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## ***The Effect Of Volume Of The Excised Part Of The Stomach On Short Term Excess Body Weight Loss Inlaparoscopic Sleeve Gastrectomy***

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### ***Abstract:***

Obesity is an epidemic disease, and its prevalence is predicted to rise in the future. Many health and social comorbidities, such as cardiovascular disease, type 2 diabetes mellitus, cancer, nonalcoholic fatty liver disease, arthritis, infertility, eating disorders, unemployment, and low quality of life, have been associated with obesity. Nowadays, bariatric surgery is the only effective treatment for severe obesity.

### ***Patient and Methods:***

Several studies showed significant remission of obesity-related comorbidities and an increase in life expectancy after surgical treatment. This prospective study was conducted in Surgery Department, Fayoum University Hospital in the period between August 2012 and August 2013. The study included 20 cases of morbidly obese patients (with BMI  $\geq 40$  Kg/m<sup>2</sup> or  $\geq 35$  Kg/m<sup>2</sup> associated with other comorbidities) who underwent laparoscopic sleeve gastrectomy. After the excised part of the stomach was extracted the evaluation of the volume of the excised part of the stomach is measured and its volume was correlated statistically to the excess body weight loss within the first 6 months after the operation. In the postoperative period, all patients were given 3<sup>rd</sup> generation cephalosporins, anticoagulants (discontinued once the patient became ambulant), opioids, proton pump inhibitors and antiemetics. Gastrographin meal was

done to all patients in day one. In day one, all patients started oral fluids (if tolerated) after confirming that there is no leakage in the study. All patients were discharged 24-48 h postoperative after meeting the discharge criteria of no bleeding, no leakage and no other complications. All patients return for their first outpatient clinic appointment in twelve days. During the first month, patients are on a liquid only diet that is then advanced to a semi-solid diet for two weeks followed by mashed food for another two weeks. They are then advanced to a regular healthy diet.

### ***Results:***

There is moderate correlation between the volume excised and the change in BMI detected after six months and this correlation is statistically significant P value = 0.005.

### ***Conclusion:***

We can conclude from this study that there is a significant relation between the volume of the excised part of the stomach and the short term EBWL.

***Key Words:*** Morbid obesity-LSG.

### ***Introduction***

Obesity has become an epidemic disease around the world, the percentage of adults who are obese (defined as having a BMI of 30 Kg/m<sup>2</sup> or more) increased from 15.3% to 23.9% in the decade from 1995 and for 10 years only (1).

Bariatric surgery is an effective treatment for massive obesity and its comorbidities. Bariatric surgical procedure reduce caloric intake by modifying the anatomy of the gastrointestinal tract. These operations are classified as either restrictive or malabsorptive. Restrictive procedures limit intake by creating a small gastric reservoir with a narrow outlet to delay emptying. Malabsorptive procedures bypass varying portions of the small intestine where nutrient absorption occurs (2).

These laparoscopic procedures have not gained popularity in Egypt yet because of its high costs as regard conventional open techniques (3).

The primary aim of the study was to evaluate the effect of volume of the excised part of the stomach in laparoscopic sleeve gastrectomy on the short term excess weight loss of the patient candidate for this operation.

### ***Patient and Methods***

This prospective study was conducted in Surgery Department, Fayoum University Hospital in the period between August 2013 and August 2014. The study included 20 cases of morbidly obese patients (with BMI  $\geq 40$  Kg/m<sup>2</sup> or  $\geq 35$  Kg/m<sup>2</sup> associated with other comorbidities) who underwent laparoscopic sleeve gastrectomy and had failed in trials of conservative management including dietary control. Patients of the study are bulky eater but non sweet eater also ASA I and II. Psychologically unstable patients and any patient suffering from significant longstanding heart/lung disease and other severe systemic disease were excluded from the study.

Different options for management of morbid obesity were discussed in details with the patients with emphasis on the

benefits and more importantly the potential complications and side effects of the LSG, informed consents was taken from all patients.

Laboratory investigations in the form CBC, FBS, renal functions, liver functions, coagulation profile, lipid profile beside specific hormonal assay ( as thyroid profile TSH, T<sub>3</sub>, T<sub>4</sub> ); to detect any endocrinal causes of obesity. Pulmonary evaluation; including chest X-ray & pulmonary function tests. Cardiac assessment; ECG & Echocardiography if needed for fitness for anaesthesia.

Patients were then operated on after following a two week low caloric (8001000 Kcal/24hrs). Informed consent was obtained from all patients.

### ***Surgical Procedure:***

All patients were operated under general anaesthesia by putting the patient in reversed Trendelenberg's position. Using 5 ports; liver retractor (5 mm), supraumbilical right and left lumbar (all are 12 mm.) A nasogastric tube was inserted at the beginning of the procedure to decompress the stomach. A window was dissected at the junction of the greater curvature and the greater omentum, around 10 cm from the pylorus. Division of the gastroepiploic, short gastric and posterior fundic vessels is done starting at 4 cm proximal to the pyloric ring all the way till the angle of His using the (***ultracision Harmonic scalpel***) (***Harmonic; Ethicon Endosurgery, Cincinnati, OH, USA***).

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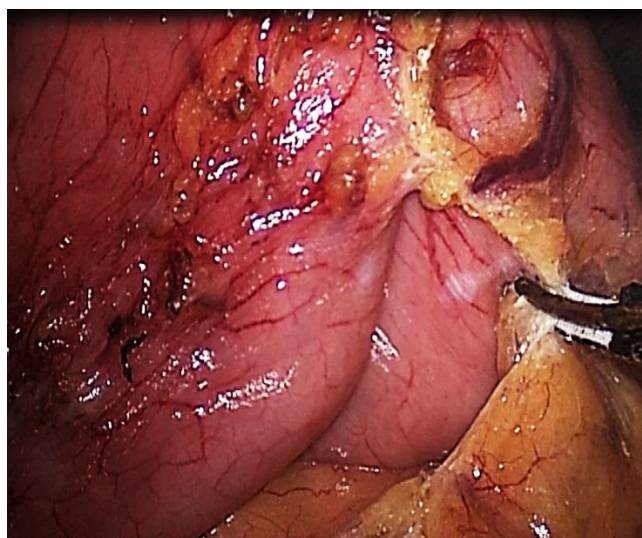
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Once the dissection part is over, a bougie was introduced orally by the anaesthesiologist through the oesophagus and inside the stomach. The surgeon then guides it along the lesser curvature and into the pyloric channel and duodenal bulb.

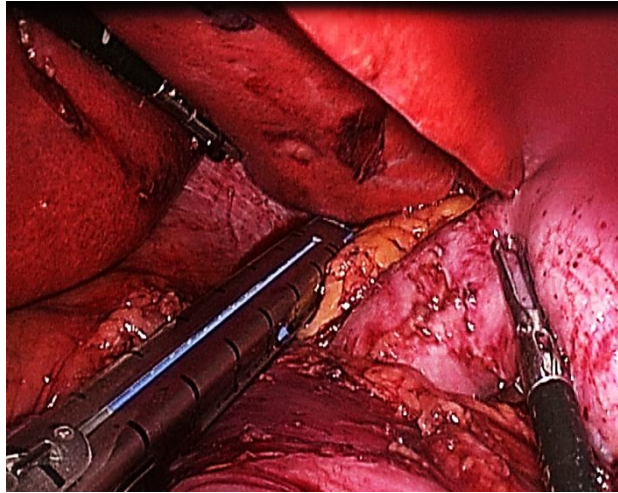
Gastric transection begins 4 to 6 cm proximal to the pylorus. A 60-mm, green or gold cartilage was placed across the antrum through the right midpigastic port and was fired. The second stapler was placed approximately 1 to 2 cm from the

border of the lesser curvature in the direction of the gastroesophageal junction.

Sequential firings of the stapler along the border of the bougie on the lesser curvature completes the gastric transection at the left crus. After completing the transection, the entire staple line is inspected carefully to make sure that the staples are well formed especially at the antrum where the stomach is thickest. A layer Vicryl 3/0 can be taken either continuous or interrupted simple at the junctions of staples line.



**Fig.(1):Devascularisation of the stomach**



**Fig.(2) :** *Gastrectomy by stapler*

After the excised part of the stomach was extracted the evaluation of the volume of the excised part of the stomach was done by :

1. Putting the excised part of the stomach on a table.
2. Adjusting the height of the normal saline bag to be 1 meter from the table.
3. An intravenous set was inserted into the bag and was inserted into the excised part of the stomach through a wide bore canula (14 G).
4. The saline was left to drip into the excised part of the stomach until complete distension was noticed.
5. Waiting for 3 minutes after stopping of dripping to assume filling the excised part of the stomach.
6. Measuring the volume of the saline filling the stomach part was done.

All data were statistically analysed.

### **Results:**

#### **Descriptive statistics**

The number of cases done was 20 patients. All procedures were completed laparoscopically with no conversion to open surgery. No mortality was recorded. The age of the study population ranged between 19 and 53 years with a mean of 33.7 years. The study comprises 8 males and 12 females with ratio of 1:1.5 male: female. The Preoperative BMI: of the study population range from 37.7 Kg/m<sup>2</sup> to 59.5 Kg/m<sup>2</sup> with a mean BMI of 48.6 Kg/m<sup>2</sup>. The BMI dropped 6m postoperative to range from 28 Kg/m<sup>2</sup> to 42.2 Kg/m<sup>2</sup> with a mean BMI of 34.6 Kg/m<sup>2</sup>. The excess body weight loss ranged from 8 to 17 Kgs. With mean of 13.5 Kgs. in the first 1 month postoperative. The percentage of the excess body weight loss ranged from 36% to 80% with a mean of 60.1%. in the first 6 months post operative. The volume of the excised part of the stomach range from 950 ml.(with BMI 41.1 Kg/m<sup>2</sup>) to

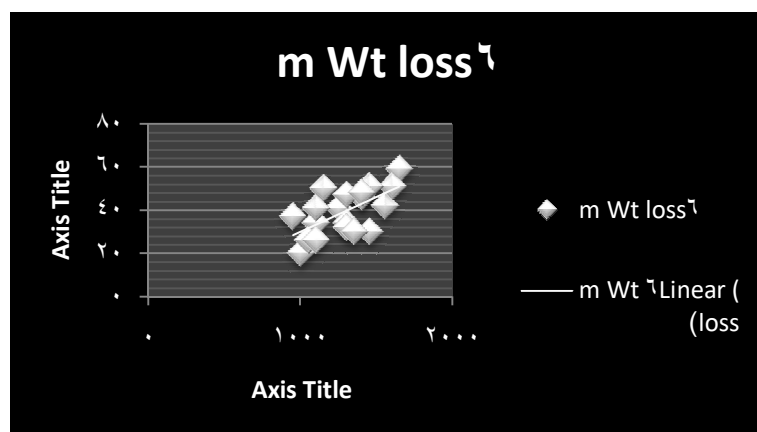
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1650 ml.(with BMI 57.1 Kg/m<sup>2</sup>) with mean of 1292.5 ml.

**Table (1):**Descriptive statistics

Descriptive Statistics						
	Number	Range	Minimum	Maximum	Mean	Std. Deviation
Age	20	34.00	19.00	53.00	33.55	7.68782
Preop.BMI	20	22.30	37.20	59.50	48.42	6.25902
volume excised	20	700.00	950.00	1650.00	1292.50	201.49115
One Month WT loss	20	9.00	8.00	17.00	13.5	2.58538
Six Month WT loss	20	39.00	20.00	59.00	39.6	10.36390
Change in BMI after 6m	20	14.80	6.90	21.70	13.8	3.47214
Valid N (listwise)	20					

**(Fig.3):**Studying correlation between Volume excised and weight loss six months after the operation

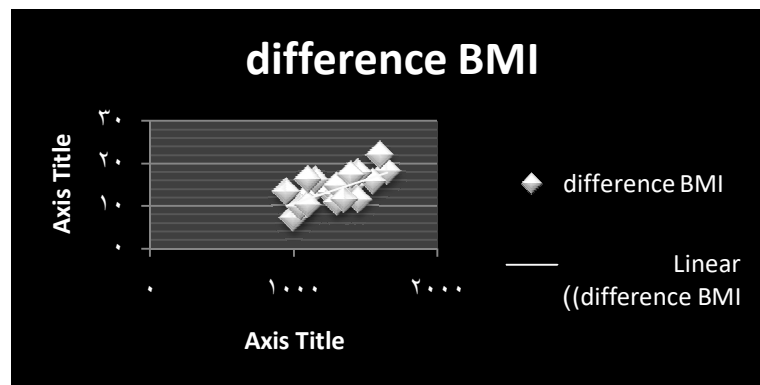


Correlation is significant at the 0.01 level (2-tailed).

- Correlation Coefficient:  $r = 0.619$
- $P$  value = 0.004 and it is statistically significant.

There is moderate correlation between the volume excised and the excess body weight loss detected after six months, and this correlation is statistically significant.

(Fig.4): Studying correlation between Volume excised and change in BMI six months after the operation



Correlation is significant at the 0.01 level (2-tailed).

- Correlation Coefficient:  $r = 0.604$
- P value = 0.005 and it is statistically significant.

There is moderate correlation between the volume excised and the change in BMI detected after six months, and this correlation is statistically significant.

### Discussion

The World Health Organization estimated that globally, in 2005, approximately 1.6-billion adults were overweight and at least 400 million were obese. The most recent data suggest that as a result of the sedentary life styles lead by most of the population and high carbohydrate load of the average meal , Egypt has become one of the Countries badly affected by the obesity epidemic with an estimated just less than third of the adult population classified as obese with a much higher prevalence amongst females than males. (4).

A recent worldwide survey reported that over 90% of world bariatric surgery was performed laparoscopically. More specifically, laparoscopic adjustable gastric band was performed the most worldwide followed by the gastric bypass and then the relatively newer procedure the sleeve gastrectomy (5). The RYGB is the most

common technique in United States. Biliopancreatic diversion was performed in 0.9% worldwide, and the BPD with duodenal switch was performed in 0.8%(6).One of the contributing factors to these surgical procedures being less commonly performed is that they are technically more difficult than gastric bypass and are more prone to micronutrient and macronutrient deficiencies. BPD and BPD-DS might have a role in the treatment of extremely obese patients or in the treatment of patients who have failed to lose weight with the other bariatric procedures as they are effective procedures in weight loss and weight loss maintenance (7).

RYGB is certainly one of the more technically challenging laparoscopic procedures performed today. Both the size of the obese patient and the complexity of these reconstructive procedures create the major technical barriers. Surgeons must perform such complex tasks as gastric

pouch creation, Roux limb creation, two anastomoses, and closure of mesenteric defects (to avoid internal hernia formation). Advanced skills such as laparoscopic suturing, stapling, and dissection techniques must be mastered. Patient factors such as massive obesity (BMI > 60), severe hepatomegaly, prior abdominal surgery, and reoperative bariatric surgery may increase the degree of difficulty by several magnitudes. Early perioperative complications for RYGB include postoperative anastomotic leak, bowel obstruction, and hemorrhage (8). Late surgical complications for RYGB include anastomotic stricture, bowel obstruction, and incisional hernia (9).

Several small series have noted a significant decrease in associated comorbidities after a sleeve gastrectomy. Several studies have been published that have suggested that a laparoscopic sleeve gastrectomy can be performed as a definitive weight loss procedure (10).

Interesting data were presented at the First International Consensus Summit for Sleeve Gastrectomy in October 2007. According to this summit, there were 10 centers in the USA that had achieved a 5-year follow-up. Only one death was reported in the first 260 patients. Sleeve gastrectomy according to the data presented at the summit represents 2 % of the bariatric operations in the USA. This took place despite the fact that the surgery had no specific insurance code (11). Our study showed no mortalities.

Morbidity rates have varied significantly between studies (12). Gastric leak is the complication of greatest concern. Anecdotally it would seem that when leaks occur in sleeve gastrectomy they are usually proximal and result in significant difficulties. Often multiple operations are required, with early intervention being the key to resolution. Prolonged fistulae are

common. Collections are practically inevitable. Leaks appear more difficult to resolve than leaks from gastric bypass surgery, presumably because of the high gastric pressures and acid and bile content in the gastric sleeve remnant. Gastric stenting may have a role in leak management. In addition sleeve gastrectomy is an irreversible procedure (13). Compared to our study there were no leaks and the complications were lung atelectasis, fever and skin bruises and all were treated conservatively.

With the development of new multi-detector computed tomographic (CT) techniques and software, radiologists can now play an important role in predicting the outcome of the restrictive bariatric procedures. Although other factors should always be taken in consideration, as the neurohormonal effect of LSG in reduction of ghrelin levels in the body, residual gastric volume remains the most important in all factors concerning restriction of stomach size, and has always been the main concern of surgeons in the bariatric surgery community.

We would like to shed a light on the technique through which the residual gastric volume has been assessed, CT volumetry, which has proven its efficacy in evaluation of the volume of other organs, such as the liver, but has not been widely used in assessing the stomach. More research is needed in order to prove its accuracy with this particular organ, which, if done, should provide a true evolution in the prediction of the outcome of the restrictive bariatric procedures, but in our study we measure the volume of excised part of the stomach in LSG operation to the weight loss within the first six months post-operative with some details about month by month EBWL beside a brief view about comorbidities related to obesity such as diabetes mellitus and hypertension and also shedding light on post-operative

histopathological assessment of the excised part of the stomach about presence of gastritis , gastric erosions or even peptic ulcers or neoplastic lesions.

The BMI of the study population range from 37.7 to 59.5 with a mean BMI of 48.6.

The BMI dropped 6m postoperative to range from 28 to 42.2 with a mean BMI of 34.6.

The excess body weight loss ranged from 0 to 10Kgs. with mean of 5.35Kgs. in the sixth month postoperative.

The excess body weight loss within the first 6 months postoperative ranged from 20 to 59Kgs. with mean of 39.6Kgs. The percentage of the excess body weight loss ranged from 36% to 80% with a mean of 60.1%. in the first 6 months post-operative. Compared to another study that showed excess body weight loss ranged from  $117.7 \pm 17.1$  KG to  $91.2 \pm 17.2$  KG. The BMI dropped from  $42.7 \pm 4.7$  Kg/m<sup>2</sup> to  $33.0 \pm 4.9$  Kg/m<sup>2</sup> ,the mean excess body weight loss was 49.0% after 6 months (14).

The volume of the excised part of the stomach range from 950 ml.to1650 ml. with mean of 1292.5 ml.

Studying correlation between volume excised and weight loss six months after the operation showed that there is moderate correlation between the volume excised and the weight loss detected after six months, and this correlation is statistically significant (P value = 0.004).

Studying correlation between volume excised and change in BMI six months after the operation showed that there is moderate correlation between the volume excised and the change in BMI detected after six months, and this correlation is statistically significant (P value = 0.005).

We can conclude from this study that there is a significant relation between the

volume of the excised part of the stomach and the short term EBWL although insignificant in the first month EBWL but the total EBWL in the first 6 months post-operative indicate a significant relation.

Although we believe that this study can be of great benefit for the assessment of the post-operative follow up for the laparoscopic sleeve gastrectomy, yet more patients and longer period of follow up are needed to better judge this operation.

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