

THE EFFECT OF SLEEVE GASTRECTOMY ON METABOLIC DISORDERS

By

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ABSTRACT

Background: Obesity has become a major health problem in both developed and developing countries in twenty first century because of its high prevalence and its relationship with serious medical and psychological complications.

Objective: To evaluate the short term effect of sleeve gastrectomy on metabolic disorders.

Patients and Methods: Fifty morbid obese patients (30 male and 20 female) aged between 21 to 56 years with BMI range between (41 – 70) kg/m² were enrolled in this study. Patients were followed up after 3 and 9 months after operation (LSG) to monitor their BMI, blood pressure, fasting blood glucose, serum cholesterol level, triglycerides, LDL and HDL cholesterol level).

Results: our study shows that LSG has a significant effect on hypertension and type 2 DM inducing resolution or improvement in the majority of cases. Nine month after operation there is a significant decrease in lipid profile (Total Cholesterol, Triglyceride and LDL cholesterol).

Conclusion: LSG very good bariatric procedure with the simplicity of the technique and less complications with good results on both body weight reduction and BMI.

Keywords: Sleeve gastrectomy, metabolic disorders.

INTRODUCTION

Obesity has become a major health problem in both developed and developing countries in twenty first century because of its high prevalence and its relationship with serious medical and psychological complications (*Singh et al., 2011*).

Clinical assessment is important in the management of the morbidly obese patients. The assessment includes the body mass index, waist circumference, comorbid risk factors and psychological evaluation (*Jacobs et al., 2010*).

Bariatric surgery is recommended for patients with a BMI index ≥ 40 kg/m² or a BMI ≥ 35 kg/m² with comorbidities (*Leong and Taheri, 2012*).

Laparoscopic sleeve gastrectomy (LSG) is one of the most common restrictive bariatric surgeries. It includes resection of a large part of the body and the fundus of the stomach along the greater curvature to provide decreased appetite and increased satiety (*Todkar et al., 2010*).

This study aimed to evaluate the short term effect of sleeve gastrectomy on metabolic disorders.

PATIENTS AND METHODS

A prospective study done on fifty morbid obese patients (30 male and 20 female) aged between 21 – 56 years with BMI range between 41 – 70 kg / m².

Laparoscopic sleeve gastrectomy was performed for all patients at general surgery department at Al-Hussein Hospital, Al - Azhar University in Cairo, Egypt, during the time between March 2018 and January 2020.

An approval from ethical committee at the Faculty of Medicine, Al-Azhar University was obtained.

The procedures and the aim of the study were clearly explained to the patient and family. A written consent was obtained from the patient before enrollment into the study.

Patients included in our study were complaining from morbid obesity with one or more metabolic disorders (type 2 DM, hypertension and dyslipidemia).

Patients who had a history of psychiatric disorders, drug and alcohol addiction, hiatal hernia, advanced malignancy, recent cardiac attack and sever diseases with major risk of surgical and anaesthetic complication were excluded from our study.

All patients planned for surgery was followed up preoperatively and 3 months and 9 months after surgery by measurement of the following: BMI, systolic and diastolic blood pressure, fasting blood glucose and lipid profile (Total cholesterol, Triglyceride, HDL and LDL).

The data were introduced to a personal computer using Statistical Package for Social Science (SPSS), tabulated and statistically processed. Data were expressed as Mean \pm SD for quantitative parametric measures and both number and percentage for categorized data. Analytical statistics was done using one way ANOVA test followed by Post-hoc tests (Tukey's test and Scheffe's Method).

RESULTS

Fifty adult patients comprising 30 males and 20 females, aged between 21 and 56 years suffering from morbid obesity with one or more metabolic disorders were enrolled in this study.

The average age of the patients included in our study was 42.8 ± 8.2 Ys (**Table 1**).

Table(1): Demogarpmic criteria of obese patients

Parameters	Count		N	%
	Male	Female		
Sex	Male		30	60.00
	Female		20	40.00
Age (Years)	Range	21-56		
	Mean ±SD	42.840±8.220		
Height (cm)	Range	150-190		
	Mean ±SD	168.280±8.164		

The average BMI of the patients was (52.4 ± 6.6) kg/m². The mean BMI of our patients 3 Ms and 9 Ms after surgery decreased by (8.4 and 19) kg/m² respectively (**Table2**).

Table (2): Description of BMI at preoperative , 3 months and 9 months after surgery

Parameters Time	BMI					COMP	Mean ± SD	P-Value
	Range	Mean	±	SD				
Pre-operative	41 - 70.2	52.460	±	6.634	Preop-post3M	8.484 ± 1.959	<0.001	
Post-operative 3 Months	36 - 62.2	43.976	±	5.449	preop-post9M	19.032 ± 3.576	<0.001	
Post-operative 9 Months	24.9 - 48.8	33.428	±	4.353	Post3M-Post9M	10.548 ± 2.268	<0.001	

The mean systolic blood pressure of our patients 3 months and 9 months after surgery decreased by 8.6 and 15.6 mmHg respectively. The mean diastolic blood pressure of our patients 3 months and 9 months after surgery decreased by 5.4 and 11 mmHg respectively (**Table 3**).

Table (3): Description of Systolic and diastolic blood pressure at preoperative, 3 months and 9 months after surgery

Parameters Variables	Time	Range	Mean ± SD	COMP	Mean ± SD	P-value
SBP (mmHg)	Pre-operative	130 -180	148.8 ± 13.422	Preop-Post3M	8.600 ± 8.633	<0.001
	Post-operative 3 Months	120 - 160	140.2 ± 10.15	Preop-Post9M	15.600 ± 10.625	<0.001
	Post-operative 9 Months	120 – 150	133.2 ± 7.407	Post3M-Post9M	7.000 ± 5.345	<0.001
DBP (mmHg)	Pre-operative	80 - 110	96.6 ± 8.657	Preop-Post3M	5.400 ± 4.932	<0.001
	Post-operative 3 Months	80 – 100	91.20 ± 6.590	Preop-Post9M	11.000 ± 5.714	<0.001
	Post-operative 9 Months	80 – 90	85.60 ± 5.014	Post3M-Post9M	5.600 ± 5.771	<0.001

There was a statistically significant decrease of FBG 3 months and 9 months after surgery (**Table 4**).

Table (4): Description of fasting blood glucose level at preoperative, 3 months and 9 months after surgery

Time	FBG			FBG (mg/dl)		COMP	Mann-Whitney Test
	Range	Median	Interquartile Range				
Pre-operative	73 - 270	105	(94-136.25)	Pre-P3M	<0.001		
Post-operative 3 Months	74 - 210	100	(83-110)	Pre-P9M	<0.001		
Post-operative 9 Months	71 - 150	95	(83.75-100)	P3M-P9M	<0.001		

The mean total cholesterol level of our patients 3 months and 9 months after surgery decreased by 21.4 and 42.1 mg/dl respectively. The mean triglyceride level 3 months and 9 months after surgery decreased by 14.5 and 30.8 mg/dl respectively. The mean LDL level 3

months and 9 months after surgery decreased by 12.1 and 27 mg/dl respectively. The mean HDL level 3 months and 9 months after surgery increased by 3.8 and 8.2 mg/dl respectively (Table 5).

Table (5): Description of lipid profile at preoperative, 3 months and 9 months after surgery

Lipid Profile	Preoperative		Posoperative 3 months		Posoperative 9 months	
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
Cholesterol (mg/dl)	137 - 320	234.800±37.904	130 - 274	213.40±31.526	130 - 240	192.680±24.735
TG (mg/dl)	111 - 190	146.560±20.498	100 - 170	132.040±19.276	60 - 155	115.720±24.576
LDL (mg/dl)	65 - 233	145.120±33.661	60 - 200	132.960±28.723	62 - 153	118.080±17.739
HDL (mg/dl)	30 - 58	42.840±5.633	39 - 60	46.720±5.997	40 - 63	51.120±6.097

According to the analysis of obtained material it is possible to count that:

The average age of the patients included in our study was (42.8 ± 8.2) Ys {Range from 21 – 56 Ys}.

The average body weight of the patients was 147.8 ± 14 kg {Range from 117 – 174 kg}.

The mean body weight of our patients 3 months and 9 months after surgery decreased by 23.8 and 53.6 kg respectively.

The average BMI of the patients was 52.4 ± 6.6 kg/m². {Range from 41 – 70 kg/m²}.

The mean BMI of our patients 3 months and 9 months after surgery decreased by 8.4 and 19 kg/m² respectively.

The mean systolic blood pressure of our patients 3 months and 9 months after

surgery decreased by 8.6 and 15.6 mmHg respectively.

The mean diastolic blood pressure of our patients 3 months and 9 months after surgery decreased by 5.4 and 11 mmHg respectively.

The mean total cholesterol level of our patients 3 months and 9 months after surgery decreased by 21.4 and 42.1 mg/dl respectively.

The mean triglyceride level of our patients 3 months and 9 months after surgery decreased by 14.5 and 30.8 mg/dl respectively.

The mean HDL level of our patients 3 months and 9 months after surgery increased by 3.8 and 8.2 mg/dl respectively.

The mean LDL level of our patients 3 months and 9 months after surgery decreased by 12.1 and 27 mg/dl respectively.

DISCUSSION

The main purpose of this study was to evaluate the short term effect of LSG on metabolic disorders.

In this study the mean BMI of patients 3 Ms and 9 Ms after surgery decreased by 8.4 and 19 kg/m² respectively.

Another study performed by *Hutter et al. (2011)* showed that the average reduction in the mean BMI for patients undergoing LSG was 8.75 kg/m² at 6 months and 11.87 kg/m² at 1 year post operation.

Nine months after surgery we found that 63% of our patients who were on oral hypoglycemic drugs required decrease drug dose while 37% of them stopped the treatment.

In another study prepared by *Gill et al. (2010)*, they stated that 66.2% of patients who underwent sleeve gastrectomy were completely cured from type 2 diabetes which was reflected by an overall improvement in fasting glucose levels allowing the termination of all diabetic medications.

In another study performed at Cleveland clinic by *Schauer et al. (2012)* in which they compared sleeve gastrectomy (SG) to medical management on type 2 diabetic patients, they found that not only there was a significant reduction in the use of oral hypoglycemic drugs but also after 1 year of follow-up only 8% of SG patients required insulin.

Our results showed that there is a significant decrease in the percentage of patients with high blood pressure at 9 months after surgery.

There have been many recent studies that have shown improvement or resolution of hypertension following LSG. A multi-center study by *Sanchez et al. (2009)* found that hypertension was improved in 63% of LSG patients.

In another cohort study, *Basso et al. (2011)* found that out of 100 high-risk super obese patients with a mean BMI of 54.4 kg/m² had complete resolution of their hypertension in 62% of cases.

Our study showed a significant decrease in lipid profile (Total Cholesterol, Triglyceride and LDL cholesterol) nine months after LSG.

Similar results were obtained by *Vidal et al. (2008)* with a significant improvement of lipid profile following LSG.

Another study performed by *Zhang et al. (2011)* showed that high-density lipoprotein cholesterol (HDL) and triglycerides were significantly improved after LSG but low-density lipoprotein cholesterol (LDL) and total cholesterol were not improved.

CONCLUSION

LSG is a very good bariatric procedure with the simplicity of the technique and less complications with good results on both body weight reduction and BMI.

LSG played an important role in the correction of metabolic disturbance associated with obesity especially DM type 2, hypertension and dyslipidemia early after the operation.

The short term follow up period after operation with low number of patients

included in the study were potential limitations of our study.

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تأثير عملية تكميم المعدة على اضطرابات التمثيل الغذائي

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خلفية البحث: مرض السمنة أصبح مشكلة صحية كبيرة في كلاً من الأقطار المتطورة والنامية في القرن الواحد والعشرين بسبب زيادة معدل انتشارها وعلاقتها بحدوث مضاعفات طبية ونفسية خطيرة.

الهدف من البحث: تقييم المدى القصير لتأثير عملية تكميم المعدة على اضطرابات التمثيل الغذائي.

المرضى وطرق البحث: تمت هذه الدراسة بقسم الجراحة العامة، مستشفى الحسين الجامعي، كلية طب الأزهر بالقاهرة وتضمنت 50 مريضاً يعانون من سمنة مفرطة حيث مؤشر كتلة الجسم تتراوح من 41 كجم / م² إلى 70 كجم / م² وتتراوح أعمارهم من 21 إلى 56 سنة وبلغ عدد الذكور 40 وعدد الإناث 20، وقد أجريت هذه الدراسة في الفترة من مارس 2018 إلى يناير 2020 وتم إجراء عملية تكميم المعدة بالمنظار لجميع المرضى وتم متابعة المرضى بعد ثلاثة أشهر وتسعة أشهر من إجراء العملية بقياس مؤشر كتلة الجسم وضغط الدم ونسبة السكر الصائم بالدم ونسبة الكوليسترول والدهون الثلاثية ونسبة الدهون مرتفعة الكثافة ومنخفضة الكثافة بالدم.

نتائج البحث: أوضحت الدراسة وجود تأثير ملحوظ على شفاء أو تحسن غالبية المرضى المصابون بارتفاع ضغط الدم ومرضى السكر من النوع الثاني كما أوضحت الدراسة وجود انخفاض بنسبة الكوليسترول والدهون الثلاثية والدهون منخفضة الكثافة بالدم.

الاستنتاج: عملية تكميم المعدة بالمنظار أحد أفضل عمليات جراحات السمنة نظراً لسهولة إجراء الجراحة وقلّة حدوث المضاعفات مع الحصول على نتائج ممتازة على المدى القصير من انخفاض الوزن ومؤشر كتلة الجسم وارتباطها الهام بتحسّن نسب الاضطرابات الأيضية المتصلة بالسمنة.