

# Laparoscopic Sleeve Gastrectomy in an Overweight Type 1 DM Patient - A Case Report

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## Abstract

**Background:** Obesity is an increasing health issue worldwide and is linked to endocrine-metabolic diseases, which are difficult to control medically. Bariatric and Metabolic surgery was born as a solution to this condition. It is an effective procedure for the complete resolution of type 2 diabetes and suitable metabolic control of type 1 diabetes. Currently, there are publications but no references on the benefits of this surgery in overweight patients (<30 Kg/m<sup>2</sup>) with T1D.

**Objective:** To present the clinical case of an overweight patient with T1D that underwent a Laparoscopic Sleeve Gastrectomy.

**Method:** Twenty year old overweight female patient with a ten year evolution T1D and bad metabolic control. Weight: 70 kg, BMI: 28 kg/m<sup>2</sup>, Fasting blood glucose: 256 mg/dl, HbA1c: 11,4% and dyslipidemia. Using Insulin therapy with Lantus<sup>®</sup> 35U and Crystalline Insulin 20U; and who underwent Laparoscopic Sleeve Gastrectomy.

**Results:** Patient with excellent metabolic control after 1 year follow-up. Weight: 51 Kg, height: 1.59 m, BMI: 20 Kg/m<sup>2</sup>, Fasting blood glucose: 116 mg/dl, reduction of insulin requirement to 4 units of Lantus<sup>®</sup> and 4 units of Crystalline Insulin. HbA1c: 5.6%, Cholesterol: 180 mg/dl and a reduction of Insulin requirements of 0.63 Unit's kg/day.

**Discussion:** It is clear that Bariatric surgery produces good results in morbid obesity patients with T2D, and less encouraging results in the case of patients with T1D. However, there are still no studies published in relation to overweight patients.

**Keywords:** Metabolic surgery; Type 1 Diabetes mellitus; Sleeve gastrectomy

## Background

The prevalence of obesity and type 2 diabetes mellitus is increasing worldwide. In 2011, the prevalence of diabetes was 8.5% (366 million people), this number is expected to reach 8.9% by 2013 (552 million) [1]. Obesity is common in type 2 diabetes, but it is rarely seen in autoimmune type 1 diabetes [2]. Bariatric Surgery is an effective method for the treatment of obesity and type 2 diabetes; this type of diabetes can resolve completely in 78.1% of diabetic patients and improve in 86.6% after surgery [3]. However, little is known about bariatric surgery in type 1 diabetes mellitus. Brethauer et al. report an improvement of glycemic control following bariatric surgery in obese patients with type 1 diabetes [4]. Bariatric surgery has not been used frequently in patients with type 1 diabetes mellitus, but it could be a reasonable option to treat their severe obesity and related comorbidities. Roux en-Y Gastric Bypass (RYGB) and Laparoscopic Sleeve Gastrectomy (LSG), both result in significant weight loss and type 2 diabetes reversal, with glycemic changes occurring before any significant weight loss. Surgical alteration of the gut leads to rapid changes in the secreted incretin and metabolic milieu, which may explain improved insulin resistance and secretion [3,5]. A recent systematic review of results of bariatric surgery in obese patients with type 1 diabetes mellitus showed significant weight loss and decreased insulin requirement, but emphasized that glycemic control remained difficult after surgery [6]. Currently, the few studies that exist describe the results of bariatric surgery in obese patients with type 1 diabetes mellitus; however it is our purpose to present our result with reference to the case of an overweight patient diagnosed with type 1 diabetes mellitus who underwent LSG.

## Case Report

We report the case of a 20-year-old female patient who consulted in May 2015, T1D since she was of 13, and with a daily requirement of insulin Lantus<sup>®</sup> 35 U/PM and Insulin Humalog<sup>®</sup> 20 U/per day. Physical Exam: Weight: 70 Kg, Height: 1.58 m, Body mass Index (BMI): 28 Kg/m<sup>2</sup>. Lab and metabolic results: Antibodies against glutamate decarboxylase (Ab anti-GAD): 250 (NV: 0-50), C-Peptide: 0.1 (NV: 0.9-4), Anti-Insulin antibodies (IAA): ≥ 100 (NV: 0-10), Pancreatic anti-lung antibodies (ICA): 10 (NV: ≤ 5) (Table 1).

On 27 August 2015, a LSG was conducted according to the technique reported by us (LSG with Duo denojejunal Bypass for the treatment of type 2 diabetes mellitus in a non-obese patient: Technique and preliminary results) [7]. The operative time was 90 minutes, without complications, and 2-day hospitalization. The patient was monitored for several days by her endocrinologist with capillary blood glucose, adjusting daily insulin doses, this was after the patient began eating food, with less calorie intake, progressively requiring fewer doses of insulin. However, after 8 days, the patient received suitable amounts of calories for her weight, just as she did before surgery, progressively requiring less doses of both Rapid-acting and Long-acting Insulin, as she suffered hypoglycemia peaks of 45 mg/dl in fasting blood glucose. Patient was evaluated at 3 months, weighing 55.2 Kg, with a 14.8 Kg weight loss from the day of surgery, corresponding to BMI: 22.1 kg/m<sup>2</sup>; Fasting blood glucose: 95 mg/dl, Lantus<sup>®</sup> insulin dose was reduced to 8 U/PM and Humalog<sup>®</sup> insulin: 20 U/per. HbA1c: 9.3%. Cholesterol: 226 mg/dl, HDL: 44 mg/dl, LDL: 108 mg/dl, TG: 121 mg/dl. During the first 6 months after surgery the patient suffered early morning

**Table 1:** Changes in Weight, BMI, Insulin use, and metabolic parameters after LSG

	Preoperative	Postoperative		
		3 months	6months	12 months
Weight (Kg)	70	55.2	50	51
BMI (Kg/m <sup>2</sup> )	28	22.1	20.08	20.48
HbA1c (%)	11.4	9.3	8.6	5.6
Fasting Glycemia (mg/dl)	256	95	60	116
HDL (mg/dl)	39	44	45	47
LDL (mg/dl)	185	108	80	61
Triglycerides (mg/dl)	166	121	95	83
Cholesterol (mg/dl)	250	226	225	183
Mean Insulin use (U/day)	Lantus <sup>®</sup> : 35 Humalog <sup>®</sup> : 20	Lantus <sup>®</sup> : 8 Humalog <sup>®</sup> :20	Lantus <sup>®</sup> : 4 Humalog <sup>®</sup> :7	Lantus <sup>®</sup> : 4 Humalog <sup>®</sup> : 4

Personal Data, 2017

BMI: Body Mass Index; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein

hypoglycemic episodes, with values below 50 mg/dl. Daily basal insulin relative to body weight decreased from 0.78 U/Kg/day before surgery to 0.15 U/Kg/day one year after surgery.

## Discussion

This case is the first report of metabolic surgery in an overweight patient with type 1 diabetes mellitus. There are some case series reporting outcomes in obese patients with type 1 diabetes after bariatric surgery. Robert et al. [8] described their experience with 10 patients (8 female), mean age 39.2 years, mean pre-surgery BMI 46.9 Kg/m<sup>2</sup>; 7 Biliopancreatic diversion (BPD) and 3 LSG were performed. Mean follow-up was 55.1 months, and mean BMI lost 16.56 Kg/m<sup>2</sup> corresponding to 35.3%. A significant reduction in the daily insulin dose and a decrease in comorbidities such as high blood pressure and dyslipidemia were observed; however, there was no significant decrease in HbA1C values [8]. Likewise, Maraka et al. described their experience with 10 patients (7 female), mean age 50.6 years, and mean pre-surgery BMI 44.3 kg/m<sup>2</sup>. Surgical procedures performed: 9 RYGB and 1 LSG, mean follow-up was 24 months, mean BMI lost 13.1 Kg/m<sup>2</sup> corresponding to 29.6%, with a significant reduction in the daily insulin dose and also an improvement of dyslipidemia; however, there was no significant decrease in HbA1C values [9]. These studies are consistent with Brethauer et al. who described their experience in 10 patients (9 female), mean age 45.6 years, mean pre-surgery BMI 41.6 Kg/m<sup>2</sup>. Surgical procedures performed: 7 RYGB, 2 Laparoscopic adjustable gastric banding (LAGB) and 1 LSG, mean follow-up 36.4 months, mean BMI lost 11.1 Kg/m<sup>2</sup> corresponding to 26.7%, with a significant reduction in the daily insulin dose and an improvement to high blood pressure and dyslipidemia. In this report, a significant decrease in HbA1C values was observed [4]. Czuprynaik et al. described their experience in 3 patients (2 female), mean age 23.3 years, mean pre-surgery BMI 42.2 Kg/m<sup>2</sup>. RYGB was performed in all patients, mean follow-up 75.6 months, mean BMI lost 8.67 Kg/m<sup>2</sup> corresponding to 20.5%, with a significant reduction in the daily insulin dose and an improvement of dyslipidemia and hypertension, likewise, there was a significant decrease in HbA1C values [10]. Different authors differ with respect to results in their studies concerning metabolic control of type 1 diabetes after performing bariatric surgery. Half of them disagree with the effective significance of bariatric surgery to control type 1 DM, while the other half sustain that there is a significant incidence of surgery in diabetes control. All authors agree on bariatric surgery as a treatment for weight loss, insulin requirements, and associated comorbidities. In a previous paper, we reported the results of LSG with Duodenojejunal Bypass for the control of type 2 diabetes in non-obese patients. Technique and preliminary results [8], we suggested performing this technique, but it was not accepted by the patient; therefore we decided to perform the LSG in this patient with type 1 diabetes. The results show an excellent

metabolic control after one year, with normal values of fasting blood glucose and HbA1c. The patient reached a normal BMI, dyslipidemia remitted and daily insulin dose was reduced substantially. These data are consistent with the Brethauer and Czuprynaikreports [4,10].

## Conclusion

LSG is a promising procedure for the treatment of an overweight patients with type 1 diabetes. Studies with a large number of patients and longer follow-ups are necessary to reach definitive conclusions.

## Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

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