



Effects of COVID-19 lockdown on a bariatric surgery waiting list cohort and its influence in surgical risk perception

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Received: 27 July 2020 / Accepted: 17 November 2020 / Published online: 26 November 2020

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Abstract

Purpose The COVID-19 outbreak has forced a 2-month lockdown (LD) in Spain. We aimed to assess how that had affected our cohort of bariatric patients waiting for surgery.

Methods A review of electronic records and a structured phone interview with each patient were conducted. Changes in severity of obesity were analyzed using the Obesity Surgery Score (OSS) and changes in health-related quality of life (HRQoL) using the validated EQ-5D questionnaire. Other miscellaneous questions about behavior modifications and surgical risk perception were also analyzed.

Results All 51 patients fully answered the questionnaires. Mean age was 47 years and mean time on waiting list 91 days. Mean BMI increased during LD (42.7 vs 43.2; $p < 0.001$). Both OSS (2.84 vs 3; $p = 0.011$) and EQ-5D (69 vs 64; $p < 0.001$) mildly worsened during LD, mainly due to psychosocial issues. Twenty-seven patients (53%) thought that perioperative risks were higher under the current circumstances but they were as willing to undergo surgery as those who believed that the risks had not increased (74% vs 87%, $p = 0.2$).

Conclusions COVID-19 LD had a significant but mild effect on our cohort of bariatric surgery waiting list patients. Although perioperative risk perception had increased, patients were still willing to undergo their planned surgeries.

Keywords Obesity · Bariatric surgery · COVID-19 · HRQoL · Waiting list

Introduction

The COVID-19 outbreak continues to severely stress healthcare systems around the world, and the future implications of this pandemic, including medical activities, remain unclear for the moment. So far, it has prompted extraordinary

social measures. In Spain, a lockdown (LD) was enforced for two months, and, during that time, only those with essential occupations were allowed to leave home. Moreover, as in many other countries, health centers were reorganized, and most activities, including all non-urgent surgeries, were delayed [1, 2].

Bariatric surgery was not an exception, and, in accordance with the recommendation of the International Federation for the Surgery of Obesity [3], our institution's bariatric program was halted [4]. Nevertheless, deferring the treatment of obese patients, specially under LD conditions, may have had undesirable consequences. Lifestyle adjustments, mobility restrictions, and insecurity about the future could have caused an increase of body weight and the worsening of associated comorbidities, as well as a lowering of health-related quality of life (HRQoL) [5–9].

Later on, as the COVID-19 pandemic passed its first peak, guides for a safely reintroduction of bariatric surgery were being issued [10, 11]. It was admitted that the threads of

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exposing vulnerable patients to infection were hard to balance with the consequences of leaving obesity unattended [11]. To date, a lot of questions regarding the impact of COVID-19 social measures in patients with obesity remain unanswered. Moreover, we believe that it is important to introduce the opinion of our patients to this conversation, as they are the ones effectively taking the risks [12–15].

Thus, the aim of this study was twofold: on the one hand, to analyze the effects of COVID-19 LD on our cohort of bariatric surgery waiting list patients in terms of obesity severity and HRQoL, and on the other, to assess their surgical risk perception and willingness to receive their planned surgery under the current uncertain situation.

Patients and methods

A descriptive cohort study was performed including all patients enrolled in the bariatric surgery waiting list of our institution, a tertiary referral center, before the LD was declared in Spain on March 14, 2020. These patients had already completed the preoperative study and had been reviewed and approved for surgery by a multidisciplinary board. Patients waiting for a revisional surgery were also included. This study was approved by the Ethics Committee of our institution (dossier number 359/2020).

The effect of LD on the severity of obesity was evaluated through changes in the Obesity Surgery Score (OSS) [16]. OSS is an index composed by three items (weight, obesity-related comorbidities, and socio-labor impact of obesity), each stratified according to severity that produces a final score that ranges from 0 (best) to 8 (worst) points, summarized in three grades (A, 0–2 points; B, 3–5; C, 6–8) (Table 1). HRQoL before and after LD was analyzed with the Spanish validated version of the EQ-5D questionnaire, a health status measure tool developed by the international research group EuroQol [17, 18]. EQ-5D assesses 5 different dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with a very simple 3-point scale (from 1, best, to 3, worst) and also summarizes the general health status with a self-rated index (from 0, worst, to 100, best) (Table 2).

All data used in this study was obtained during May 5 and 10, 2020, when a progressive lifting of LD had been already announced but still not implemented. For each patient, both our institution's electronic clinical record and the national centralized electronic database, which contains primary care and other medical institutions' reports, as well as a log of current and passed drug prescriptions, were reviewed. Afterwards, all patients were contacted by phone by three of the authors (RV, CP, and AC) and asked to answer to a structured questionnaire of 40 short items. It included retrospective "before LD" OSS and EQ-5D evaluations, current "after LD" OSS and EQ-5D evaluations, and a number of miscellaneous

questions about behavioral changes during LD, along with surgical risk perception and prioritization preferences. In case of disparity between the previously collected clinical data and the answers of the patients (e.g., medication still present in electronic records that the patient had stopped long before), the item was further discussed until a clarification was reached. Data was shared and analyzed by all authors through e-mail and structured video meetings.

For quantitative data, normality was explored with the Shapiro-Wilk test. Normal quantitative data was analyzed with the Student's *t* test for paired data. Otherwise, the non-parametric Chi-square test and Wilcoxon signed-rank test for paired data were used. All statistical tests were two-sided, and a *p* value < 0.05 was considered significant. Statistical analysis was performed with SPSS v20 (SPSS Inc., Chicago, IL, USA) and figures designed with Datagraph v4.5.1 (Visual Data Tools Inc., North Carolina, USA).

Results

There were 51 patients in the bariatric surgery waiting list of our institution before LD was enforced, 31 (61%) expecting a primary surgery and 20 (39%) a revisional surgery, mainly due to insufficient weight loss or reflux. The mean age was 47 (\pm 10) years, and there were 33 (65%) females. The mean time on the waiting list was 91 (\pm 30) days. All patients fully answered the structured questionnaire, requiring around 8–10 min per patient, and all of them were satisfied with the call. None had been hospitalized during LD nor diagnosed with COVID-19.

There was a mild but statistically significant increase in body mass index (BMI) during LD (42.7 vs 43.2 Kg/m²; *p* < 0.001), in line with a strong decline of patients following any weight-loss program (45% vs 20%; *p* < 0.001) (Table 3). Besides, 25 patients (49%) referred having changed their diet, 21 (41%) having had more frequent sleep disorders, and 15 (29%) a lower than usual self-esteem (Fig. 1).

Regarding changes in OSS before and after LD, only the socio-labor aspect seemed to have worsened significantly (0.30 vs 0.42; *p* = 0.014). However, a slight but significant increase in the total score was observed (2.84 vs 3; *p* = 0.011), which corresponded with 4 patients (8%) escalating from grade A to grade B (Fig. 2). HRQoL questionnaire EQ-5D also showed a higher level of anxiety after LD (1.2 vs 1.5; *p* = 0.001) and a decreased self-rated health index (69 vs 64, *p* < 0.001) (Fig. 3).

A majority of patients (84%) were worried about a possible delay on their planned surgery (Fig. 1). Perioperative risks were believed to be higher than before the COVID-19 outbreak by 27 patients (53%). However, these subjects were similarly willing to undergo their surgery than those who believed that the risks had not increased (74% vs 87%, *p* = 0.2)

Table 1 Obesity Surgery Score (OSS)

Item	Description	Score
BMI (Kg/m ²)	< 40	0
	40–49.9	1
	50–59.9	2
	≥ 60	3
Obesity-related comorbidities	None	0
	Mild (subclinical metabolic changes)	1
	- Carbohydrate intolerance	
	- Hypertension grade I (140-159/90-99)	
	- Dyslipidemia	
	- Non-erosive symptomatic gastroesophageal reflux	
	Moderate (established chronic disease)	2
	- Non-insulin dependent diabetes with HbA1c < 8%	
	- Hypertension ≥ grade II	
	- Metabolic syndrome	
- Obstructive sleep apnea syndrome (with CPAP/BiPAP)		
- Dyspnea on small exertion		
- Severe osteoarthropathy (non-disabling)		
- Symptomatic cholelithiasis		
- Infertility/erectile dysfunction		
- Erosive gastroesophageal reflux (grades A–B Los Angeles classification)		
Severe (severe-limiting pathology or organic damage)	3	
- Insulin-dependent diabetes, HbA1c > 8% or metadiabetic complications		
- Refractory hypertension (need for ≥ 3 drugs)		
- Dyspnea at rest		
- Heart failure		
- Ischemic heart disease		
- Atrial fibrillation		
- Stroke		
- Deep venous thrombosis / pulmonary thromboembolism		
- Disabling osteoarthropathy		
- Erosive gastroesophageal reflux (grades C–D Los Angeles classification)		
- Barrett's esophagus		
Socio-labor impact	Mild (situation close to normal, including slightly low self-esteem, or slightly decreased functional capacity due to obesity)	0
	Moderate (minor psychopathological symptoms as depressive disorder without medical treatment, poor social relations, or moderate limitation of normal daily life activities due to obesity)	1
	Severe (major psychopathological symptoms as depressive disorder requiring medication, social isolation, severe relational problems, dependence for most daily life activities, loss of employment, or sick leave because of obesity)	2

The final OSS, ranging from 0 to 8, is obtained by adding the scores of the three independent items. It may be further simplified in 3 grades: A (0–2), B (3–5), and C (6–8). *BMI* body mass index, *CPAP/BiPAP* continuous positive airway pressure devices

(Fig. 4). Overall, they thought that severity should be the main prioritization criterion.

Discussion

This descriptive study aimed to explore the effects of COVID-19 LD on the cohort of patients waiting for a bariatric surgery in our institution. To that end, exhaustive reviews of electronic clinical records and structured phone interviews were conducted. We found an increase in BMI and a decline in weight-loss program compliance during LD. Moreover, both OSS and EQ-5D scores worsened during LD, although changes seemed to be more related

with social and psychological issues rather than organic deterioration. Around half of our patients believed that perioperative risks had increased in the aftermath of COVID-19 LD, but their willingness to undergo their planned surgery was still very high and not significantly different than among those who believed that the risk remained equal than before COVID-19.

Obesity is a chronic illness with progressive deleterious effects on many fronts, so, in order to grasp the severity of its impact on a particular patient, it is important to take into account the level of organic damage induced by the associated comorbidities and also its social repercussions. A number of systems have been proposed to integrate all these aspects, being the Edmonton Obesity Staging

Table 2 Quality of life EQ-5D questionnaire

Item	Score
1. Mobility	
- I have no problems in walking about	1
- I have some problems in walking about	2
- I am confined to bed	3
2. Self-Care	
- I have no problems with self-care	1
- I have some problems washing or dressing myself	2
- I am unable to wash or dress myself	3
3. Usual activities	
- I have no problems with performing my usual activities	1
- I have some problems with performing my usual activities	2
- I am unable to perform my usual activities	3
4. Pain/discomfort	
- I have no pain or discomfort	1
- I have moderate pain or discomfort	2
- I have extreme pain or discomfort	3
5. Anxiety/depression	
- I am not anxious or depressed	1
- I am moderately anxious or depressed	2
- I am extremely anxious or depressed	3

System (EOSS) [19–23] and the King's Obesity Staging Criteria (KOSC) [24, 25] the most commonly used. For this study, however, OSS [16] was preferred. It provides an objective and simple categorizing frame, and, unlike

EOSS, weight, comorbidities, and psychopathological consequences of obesity are independently assessed. Moreover, these three items generate a single numeric score and a graded scale, which makes comparisons easier than with KOSC.

Although BMI significantly increased during LD, changes seemed to be too small to reflect on OSS. No relevant worsening of comorbidities was found either. This is likely due to a relatively short lapse of time for chronic diseases like hypertension or diabetes to aggravate, but the fact that patients have had a limited access to medical consultations, and therefore to reevaluation, may also be involved. OSS socio-labor status, however, did show a deterioration during LD. Moreover, the validated HRQoL questionnaire EQ-5D also showed a selective increase in the anxiety/depression item. These results are in accordance with the other two published studies about the impact of COVID-19 pandemic on bariatric patients [26, 27]. Two weeks after the stay-at-home order was issued in Texas (USA), Almandoz et al. [26] asked a local cohort of operated and non-operated obese patients about lifestyle and socio-labor topics, reporting that around three quarters of them had anxiety or depression issues. Likewise, Wałędziak et al. [27] conducted a similar inquiry on a Polish population, finding the same results.

The mean waiting time of 3 months may not seem much for half of our cohort to be worried about a delay on their surgery. However, it does not include the previous endocrinological evaluation and subsequent preoperative study. Unfortunately, the whole process can take a few years in our public institution. Given that waiting for

Table 3 Changes in obesity-related items and quality of life during COVID-19 LD

	Before LD (n = 51)	After LD (n = 51)	p Value
BMI (Kg/m ²)	42.7 (± 10)	43.2 (± 11)	< 0.001*
Following any weight-loss program	23 (45%)	10 (20%)	< 0.001*
Number of drugs used	6.1 (± 4)	6.1 (± 4)	1
OSS			
- BMI	0.86 (± 0.9)	0.88 (± 0.9)	0.6
- Obesity-related comorbidities	1.68 (± 1.1)	1.70 (± 1.1)	0.3
- Obesity-related socio-labor impact	0.30 (± 0.5)	0.42 (± 0.6)	0.014*
- Total score	2.84 (± 1.7)	3.00 (± 1.8)	0.011*
EQ-5D			
- Mobility	1.29 (± 0.5)	1.31 (± 0.5)	0.6
- Self-care	1.2 (± 0.4)	1.2 (± 0.4)	1
- Usual activities	1.2 (± 0.4)	1.2 (± 0.4)	1
- Pain/discomfort	1.5 (± 0.6)	1.4 (± 0.6)	0.2
- Anxiety/depression	1.2 (± 0.5)	1.5 (± 0.7)	0.001*
- Self-rated health index	69 (± 1.8)	64 (± 1.8)	< 0.001*

Data is shown as mean (± standard deviation) or n (percentage)

LD lockdown, BMI body mass index, OSS Obesity Surgery Score, EQ-5D EuroQol group quality of life validated questionnaire. *Statistically significant differences

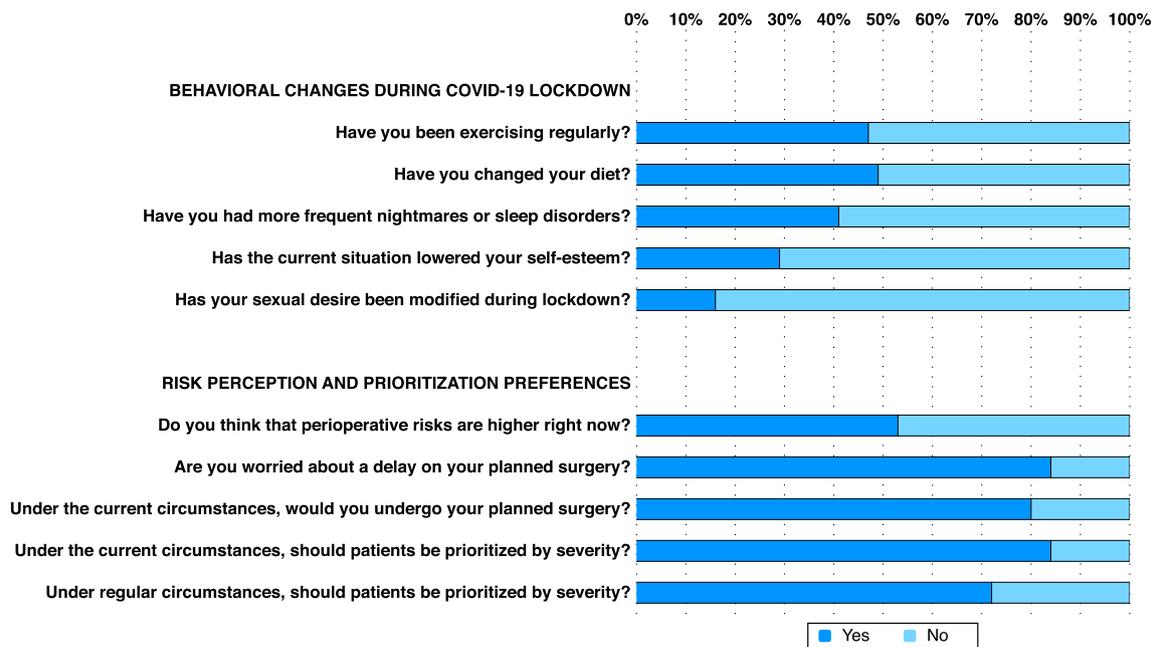


Fig. 1 Answers to miscellaneous questions about behavioral changes, surgical risk perception, and prioritization preferences by our bariatric surgery waiting list cohort ($n = 51$)

a bariatric surgery is associated with a decreased HRQoL and an increased metabolic risk, including death [5–7, 28], it is understandable that even believing that perioperative risks had increased under the current circumstances, the vast majority of patients were still willing to

undergo immediate surgery. This point should be noticed by health administrators when planning the reintroduction of regular activities, in order not to overlook old known pandemics for the sake of the new. Furthermore, involving the patients’ opinions in decision-making processes not only has a positive effect on patient-physician communication but also has been reported to improve clinical outcomes [12, 13]. In this regard, telemedicine is a very exciting tool. Maybe to date, no definitive advantage over conventional outpatient consultation has been found in the management of bariatric patients [29–31], but COVID-19 has shown us that we must be ready to rethink “conventional” and adopt and develop new ways to keep in touch with our patients.

This work has several limitations worth mentioning. First of all, our results are based on a mixed cohort of patients waiting for primary and revisional surgeries, which may have different baseline situations and expectations about the forthcoming surgery. Secondly, the baseline OSS and EQ-5D outcomes were obtained retrospectively, as these scores were not routinely recorded. Besides, they were partially based on self-reported data. Finally, the lack of a control group makes it difficult to ascertain if the reported effects of COVID-19 LD are specific to the bariatric patients or, instead, equal to that experienced by the general population. Nevertheless, we believe that the results of this study offer some interesting insights and contribute to a more meaningful conversation about how to manage bariatric surgery programs under the influence of COVID-19.

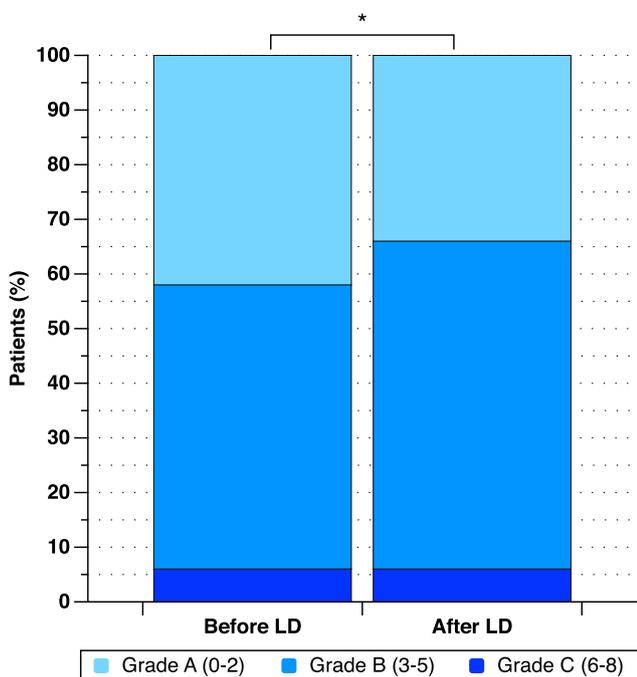
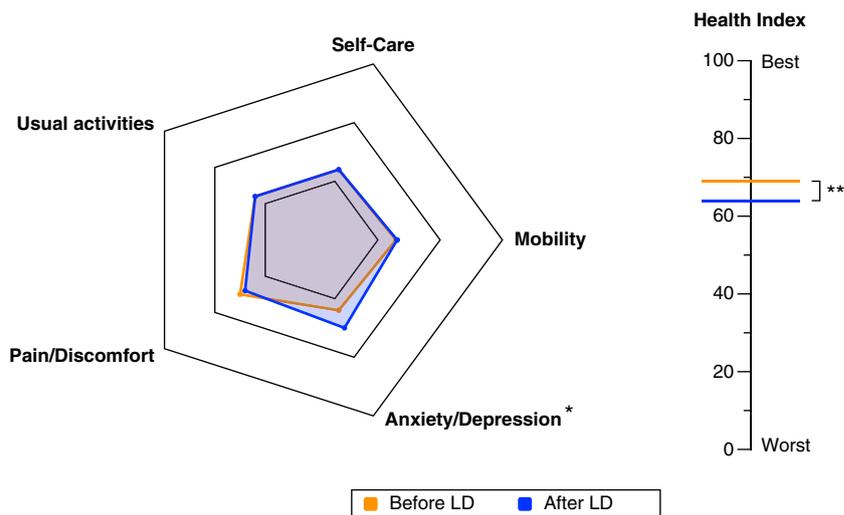


Fig. 2 Changes in Obesity Surgery Score grade on our bariatric surgery waiting list cohort ($n = 51$) before and after COVID-19 lockdown (LD). $*p = 0.046$

Fig. 3 Changes in quality of life (EQ-5D) on our bariatric surgery waiting list cohort ($n = 51$) before and after COVID-19 lockdown (LD). * $p = 0.001$, ** $p < 0.001$.



Conclusions

In summary, COVID-19 LD had a significant but mild effect on our cohort of bariatric surgery waiting list patients. Both OSS severity index and EQ-5D quality of life outcomes were slightly worse after LD, mainly due to socio-labor and anxiety-related problems. Although perioperative risk perception had increased,

patients were still willing to undergo their planned surgeries.

Authors' contributions Study conception and design: RV, AA, JC, CF, CP, and MB
 Acquisition of data: RV, CP, and AC
 Analysis and interpretation of data: All authors
 Drafting of manuscript: MB, RV, and AA
 Critical revision of manuscript: All authors

Data availability All used data is available at our institution.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interests.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This retrospective study was approved by the Ethics Committee of our Institution (dossier number 359/2020).

Consent to Participate and Consent for Publication At inclusion in the waiting list, all patients gave their consent for the anonymized use of their medical data.

Code availability Not applicable.

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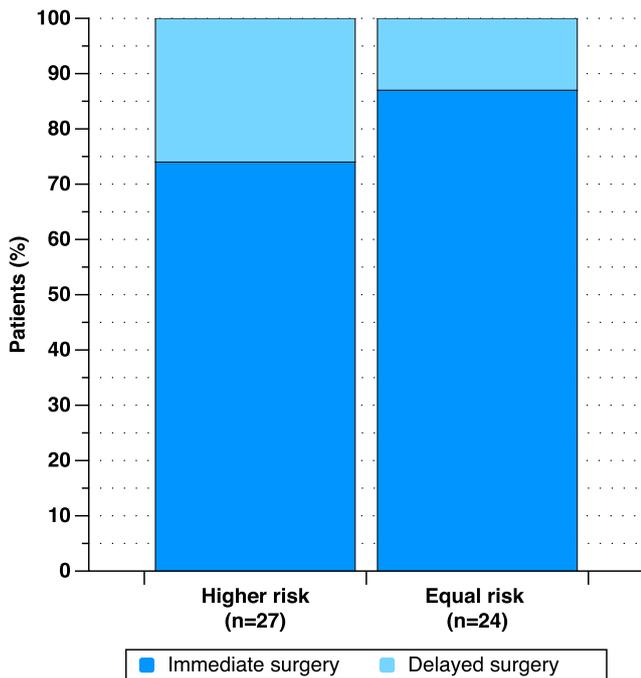


Fig. 4 Willingness to undergo immediate surgery according to the group of perceived perioperative risk after COVID-19 outbreak ($p = 0.2$)

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