OUTCOME OF LAPAROSCOPIC SLEEVE GASTRECTOMY AND LAPAROSCOPIC MINI GASTRIC BYPASS ON EGYPTIAN MORBID OBESE PATIENTS

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ABSTRACT

Background: *Chronic diseases are well established as the predominant death cause, and obesity, being one of the factors strongly contributive to chronic diseases, has been consistently threatening the global health.*

Aim of the Work: *To compare between laparoscopic mini gastric bypass and laparoscopic sleeve gastrectomy on morbid obese patients in Egypt as regard weight loss, outcome of associated co-morbiditis and with 1 year follow up after operation.*

Patients and Methods: *This study included 200 patients, 100 patients in each group. The group age ranged between 22 -55 years with a mean ± SD of 37.88 ± 9.52 years. Female patients represented the main population of this study (60.5%). It is a common finding in the literature that women are undergoing bariatric surgery more than men. We included in this study patients with BMI ≥ 40 or BMI = 35–39 with one or more obesity-related co morbidities. It is a sample study which was done between December 2016 – December 2018 at Ain Shams University Hospitals, Cairo, Egypt.*

Results: *Finally our study suggests that bariatric surgery (mainly LSG and LMGB which are the most common bariatric operations nowadays) are considered the best treatment of diabetes type 2 in obese patients and LMGB is superior to LSG in diabetes remission. Both procedures are also associated with improvement of the blood pressure and the sleep apnea owing to weight loss.*

Conclusion: *It is reasonable to say that both LSG and LMGB achieve similar weight loss mean and resolution of co-morbidities at 1 year.*

Keywords: *Haemoglobin A1 c, Laparoscopic mini gastric bypass, Laparoscopic sleeve gastrectomy, American diabetes association*

INTRODUCTION:

Obesity is a chronic disease that impairs health-related quality of life in adolescents and children. In 2010, overweight and obesity were estimated to cause 3.4 million deaths, 3.9% of years of life loss, and 3.8% of disability-adjusted life-years worldwide [(1)].

Weight loss surgery has become increasingly recognized as effective treatment for these comorbidities, and it is considered to be a reasonable option when non surgical methods of weight loss fail. Current studies suggest that neither pharmacologic nor dietary treatment can maintain weight loss in obese patients as effectively as can weight loss surgery [(2)].

Sleeve gastrectomy is a bariatric technique consisting of subtotal vertical gastrectomy with preservation of the pylorus, including longitudinal resection of fundus, corpus and antrum, to create a tubular duct along the lesser curvature. Resection comprises approximately 80% of the stomach and the remnant gastric has a capacity > 100 mL. It is considered an easier technique than other procedures [(3)].

Laparoscopic mini-gastric bypass is reported to be a safe alternative to LRYGB, showing comparable efficacy in weight reduction and resolution of metabolic complications, including diabetes [(4)].

AIM OF THE WORK:

The aim of this randomized trial study to compare between laparoscopic mini gastric bypass and laparoscopic sleeve gastrectomy on morbid obese patients in Egypt as regard weight loss, outcome of associated co-morbiditis and with 1 year follow up after operation.

PATIENTS AND METHODS:

Study Design: It is a sample study which was done between December 2016 – December 2018 at Ain Shams university hospitals, Cairo, Egypt.

Study Population: This study included 200 morbidly obese patients withdivided into two groups: **Group (1):** (100 patients) treated by laparoscopic Sleeve gastrectomy**. Group (2):** (100 patients) treated by laparoscopic Mini-Gastric Bypass.

All patients were operated with the same surgical team in Ain Shams University Hospitals.

Inclusion criteria:

The patients included in this study fulfilled the following criteria: They were willing to give consent and comply with the evaluation and treatment schedule. (The patients treated by LSG refused to take multivitamins for life and the patients treated by MGB were sweet addicts). Their age between 18 and 60 years. Their body mass index (BMI) ≥35 kg/m2. Supportive family/ social environment. No alchol or substance abuse. Absence of active untreated depression or schizophrenia.

Exclusion criteria:

The patients who were excluded from the study: Endocrine abnormalities: e.g. hypothyroidism, Cushing syndrome. Previous bariatric operations. Major upper abdominal surgery. Age below 18 years old or more than 60 years. Pregnant or lactating females. Patient with contraindications for insufflation as those with sever cardiovascular or sever restrictive respiratory diseases**.** Patient with significant abdominal ventral hernia**.** Patient with major psychiatric illness**.**

Preoperative workup:

All patients were subjected to the following:

Complete history taking: Personal history: as age, sex, marital status. Feeding history and if the patients likes sweet much or not. Duration of obesity. History of previous trials of weight loss whether surgical or non-surgical. Medical history for co morbidities: DM: type, onset, course, duration, current medications, controlled or not, if change from oral hypoglycemic to insulin and when, family history. Hypertension. Cardiac and respiratory problems. Sleep symptoms questionnaire. Family history of obesity. Previous DVT. Any other morbidity. Past surgical history.

Complete physical examination: Measurement of weight per Kg, height per meter then calculation of BMI = (weight Kg/height m²). Abdominal examination for (scar for pervious surgery, hernia orifices, organomegaly, right hypochondrial tenderness). Cardiac and pulmonary

evaluation. Medical consultation for proper control of blood sugar and hypertension.

Investigations:

Laboratory investigation: CBC,LFT, KFT, FBS, 2hours Postprandial blood sugar, serum insulin level, C-peptide level, HbA1c, coagulation profile, serum Calcium,Na, K, Mg, thyroid function tests, serum cortisol level, lipid Profile.

Other investigation: Chest X-ray, abdominal U.S, pulmonary function test, echocardiography, UGI endoscopy (if needed).

Operative Techniques:

The first group of sleeve gastrectomy: technique was done by laparoscopy with the following steps: the patient is positioned in reverse Trendelenburg position with splitting of the legs (French position) and abducted arms. CO_2 insufflation is done through a Verress needle placed in left subcostal region at midclavicular line. Five ports are inserted, a 5-12-mm port is placed under direct vision approximately 15 cm below the xiphoid and 3 cm to the left of midline **(Figure 1)**.

Figure (1): Five ports insertion.

A 30-degree angled laparoscope is placed through the port into the peritoneal cavity and 5-12-mm port is placed in the left lateral flank (right hand of surgeon), is placed at the level of the left midclavicular line with the patient in a supine position and at the same level as the periumbilical port. Next, a 5-mm trocar port is placed along the left subcostal margin between the xiphoid process and the left flank port in the left anterior axillary line (grasper of assistant). Another 12-15-mm port is placed in the right upper quadrant region at midclavicular line (left hand of surgeon) and a 5 mm port was placed in the mid-epigastric region for retraction of the left liver lobe by Nathanson liver retractor.

The pylorus of the stomach is then identified and the greater curve of the stomach is elevated (Figure 2). A laparoscopic harmonic® scalpel (or Ligasure®) is then used to enter the greater sac via division of the greater omentum (Figure 3). The greater curvature of the stomach is then dissected free from the omentum starting 2-4 cm from the pylorus and proceeds to the short gastric blood vessels (taking care to avoid injury of spleen) and angle of Hiss (Figure 4&5). The left crus is completely freed from any attachment to avoid leaving any posterior pouch or fundus remnant and to be sure that there is no hiatus hernia. (Figure 6). Then freeing of any posterior attachments between stomach and pancreas (posterior gastric adhesions) (Figure 7).

Figure (2): Identification of pyloric ring.

Figure (3): Opening of greater omentum.

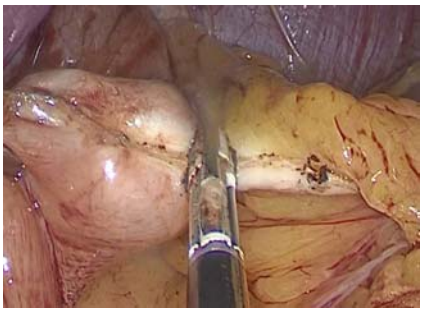

Figure (4): Dissection of greater omentum.

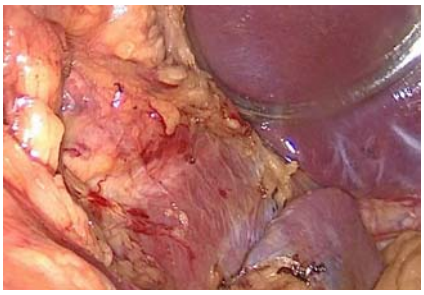

Figure (5): Complete freeing of left crus.

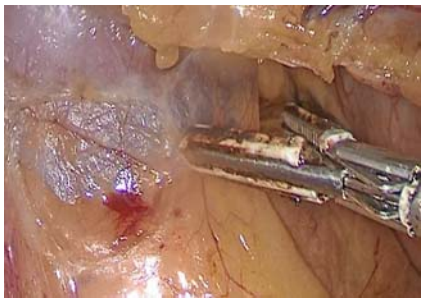

Figure (6): Dissection of posterior gastric wall from pancreas.

A 36 French bougie is used as a template to perform the vertical sleeve gastrectomy beginning 2-4 cm proximal to the pylorus and extending to the angle of Hiss by a 60-mm stapler along and guided by the bougie, the first used stapler is green cartridge (due to more thick antral stomach) and the remaining staplers are blue cartridge stapler. Then vertical gastric pouch is completely separated from the small tubular (sleeve like) stomach pouch.

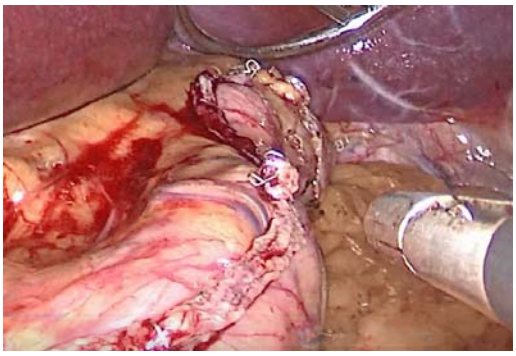

Figure (7): The remaining sleeve like gastric pouch after completion of transection.

The staple line along the remaining tubularized stomach is then tested for any leak through methylene blue test (Figure 8). The staple line is also evaluated for bleeding. The gastric suture line was not systematically reinforced except in the case of bleeding and fixation of sleeve with interrupted PDS® or Vicryl sutures to omentum or pre pancreatic fascia if needed, in which case a drain was placed along the staple line.

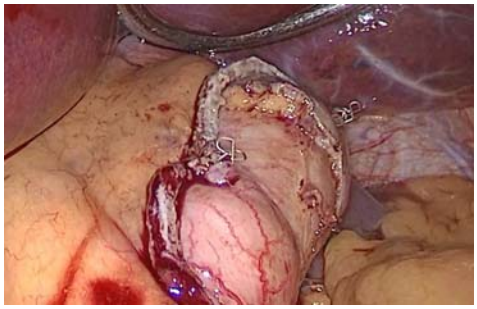

Figure (8): Gastric pouch is distended with methylene blue to test leak.

The second group of minigastric bypass: technique was done by laparoscopy with the following steps the same first group: Dissection of phrenogastric ligament (Figure 9). A window is created to enter the lesser sac between the vagus nerve and the lesser curvature just proximal to the antrum. The gastric pouch must be lengthy and narrow, measuring around 18 cm. Through the window created, a 60 mm blue stapler is passed horizontally.(Figure 10&11).

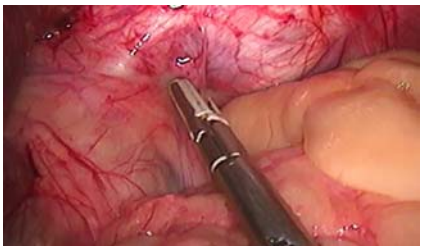

Figure (9): Dissection of Phrenogastric ligament.

Figure (10): Opening window in lesser omentum.

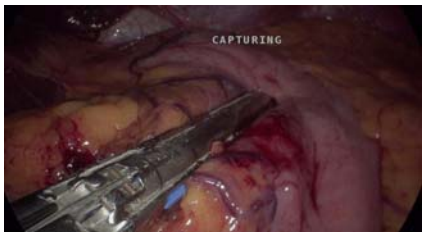

Figure (11): First stapler passing horizontally to the stomach axis.

Anterior gastrostomy is done in the new pouch. After elevation of the transverse colon and the transverse meso-colon, the ligament of Trietz was identified. Measurement of 200 cm of jejunum from the ligament of Treitz, Then, we approximated the bowel loop to the gastric pouch,when both are in position, the Hook were used to make an opening in the small bowel but the distal small intestines are assessed to be at least 2 miters. An antecolic-antegastric-terminolateral gastrojejunostomy is performed using 60 mm blue stapler **(Figure 12)**.

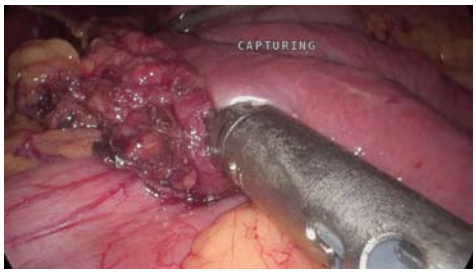

Figure (12): Stapler gastrojejunostomy between the gastric pouch and jejunal loop 200 cm from Treitz's ligament.

Then the stoma opening was closed with two layers continuous sutures using 2/0 absorbable V-lock® over a Ryle tube inserted through the oral cavity and carefully introduced through the stoma opening to efferent intestinal loop (Figure 13&14). Thereafter, leak test was performed through injection of about 50 cc of Methylene blue dye

while both afferent and efferent loops were closed by intestinal clamps, anastomosis was carefully inspected all through and should be water tight (Figure 15).

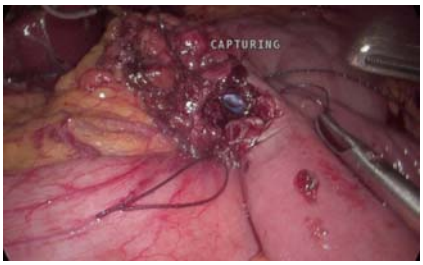

Figure (13): Passing rhyle tube through the anastomosis opening

Figure (14): Closure of the residual stoma by Vicryl Sutures.

Figure (15): Methylene blue test

Postoperative care: Close observation for vital signs (ICU admission if indicated). Chest physiotherapy. Encourage early mobilization. Low molecular weight heparin during hospital stay. The patients received proton pump inhibitors to avoid stress ulcers. One dose of one gram intravenous third generation cephalosporin. Proper pain management. Oral clear fluid started one day after surgery and maintained for two weeks. The Drain is usually removed before discharge in LSG group and left for 5-7 days in MGB group.

Outcomes Assessment: Operative time. Hospital stay. Rate of conversion. Time to oral feeding. Weight loss depending on the change in BMI which was measured at the initial screening on the day of surgery, 1 week at stitch removal and at 1, 3, 6, and 12 months after surgery. Intraoperative and postoperative complications (early or late) were recorded for each operations D.M control by measurement of HbA1c at 3,6 and 12 months and FBS at 1,3, 6 and 12 months with follow up of changes in dose or discontinuation of anti-diabetic medications Hypertension control by measurement of Blood pressure at 1, 3, 6 and 12 months with follow up of changes or discontinuation of Antihypertensive medications. Sleep apnea syndrome follow up for patients with past history of it using sleep symptoms questionnaire.

Data management and statistical analysis:

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Data was presented and suitable analysis was done according to the type of data obtained for each parameter:

Descriptive statistics: Mean, Standard deviation (± SD) and range for parametric numerical data, Frequency and percentage of non-numerical data.

Analytical statistics: Student T Test was used to assess the statistical significance of the difference between two study group means. Chi-Square test was used to examine the relationship between two qualitative variables. Fisher's exact test: was used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells. Logistic regression: used in the prediction of the presence or absence of an outcome based on a set of independent variables.

P- value: level of significance: $P>0.05$: Non significant (NS). $P< 0.05$: Significant (S). $P<0.01$: Highly significant (HS).

RESULTS

Table (1): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard personal characteristics.

		Group				P value	Sig.
		Sleeve gastrectomy		Minigastric bypass			
		Mean	±SD	Mean	±SD		
Age		37.73	9.35	37.47	9.05	0.911*	NS
		No.	%	No.	%		
Sex	Male	37	37%	42	42.0%	0.592**	NS
	Female	63	63%	58	58.0%		
Family history of DM	Negative	12	40.0%	19	21%	0.273**	NS
	Positive	18	60.0%	70	79%		

Table (2): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard biochemical characteristics.

	Group				P value	Sig.
	Sleeve gastrectomy		Minigastric bypass			
	Mean	±SD	Mean	±SD		
C-peptide	3.77	1.25	3.90	1.37	0.549*	NS
BMI baseline	51.93	9.78	52.33	9.41	0.421*	NS
FBS baseline	138.27	15.78	140.67	12.27	0.514*	NS
HbA1c baseline	8.01	0.80	8.10	0.92	0.326*	NS
Systolic Bl.Pr	145.7	10.7	143.5	11.7	0.99*	NS
Diastolic Bl Pr	86.3	8.9	90.4	8.6	0.97	NS

*Student t tests.

Table (3): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard medical characteristics.

		Group				P value	Sig.
		Sleeve gastrectomy		Minigastric Bypass			
		No.	%	No.	%		
Distribution of obesity	Peripheral	13	13%	26	26%	0.235*	NS
	Central	34	34%	40	40 %		
	Both	53	53%	34	33%		
D.M	yes	65	65%	89	89%	0.593*	NS
	no	35	35%	11	11%		
Preoperative medication	OHG	51	78.5%	51	57%	0.573*	NS
	Insulin	14	21.5%	38	43%		
Status of D.M (according to baselineHbA1c)	Less Control > 8.5%	12	18.5%	46	52%	1.0*	NS
	Better Control < 8.5%	53	81.5%	43	48%		
C-peptide	<3 ng/ml	13	20.0%	23	26%	0.542*	NS
	>3 ng/ml	52	80.0%	66	74%		
Hypertension	Not on medication	68	68%	71	71%	0.957	NS
	On medications	60	88.2%	49	69%		
Sleep apnea		73	73%	69	69%	1.05	NS

Table (4): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard operative time.

	Group				P value	Sig.
	Sleeve gastrectomy		Minigastric bypass			
	Range	Mean	Range	Mean		
Operative time	50-120 min.	85	90-160 min.	130	0.024*	S

*Student t tests.

Table (5): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard hospital stay

	Group				P value	Sig.
	Sleeve gastrectomy		Minigastric bypass			
	Range	Mean	Range	Mean		
Hospital stay	1-3 days.	2	1-5 days.	3	0.75*	NS

*Student t tests.

Table (6): Comparison between group 1 (sleeve gastrectomy) and group 2 (minigastric bypass) as regard complications.

	SG group	MGB group	P value	Sig.
Bleeding	4	1	0.174	NS
Wound infection	3	0	0.214	NS
Leakage	2	1	0.560	NS
GIT symptoms	5	7	0.551	NS
Malnutrition	0	1	0.156	NS
Cholelithiasis	1	3	0.312	NS
Mortality	0	0	-	-

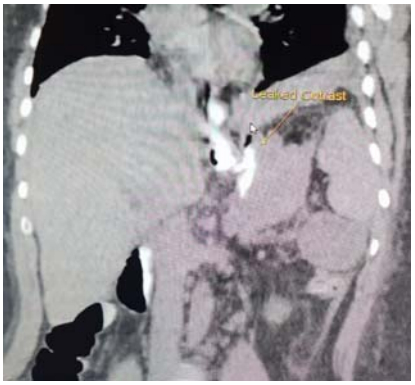

Figure (16): CTPA for a case of leakage post LSG.

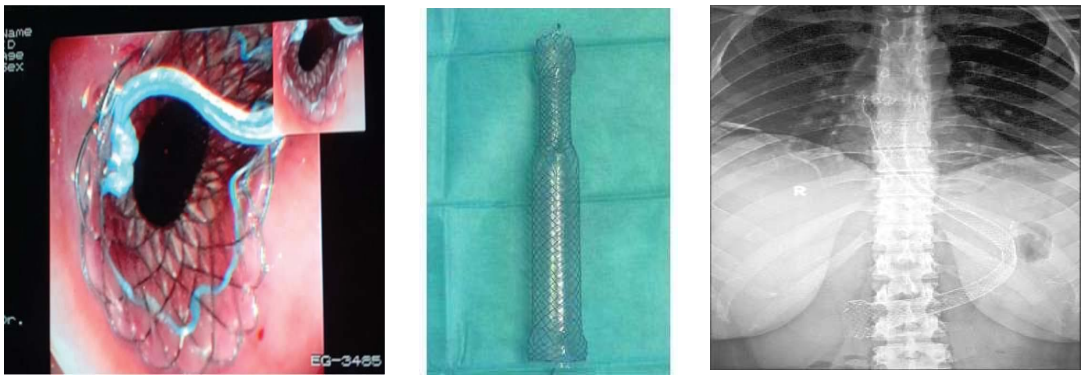

Figure (17): Mega stent insertion via upper GIT endoscopy in a case of leakage post LSG.

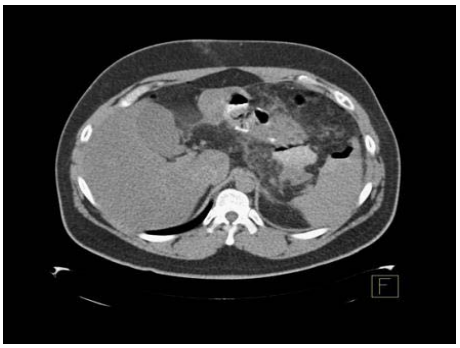

Figure (18): CTPA for a case of leakage post MGB.

Table (7): Comparison between group 1 and 2 as regard BMI at baseline, at follow up and overall BMI loss

	Group				P value	Sig.
	Sleevegastrectomy		Minigastric bypass			
	Mean	±SD	Mean	±SD		
BMI baseline	51.93	9.78	51.53	9.41	0.872	NS
BMI 1 month	48.2	8.8	48.3	8.5	0.924	NS
BMI 3 months	44.00	8.49	43.93	7.94	0.975	NS
BMI 6 months	37.73	6.92	36.73	4.83	0.519	NS
BMI12 months	33.47	5.69	31.87	3.66	0.200	NS
Total BMI loss	18.47	5.14	19.67	7.17	0.459	NS

*Student t test

Table (8): Comparison between group 1 and 2 as regard FBS at baseline, at follow up and overall FBS change

	Group				P value	Sig.
	Sleeve gastrectomy		Minigastric bypass			
	Mean	±SD	Mean	±SD		
FBS baseline	138.27	15.78	140.67	12.27	0.179	NS
FBS 1 month	140.72	12.3	137.3	11.4	0.332	NS
FBS 3 months	132.47	11.31	135.47	9.99	0.281	NS
FBS 6 months	124.20	10.99	125.07	10.66	0.758	NS
FBS 12 months	115.33	13.79	111.87	12.05	0.304	NS
Total FBS change	29.93	12.84	37.80	6.41	0.004	HS

*Student t tests

Table (9): Comparison between group 1 and 2 as regard HbA1c at baseline, at follow up and overall HbA1c change

	Group				P value	Sig.
	Sleeve gastrectomy		Minigastric bypass			
	Mean	±SD	Mean	±SD		
HbA1c baseline	8.01	0.80	8.10	0.92	0.648	NS
HbA1c 3 months	7.35	0.81	6.84	0.76	0.014	S
HbA1c 6 months	6.70	0.71	6.21	0.71	0.009	HS
HbA1c 12 months	6.20	0.73	5.77	0.67	0.022	S
Total HbA1c change	2.01	0.59	2.33	0.48	0.024	S

*Student t tests

Table (10): Comparison between group 1 and 2 as regard outcome at 6 month and at final assessment diabetes.

		Group				P value	Sig.
		Sleeve gastrectomy		Minigastric bypass			
		N	%	N	%		
Resolved at 6 ms	No	52	80.0%	48	54%	0.028*	S
	Yes	13	20.0%	41	46%		
Final outcome	No change	5	7.7%	0	0%	0.331**	NS
	Improved	17	26.1%	19	21%		
	Resolved	43	66.2%	70	79%		
Final outcome	No change/improved	22	33.8%	19	21%	0.243*	NS
	Resolved	43	66.2%	70	79%		

*Chi-Square Tests. **Fisher exact test

Table (11): Comparison between group 1 and 2 as regard systolic blood pressure at baseline and at follow up

Systolic Blood Pressure		Lap sleeve group	Lap MBG group	Test value•	P-value	Sig.
		No. = 68	No. = 71			
Preoperative	Mean±SD	145.79 ± 10.71	143.33 ± 11.44	0.699•	0.489	NS
	Range	120 – 160	120 – 170			
1 month	Mean±SD	140.26 ± 11.11	138.10 ± 9.28	0.672•	0.506	NS
	Range	120 – 160	120 – 160			
3 month	Mean±SD	135.53 ± 9.70	133.10 ± 8.73	0.834•	0.409	NS
	Range	120 – 150	120 – 150			
6 month	Mean±SD	132.89 ± 10.18	129.76 ± 7.98	1.089•	0.283	NS
	Range	120 – 150	120 – 150			
1 year	Mean±SD	130.79 ± 9.32	128.33 ± 7.64	0.915•	0.366	NS
	Range	115 – 145	120 – 150			
Total Decrease in Systolic Blood Pressure		15.00 ± 7.45	15.00 ± 6.89	0.00	1.00	NS

NS: Non significant; S: Significant; HS: Highly significant
*:Chi-square test; •: Independent t-test

Table (12): Comparison between group 1 and 2 as regard diastolic blood pressure at baseline and at follow up.

Diastolic Blood Pressure		Lap sleeve group	Lap MGB group	Test value	P-value	Sig.
		No. = 68	No. = 71			
Preoperative	Mean±SD	90.48 ± 8.65	86.32 ± 8.95	1.495•	0.143	NS
	Range	80 – 110	70 – 100			
1 month	Mean±SD	86.19 ± 5.90	84.47 ± 7.62	0.801•	0.428	NS
	Range	80 – 100	70 – 100			
3 months	Mean±SD	83.10 ± 4.60	81.05 ± 5.91	1.226•	0.228	NS
	Range	80 – 90	70 – 90			
6 months	Mean±SD	81.67 ± 5.08	78.68 ± 4.96	1.875•	0.068	NS
	Range	70 – 90	70 – 85			
1 year	Mean±SD	79.76 ± 3.35	76.58 ± 6.25	2.036•	0.049	S
	Range	70 – 85	60 – 85			

NS: Non significant; S: Significant; HS: Highly significant
*:Chi-square test; •: Independent t-test

Table (13): The final outcome of hypertension between the 2 groups.

	LSG (n=68)	MGB (n=71)
Resolved	38(55.9%)	42 (60%)
Improved	20 (29.4%)	16 (22%)
No Change	10 (14.7%)	13(18%)

Table (14): The final outcome of sleep apnea between the 2 groups:

	LSG (n=73)	MGB (n=69)
Resolved	33 (45%)	35 (51%)
Improved	25 (35%)	23 (33%)
No Change	15 (20%)	11 (16%)

DISCUSSION

Bariatric surgery has been proven to be a viable option for the treatment of severe obesity in comparison to conservative methods, resulting long lasting weight loss, improved quality of life, and resolution of obesity related co morbidities. It decreased overall mortality as well as morbidity in morbidly obese patients[5].

Laparoscopic sleeve gastrectomy (LSG) has seen growth in popularity because of the perceived simplicity of the surgical technique, resolution of co-morbidities, and excellent weight loss outcomes. LSG has become widely considered as a primary restrictive bariatric procedure; LSG became the most commonly performed bariatric procedure (45.9%) in 2014 According to the IFSO worldwide survey of 2014[6].

The mini-gastric bypass (MGB) was introduced by Rutledge in 1997 and reported some years later. Since then, thousands of patients have been treated with this approach by several authors in different countries[7].

Frequently, MGB is reported as an easier technique, to be preferred to other bariatric approaches, including both RYGB and SG, for the results in both the short and long terms [7].

Laparoscopic Sleeve Gastrectomy (LSG) is one of the principal bariatric procedure worldwide with excellent results for weight loss and reduction of co morbidities. Mini Gastric Bypass (MGB) has gained some popularity over years as a simple malabsorbtive bariatric procedure[8].

The aim of our study was to compare between MGB and SG as regard weight loss, outcome of associated co-morbidities and complications. It is sample study which was done between December 2016 – December 2018, at Ain Shams university Hospitals, Cairo, Egypt.

This study included 200 patients, 100 patients in each group. The group age ranged between 22 -55 years with a mean ± SD of 37.88 ± 9.52 years. Female patients represented the main population of this study (60.5%). It is a common finding in the literature that women are undergoing bariatric surgery more than men[9]. We included in this study patients with BMI ≥ 40 or BMI = 35–39 with one or more obesity-related co morbidities.

We used a 36 Fr bougie for sizing of the gastric sleeve. The American Society for Metabolic and Bariatric Surgery recommends now the use of a 34–40 Fr bougie to guide the stapling and maintain an adequate lumen of the gastric sleeve [10]. We used a 36 Fr bougie for sizing of the gastric pouch in MGB. According to the IFSO Position Statement about Mini Gastric Bypass-One Anastomosis Gastric Bypass (MGB-OAGB) published in 2018, the majority of studies used a 36 Fr bougie; however, the bougie size varied from a 1 cm diameter nasogastric tube to a 42 French bougie[11].

The mean operative time for LSG in our study was 85 minutes ranging between 50-120 minutes, while in the MGB, it was 130 minutes ranging between 90-160 minutes. Statistically, the operative time for MGB was significantly longer than LSG. MGB

consumes more time than LSG, due to mobilization of the bowel and sewing of the defects left after stapled gastrojejunostomy. The operative time for both techniques varies in the literature among different studies. Tucker et al. reported a mean operative time of 60 (58–190) minutes for LSG in primary cases[12]. Young et al. analyzed the data of 5000 patients who underwent LSG using the American College of Surgeons National Surgical Quality Improvement Program database, and reported a mean operative time of 101 minutes for LSG in primary cases[13].

As regard complication:

Complications in both procedures include hemorrhage, staple-line leak, stricture, obstruction, nutritional deficiencies, GERD, cholelithiasis, and weight-loss failure. LMGB has additional complications, in the form of marginal ulcer, anastomotic leakage, and chronic alkaline reflux. Compared with LMGB, LSG seems to have a smaller risk of complications, but the potential complications can be as severe as those associated with other techniques. The most feared complications after LSG and LMGB are leakage and hemorrhage[14].

In our study hemorrhage was reported in 4 cases in SG group but it was reported in one case in MGB group and all cases were managed conservatively.

As regard postoperative leakage, it was reported in our study in two cases in SG group and was managed laparoscopic and UGE and one case in MGB group and had been converted to open.

As regard postoperative cholelithiasis, rapid weight loss is associated with the formation of cholesterol gallstones, within 6–12 months of the operation. The incidence was around 8.42% in the LSG group, and 12.7% in the LMGB group. The diagnosis is usually made by abdominal ultrasound during the follow-up period [15]. In our study, one case in SG group developed gall bladder stone and 3 cases in MGB group and 4 cases planned for cholecystectomy.

As regard mortality the incidence of mortality after LMGB ranged from 0 to 0.18%; however, it was reported to be about 1.5% after LSG [16]. No mortality occurred in this study.

As regard BMI loss:

The mean BMI loss after one year in MGB (19.67 ± 7.17 kg/m_2) was more than BMI loss in SG (18.47 ± 5.14 kg/m2) but this difference was statistically non-significant. In comparing to the study of Milone and his colleagues (to compare between SG and MGB after one year) in which, SG and MGB were associated with changes in BMI (20.33 ± 4.48 % vs 19.19 ± 4.42 %) and also, the difference between them was statistically non-significant (P value= 0.931)[17].

Wang and his colleagues published their results on 423 consecutive patients (87 males and 336 females) underwent laparoscopic MGB for morbid obesity. The BMI decreased from 44.2 to 35.1, 31.9, and 29.2, at 3, 6 and 12 months respectively with total BMI loss after one year was 15 kg/m2[18]. The mean BMI loss in our study in MGB group was better than Wang study.

In the study done by Musella and his colleagues, after SG, BMI decreased from basal 47.9 to 32.6 after one year with total BMI loss after one year was 15.3 kg/m2 (less than in our study) while in MGB group, BMI decreased from basal 50.8 to 29.2 after one year with total BMI loss was 21.6 kg/m2 (better than in our study)[7].

As regard diabetes, HTN and sleep apnea remission effect:

MGB has a better effect than SG in diabetes remission detected by that the mean FBS drop after one year in MGB (37.80 ± 6.41 mg/dl) was more than after SG (29.93 ± 12.84 mg/dl) and this difference of drop was

highly statistically significant (p value <0.004).

The mean HBA1c drop after one year in MGB (2.33 ± 0.48 %) was more than in SG (2.01± 0.59 %) and this difference of drop was statistically significant (p value <0.024).

So, Complete resolution of diabetes occurred in MGB cases in 79% compared to 66.7% in SG cases at 12 months and cases with no remission in D.M was 0% in MGB and 7.7% with SG.

The universal published data shows similar results to our study. A retrospective study by Lee and his colleagues including 62 T2DM obese patients underwent gastrointestinal surgery (LMGB and LSG). After one year the result was remission of T2DM achieved in 45 (72.5%) patients after these different operations. A comparison among three different operative methods revealed remission rate of T2DM was achieved in 84.8%, 58.8% and 58.3% of patients for LMGB, LAGB and LSG, respectively. LMGB had the best remission effect on T2DM (85%) at 1 year after surgery compared with LAGB and LSG. Among the different operative methods, waist circumference and C-peptide levels were determined to be significant predictors for the remission of T2DM in obese patients [(5)]. The result of our study agreed with this study as regard that both operation are effective in diabetes remission but MGB has better effect than SG.

Another study done by Milone and his colleague. The patients were split into two groups according to the surgical intervention performed, sleeve gastrectomy and mini-gastric bypass. A total of 53 subjects who underwent sleeve gastrectomy or mini-gastric bypass for obesity and diabetes were screened for the inclusion in this study. Of these, 4 subjects were excluded because of surgical complications, 7 subjects were omitted because young surgeons conducted the operations and 11 subjects were removed because of the lack of follow-up. Thirty one obese patients were recruited for this study. A total of 15 subjects underwent SG (48.4%), and 16 underwent MGB (51.6%).The prevalence of diabetes remission was gradually increased following surgery, regardless of the type, specifically, at 3 months post-surgical intervention, diabetes remission was reported by 18 subjects (53.3% in SG vs 62.5% in MGB, P = 0.722). Similar results were confirmed at the 6 months follow-up (53.3% for SG vs 68.8% for MGB, P = 0.473).At the 12 months follow-up, 66.7% of subjects who underwent SG achieved diabetes remission vs 87.5% of those who underwent MGB (P = 0.220).High preoperative HBA1c was determined to be a negative predictor of diabetes remission at 12 months while there was significant correlation between percent of BMI loss and diabetes remission in both operation [(17)]. The result of our study agreed with this study as regard MGB has better and faster effect on diabetes remission than SG although the effect of both operation at 6 months are better in Milone study than our study.

The study also revealed positive correlation between BMI loss and diabetes remission but statistically non significant (may indicating presence of other more important mechanisms of postoperative diabetes resolution rather than weight loss).

In the retrospective study by Lee and his colleagues to compare between different gastrointestinal surgery (LMGB and LSG) among the different operative methods, waist circumference and C-peptide levels were determined to be significant predictors for the remission of T2DM in obese patients[(5)].

As regard HTN in our study, in group 1 (SG) resolution of hypertension was 55.9% (38 cases), improvement was 29.4% (20 cases) and no change in hypertension status was 14.7% (10cases), in group 2 (MGB) resolution of hypertension was 60% (42cases), improvement was 22% (16 cases)

and no change in hypertension status was 18% (13 cases).

As regard sleep apnea in our study, in group 1 (LSG) resolution of sleep apnea was 45% (33 cases), Improvement was 35% (25 cases) and no change in sleep apnea was 20% (15 cases), In group 2 (LMGB) resolution of sleep apnea was 51% (35 cases), Improvement was 33% (23 cases) and no change in sleep apnea was 16% (11 cases), with comparing the 2 groups.

Approximately 80% of obese adults have at least one, and 40% have two, or more associated diseases such as T2DM, hypertension, cardiovascular disease, cancers, dyslipidemia and/or insulin resistance. Weight loss is associated within improvement in fasting glucose, insulin resistance and dyslipidemia. Several surgical studies have demonstrated the safety and efficacy of bariatric surgery, especially in terms of reduction in comorbidities over time[19].

Finally our study suggests that bariatric surgery (mainly SG and MGB which are the most common bariatric operations nowadays) are considered the best treatment of diabetes type 2 in obese patients and MGB is superior to SG in diabetes remission.

Both procedures are also associated with improvement of the blood pressure and the sleep apnea owing to weight loss.

Conclusion:

It is reasonable to say that both LSG and MGB achieve similar weight loss mean and resolution of co-morbidities at 1 year.

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نتائج عمليتى تكميم المعدة بالمنظار وتحويل مسار المعدة المصغر بالمنظار فى المرضى المصريين الذين يعانون من مرض السمنة المفرطة

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خلفية: تعتبر الأمراض المزمنة من اهم اسباب الوفاة وتعتبر السمنة المفرطة سبب رئيسي لتلك الأمراض والتي تهدد الصحة العالمية.

الهدف من العمل: المقارنة بين تحويل مسار المعدة المصغر بالمنظار وتكميم المعدة بالمنظار علي مرضي السمنة في مصر فيما يتعلق بفقدان الوزن، وتحسن الامراض المصاحبة للسمنة ومتابعة سنة واحدة بعد العملية.

المرضى والطرق: شملت هذه الدراسة ٢٠٠ مريض، ١٠٠ مريض في كل مجموعة. تراوحت الفئة العمرية بين ٢٢ و ٥٥ عامًا. كانت نسبة مرضى الأناث اكبر من الرجال. شملنا في هذه الدراسة مرضى معدل كتلة الجسم اكبر من ٤٠ او من ٣٥-٣٩ مع واحد أو أكثر من الأمراض المصاحبة للسمنة. إنها دراسة عينة تم إجراؤها بين ديسمبر ٢٠١٦ - ديسمبر ٢٠١٨ في مستشفيات جامعة عين شمس، القاهرة، مصر.

النتائج: تشير دراستنا إلى أن جراحات السمنة (خاصة تحويل مسار المعدة المصغر بالمنظار وتكميم المعدة بالمنظار والتي تعد أكثر عمليات السمنة شيوعًا في الوقت الحاضر) تعتبر أفضل علاج لمرض السكري من النوع ٢ في المرضى الذين يعانون من السمنة المفرطة وأن تحويل مسار المعدة المصغر بالمنظار متفوقة على تكميم المعدة في مرض السكري. ترتبط كلتا العمليتين أيضًا بتحسن ضغط الدم وتوقف التنفس أثناء النوم بسبب فقدان الوزن.

الخلاصة: من المعقول القول أن كلا من تكميم المعدة بالمنظار و تحويل مسار المعدة المصغر بالمنظار يحققان نفس معدل إنقاص الوزن وتحسن الأمراض المصاحبة للسمنة ومتابعة سنة واحدة بعد العملية.

كلمات البحث: السكر التراكمي، تحويل مسار المعدة المصغر بالمنظار، تكميم المعدة بالمنظار