Weight and Metabolic Profiles of Adult Obese Patients who Underwent Sleeve Gastrectomy & Laparoscopic Adjustable Gastric Banding: A Before-and-After Study

Christine Joy W. Balalta [1], Romielle Grazel Joi H. Ramos [2] , Eliza Mei P. Francisco [3], Miguel C. Mendoza [4], Jaime Alfonso M. Aherrera [5]

[12345] Asian Hospital and Medical Center
Correspondence to: cjwbalalta@gmail.com

Abstract

Introduction: Bariatric surgery exhibits promising outcomes for weight-loss and obesity-related comorbidities. This study was conducted to contribute to local data since differences in body composition and metabolism may affect applicability of international studies on Asians.

Methodology: A before-and-after study was conducted at Asian Hospital and Medical Center (AHMC). Data of patients who underwent Sleeve Gastrectomy (SG) or Laparoscopic Adjustable Gastric Banding (LAGB) between January 1, 2006 to December 31, 2020 were collected through a review of records. The primary outcomes were changes in weight, glucose, cholesterol, and blood pressure post-operatively.

Results: Fifty-five patients aged 21-68 years old were included; 60% underwent SG and 40% underwent LAGB. Mean baseline weight was 125.29(±30.66)kg and mean BMI was 44.04(±8.73)kg/m^2. Most patients (98%) were classified as obese class II*. Both procedures showed decrease in weight and BMI at 1-month, 6-months, and 1-year post-op. A significantly higher percentage of weight loss was noted after SG compared to LAGB (49.11% & 17.91% respectively, 1-year post-op). There was a significant decrease in HbA1c among SG patients (6.49±1.05% to 5.76±0.79%). Changes in FBS, and cholesterol parameters were not significantly different pre- and post-op. Both groups showed significant decreases in SBP (124.21±9.02mmHg to 120.52±7.05mmHg for SG; 130.29±17.39mmHg to 117.86±11.88mmHg for LAGB), while only LAGB showed a decrease in DBP (82.86±12.04mmHg to 74.86±7.36mmHg).

Conclusion: Both procedures showed weight loss; greater in SG. SG is associated with adequate glycemic control as evidenced by lower HbA1c, and both showed effective blood pressure control. Our data demonstrates that these procedures are good options to improve the metabolic profile of patients with obesity.

Keywords: obesity, weight loss, sleeve gastrectomy, laparoscopic adjustable gastric banding, obesity-related co-morbidities

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Introduction

Obesity is a global health problem. The percentage of obesity worldwide has nearly tripled since 1980.[1][2] Obesity is defined as a state of excess adipose tissue mass due to a state of energy imbalance between calories consumed and calories expended, mainly attributed to dietary habits and physical inactivity. It has been officially recognized by the American Medical Association as a disease in 2013. [2] The most widely used method to gauge obesity is by correlating weight to height to get the body mass index or BMI (kg/m^2), however it is not a direct measure of adiposity.[1] Based on the Asia-Pacific BMI Classification, a BMI of equal to or more than 25 kg/m^2 is classified as obese, which is a lower threshold compared to the World Health Organization (WHO) International Classification which sets a BMI of >30 kg/m^2 as obese. This is further categorized into obese class I (BMI of 25-29.9kg/m^2), and obese class II (BMI of >30kg/m^2)[1][2]. A higher prevalence of obesity is seen in the Pacific Islands and United States and is noted to be lower among developing countries. [1] In 2019, the Philippines ranked fifth among ASEAN countries with the highest prevalence rates of obesity – following Malaysia, Brunei, Thailand, and Indonesia – with a percentage of 6.4%. [3] According to the Department of Science and Technology Food and Nutrition Research Institute (DOST FNRI): Expanded National Nutrition Survey in 2018, there is a continuous increase in the local obese population among the adult age group (20-59 years old) from 7.2% in 2015 to 9.6% in 2018, as well as in the elderly age group (>60 years old) from 4.8% in 2015 to 6.3% in 2018.[4]

Obesity is a health concern because of its association with multiple conditions such as cardiovascular disease, diabetes mellitus, sleep apnea, stroke, liver disease, musculoskeletal disorders, and even some cancers. The risk and severity of these obesity-related comorbidities increase with increasing BMI due to the anatomical, metabolic, and physiologic effects of excess adiposity.[1] Insulin resistance increases with obesity, which puts them at risk for diabetes. Obesity and weight gain are both independent risk factors for hypertension, with an established direct linear correlation between BMI and blood pressure. Around 60% of hypertensive patients are overweight, and around 60-70% of hypertension in adults may be directly attributable to obesity. Obesity, especially central or abdominal obesity, is associated with an atherogenic lipid profile which usually coexists with hypertension.[1] Because of this, it has been recommended to do routine laboratories including but not limited to glucose, lipid profile, creatinine for renal status, and cardiopulmonary evaluation in obese individuals.[2][7]

The goals in managing obesity have been directed towards promoting weight loss and improving obesity-related comorbid conditions. Starting with the patients' readiness to change, management begins with lifestyle interventions which include diet, physical activity, and behavioral therapy, to set an initial weight-loss goal of 8-10% over 6 months.[1] Pharmacologic agents are considered in those with a BMI of >30 kg/m^2 or for those in whom dietary and physical therapy have been unsuccessful. Bariatric surgery or weight-loss surgery is typically indicated for patients with a BMI of >40kg/m^2 or for those with a BMI of >35kg/m^2 with a serious medical condition.[1][2] Weight-loss surgeries are traditionally categorized based on its anatomical changes as either restrictive, malabsorptive-restrictive, and malabsorptive. Roux-en-Y gastric bypass (RYGBP), a malabsorptive-restrictive type of surgery which promotes weight loss through decreased caloric intake and nutrient malabsorption, was the procedure of choice for bariatric surgery in the United States in the early 1990s. However, to decrease hospital length of stay and minimize risk of complications from open surgery, there was a shift towards a laparoscopic approach with the introduction of laparoscopic adjustable gastric banding (LAGB) in 1994 and laparoscopic sleeve gastrectomy (SG) in 2008. LAGB is the prototype procedure of the restrictive category. It is done by placing a fluid-filled adjustable band around the stomach to change the size of its gastric opening by tightening the band's internal diameter, thereby limiting the stomach's capacity for food. SG, on the other hand, is done by surgically removing ~80% of the greater curvature, leaving a slim banana-shaped remnant stomach along the lesser curvature, which also restricts the stomach's diameter and capacity for food. At present, SG is the most common technique comprising of 46% of all bariatric surgeries.[2] In a study by Uememura et al. which compared gastric bypass, LAGB and SG, gastric bypass had the highest patient satisfaction rates in terms of weight loss but was found to be associated with elemental nutritional deficiencies. The occurrence of long-term weight regain in LAGB was associated with lower patient satisfaction rates. SG had a high patient satisfaction rate for weight loss owing to both gastric restriction and reduced appetite from decreased ghrelin secretion.[5] Another study done in 2012 by Lomanto et al. included 6,598 bariatric procedures in Asia within a 5-year period. Majority of subjects were from Taiwan and South Korea, and 457 were from the Philippines. They documented SG to have the highest increase in number of procedures with a relative percentage increase of 24.8 times because of its effect on weight loss.[6]

In terms of weight loss and comorbidity remission, the AACE/ACE Obesity Guidelines have established weight loss targets that are associated with improvement of different comorbidities. They specified a weight loss of 5-15% body weight for reduction in HbA1c or reduced number or doses of glucose lowering medications; lower triglycerides, higher HDL and lower non-HDL cholesterol levels; and lower systolic and diastolic blood pressure or reduced number or doses of antihypertensive medications.[7] A systematic review by Buchwald et al. which included 136 international studies done in a span of over 10 years showed both effective weight loss and resolution or improvement of comorbidities after bariatric surgery. Specifically, diabetes was completely resolved in 76.8% and improved in 86.0% of patients; hypertension was resolved in 61.7% and improved in 78.5% of patients; and hyperlipidemia improved in ~70% patients.[8]

Studies on bariatric surgery have substantially increased over the past two decades. The pioneer studies on bariatric surgery and its effect on weight loss and comorbidity remission were initially published internationally in the 1990s, while studies in Asia began to flourish in the early 2000s. Since the start of bariatric surgery in the Philippines around 20 years ago, some local papers have already been published. According to Dineros et al. in 2007, which compared the outcomes of Roux-en-Y Gastric Bypass (RYGBP) and LAGB after a 1-year period among 50 patients in St. Luke's Medical Center, there was greater weight loss in the RYGBP group compared to the LAGB group.[9] In another retrospective study by Evora in 2013 on the effect of LAGB on weight after a 2-year period also at St Luke's Medical Center, it was found that among the 97 patients included in their study, a substantial weight loss of 43.56% was achieved after 2 years. This study did not compare LAGB with any other bariatric procedure.[10] Upon review of literature, there are only a few local case studies involving sleeve gastrectomy.

The differences in body composition and metabolism may affect the applicability of international studies on the Asian population. It has been established that for the same BMI, Asians have a higher body fat percentage and more visceral fat compared to Caucasians. Among Asians, diabetes has also been noted to develop at a younger age and at a lower BMI.[1] The goal of this study therefore, is to provide data that could be of relevance to the local demographic, and further contribute to the current practices and recommendations on bariatric surgery and weight-loss management in the country.

Methodology

Study Design and Population. This is a before-and-after study conducted at Asian Hospital and Medical Center, a 296-bed capacity tertiary hospital. Records of all adult patients who were admitted between January 1, 2006 to December 31, 2020, who had undergone SG and LAGB guided by a medical team that deemed each patient a candidate for surgery according to its indications, were reviewed. The diagnosis of obesity was taken from the admitting diagnoses, and the operative notes of the procedures were obtained to verify the type of surgery that was done. All subjects who met the inclusion criteria were included in the study.

Inclusion criteria.

- Adult patients aged 19 years old and above at the time of surgery, regardless of gender, with a diagnosis of obesity based on the Asia-Pacific BMI Classification, who had undergone either SG or LAGB at Asian Hospital and Medical Center between January 1, 2006 to December 31, 2020, with at least one post-operative follow-up visit.

Exclusion criteria.

- SG and LAGB patients with no available data or who were lost to follow-up
- Obese children who underwent SG, LAGB or any form of bariatric surgery
- Other types of open or laparoscopic bariatric procedures not otherwise specified, and endoscopic or gastric balloon procedures

Data Collection. Data were collected through a review of medical records of patients who fulfilled the inclusion criteria. The pre-operative weight and BMI recorded on admission, and post-operative weight and BMI recorded at different time points – at 1 month, 6 months, and 1 year post-operative – were collected from follow-up records to determine the percentage of weight loss compared to baseline. The vital signs on the monitoring sheets upon admission and on follow-up records were used to gather blood pressure trends. Selected laboratory parameters specifically HBA1c, fasting blood sugar, total cholesterol, LDL, and triglyceride levels done pre-operatively and post-operatively were also compiled. Data collection from Medical Records and *Orion*© commenced after REC approval and was facilitated over a period of two months. All data were initially inputted in an excel file (Microsoft Excel Version 16.55).

Outcome measures. The primary outcomes of the study were changes in weight and BMI, glucose levels, cholesterol levels and blood pressure after SG and LAGB. The secondary outcome was to determine which type of bariatric surgery produced more weight loss.

Data analysis. Data were encoded and tallied in SPSS version 23 for Windows. Descriptive statistics were generated for all variables. Frequencies and percentages were used for nominal data. Mean ± SD were generated for numerical data. Analysis of the different variables was done using the following test statistics:

- T-test – used to compare two groups with numerical data. Paired T-test was used to assess the differences between pre-operative and post-operative values.
- Mann Whitney U test – a non-parametric equivalent of the t-test
- A *p-value* of ≤0.05 was considered statistically significant.

Ethical considerations. Data The protocol was initially submitted to the AHMC Ethical Review Board for ethics review and was only conducted upon its approval. Permission from the Data Privacy Officer was obtained before accessing data for the study. No other data was obtained aside from what was stated in the protocol. The patients' records remained confidential in compliance with the Data Privacy Act of 2012 and Data Privacy Policy of Asian Hospital and Medical Center. Each patient was assigned a corresponding code to ensure anonymity, hence there were no patient identifiers. The soft copy data were stored in a password-protected laptop and USB, accessible only to the principal investigator and advisor until five years after completion of the study, after which will be disposed.

Results

Patient characteristics. A total of 61 records were reviewed. Of these patients, 55 were included in the study and 6 were excluded for not meeting the inclusion criteria: two were less than 19 years old at the time of surgery, and 4 underwent either SG or LAGB but were lost to follow-up, with no available data for review ***(Figure 1).*** Thirty-three (33) patients (60%) had undergone SG, and 22 (40%) patients had undergone LAGB. ***Table 1*** shows the baseline characteristics of both groups. Ages ranged from 21 to 68 years, with a mean age of 40.12 ± 11.68 years in the SG group, higher than 33.14 ± 6.87 years in the LAGB group. Between the 2 groups, 50.9% were male and 49.1% were female. The mean baseline weight in kilograms for both was 125.29 ± 30.66kg, and mean BMI was 44.04 ±

8.73kg/m^2. Based on the Asia-Pacific BMI Classification, 98% were categorized as obese class II (BMI >30kg/m^2), and 2% were categorized as obese class I (BMI >25kg/m^2). The highest BMI recorded was 72kg/m^2.

The laboratory parameters of the included patients are described in ***Table 1.*** For this study, the following normal ranges were applied: an HbA1c of <5.6% and an FBS of <100mg/dl based on the American Diabetes Association (ADA) and UNITE for Diabetes Philippines guidelines[11][12]. The values for cholesterol may vary depending on age and comorbidities but for the purpose of this paper, the normal values were set as follows: total cholesterol of <200mg/dl, LDL of <100mg/dl, and triglycerides of <150mg/dl[13]. Lastly, normal blood pressure is 120/80mmHg based on the Eighth Joint National Committee (JNC8) Hypertension Guideline and the Clinical Practice Guidelines for the Management of Hypertension in the Philippines.[14][15] Among all 55 patients, 49% had an elevated HbA1c of ≥5.6%, and 51% had an elevated FBS of ≥100mg/dl at baseline. For lipid levels, 40% had a total cholesterol of >200mg/dl, 53% had a LDL of >100mg/dl, and 35% had a triglyceride level of >150mg/dl at baseline. Pre-op blood pressure was above 120/80 in 45% of the subjects.

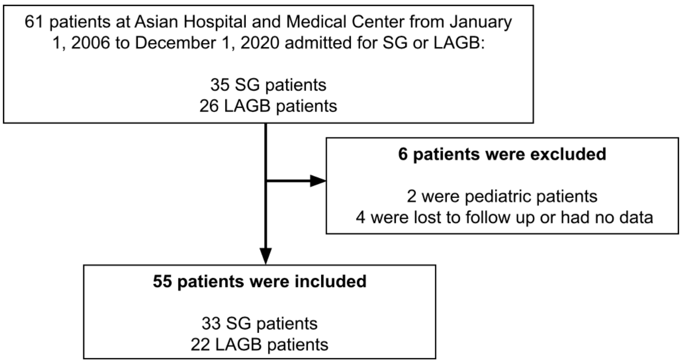

Figure 1. Patient inclusion & exclusion criteria flowchart

Table 1. Baseline characteristics of patients who underwent SG & LAGB

	SG (n=33)	**LAGB** (n=22)
	Frequency (%); Mean ± SD	
Age (in years)	40.12 ± 11.68 (40)	33.14 ± 6.87 (34)
Sex		
Female	15 (45.5%)	12 (54.5%)
Male	18 (54.5%)	10 (45.5%)
Weight (kg)	128.92 ± 34.72	119.84 ± 22.98
BMI (kg/m^2)	45.23 ± 9.85	42.26 ± 6.53
HbA1c (%)	(n=27) 6.41 ± 1.47	(n=22) 5.92 ± 0.47
FBS (mg/dl)	(n=28) 114.66 ± 39.6	(n=21) 98.1 ± 14.4
Total Cholesterol (mg/dl)	(n=30) 176.45 ± 41.3	(n=21) 204.25 ± 26.24
LDL (mg/dl)	(n=22) 105.79 ± 3.24	(n=16) 118.15 ± 37.07
Triglycerides (mg/dl)	(n=31) 127.43 ± 44.25	(n=21) 145.13 ± 65.49
Systolic BP (mmHg)	(n=33) 120.30 ± 9.84	(n=21) 128.29 ± 16.24
Diastolic BP (mmHg)	(n=33) 79.39 ± 5.56	(n=21) 82.38 ± 10.44

Weight and Body Mass Index (BMI). The mean weight and BMI taken at each time point (baseline, 1 month, 6 months, and 1 year post-operative) are summarized in ***table 2***. In the SG group, the average weight was 121.91 ±33.05kg after 1 month, 107.43 ±33.65kg after 6 months, and 97.31 ±27.35kg after 1 year, while average BMI was 42.18 ±9.01kg/m2 after 1 month, 37.23 ±8.16kg/m2 after 6 months, and 33.94 ±7.72kg/m2 after 1 year. In the LAGB group, the average weight was 110.79 ±22.25kg after 1 month, 104.92 ±24.39kg after 6 months, and 91.77 ±17.23kg after 1 year, while average BMI was 38.98 ±6.44kg/m2 after 1 month, 37.67 ±1.61kg/m2 after 6 months and 33.29 ±6.12kg/m2 after 1 year. Both weight and BMI demonstrated decreasing trends among both groups.

Table 3 shows the comparison of percentage weight loss between the two groups. There was a significant difference in the percentage weight loss at 1 month, 6 months and 1 year between the two groups as shown by the *p-values* 0.01, <0.0001 and <0.0001 respectively. Significantly higher percentage weight loss was noted among patients who underwent SG compared to patients who underwent LAGB.

Table 2. Weight & BMI at different time points of patients who underwent SG & LAGB

	SG		**LAGB**	
	Weight (kg)	**BMI (kg/m^2)**	**Weight (kg)**	**BMI (kg/m^2)**
	Mean ± SD			
Baseline	(n=33) 128.92 ± 34.72	(n=33) 45.23 ± 9.85	(n=22) 119.84 ± 22.98	(n=22) 42.26 ± 6.53
1 month	(n=22) 121.91 ± 33.05	(n=22) 42.18 ± 9.01	(n=20) 110.79 ± 22.25	(n=20) 38.98 ± 6.44
6 months	(n=15) 10 7.43 ± 33.65	(n=15) 37.23 ± 8.16	(n=18) 104.92 ± 24.39	(n=18) 37.67 ± 1.61
1 year	(n=9) 97.31 ± 27.35	(n=9) 33.94 ± 7.72	(n=10) 91.77 ± 17.23	(n=10) 33.29 ± 6.12
67% and 91% of SG and LAGB patients respectively, had available data on weight and BMI at 1 month post-op. For SG, 45% of the initial population had followed up at 6 months post-op, 93% of which had prior follow-up at 1 month. After 1 year, only 27% of the initial population had followed up, 89% of which had prior follow-up at 6 months. For LAGB on the other hand, 82% of the initial population had followed up after 6 months, 94% of which had prior follow-up at 1 month. At 1 year, follow-up rate was down to 45% of the initial population, 90% of which had previous follow up at 6 months.				

Table 3. Percentage of weight loss at 1 month, 6 months, & 1 year of patients who underwent SG & LAGB

Percentage of Weight Loss from Baseline (%)	**SG**	**LAGB**	***p-value****
	Mean ± SD		
1 month	(n=22) 10.88 ± 4.59	(n=20) 7.51 ± 3.85	0.01 §
6 months	(n=15) 31.99 ± 11.66	(n=18) 11.84 ± 6.32	<0.0001 †
1 year	(n=9) 49.11 ± 19.33	(n=10) 17.91 ± 10.18	<0.0001 †
** p>0.05- Not significant; p ≤0.05-Significant* *† Mann Whitney U test; § T- test*			

Metabolic profile. The baseline and post-operative laboratory values in each group are summarized in ***Table 4***. Of note, not all patients had available data on these parameters since there was no standardized panel. The time between baseline and post-op laboratories also varied among patients. Baseline laboratory values were taken prior to surgery, while most post-op recorded values were taken upon first follow-up.

Glucose levels**:** Both HbA1c and FBS were collected to assess glycemic control. The mean pre- and post-op HbA1C levels decreased from 6.49% to 5.76% and from 5.92% to 5.86% for SG and LAGB patients respectively. The decrease in HbA1c in the SG group was statistically significant with a *p-value* of 0.001, but not in the LAGB group (*p-value*=0.67). In terms of FBS levels, the mean values decreased from 112.5mg/dl to 102.78mg/dl and from 93.78mg/dl to 92.16mg/dl for SG and LAGB patients, respectively. However, the differences between baseline and post-op FBS for both groups were not significant (*p-value* >0.05).

Cholesterol levels**:** Three parameters for cholesterol were gathered – total cholesterol, LDL and triglyceride levels. For total cholesterol, the SG group had a mean baseline of 170.27mg/dl, which increased to 198.07mg/dl post-op. On the other hand, the LAGB group had a mean baseline value of 198.45mg/dl and a slightly decreased mean post-op value of 197.68mg/dl. There was also a mean increase in LDL for both groups, from 96.1mg/dl to 110.8mg/dl in the SG group and from 129.7mg/dl to 135.5mg/dl in the LAGB group. Lastly for triglycerides, the SG group showed an increase from 132.7mg/dl to 138.9mg/dl, while the LAGB group showed a decrease from 155.6mg/dl to 119.5mg/dl between pre- and post-op. There were no significant differences noted for all three variables in both groups with all *p-values* of >0.05.

Blood Pressure**:** Both systolic and diastolic blood pressures demonstrated decreasing trends. In the SG group, the mean SBP decreased from 124mmHg to 121mmHg, while the mean DBP decreased from 80mmHg to 77mmHg. In the LAGB group, the mean SBP decreased from 130mmHg to 118mmHg, while the mean DBP decreased from 83mmHg to 75mmHg. The decrease in SBP was statistically significant for both groups with *p-values* of 0.04 and <0.0001 in the SG group and LAGB group respectively. There was also a significant decrease in DBP in the LAGB group (*p-value*<0.05), but not in the SG group.

Table 4. Baseline & Post-operative laboratory values of patients who underwent SG & LAGB

Parameter	Baseline	Post-op	*p-value**
	Mean ± SD		
HbA1c (%)			
SG (n=8)	6.49 ± 1.05	5.76 ± 0.79	0.001 (S)
LAGB (n=5)	5.92 ± 0.42	5.86 ± 0.36	0.67 (NS)
FBS (mg/dl)			
SG (n= 12)	112.5 ± 34.2	102.78 ± 29.7	0.15 (NS)
LAGB (n=10)	93.78 ± 12.6	92.16 ± 6.6	0.58 (NS)
Total Cholesterol (mg/dl)			
SG (n=11)	170.27 ± 32.4	198.07 ± 55.2	0.08 (NS)
LAGB (n=9)	198.45 ± 30.8	197.68 ± 32.0	0.97 (NS)
LDL (mg/dl)			
SG (n=7)	96.1 ± 22.4	110.8 ± 39.8	0.44 (NS)
LAGB (n=7)	129.7 ± 15.1	135.5 ± 29.7	0.55 (NS)
Triglycerides (mg/dl)			
SG (n=10)	132.7 ± 50.4	138.9 ± 57.5	0.63 (NS)
LAGB (n=8)	155.6 ± 62.8	119.5 ± 64.6	0.29 (NS)
Systolic BP (mmHg)			
SG (n=19)	124.21 ± 9.02	120.52 ± 7.05	0.04 (S)
LAGB (n=14)	130.29 ± 17.39	117.86 ± 11.88	<0.0001 (S)
Diastolic BP (mmHg)			
SG (n=19)	80.00 ± 5.77	77.37 ± 5.62	0.17 (NS)
LAGB (n=14)	82.86 ± 12.04	74.86 ± 7.36	0.009 (S)

** p>0.05- Not significant; p ≤0.05-Significant*
Paired T- test

Discussion

Both SG and LAGB are restrictive type of surgeries in which the mechanism for weight loss is mainly from reduced food intake. Aside from the anatomical changes induced by surgery, alterations in gastric emptying time and improved insulin sensitivity also play a role. This study demonstrated a decrease in weight and BMI in both SG and LAGB groups. However, a significantly higher percentage of weight loss was noted in those who underwent SG. In SG, the removal of the fundus where ghrelin is secreted also contributes to decrease intake by decreasing appetite.[5] In LAGB, there is no anatomical alteration of the stomach, only the placement of a fluid-filled adjustable band around the proximal stomach to decrease intake and induce satiety. Hence, failure to lose clinically significant weight is more common following LAGB from band readjustments.[2]

Elevated glucose in association with obesity is due to multiple factors including increased insulin resistance which can result in diabetes. Weight loss after bariatric surgery decreases blood glucose via caloric restriction, which lead to reduced hepatic glucose production, increased glucose uptake in tissues, and improved insulin sensitivity.[2] Our study showed a significant decrease in HbA1c, but not in FBS despite both showing lower values post-op. Similar results were obtained by Buzga et al in a prospective study of thirty-five SG patients which showed statistically significant improvements in HbA1c and C-peptide levels, but not FBS. Their study also attributed improvement of glucose due to increased circulation of GLP-1 and PYY hormones as an additional effect seen in SG only.[16] Glucagon-like peptide-1 (GLP-1) is an incretin hormone that augments insulin response after oral intake. Pancreatic peptide YY (PYY) is a hormone co-secreted with GLP-1, which can inhibit appetite.[1]

In terms of lipid levels, our study did not show any significant difference between pre-op and post-op levels of all three parameters in both groups. This is similar to results of a meta-analysis done in 2017 wherein post-operative compared to baseline total cholesterol and LDL levels were also not significant for both SG and LAGB. The reduction in cholesterol was found to be more associated with malabsorptive type of surgeries compared to restrictive surgeries like SG and LAGB.[17] In malabsorptive-type procedures, the presence of anatomical alteration of the intestines reduces cholesterol absorption, which mainly occur in the duodenum and proximal jejunum.[1]

Lastly for blood pressure, the study showed a significant decrease in baseline and post-op systolic blood pressure for both groups. There was also a significant decrease in baseline and post-op diastolic blood pressure, but only for the LAGB group. This is consistent with a meta-analysis done by Wilhelm et al which concluded that patients who undergo any type of bariatric surgery experience improvement or resolution of hypertension[18]. The decrease in blood pressure could be explained by the overall improvement in metabolic profile, decreased inflammation and decreased sympathetic activity brought about by weight loss post-operatively.[2]

Limitations. Since bariatric surgery is typically less common compared to other procedures, it would take years to gather a substantial amount of data. Given that the study was done in the time of pandemic, there are also fewer elective procedures in general for a prospective study. Being a retrospective study, data were lacking for several subjects. Not all patients in both groups followed up at the time points of interest, and the laboratories requested were not standardized hence some profiles were incomplete. The relatively short duration of follow-up to up to 1 year also limited our assessment of the long-term effects of SG and LAGB on weight and metabolic profile. It is important to mention that this study did not take into consideration other factors such as diet, physical activity, and pharmacologic therapy that could have contributed to weight loss, changes in blood pressure, and laboratory values. Lastly, the findings may not be reflective of the general population since it is a single center study with a small study population.

Conclusion

In conclusion, both SG and LAGB have demonstrated decrease in weight and BMI post-op, with SG resulting in more significant weight loss than LAGB. SG is also associated with adequate glycemic control as evidenced by a lower HbA1c. Both SG and LAGB showed effective blood pressure control as seen by significantly lower trends. Our data therefore demonstrates that these procedures are good options to improve the metabolic profile of patients with obesity.

Recommendations

Since the presence of visceral or abdominal fat is more associated with cardiovascular risk factors, the assessment of pre-operative and post-operative waist circumference or waist-to-hip ratio would be helpful to measure. The assessment of other obesity-related comorbidities such as fatty liver, obstructive sleep apnea, musculoskeletal disorders, reproductive disorders, assessment of nutritional deficiencies that may have occurred, and possibly the assessment of quality of life before and after surgery can also be done. Lastly, we recommend a long-term prospective study (with more than 1 year follow-up) to assess the clinical benefit of SG and LAGB in terms of decreasing morbidity and mortality.

Disclosure

Dr. Christine Balalta, Dr. Romielle Ramos, Dr. Miguel Mendoza, Dr. Jaime Aherrera: No conflict of interest.

Dr. Eliza Francisco: Board Member, Philippine Society for Parenteral and Enteral Nutrition (PhilSPEN)

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