

# The Role of Sleeve Gastrectomy on Preventing Type 2 Diabetes Mellitus

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## Abstract

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**AIM:** To investigate the effect of bariatric surgery on HbA1c and serum cortisol levels in morbidly obese patients without type 2 diabetes mellitus.

**MATERIALS AND METHODS:** Twenty-nine patients who underwent sleeve gastrectomy and whose body mass index was > 40 were included in the present study. Patients' files were reviewed retrospectively. Those with diabetes mellitus and those with age <18 were excluded from the study. Pre-operative and 1-year post operative data were documented. The obtained data were analysed by SPSS statistical program.

**RESULTS:** The mean age of the patients was 27.4 ± 8.4. 5 of the patients were male, and 24 were female. The mean body mass index of the patients was 44 ± 2.3. 1 patient [3.4%] had hypertension. Four patients [13.7%] had gastroesophageal reflux disease. The number of smokers was 7 [24.1%], and the number of alcohol users was 3 [10.3%]. There was a statistically significant decrease in HbA1c, body mass index values after operation [p value <0.01], but cortisol was not different [p value = 0.72].

**CONCLUSION:** In this present study we found that bariatric surgery caused a significant decrease in HbA1c levels in non-diabetic patients, suggesting that bariatric surgery may prevent Type 2 Diabetes Mellitus in obese patients.

## Introduction

Type 2 diabetes mellitus is a preventable disease. With an appropriate and effective exercise and diet program, this disease can be prevented [1]. In the development of Type 2 DM, it is thought that the starting point is insulin resistance [2-3]. It is known that the process leading to insulin resistance is excessive weight gain.

In overweight diabetic patients who do not respond to medical treatments and lifestyle changes, bariatric surgery has become a very important option today [4-8]. Here, we hypothesise that weight loss after a sleeve gastrectomy can break insulin resistance and prevent Type 2 DM development. To support this hypothesis, we examined the effect of sleeve gastrectomy on HbA1c in patients without type 2 diabetes mellitus.

## Materials and Methods

Twenty-nine patients who underwent Sleeve gastrectomy in Adiyaman University Medical Faculty Education Research Hospital and whose body mass index was > 40 were enrolled in this present study. Patients' files were reviewed retrospectively. Those with type 2 diabetes mellitus, those with malignancy or collagen tissue disease, those using corticosteroids and those with age <18 were excluded from the study. Age, gender, body mass index, the presence of additional illness, smoking, alcohol use, serum HbA1c and cortisol levels were recorded before the operation. Body mass index (BMI) and cortisol levels were re-evaluated at the first postoperative year.

All the analyses were done using the SPSS for Windows [version 21.0; SPSS / IBM, Chicago, IL]. Descriptive statistics and paired samples 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  $27.4 \pm 8.4$ . 5 of the patients were male, and 24 were female. The mean body mass index of the patients was  $44 \pm 2.3$ . 1 patient [3.4%] had hypertension. Four patients [13.7%] had gastroesophageal reflux disease. The number of smokers was 7 [24.1%], and the number of alcohol users was 3 [10.3%]. One [3.4%] patient underwent cholecystectomy due to cholecystitis. The demographic and general characteristics of the patients are summarised in Table 1.

**Table 1: General characteristics of patients**

Parameters	N = 29
Age	$27.4 \pm 8.4$
Gender Male / Female	5/24 (17.2%/82.8%)
Hypertension	1 (3.4%)
Cholecystitis	1 (3.4%)
Smoking	7 (24.1%)
Alcohol consumption	3 (10.3%)
Reflux disease	4 (13.7%)
Body Mass Index	$44 \pm 2.3$
Cortisol	$13.6 \pm 2.7$

There was a statistically significant decrease in HbA1c, body mass index values after operation [p values <0.01, <0.01], but cortisol was not different [p value = 0.72]. The mean preoperative HbA1c value was  $4.4 \pm 0.6$ , but it decreased to  $3.94 \pm 0.5$  in the first year after operation. The mean BMI before the operation was  $44 \pm 2.3$  and it decreased to  $28 \pm 3.1$  in the first year after operation. The mean cortisol level before surgery was  $13.6 \pm 2.7$  and  $13.6 \pm 3.6$  at 1 year after operation. The values of the patients before and after the operation are summarised in Table 2.

**Table 2: Comparison of preoperative and postoperative values of patients**

Parameters	Preoperative	Postoperative	P values
HBA1C	$4.4 \pm 0.6$	$3.94 \pm 0.5$	<0.01
Cortisol	$13.6 \pm 2.7$	$13.6 \pm 3.6$	0.81
Body Mass Index	$44 \pm 2.3$	$28 \pm 3.1$	<0.01

## Discussion

Morbid obesity is a preventable and treatable disease that sets the stage for 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, hepatosteatosi and some types of cancer may develop [9-15]. With weight loss, most of these illnesses can heal or can get out of

hand.

Bariatric surgery has become a very important option in the overweight problem of not responding to medical treatments and lifestyle changes. Sleeve gastrectomy is one of the bariatric surgical methods. Sleeve gastrectomy is a partial gastrectomy, in which the majority of the stomach is removed. Restricted food intake and hormonal changes in hunger and insulin resistance lead to the weight loss. Thus, high rates of short-term improvement in type 2 diabetes mellitus and insulin resistance, leading to overweight, are achieved.

Many studies in the literature have shown that the bariatric surgery provides a high rate of improvement in DM patients [16-20]. According to our knowledge, we did not find a study that examines the change in HbA1c levels in non-diabetic patients with bariatric surgeries. For this reason, we retrospectively reviewed our patients who did not have diabetes mellitus, thinking that the bariatric surgery could be effective in preventing diabetes even in the absence of diabetes mellitus.

The mean HbA1c value of our patients before surgery was  $4.4 \pm 0.6$ , and decreased to  $3.94 \pm 0.5$  at 1 year after operation [p value < 0.01]. Thus, the obvious precaution in the preventive medicine of the bariatric surgery emerges. In lifestyle modification and obese patients who do not respond to pharmacological treatment, bariatric surgery will prevent many diseases that can be caused by obesity. This surgical method, which has very successful results in well-selected patient groups, will significantly improve countries' health spending.

It is known that there is a slight increase in the level of cortisol in obese patients. We studied the effect of weight loss on cortisol in our study. The mean cortisol level before surgery was  $13.6 \pm 2.7$  and  $13.6 \pm 3.6$  at 1 year after operation [p value = 0.81]. There was no significant decrease in cortisol levels in our study.

The limitations of our work were: 1. The number of the patients was low; 2. The study design was retrospective; and 3. The follow-up time was as short as 1 year.

Studies conducted with surveillance covering too many and very long years can reveal this relationship more clearly.

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