

Results of Sleeve Gastrectomy in Type 2 Diabetic Patients; A Retrospective Cross-Sectional Study

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Abstract

Background: Obesity is a preventable and treatable disease with daily exercise and healthy dietary lifestyle interventions that predisposes to many diseases. Sleeve gastrectomy is a partial gastrectomy, in which the majority of the stomach is removed.

Aim: Herein our aim was to investigate the effect of bariatric surgery on glycemic control, blood pressure and serum cortisol levels in morbidly obese patients with type 2 diabetes mellitus (DM).

Material and Methods: 107 type 2 DM patients who had undergone sleeve gastrectomy at Adıyaman University Medical Faculty and whose body mass index was 40 were enrolled in this present study. Patients' age, gender, pre-operative

and 1-year post operative HbA1c, Body Mass Index, serum cortisol, blood pressure, usage of the anti-diabetic and antihypertensive drugs and postoperative complications were documented retrospectively from the records of the patients.

Results: The mean age of the patients was 39.7 ± 9.8 . Of the patients 32 were male and 75 were female. The mean body mass index of the patients was 46.6 ± 3.8 . A statistically significant decrease in HbA1c, body mass index and serum cortisol levels was observed at 1 year after operation (p value <0.01) when compared with values before operation. Bleeding occurred in 9.3% of the patients, leakage was found in 0.9% of the patients, infection was found in 0.9% of the patients and no complication was detected in

88.8% of the patients after operation.

Conclusions: In this present study, it was found that sleeve gastrectomy in appropriate indication had a high success rate in the morbidly obese type 2 DM patient group.

Keywords: Obesity, Sleeve Gastrectomy, Diabetes Mellitus

INTRODUCTION

Obesity is a preventable and treatable disease with daily exercise and healthy dietary lifestyle interventions (1, 2, 3) that predisposes to many diseases. Depending on the metabolic and endocrinological effects of obesity, type 2 diabetes mellitus (DM), dyslipidemia, hypertension, cardiovascular diseases, gastroesophageal reflux disease, degenerative joint disease, cholelithiasis, hepatosteatorosis and some cancers can develop (4, 5, 6). With weight loss, most of these illnesses can heal or can be completely removed.

In patients who do not respond to medical treatments and lifestyle changes, bariatric surgery has become a very important option today for weight loss. Sleeve gastrectomy is one of the bariatric surgical methods (7, 8, 9, 10).

Sleeve gastrectomy is a partial gastrectomy, in which the majority of the stomach is removed. Restricted food intake and hormonal changes in hunger and decreasing insulin resistance lead to the weight loss after surgery. Thus, increasing weight loss lead to high rates of improvement in type 2 DM and insulin resistance in the short term.

Here, we aimed to investigate the effect of sleeve gastrectomy on glycemic control, blood pressure and cortisol in patients with type 2 DM.

MATERIAL AND METHODS

Patients selection

107 type 2 DM patients with sleeve mass gastrectomy and body mass index > 40 were

included in the study. Patient's hospital records were reviewed retrospectively between January 2015 and June 2017 from the Adiyaman University Medical Faculty patient's records. Non Type 2 DM patients, body mass index <40 patients, secondary diabetes mellitus, patients with malignancy or collagen tissue disease, patients using corticosteroids and age <18 were excluded from the study.

Pre-operative age, gender, body mass index, presence of additional illness, smoking, alcohol usage, antihypertensive drug usage, oral antidiabetic usage, insulin usage, serum HbA1c and cortisol levels were recorded. At the first postoperative year, antihypertensive drug usage, oral antidiabetic usage, insulin usage, body mass index, HbA1c and cortisol levels were reevaluated.

Postoperative early complications were documented. After surgery remission criterias were defined. Complete remission criteria was HbA1c < 6% without any medication for diabetes mellitus, partial remission criteria was 6.5% without any medication for diabetes mellitus, and None remission criteria was HbA1c > 6.5% without any medication for diabetes mellitus.

Surgery Procedure

The operation was performed by a single surgeon. After the preoperative multidisciplinary team evaluation and approval, all patients underwent an upper-GI endoscopy, and the patients who had normal gastric mucosa were chosen for the surgery. Deep venous thrombosis prophylaxis with subcutaneous LMWH was given to all

patients 12 h before and 10 days after the surgery, and elastic stockings are used in the perioperative period. Patients are positioned with both legs apart in the reverse Trendelenburg position. The surgeon is positioned in between the legs of the patient, with a camera assistant at left side and a first assistant on the right side of the surgeon. Because the body posture was affected negatively by obesity, a xiphoid is accepted as the landmark rather than an umbilicus. The first trocar is directly introduced 18–20 cm inferior to the xiphoid and patient's left side of the midline. To avoid iatrogenic injury, our first trocar insertion technique consisted of approaches applied stepwise. After the incision, a 10-mm trocar was inserted till it touched the anterior sheath of the rectus abdominis muscle. With continuous pressure, as it passed, the first "tic" was heard. The trocar was not loosened and was allowed to spring up with the abdominal wall. Then, a tightly holding trocar was pushed again till the second "tic" was heard, and the trocar was bluntly inserted into intra-abdominal space. A 30° scope was introduced, the abdomen was explored, and other trocars were applied with direct vision. The second trocar for liver retractor (5 mm) was inserted just below the xiphoid from the patient's left side. The third and fourth trocar (12–15 mm) for the surgeon's left and right hands were inserted symmetrically from the patient's left and right midclavicular line just about 2–3 cm higher from the level of the camera trocar. For operations using five trocars, the fifth trocar for the first assistant was inserted from the patient's

left anterior axillary line just below the costal arc. With use of a bipolar vessel sealing device or harmonic scalpel, gastroepiploic arcade preserving dissection of a greater curvature was continued superiorly to the HIS angle of the stomach and inferiorly to 2–4-cm distance from the pylorus. Whole fundus and posterior attachment of the stomach are dissected and the left crus was visualized. After preparing the stomach, 39 Fr gastric tube placement was requested from the anaesthesiologist. The tube was placed in the lesser curvature. All staplers were applied from the 12–15-mm port on the patient's right side. In all stapler usage, before firing the stapler, 15 s were waited for grasping of the tissues. If any hemorrhage occurs from the stapled line, it was controlled with endoclips or bipolar electro cautery. Buttress material, fibrin glue, or reinforcement sutures were not used. The resected specimen was removed from the patient's right side using a 12–15-mm trocar, which was used to apply staplers. All patients were early mobilized at postoperative 8–12 h. After the confirmation of the absence of leakage on oral contrast radiograms on postoperative day 3, they were allowed to take a high-protein liquid diet, which was continued for first 2 weeks. After this, an 800–1200-kcal normal diet was initiated under the control of the clinic dietitian.

Statistics

All the analyses were performed using the SPSS for Windows (version 21.0; SPSS/IBM, Chicago, IL). Descriptive statistics and paired samples T tests were used when suitable. The statistical

significance level was accepted as a *P* value of less than 0.05.

RESULTS

The mean age of the patients was 39.7 ± 9.8 . Of the patients 32 were male and 75 were female. The mean body mass index of the patients was 46.6 ± 3.8 . There were hypertension in 57 patients (53.2%) (**Table 1**).

Table 1. General characteristics of the patients

Parameters	n=107
Age	39,7±9,8
Gender M/F	32/75
Hypertension	57 (53,2 %)
Mean HbA1c% values	6,7±1,5
Mean BodyMassIndex	46,8±3,8
Mean cortisol (ug/dl)	14,2±3,5

After operation, 10 (9.3%) patients had bleeding, 1 (0.9%) patients were leakage, and 1 (0.9%) patients were infected and 95 (88.8%) patients had no complications (**Table 2**).

Table 2. Complication frequency of the patients

Acute(Early) Complications	n%
Bleeding	10 (9,3 %)
Leakage	1 (0,9 %)
Infection	1 (0,9 %)

There was a statistically significant decrease in HbA1c, body mass index and serum cortisol values after operation compared to the values before operation according to one year results (p value <0.01). Mean preoperative HbA1c value was 6.7 ± 1.5 , and it decreased to 5.3 ± 1.1 in the

first year after operation. The mean BMI before the operation was 46.8 ± 3.8 , and it decreased to 30.7 ± 3.8 in the first year after the operation. The mean pre-operative cortisol level was 14.2 ± 3.5 , and decreased to 13.2 ± 2.7 in the first postoperative period (**Table 3**).

Table 3. Comparison of investigated values before and after operation

Parameters	Before operation	After 1 year operation	<i>P</i> value
HbA1c%	6,7±1,5	5,3±1,1	<0,01
Cortisol ug/dl	14,2±3,5	13,2±2,7	<0,01
BMI kg/m ²	46,8±3,8	30,7±3,8	<0,01

According to one year results 94.7% of patients using antihypertensive drugs, blood pressure control was achieved without antihypertensive drugs. Of the patients using oral antidiabetics Complete glycemic remission was achieved in 81.8% of the patients and partial glycemic remission in 10.9% of the patients. Of patients using insulin, Complete glycemic remission was achieved in 76.9% of the patients and partial glycemic remission was achieved in 15.3% of the patients. Of the patients using oral antidiabetic and insulin together, Complete glycemic remission was achieved in 37.5% and partial glycemic remission was achieved in 25% of the patients (**Grafic 1**).

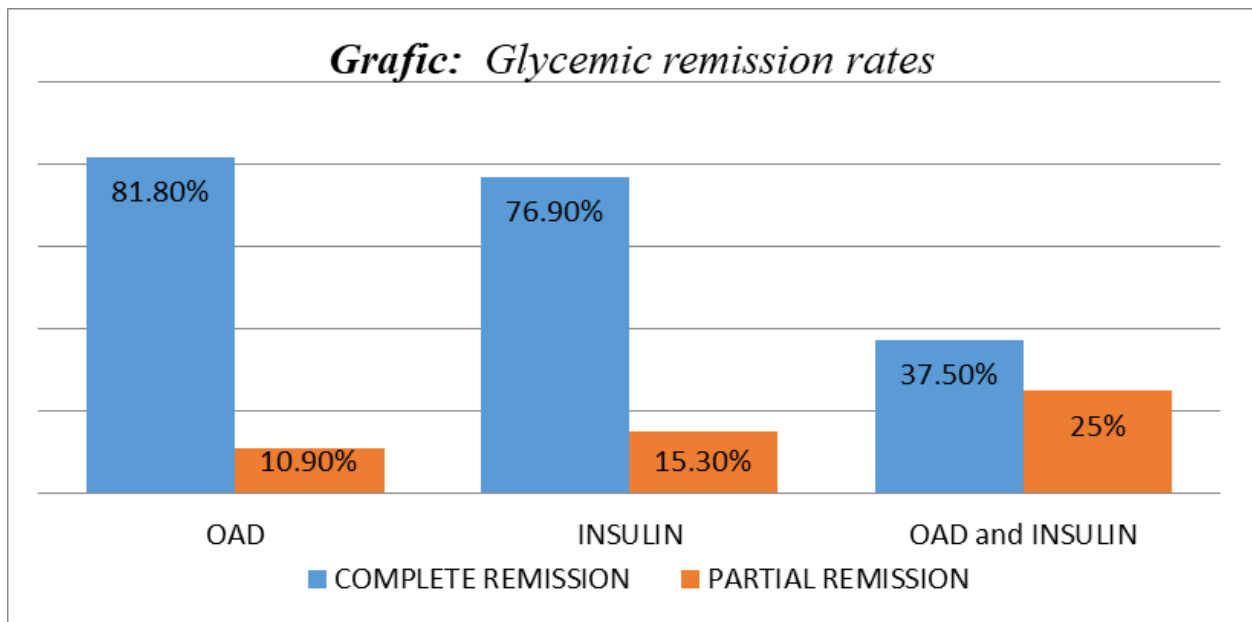


Figure 1. Glycemic remission rates

- OAD: Oral antidiabetics usage only
- INSULIN: Insulin usage only

DISCUSSION

Type 2 DM frequency is increasing all over the world and it constitutes a significant part of countries' health expenditures. Currently, oral antidiabetics and insulin treatments rank first among treatment options (11, 12, 13, 14). But with these treatments weight gain is a major problem and it is difficult to break insulin resistance. Type 2 DM development begins with insulin resistance and is followed by insulin secretion deficiency (15). Because of the weight gain does not break insulin resistance, continuous drug doses are increased, and blood sugar regulation is not achieved in a significant proportion of patients.

The question is whether chronic diseases such as Type 2 DM can be cured completely. It was found in bariatric surgeries in morbidly obese patients

that obesity-related metabolic diseases (DM, Hypertension, Dyslipidemia, Cardiovascular disease etc.) can be treated completely (16).

Sleeve gastrectomy is a popular method of bariatric metabolic surgery in recent years (17). In a study conducted by F. Abbatini et al., 36-month diabetes remission rate was found to be 84.6% in diabetic patients who underwent sleeve gastrectomy, whereas this rate decreased to 76.9% in 60 months period (18). In a study conducted by Pontiroli et al., the 4-year diabetes remission rate was 45% in diabetic patients who underwent sleeve gastrectomy (19). In a study conducted by Casella G et al., the remission rate was 80.3% for diabetic patients undergoing sleeve gastrectomy (20). In the same study, while the remission rate for less than 10 years disease duration was determined as 100%, the remission

rate was determined as 31% for more than 10 years disease duration.

A statistically significant decrease in HbA1c, body mass index and serum cortisol levels was observed at 1 year after operation (p value <0.01) when compared with values before operation.

According to the 1 year results; of the patients using oral antidiabetics Complete glycemic remission was achieved in 81.8% of the patients and partial glycemic remission in 10.9% of the patients. Of patients using insulin, Complete glycemic remission was achieved in 76.9% of the patients and partial glycemic remission was achieved in 15.3% of the patients. Of the patients using oral antidiabetic and insulin together Complete glycemic remission was achieved in 37.5% and partial glycemic remission was achieved in 25% of the patients.

Insulin use has been shown to reduce remission rates.

The most common early complications of SG operation are bleeding, stenosis, gastric leak, infection and gastroesophageal reflux (21). In the present study, bleeding occurred in 9.3% of the patients, leakage was found in 0.9% of the patients, infection was found in 0.9% of the patients and no complication was detected in 88.8% of the patients after operation.

There were some limitations of our study. A more comprehensive study can be done if the limitations are exceeded.

Limitations of the study

Retrospective design

Short follow-up results

Singe center study

Less data work

CONCLUSION

Bariatric surgery had very high success rates in type 2 diabetes mellitus. Most of our patients have left their antidiabetic medications and have lost weight effectively. It is a very effective treatment option in patients who do not respond to diet, exercise and pharmacological treatment. Finally it can be preferred as a treatment option in the treatment of obesity in appropriate indications.

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Conflict of Interest Disclosure: The authors declare that they have no conflict of interest.

Ethical approval: The retrospective data scan was approved by the hospital management.

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