Effect of Laparoscopic Sleeve Gastrectomy in Treatment of Type II Diabetes Mellitus

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ABSTRACT

Introduction: *Excess body weight can result in Diabetes mellitus, where 90% of all diabetics are type 2 (T2DM).* ***Aim of study****: To evaluate the effect of Laparoscopic Sleeve Gastrectomy (LSG) as a method of treatment of type 2 Diabetes mellitus in morbidly obese patients.* ***Patients and methods:*** *A prospective study was carried out on 40 diabetic morbidly obese patients who underwent LSG during 1.5 years. The pre-operative diabetic status, duration of Diabetes, body mass index, the excess weight loss percent (EWL %) at 12 and 18 months follow-up, and remission or improvement of T2DM were recorded and analyzed. Pre- and postoperative fasting blood glucose, and HbA1C were measured. In addition, Continuous Glucose Monitoring (CGM) was performed in each patient to clarify the remission of Diabetes.* ***Results****: The mean age of patients was 40.1±4.7 years. The mean preoperative BMI was 51.2±6.5 Kg/m^2. Post-operative calf DVT and bleeding occurred in 5% of cases. Diabetes resolution occurred in 87.5% of patients (n = 35), where the blood sugar control started at 3 months and reached to no medication at 6 months for 28 patients and 7 patient reached complete cure at 18 months. Diabetes was controlled on oral hypoglycemic only and a minimal dose was required in 12.5% of patients(n = 5). The EWL% was 70.2% at 12 months and 72.7% at 18 months.* ***Conclusion****: LSG resulted in total remission of T2DM in 87.5% of the patients and easy control of diabetes in 12.5% of patients, and can be considered a metabolic surgery.*

Key words*: LSG; Type 2 DM; excess weight loss.*

INTRODUCTION

Worldwide, 1.7 billion adults are taken into consideration obese, with three hundred million taken into consideration clinically obese[(1)]. Obesity is typically described as a body mass index (BMI) ≥ 30 kg/m^2. Co-morbid diseases associated with weight problems include hyperlipedemia, high blood pressure, sleep apnea syndrome, and type 2 Diabetes mellitus. It's been proposed that, the overweight patients, a failure might occur of ß-cells to secrete adequate degrees of insulin to atone for the insulin resistance in peripheral tissues, which ultimately ends in T2DM. Human beings with both obesity and T2DM have an accelerated danger of cardiac diseases and early death [(2)].

The principle solution to the global weight problems epidemic is the number of performed bariatric procedures[(3)]. Type 2 diabetes and glucose metabolism abnormalities are one of the most important consequences of morbid obesity which result in an excessive and chronic discount in high-quality of fitness. Excessive effectiveness of bariatric therapy for weight loss and remedy of co-morbidities has been proven in several studies[(4)]. Nevertheless, unclear which bariatric technique must be selected for diabetic patients that allows to gain the satisfactory consequences in diabetes remission [(5)].

In latest years, Laparoscopic Sleeve Gastrectomy (LSG) has end up one of the maximum commonly used number one bariatric technique for morbid obesity [(5,6)]. Numerous authors attempt to prove that effect of LSG on type 2 Diabetes treatment is as precise because the laparoscopic Roux-en-Y gastric pass (LRYGB), which was called a "gold standard" for diabetic sufferers. Capability mechanisms of Diabetes remission and development in glucose homeostasis after LSG are the primary topic of latest research, but its effects are nonetheless

doubtful [2]. At the same time as LRYGB has nicely documented effective clinical influence on T2DM, the role of LSG in Diabetes treatment is controversial. Many research display splendid biochemical results. Despite the fact that this should result in diabetes remission, the clinical long-term consequences aren't so constructive [7].

Aim of study:

The aim of this study was to evaluate the effect of LSG as a method of treatment of type 2 Diabetes mellitus in morbidly obese patients.

PATIENTS AND METHODS

According to the modification of the American Diabetes Association Consensus Group (2); Diabetes was defined as hemoglobin A1c (HbA1c) ≥6.5% (48 mmol/mol) or (if HbA1c was not available) fasting glucose >6.9 mmol/L; or self-report currently having Diabetes and on a treatment for Diabetes; or self-report currently having Diabetes and report ever hospitalized for treatment of a Diabetes complication; or take any of the antidiabetic medication in the 90 days before surgery. An exception was made for participants who self-reported take metformin with no other Diabetes medications, and had an HbA1c <6.5% (48 mmol/mol).

Diabetes remission was defined as HbA1c <6.5% (48 mmol/mol) (or a fasting glucose ≤ 6.9 mmol/L if HbA1c was not available) and an absence of active pharmacologic therapy for Diabetes [8]. The decision to continue or discontinue Diabetes medications was not standardized but instead left to the discretion of each patient and their clinician [9].

This is a prospective study which was performed on 40 morbidly obese patients with T2DM who underwent LSG. All patients have type 2 Diabetes mellitus and on insulin or oral hypoglycemics for much less than five years duration.

LSG turned into finished within the standard split-leg French role the usage of five laparoscopic ports method, Devascularization of the greater curvature of the stomach was done starting 4-6 cm from the Pylorus and as much as the angle of His using the Harmonic scalpel ® (J&J). A 36-Fr calibrating bougie then introduced to the duodenum before performing the gastric sleeve. The sleeve then done with a linear laparoscopic stapler Echelon ® (J&J), the green reloads for the antrum starting 6cm from the pyloric ring, the gold reloads for the body and the blue reloads for the fundus, aiming for a gastric pouch of approximately 100ml. The calibrating bougie is then pulled proximally and 100ml of methylene blue had been injected to assess for technical leak. An intra-abdominal drain was left for 48 hours. Stepwise diet starting by fluids, purred foods, semisolids and then the solid food after 6-8 weeks postoperative.

Ethical Consideration:

Approval from Medical Ethical Committees of Faculty of Medicine was taken. Each patient gave his/her written consent to participate in the study.

Statistical analysis:

Categorical variables were described by number and percent (N, %), where continuous variables described by mean and standard deviation (Mean, SD). Comparison between continuous variables was done by independent T test. A two tailed $p < 0.05$ was considered statistically significant. All analyses were performed with the IBM SPSS 23.0 software.

RESULTS

This prospective study included 30 females and 10 males; the mean age of patients was 40.1±4.7 years. The mean preoperative BMI was 51.2±6.5 Kg/m^2. The demographic data was shown in table (1).

Table: (1) Demographic data of the study group

Age (mean ±SD)	40.1±4.7
Gender (%)	
Male	10(25%)
Female	30(75%)
BMI(Kg/m^2)	51.2±6.5
HbA1C	
Less than or equal to 6.5%	30(75%)
More than 7%	10(25%)
Duration of Diabetes mellitus	
Less than 1 year	13(32.5%)
1-3 years	14(35%)
3-5 years	13(32.5%)

Data are expressed as mean ±SD or number (%)
BMI: Body Mass Index, HbA1c: glycated hemoglobin.

Post-operative complications including calf DVT and bleeding were recorded in 5% of cases as shown in figure (1).

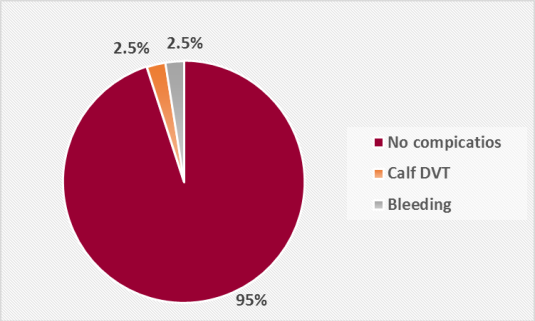

Fig. (1): Post-operative Complications

The median postoperative follow-up period was 18 months, pre- and postoperative fasting blood glucose and HbA1C were measured. During 1.5 years of follow-up, continuous Glucose Monitoring (CGM) was performed in each patient for better verification of the remission of Diabetes. In this study, Diabetes resolution after LSG occurred in 87.5% of patients (n = 35), where the blood sugar control started at 3 months and reached to no medication at 6 months for 28 patients and after 18 months for 7 patients; Diabetes was controlled on oral hypoglycemic only and a minimal dose was required in 12.5% (n = 5) (Table 2).

Table: (2): Outcome of type 2 Diabetes Mellitus after LSG

Complete remission	35(87.5%)
Controlled by OHG	5(12.5%)

Data are expressed as number (%)
OHG: Oral Hypoglycemic Agent

In addition we found an inverse relationship between the duration of Diabetes and the possibility of cure postoperatively. Best result of Diabetes control was observed in group between 1-3 years of T2DM.

The excess weight loss percentage (EWL %) was 70.2% at 12 months and 72.7% at 18 months follow-up (Figure 2).

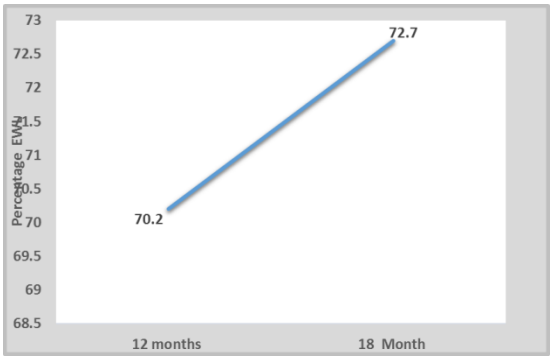

Fig. (2): Percentage of EWL over 18 months

A significant association was found between the % EWL and complete resolution of Diabetes compared to control by OHG as shown in table (3).

Ten patients were suffering from hypertension, 7 patients had hyperlipedemia and 2 patients had sciatica, all of them were cured by the end of the follow up period of 18 months, except one patient continue on antihypertensive drugs.

Table (3): Percentage of EWL and resolution of type 2 Diabetes mellitus

Variable	Complete remission (n=35)	Controlled by OHG (n=5)	P value
EWL after 12 months	71.1±1.9	63.8±2.3	<0.001
EWL after 18 months	73.3±2.1	68.6±4.3	0.021

EWL% = Excess Weight Loss Percentage

DISCUSSION

The results of this study virtually outline the rule of LSG inside the remedy of T2DM. The fact that 87.5% of patients have whole therapy of T2DM and 12.5% of patients have become controlled on OHG. Beside an improvement of the related co-morbidities including; high blood pressure, hyperlipedemia and sciatica [(10)].

A systematic evaluation by means of Buchwald et al. [(11)] said that there's similar resolution of T2DM after different bariatric

surgical methods. Gastric banding and Mini-gastric bypass resulted in remission of type 2 DM in 48% and 84% of patients, respectively [12].

Furthermore, the Swedish obesity subjects study proven that the 2-yr restoration rate from DM in the group dealt with bariatric surgery becomes significantly higher [13]. Moreover they verified an 80% reduction in annual mortality in the surgical group in comparison with the medical group [14]. Similarly, MacDonald et al. [15] found that gastric bypass reduced the progression of type 2 DM within the surgically treated patients.

In 705 morbidly obese patients, LSG reduced extra weight by 47.3%. Buchwald et al. [11] observed gastric bypass to reduce extra weight by 62%. In comparison with the evaluation with the aid of Buchwald et al. [11], our findings had demonstrated that patients undergoing LSG had an extra degree of extra weight reduction and remission of T2DM. They said a T2DM resolution occurred in 80.9% for LSG, as well as improvements in insulin resistance after LSG.

If the hindgut principle holds true, it could provide an explanation for the additive improvement of T2DM after LSG as compared with other restrictive procedures [16]. Despite the fact that the excess weight loss and T2DM resolution has been lower after LSG in comparison with after both gastric banding. Dumping syndrome has now not been pronounced as a postoperative trouble. Buchwald et al. [11] reported a mortality price of 0.1% for basically restrictive processes (3000 patients). From sixteen studies, the envisioned mortality charge for LSG is 0.35% (four deaths in 1117 patients).

There is generally agreement among the published studies that patients who have long duration of T2DM have a lower remission rate after LSG, mostly due to their poor residual ß-cell function [17].

Duration of diabetes is the main prognostic factor for Diabetes remission after LSG. Capoccia et al. published the fact that patients with history of less than 10 years of diabetes were cured from diabetes, according to the standard criteria for diabetes remission [18]. In the current study, we found an inverse relationship between the duration of diabetes and the possibility of cure postoperatively. The postoperative complications which include bleeding (2.5 %), postoperative DVT (2.5%) and staple line leak (0%) compared favorably with the rates reported from the published data within the literature [19-21].

CONCLUSION

LSG remains a much less technically complicated procedure and may have wider applicability to general surgeons. The risk of malabsorption and internal hernias postoperatively are less than gastric bypass.

LSG is a safe and effective Bariatric procedure that provides complete cure of T2DM in 87.5% of cases and better results seen with short-term DM history between 1-3 years, and can be considered as a metabolic surgery.

Conflict of interest: No.

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