 3.8	−32.7 ± 5.1	−39.5 ± 6.3
Married	−11.7 ± 4.2	−22.7 ± 5.3	−31.5 ± 5.7	−37.4 ± 5.8
P value	0.522	0.990	0.375	0.132
Chronic diseases				
No	−12.4 ± 4.5	−22.7 ± 4.0	−31.9 ± 4.6	−38.2 ± 6.4
Yes	−11.7 ± 4.1	−22.7 ± 5.2	−31.8 ± 5.8	−37.9 ± 6.0
P value	0.525	0.979	0.934	0.839

SD = standard deviation

**This P value compares each follow-up period with the previous period.*

weight loss.[14] Furthermore, positive hormonal changes after surgery, such as increased satiety hormones and decreased appetite hormones, contribute to the long-term weight loss found in these studies.[15]

In addition to post-surgery hormonal changes contributing to weight loss, other potential mechanisms, such as altered gut microbiota and metabolic adaptations, may influence weight reduction. Research has shown that preoperative gut microbiota can influence bariatric surgery outcomes. The *Prevotella*-to-*Bacteroides* ratio is significantly higher in those who respond to surgical procedures.[24]

Individual disparities in weight reduction exist, and factors such as adherence to postoperative food and lifestyle advice, metabolic differences and genetic predispositions can influence outcomes.[23] As a result, ongoing research and comparisons with similar studies can provide a more comprehensive understanding of the factors that impact weight reduction following MGB or OAGB procedures. Metabolic differences are crucial in determining how individuals respond to bariatric surgery and achieve weight loss goals. Pre-existing insulin resistance, dyslipidaemia and low resting metabolic rate impact a patient's ability to achieve sustained weight loss post-surgery.[25,26] Thus, genetic factors play a significant role in influencing weight loss responses post-bariatric surgery. Genetic predispositions towards increased appetite, slower metabolism and reduced insulin sensitivity may contribute to the patient's challenges in achieving sustained weight loss following surgery.[26]

The significant weight reduction, as measured by weight change (%) and %EWL over the follow-up period, reflects the effectiveness of MGB or OAGB surgery in inducing and maintaining significant weight loss. The percentage change in weight increased significantly from −11.8% at week 12 to −37.9% at week 48. This trend is consistent with earlier prospective studies on bariatric surgery results, demonstrating the slow and prolonged nature of postoperative weight

Table 5: Excess weight loss (%) during the follow-up period for patients with obesity who underwent mini-gastric bypass or one-anastomosis gastric bypass surgery and the association with different demographic variables

Variable	Excess weight loss in % Mean ± SD			
	Week 12	Week 24	Week 36	Week 48
Total	26.8 ± 8.7	51.5 ± 9.5	72.3 ± 10.2	86.1 ± 9.7
P value*	-	<0.001	<0.001	<0.001
Age group in years				
20–30	29.1 ± 9.0	53.4 ± 8.1	75.9 ± 10.0	88.6 ± 6.9
31–40	26.3 ± 8.7	51.1 ± 9.9	71.4 ± 9.9	86.1 ± 11.1
>40	25.0 ± 8.0	50.2 ± 10.1	69.7 ± 10.1	83.6 ± 9.7
P value	0.159	0.385	0.048	0.140
Gender				
Male	27.0 ± 9.0	52.1 ± 11.1	71.9 ± 10.0	86.2 ± 9.8
Female	26.7 ± 8.6	51.3 ± 8.8	72.4 ± 10.3	86.1 ± 9.7
P value	0.852	0.694	0.805	0.950
Marital status				
Single	28.5 ± 10.3	52.2 ± 9.4	74.9 ± 11.8	90.1 ± 9.7
Married	26.3 ± 8.1	51.3 ± 9.5	71.5 ± 9.6	84.9 ± 9.5
P value	0.266	0.681	0.146	0.022
Chronic diseases				
No	28.5 ± 10.5	52.4 ± 10.2	73.4 ± 12.5	87.2 ± 11.9
Yes	26.4 ± 8.3	51.3 ± 9.3	72.0 ± 9.7	85.9 ± 9.2
P value	0.357	0.663	0.608	0.606

SD = standard deviation
**This P value compares each follow-up period with the previous period.*

loss.[8,21] Additionally, the constant increase in weight loss size over time demonstrates the durability and effectiveness of MGB or OAGB procedures to achieve long-term weight loss.[27]

Moreover, the %EWL, a key indicator in determining the efficacy of bariatric therapy, followed a similar pattern of consistent improvement throughout the study. The considerable increase from 26.8% at week 12 to 86.1% at week 48 underscores the long-term influence of the MGB-OAGB procedures on excess weight loss. These findings are consistent with the goals of bariatric surgery, which are to reduce total body weight and address the health hazards associated with obesity.[21]

Notably, the correlation analysis with demographic factors found some interesting trends. The significantly higher %EWL observed among the 20–30 years age group at week 36 compared to the 31–40 and >40 age groups is consistent with previous research.[28] This finding might indicate potential age-related changes in weight loss response, with younger patients losing a greater amount of excess weight than older patients after bariatric surgery. Another prospective comparative study reported this tendency, which is useful as a postoperative predictor for weight loss in patients undergoing bariatric surgery.[28] Besides, a case series study revealed that positive social support leads to significantly more weight loss through appropriate lifestyle change.[29] In this sense, there is expected to be more weight loss in married than in unmarried patients. However, the present study revealed a considerably higher %EWL among unmarried patients at week 48 compared to married patients, a finding that requires further exploration. These findings highlight the multidimensional character of weight loss outcomes, which are impacted by factors other than the surgical process. Although the procedures were generally beneficial, knowing demographic differences can help personalise postoperative care and support for more personalised results.[30]

The main strengths of the current study include having a robust follow-up period and detailed data collection. However, this study also has several limitations, including the limitations and biases inherent in the study design and methods, such as having a retrospective design, small sample size, selection bias, measurement bias and a single-centre setting that limit the robustness of the study and generalisability of the findings. Moreover, this study only assessed the weight reduction outcome of MGB or OAGB and did not assess the complications encountered in these patients. A good weight reduction procedure would be useful if associated with a low complication rate. Additionally, the current study also has constraints associated with the statistical analysis sample size limitations, missing data and lack of sensitivity analysis and association or confounding analysis.

Conclusion

This study supports the promising role of MGB or OAGB operations in addressing the complex challenges of obesity. The significant and persistent weight loss outcomes of this study provide clinicians and patients with helpful information for successful and sustainable decision-making about weight management. The practical implications of this study for clinical practice include helping establish patients' selection criteria and postoperative monitoring, especially with the demographic trends of age and marital status identified by this study. This can help in offering personalised treatment approaches post-MGB-OAGB surgery. Future research should address the longer-term weight reduction of MGB or OAGB and the associated complications.

Authors' Contribution

NHI and NPS conceptualised and designed the study. NHI collected the data. NPS performed data analysis. NHI and NPS drafted the manuscript. Both authors read and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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