



Impact of COVID-19 Lockdown on Short-Term Results After Laparoscopic Sleeve Gastrectomy

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Abstract

Background The recent COVID-19 pandemic has led several countries worldwide to confine the population. Consequently, people's mobility and physical activity are limited in addition to a negative psychosocial effect. The aim of this study was to assess the impact of COVID-19 crisis on short-term weight loss and the remission of obesity-associated comorbidities in patients undergoing sleeve gastrectomy (SG).

Methods A case-control study was conducted comparing percentage of total weight loss (%TWL), excess weight lost (%EWL), and the remission rate of obesity-related comorbidities at the first postoperative year between patients who underwent primary SG between June 2019 and October 2019 (1-year postoperative period affected by COVID-19 lockdown; COV-group), and a control group operated between June 2018 and October 2018 (1-year postoperative period not affected by COVID-19 lockdown; CONTROL-group).

Results In total, 45 patients from COV-group were compared to 57 patients from CONTROL-group. Demographic data were similar between groups. The follow-up rate at 1 year was 100%. The mean %TWL and %EWL was lower at $28.2 \pm 12.7\%$ and $67.6 \pm 23.5\%$ in COV-group patients compared to $34.3 \pm 14.1\%$ and $78.3 \pm 27.2\%$ in CONTROL-group patients at 1 year from SG ($p=0.025$ and $p=0.036$, respectively). The remission rate of obesity-related comorbidities at 1 year from SG including type 2 diabetes mellitus, hypertension, dyslipidemia, and obstructive sleep apnea syndrome was 57.1%, 60.0%, 71.4%, and 41.7% in COV-group and 66.7%, 72.4%, 85.3%, and 52.9% in CONTROL-group, respectively, without any statistically significant difference between groups.

Conclusions The COVID-19 lockdown had a negative effect on weight loss in the first year after SG. Larger studies are needed to confirm these results, and we are expecting for a longer follow-up to evaluate the long-term impact on weight loss and comorbidities.

Keywords Sleeve gastrectomy · COVID-19 · Obesity · Diabetes · Hypertension

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Introduction

Severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 represents the most significant pandemic in recent decades from which humans have suffered, causing thousands of deaths worldwide [1]. In Belgium, as in other many countries [2], the population was confined to their home from March to May 2020. The difficulty in practicing physical activity during this period, as well as the emergence or worsening of various psychological syndromes derived from such situation [3], leads us to believe that the short-term weight loss after bariatric surgery is not ideal. The first year after bariatric surgery is very important as the greatest weight loss can be achieved [4] with the motivational

implications that follow, in addition to the positive reinforcement that this phenomenon produces. Consequently, we suspect that the COVID-19 lockdown has also consequences on bariatric patient's outcomes. Furthermore, this health crisis is still not under control, and it is possible that new outbreaks in the near future will again force drastic measures of social isolation.

The points of the study were to quantify the weight loss and the remission rate of obesity-related comorbidities after sleeve gastrectomy (SG) obtained in patients whose first postoperative year included the period of COVID-19 lockdown, and to compare results with those of a control group whose first postoperative year was not included in the lockdown period caused by the recent pandemic.

Methods

The case-control study was conducted on patients undergoing primary SG in the Bariatric Surgery Unit of our hospital, divided into two groups according to the date of SG. The COV-group included patients who underwent SG between June 2019 and October 2019 and therefore affected by the COVID-19 lockdown during the first postoperative year. The CONTROL-group was composed of patients who underwent a SG between June 2018 and October 2018, with a 1-year postoperative period not affected by the COVID-19 lockdown. The study was approved by the ethical committee of our institution (number: 2020_454_TFE) and was performed in accordance with the Declaration of Helsinki.

Each patient was preoperatively screened and evaluated by a multidisciplinary bariatric team. Prior to making a final decision for surgery, every patient underwent a detailed and up-to-date discussion regarding the various available bariatric surgical options, their pros and cons, risks and benefits, and the potential postoperative complications, including the possibility of reoperations and the likelihood of requiring postoperative nutritional supplementation.

SG was performed by laparoscopy, systematically using a 40 French calibration tube. The left crus of the diaphragm were consistently visualized during the freeing of the greater curvature of the stomach. Gastric division was started at the gastric antrum at 5cm from the pylorus and was continued parallel to the calibrating boogie positioned along the lesser curvature of the stomach, until reaching the angle of His. Patients were followed closely during their first postoperative year, conducted by a multidisciplinary team including surgeons, endocrinologists, psychologists, and dieticians at 2 weeks, 1 month, 3 months, 6 months, and 12 months. A group exercise programs is organized from the 7th postoperative day with 60-min workouts (strength and aerobic) performed three times a week and supervised by exercise specialists; in addition, it is recommended that all patients walk at least 150 min

per week. During the total lockdown period between March and May 2020 in Belgium due to COVID-19 pandemic, operated patients were followed by telephone consultation as recommended by our institution, except when a physical examination was necessary in emergent situations; an immediate in-person visit was scheduled. Collective sports activity was prohibited as well as sports centers were closed, and only individual exercise such as walking was allowed during the lockdown period.

Data analyzed included patient's demographics, comorbidities, weight, and body mass index (BMI). The study endpoints were the percentage of total weight loss (%TWL) and the percentage of excess weight loss (%EWL) based on the weight measured in face-to-face consultation, the remission rate of type 2 diabetes (T2DM), hypertension (HTN), obstructive sleep apnea syndrome (OSA), and dyslipidemia. %TWL defined as $100 \times [\text{weight loss}/\text{the initial weight}]$, %EWL defined as $100 \times [\text{weight loss}/\text{baseline excess weight}]$, with the calculation of ideal body weight as that equivalent to a BMI of 25 kg/m^2 ; T2DM remission was defined as a fasting plasma glucose level below 126 mg/dL in the absence of hypoglycemic drugs; remission of HTN was taken as $\text{BP} < 120/80$ with no antihypertensive medications; and remission of dyslipidemia was also taken as a normal lipid panel off-medication. Finally, remission of OSA was detected by a subjective method based on the patient's discontinuance of continuous positive airway pressure therapy (CPAP) or sleeping better on lower CPAP settings.

Descriptive results regarding continuous variables were reported as the means \pm standard deviation (SD), and categorical variables were presented as frequencies or percentages. Differences were analyzed using the unpaired *t* test or a paired *t* test when appropriate. A *p* value of <0.05 indicated a statistically significant difference. The statistical analysis was done using SPSS version 12 for Windows.

Results

In total, 102 patients (29 males, 73 females) were included in the study, including 45 in the COV-group and 57 patients in the CONTROL-group. Groups were similar in terms of age and sex. The mean preoperative weight and BMI were $113.7 \pm 19.9 \text{ kg}$ and $42.9 \pm 5.9 \text{ kg/m}^2$ in COV-group, and $115.1 \pm 17.3 \text{ kg}$ and $43.5 \pm 5.1 \text{ kg/m}^2$ in CONTROL-group, respectively, without statistically significant difference between groups. The prevalence of type 2 diabetes mellitus (T2DM), hypertension (HTN), dyslipidemia, and obstructive sleep apnea syndrome (OSA) was 46.7%, 55.6%, 62.2%, and 26.6% in COV-group and 52.6%, 50.9%, 59.6%, and 29.8% in CONTROL-group, respectively, with no significant difference between the two groups (Table 1).

Table 1 Baseline patient's characteristics

	COV-group, n=45	CONTROL-group, n=57	<i>p</i>
Age, y (mean ± SD)	40.4 ± 10.1	42.1 ± 9.7	0.39
Female gender, n (%)	33 (73.3)	40 (70.1)	0.72
Preoperative weight, kg (mean ± SD)	113.7 ± 19.9	115.1 ± 17.3	0.70
Preoperative BMI, kg/m ² (mean ± SD)	42.9 ± 5.9	43.5 ± 5.1	0.58
T2DM, n (%)	21 (46.7)	30(52.6)	0.74
HTN, n (%)	25 (55.6)	29(50.9)	0.72
Dyslipidemia, n (%)	28 (62.2)	34(59.6)	0.68
OSA, n (%)	12(26.6)	17(29.8)	0.70

BMI body mass index, T2DM type 2 diabetes mellitus, HTN hypertension, OSA obstructive sleep apnea syndrome

Patients from the CONTROL-group were followed closely during their first postoperative year by face-to-face consultations of the multidisciplinary team, while the 45 patients in COV-group were followed during the total lockdown by telephone consultations. The follow-up rate at 1 year was 100%, but the average number of multidisciplinary patient consultations (face-to-face or by telephone) during the first year of follow-up was reduced by 36% in COV-group. Regarding the results of weight loss at 1 year after SG, we observed a significant lower %TWL and %EWL in COV-group compared to CONTROL-group patients (28.2 ± 12.7% versus 34.3 ± 14.1% TWL, *p* = 0.025) (67.6 ± 23.5% versus 78.3 ± 27.2% EWL, *p* = 0.036) at 1 year from SG (Table 2).

One year after SG, the remission rate of T2DM was 57.1% in COV-group and 66.7% in CONTROL-group (*p* = 0.48). HTN remission rate was 60.0% and 72.4% in COVID-group and CONTROL-group, respectively (*p* = 0.33). For dyslipidemia, the remission rate was 71.4% in COV-group and 85.3 in CONTROL-group (*p* = 0.18). Finally, the remission rate of OSA was 41.7% in COV-group and 52.9% in CONTROL-group (*p* = 0.55) (Table 3).

Discussion

Obesity and related comorbidities constitute a significant health problem worldwide because of their impact on quality of life, life expectancy, and healthcare finances [5]. Bariatric

Table 2 Percentages of total weight (%TWL) and excess weight lost (%EWL) at the first year after surgery between sleeve gastrectomy groups (COV-group vs. CONTROL-group)

	COV-group, n=45	CONTROL-group, n=57	<i>p</i>
%TWL (%)	28.2 ± 12.7	34.3 ± 14.1	0.025
%EWL (%)	67.6 ± 23.5	78.3 ± 27.2	0.036

%EWL percentage of excess weight loss, %TWL percentage of total weight loss

surgery is currently the most effective and long-lasting treatment for morbid obesity. Several studies support its cost-benefit by producing a significant reduction in weight, as well as the resolution or substantial improvement of various obesity-related comorbidities [4, 6]. However, it must be taken into account that weight loss is more evident during the first year after the intervention, which increases motivation and establishes healthy lifestyle habits in many patients. One of these pillars is physical activity [7], especially important in subjects who have received a restrictive technique such as SG [8].

COVID-19 lockdown had a negative impact on postoperative follow-up, face-to-face consultations being temporarily replaced by telephone consultations which do not offer the same safety in terms of diagnosis and drug prescription. Moreover, a recent study [9] has shown that BMI calculated from self-reported data was lower than for measured data. In addition, the present study found that the average number of multidisciplinary patient consultations (face-to-face or by telephone) was reduced by 36% in patients who were confined during the first postoperative year, compared to subjects whose first year after the bariatric intervention was not during the lockdown period. COVID-19 lockdown had also a negative impact on short-term weight results, with a reduction of %TWL and %EWL at 1 year after SG compared to patients without 1-year COVID lockdown. We believe that the diminution of all multidisciplinary patient consultations and the cancellation caused by the COVID-19 lockdown of face-to-face consultations as well as the limitation of sports activities had negatively affected the weight loss. Confinement in their home, to which the Belgian population has been subjected due to COVID-19, has decreased mobility and physical exercise of most individuals, producing stress and fear, in addition to addictions, a tendency to depression, and even suicide [10]. Pellegrini et al. [11] found that individuals with obesity significantly gained weight 1 month after the beginning of the quarantine during the COVID-19 pandemic in Northern Italy, and they demonstrated that lower exercise, self-reported boredom, solitude, anxiety, depression, enhanced eating,

Table 3 Remission of obesity-associated comorbidities between sleeve gastrectomy groups (COV-group vs. CONTROL-group) at 1-year follow-up

	COV-group, n=45	CONTROL-group, n=57	<i>p</i>
T2DM remission	12 out of 21 (57.1%)	20 out of 30 (66.7%)	0.48
HTN remission	15 out of 25 (60.0%)	21 out of 29 (72.4%)	0.33
Dyslipidemia remission	20 out of 28 (71.4%)	29 out of 34 (85.3%)	0.18
OSA remission	5 out of 12 (41.7%)	9 out of 17 (52.9%)	0.55

T2DM type 2 diabetes mellitus, HTN hypertension, OSA obstructive sleep apnea syndrome

consumption of snacks, unhealthy foods, cereals, and sweets were correlated with a significantly higher weight gain. Obesity-associated comorbidities remission has not been statistically impacted by COVID-19 lockdown in this study at 1 year after SG. The difference in weight loss between the two groups is probably not large enough to induce a significant difference in metabolic results at 1 year postoperatively, in addition to the fact that the number of patients with comorbidities is too small to have a statistical significance. Other studies are necessary to assess this impact in the short and long terms.

In this context, it would be worrying if bariatric surgery does not meet the expected results and sustainability, as its cost-effectiveness could be questioned. Several reports have demonstrated a high mortality rate in obese patients who contract COVID-19 [12–15]; this is most likely caused by the negative effect of obesity on the immune system, which makes obese patients more vulnerable to an infection like COVID-19 that specifically requires a rapid cellular immune response [16]. Hajifathalian et al. [17] reported that obesity was associated with increased risk of ICU admission or death. Bariatric surgery and the subsequently weight loss seem to significantly lower the risk of serious consequences due to COVID-19 infection. Uccelli et al. [18] reported that among more than 2000 patients who underwent bariatric surgery analyzed in their study, only 0.1% needed ICU admission, lower than described in the literature data. Therefore, bariatric surgery can be considered a protective factor with respect to the onset of severe respiratory disease resulting from SARS-CoV-2 infection and probably other respiratory diseases.

Various authors have denounced the injustice represented by the COVID-19 pandemic for patients suffering from morbid obesity regarding the cancellation or postponement of their bariatric surgery, which makes them more vulnerable to gain more weight and worsen their comorbidities [19]. Others have described prioritization protocols for both bariatric and metabolic surgery [20]. Even so, it is difficult to predict the evolution of the pandemic and if exceptional situations of confinement and social isolation will prevail again. Bariatric surgery is the best treatment for thousands of people who have a serious illness, so its continuity can be claimed from the competent authorities [12]. However, despite the paucity of data on the safety of bariatric surgery performed during the COVID-19 pandemic, a recent international cohort study [21] showed that 30-day morbidity and mortality following

bariatric surgery during the COVID-19 pandemic with locally appropriate perioperative COVID-19 protocols in place seemed to be similar to pre-pandemic levels. But, with the evolving pandemic situation, we must ensure that the results will continue to meet the established standards. Given the unpredictable evolution of the global infection by COVID-19, the nutritional and, above all, psychological support of the patients treated or on the surgical waiting list should be emphasized, as well as multidisciplinary meeting to establish priorities until the normalization of the health situation. Finally, it is necessary to conduct larger studies, and evaluate long-term outcome to determine the real influence of this COVID-19 lockdown and potential future ones on the outcome of bariatric surgery.

Conclusion

The COVID-19 lockdown of the Belgian population during the months of March, April, and May 2020 had a negative effect on weight loss of patients operated from SG who were confined during the first postoperative year, compared to subjects whose first year after the bariatric intervention was not during the lockdown period. Long-term follow-up would be interesting to evaluate the long-term impact on weight loss and comorbidities.

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