

## Evaluation of outcomes in bariatric surgery and body contour surgery using the BODY-Q<sup>©</sup> questionnaire

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### Abstract

**Objectives:** To evaluate outcomes obtained in a series of patients who underwent bariatric surgery (BS) and body contouring surgery (BCS), using the BODY-Q<sup>©</sup>, Psychosocial Distress questionnaire related to appearance questionnaire. **Methodology:** This retrospective study analyzed patients treated with BS and BCS at Vall d'Hebron Hospital between 2010 and 2018. The BODY-Q<sup>©</sup>, Psychosocial distress related to appearance questionnaire was administered. Scores were collected at three points: baseline, post-BS, and post-BCS. **Results:** A total of 24 patients were included for study, with women representing 79.2%. The initial and final body mass index (BMI) values were 42.2(35.2-66.1) Kg/m<sup>2</sup> and 28.7(19.7-36.8) Kg/m<sup>2</sup>, respectively. Questionnaire scores were 84,4(56,3-93,8) at baseline, 62,5(28,1-84,4) post-BS

and 42,2(25-81,3) post-BCS. The differences between stages were statistically significant. **Conclusion:** Patients undergoing BS exhibit meaningful and sustained improvements in body image, resulting in reduced emotional distress and improved quality of life, as measured by the BODY-Q<sup>©</sup> questionnaire. BCS following BS further enhances body image and should be considered in patients with obesity after significant weight loss.

### Keywords:

- Abdominoplasty
- BODY-Q<sup>©</sup>
- Bariatric surgery
- Weight loss
- Psychosocial distress related to appearance

### Introduction

Obesity and its associated comorbidities represent one of the major health challenges facing our healthcare system. Its prevalence is increasing rapidly: according to data from the World Health Organization, the global prevalence of obesity has doubled between 1980 and 2014 <sup>(1)</sup>. Bariatric surgery (BS) is currently the most effective therapeutic option for treating obesity, with sustained medium- and long-term results in terms of both weight loss and improvement or remission of comorbidities <sup>(2-4)</sup>. It is therefore considered an

effective and safe treatment, with a complication rate below 3% and a mortality rate close to 0.2–0.3% <sup>(2)</sup>.

One of the consequences of BS is the presence of excess skin, directly related to the significant reduction in body weight. This, in turn, leads to functional, dermatological, and aesthetic issues that may limit mobility and personal hygiene, as well as negatively impact the patient's mental health (e.g., dissatisfaction with body image). Ultimately, these post-BS changes affect quality of life <sup>(5)</sup>.

Body image dissatisfaction can negatively impact multiple

areas, including sexual life, self-esteem, social isolation, and even work performance, social relationships, and recreational activities <sup>(6)</sup>.

Body contouring surgery (BCS) encompasses a set of surgical techniques aimed at removing excess skin. Its outcomes lead to improvements in daily activities, personal hygiene, and, ultimately, a significant enhancement in self-esteem and body image perception <sup>(7)</sup>.

The BODY-Q<sup>®</sup> is a next-generation Patient-Reported Outcome Measure (PROM) designed to assess outcomes as perceived by patients with obesity who have lost weight through diet, exercise, and/or BS.

The aim of this study is to conduct an exploratory pilot study to analyse the outcomes in a series of patients who underwent BS and BCS, using the BODY-Q<sup>®</sup> questionnaire, specifically the Psychosocial Distress related to Appearance scale.

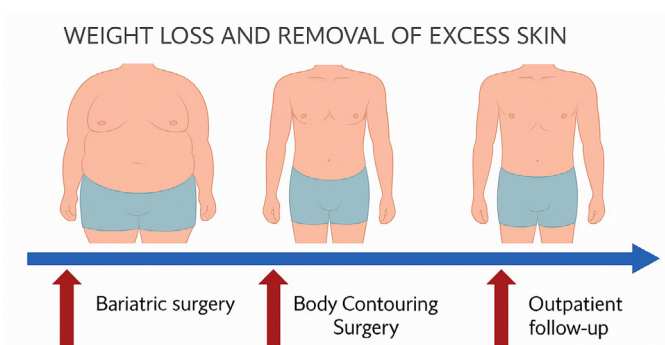
## Materials and methods

A retrospective study was conducted on a cohort of patients who underwent bariatric surgery (BS) and body contouring surgery (BCS) at a tertiary university hospital between 2010 and 2018. Included patients had undergone BS with adequate weight loss, followed by BCS (abdominoplasty) performed at least one year prior to inclusion in the study.

Patient selection criteria were based on adults who had undergone BS, achieved a weight loss of more than 50% of excess weight, and had a body mass index (BMI)  $\leq 40$  kg/m<sup>2</sup>. This subgroup was offered an evaluation for BCS by the plastic surgery team, and all those who agreed to participate were consecutively included from the outpatient clinic.

Adequate weight loss was defined as that which met the surgical indication criteria established by the plastic surgery team, based on individualized clinical and functional parameters for each patient. These criteria included BMI, weight stability, functional discomfort, and personal motivation. Patients who had undergone multiple BCS procedures were excluded from the study.

The study was approved by the hospital's Ethics Committee. Patients were randomly scheduled for follow-up during June and July 2020, and the BODY-Q<sup>®</sup> questionnaire, *Psychosocial Distress Related to Appearance*, was administered at three time points: pre-BS, pre-BCS, and post-BCS (**Fig. 1**).



**Fig. 1:** BODY-Q-Appearance-related Psychosocial Distress assessed at each of the three follow-up points

Subsequently, an analysis was conducted on patient characteristics in relation to weight loss, as well as the results obtained from the BODY-Q<sup>®</sup> scale at each study time point (**Table 1**).

**Table 1:** BODY-Q Questionnaire – Appearance-Related Psychosocial Distress

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
1. I feel unhappy with my appearance	1	2	3	4
2. I get stressed when I think about my appearance	1	2	3	4
3. I feel sad about my appearance	1	2	3	4
4. I feel anxious when people look at me	1	2	3	4
5. I worry about not looking normal	1	2	3	4
6. I worry about looking ugly	1	2	3	4
7. Intento evitar estar rodeado/a de gente	1	2	3	4
8. I have little interest in doing things	1	2	3	4

The BODY-Q® questionnaire was developed according to the principles of Rasch Measurement Theory (RMT), a modern psychometric approach that enables the construction of unidimensional scales with high validity and sensitivity to clinical change (without generating a total score). This approach allows for precise evaluation of clinical evolution in specific aspects.

The BODY-Q® consists of a set of independent scales covering three domains: appearance, health-related quality of life, and experience of care. The *Psychosocial Distress Related to Appearance* scale belongs to the health-related quality of life domain. It assesses the emotional and social impact derived from body image perception, including aspects such as feelings of shame or discomfort with one's body, avoidance of social or intimate situations, anxiety related to physical appearance, and social isolation.

This scale comprises 8 items with 4-point Likert-type response options. Responses are transformed into a continuous score ranging from 0 to 100, where 0 indicates the highest level of psychosocial distress and 100 the lowest, reflecting better emotional adjustment and body image perception.

Due to its modular structure, the BODY-Q® allows for the selection of only the scales relevant to the study objectives, without requiring administration of the full questionnaire. This makes it an effective tool for evaluating outcomes following significant weight loss and BCS procedures<sup>(7-11)</sup>.

### Statistical Analysis

The following variables were collected: age, weight, BMI (kg/m<sup>2</sup>), weight loss, sex, and BODY-Q® scale scores at the initial, pre-BCS, and final phases. Body image perception was assessed using the BODY-Q® questionnaire, specifically the body image domain. Responses were recorded on a 4-point Likert scale (1-4) and summed to obtain a raw score (range 8-32). These scores were then converted to a 0-100 scale using a Rasch model-based transformation, following the official conversion tables of the questionnaire. This methodology allows for a more accurate and comparable interpretation of results across patients and time points<sup>(12)</sup>. The analysis included Chi-square tests to examine differences in categorical variables, and Student's t-tests or equivalent non-parametric tests, depending on the normality of data distribution. For the checklist of obesity-specific symptoms, score differences were calculated across the three study

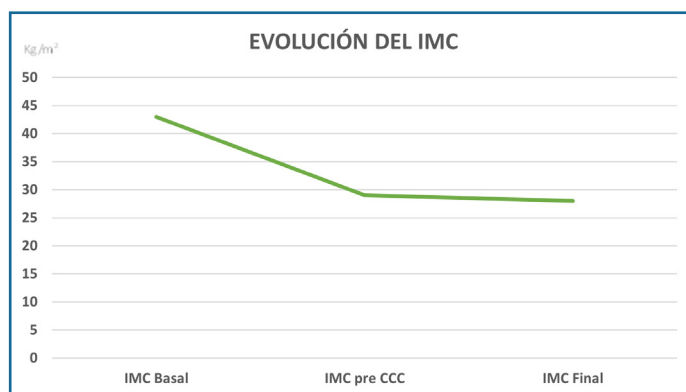
time points (time 1, time 2, and time 3). Clinical change was assessed using paired tests or their non-parametric equivalents in cases of non-normal distribution.

Data were analysed using SPSS software, version 23 (IBM SPSS Statistics, Version 23, IBM Corp). A p-value < 0.05 was considered statistically significant.

For the development of this study, an academic use license was obtained via the following link: <https://fhspeds.mcmaster.ca/pedsCapOne/surveys/?s=NRKX3HPT9J.> The study was approved by the research committee of our institution.

## Results

A total of 24 patients were included in the study, of whom 79.2% were women (5 men and 19 women). The median age was 43.4 years (range: 26-61), and the median weight prior to BCS was 76.1 kg (range: 55-97). The initial and final BMI after BCS were 42.2 kg/m<sup>2</sup> (range: 35.2-66.1) and 28.7 kg/m<sup>2</sup> (range: 19.7-36.8), respectively (**Fig. 2**).



**Fig.2:** Gráfica donde se muestra la evolución del índice de masa corporal (IMC) antes de la cirugía bariátrica (IMC Basal), antes de la cirugía del contorno corporal (IMC pre CCC) y por último durante el seguimiento (IMC Final)

The time interval between BS and BCS was 44.9 months (range: 13.4-78.6), and between BCS and the last follow-up was 45.7 months (range: 12.9-91.1). The total follow-up period was 93.3 months (range: 73-160). The pre-BCS BMI was 29.1 kg/m<sup>2</sup> (range: 21.5-37), and remained stable during follow-up, with a post-BCS BMI of 28.7 kg/m<sup>2</sup> (range: 19.7-36.8) (**Table 2**).

**Table 2.** Evolution of weight loss during follow-up.

	Basal	Pre-CCC	Post-CCC	p-valor
IMC (Kg/m <sup>2</sup> )	42,2 (35,2-66,1)	29,2 (21,5-37)	28,7 (19,7-36,8)	<0,001*
PSP (%)	-	77,1 (47-129,5)	81,6 (42,7-143,9)	0,212
PPT (%)	-	32 (18,4-52,1)	33,5 (18,4-50,9)	0,212

BSC: Body Contouring Surgery; BMI: body mass index;

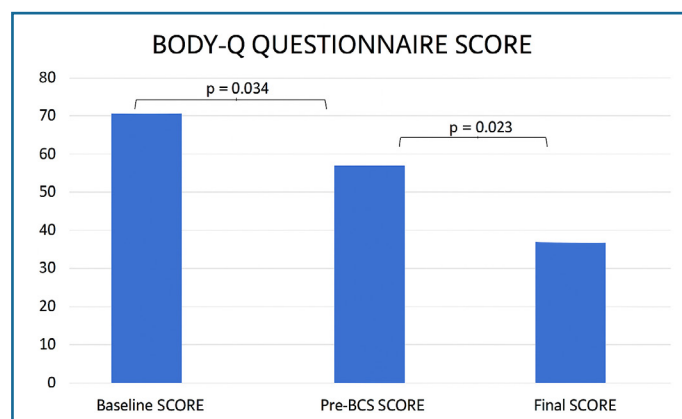
EWL: excess weight loss; TWL: total weight loss. \*p-value applies to both Baseline vs. Pre-BSC and Baseline vs. Post-BSC.

The median scores obtained from the BODY-Q® questionnaire were 84.4 (range: 56.3–93.8), 62.5 (range: 28.1–84.4), and 42.2 (range: 25–81.3) out of 100 at baseline (baseline SCORE), pre-BCS (pre-BCS SCORE), and at follow-up (final SCORE), respectively (**Table 3**). The differences between scores were statistically significant (**Fig. 3**).

**Table 3: BODY-Q® Rasch Scores**

Patient	Preoperative	18 months	Post-bariatric surgery
1	87,5	62,5	34,4
2	81,3	81,3	65,6
3	87,5	53,1	37,5
4	75	71,9	56,3
5	68,8	50	40,6
6	84,4	56,3	43,8
7	87,5	71,9	78,1
8	81,3	43,8	25
9	59,4	46,9	28,1
10	84,4	71,9	62,5
11	56,3	28,1	25
12	68,8	84,4	28,1
13	84,4	53,1	57,8
14	87,5	78,1	50
15	71,9	62,5	50
16	90,6	68,8	37,5
17	90,6	65,6	37,5
18	90,6	59,4	31,3
19	78,1	62,5	43,8
20	78,1	68,8	37,5
21	93,8	43,8	71,9
22	84,4	78,1	81,3
23	87,5	68,8	71,9
24	90,6	43,8	28,1
Median	84,4	62,5	42,2
Range	56,3-93,8	28,1-84,4	25-81,3

Scores correspond to the Rasch-transformed scale (0–100) of the BODY-Q® questionnaire. Individual patient values, as well as the median and range (minimum–maximum), are presented for each study time point



**Fig. 3:** En esta gráfica se muestra los resultados relativos a la puntuación del BODY-Q en función del momento de su aplicación (SCORE basal, SCORE Pre-CCC y SCORE Final)

## Discussion

The effectiveness of bariatric surgery (BS) in the treatment of obesity is well documented in the scientific literature (13–17). BS leads to significant weight loss and contributes to the prevention, improvement, or resolution of most obesity-related diseases (18). However, the benefits of BS and BCS, particularly in aspects such as self-image, anxiety, and quality of life, are not yet fully established.

The difficulty in measuring these aspects, along with the variability in body image outcomes related to weight loss, complicates their description, analysis, and management. This complexity is further exacerbated by the lack of standardized tools to assess emotional, psychological, and body self-perception status, which hinders reproducibility and comparison across studies.

The BODY-Q® questionnaire aims to standardize the evaluation of various aspects related to BCS. However, only three validated Spanish versions are currently available, one of which was used in this study to assess BCS outcomes following BS. Our institutional data suggest that BS followed by BCS improves body image and reduces psychosocial distress related to appearance.

The initial decrease in BODY-Q® scores after BS may be explained by improvements in body contour. However, due to the limited availability of BCS in the public healthcare system, the long intervals between procedures may lead to phenomena such as weight regain, associated with anxiety about body image.

BCS significantly reduces excess skin, thereby improving body self-perception. In our study, a statistically significant decrease in BODY-Q® scores was observed between the pre-BCS period and final follow-up compared to baseline, indicating that both excess weight and excess skin are relevant factors in the emotional distress related to body image in patients with obesity.

These findings highlight the importance of body contour perception in the course of BS and its role in optimizing post-BS surgical outcomes. Patients with severe obesity tend to have a more negative self-perception of their body image compared to the general population<sup>(19)</sup>. Although some post-BS patients maintain a BMI above the normal range, several studies have shown that BS can improve body image to levels comparable to those of individuals without a history of obesity<sup>(20–22)</sup>.

Despite the limited sample size and follow-up period, statistically significant differences were observed in the scores obtained before and after BS and BCS. Our data support the notion that BS has a positive impact on patients' anxiety levels related to body image following massive weight loss. Improvements in body perception and quality of life are long-lasting, as evidenced by the final BODY-Q® score of 42.2 (range: 25–81.3), nearly four years after BCS.

Furthermore, patients who undergo BCS after substantial weight loss show additional improvements in body image. Our results suggest that the combination of BS and BCS yields optimal functional and aesthetic outcomes, superior to those achieved with BS alone.

These findings may help patients make informed decisions regarding the advisability of undergoing BCS after weight loss. They also provide evidence for healthcare professionals and public and private institutions regarding the value of BS and BCS in the comprehensive treatment of obesity.

It is reasonable to assume that patients with higher initial BMI, greater weight loss, and predominantly abdominal fat distribution may experience a greater difference in BODY-Q® scores between BCS and final follow-up, due to the larger amount of excess skin. To confirm this hypothesis, it would be necessary to include more patients and classify them according to fat distribution.

One limitation of this study is that, although the BODY-Q® is available in several languages, there is no specific Spanish version for abdominoplasty. Therefore, the *Psychosocial Distress Related to Appearance* scale of the BODY-Q® was

used. Finally, it would be of interest to analyse the impact of the waiting time for BCS on body perception and emotional state, including two or three time points to assess the evolution of BODY-Q® scores during the waiting period for BCS.

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## Conclusions

The use of validated instruments such as the BODY-Q® questionnaire demonstrates that patients undergoing BS experience significant and sustained improvements in body image, along with a reduction in psychosocial distress related to appearance. Furthermore, subsequent BCS contributes to additional enhancement in body image perception. These findings reinforce the value of BCS as an integral component of the surgical management of obesity—not only from a functional perspective, but also in terms of psychological well-being and quality of life.

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## Conflicts of interest

None of the authors have any conflicts of interest related to this scientific article.

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