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CLINICAL RESEARCH

The Impact of Reconstructive Procedures Following Bariatric Surgery on Patient Well-being and Quality of Life

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Abstract
Background Massive weight loss following bariatric surgery may lead to an excess of lax, overstretched skin, causing physical discomfort which may affect the patient's quality of life. Whereas the functional and aesthetic deformity is an expected result of massive weight loss, the role of the plastic surgeon in the multidisciplinary approach of the morbidly obese is still unclear. The purpose of the current study is to evaluate the results of reconstructive surgery following weight loss surgery, focusing on the impact on the physical and psycho-social well-being and quality of life of the patients.
Methods Out of a group of 465 patients, 61 patients underwent reconstructive surgery following weight loss surgery. In 43 respondents, the quality of life after reconstructive surgery was measured by the Obesity Psychological State Questionnaire. Patient satisfaction was evaluated.
Results Reconstructive surgery resulted in a significant improvement in quality of life in patients at a mean interval of 42 months between weight loss and reconstructive surgery. The most frequent procedures were abdominoplasty and breast reconstruction. The relative high complication rate of 27.9% was of no influence on quality of life and the majority of the patients (67%) were satisfied with reconstructive surgery.
Conclusions This study shows that reconstructive surgery following weight loss after bariatric surgery results in a significant improvement in overall quality of life. Reconstructive surgery should be incorporated in the multidisciplinary care programme following weight loss surgery in the morbidly obese patient.

Keywords Obesity · Reconstructive surgery · Quality of life

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Introduction

The worldwide obesity epidemic is becoming a major health problem. In recent years, a growing number of morbidly obese patients are seeking a surgical solution for their weight problem. Bariatric surgery is the only effective treatment for morbidly obese patients resulting in a substantial and long-term weight reduction with a concomitant significant improvement in overall quality of life [1–4].

Massive weight loss following surgery leads to an excess of lax, overstretched skin, causing physical discomfort and psycho-social problems, which may negatively affect the patients' quality of life [5]. The changes in physical appearance and functioning may also impede a further weight reduction or may even lead to weight regain [6]. Whereas the functional and aesthetic deformity is an expected result of massive weight loss, the role of the plastic surgeon in the multidisciplinary approach of the morbidly obese is still unclear.

The purpose of this study is to evaluate the role of reconstructive surgery following weight loss surgery in the treatment of morbid obesity, with special emphasis on its

impact on the physical and psycho-social well-being and quality of life of the patients.

Materials and Methods

Patients

During the period November 1995 to April 2005, 465 patients underwent surgery for morbid obesity at the St. Antonius Hospital in Nieuwegein. Of these patients, 61 (13.1%) underwent body-contouring surgery in the same clinic following massive weight loss. These patients were included and asked to participate in the study.

Quality-of-Life Measurements

Following informed consent, the patients completed a questionnaire to analyse the effect of reconstructive surgery on quality of life. The actual and past psycho-social states were measured by the Obesity Psycho-social State Questionnaire (OPSQ; Table 1) [7]. The questionnaire measures seven domains: 'physical functioning' (15 items), 'mental well-being' (six items) 'physical appearance' (nine items), 'social acceptance' (four items), 'self-efficacy toward eating and weight control' (three items), 'intimacy' (four items) and 'social network' (two items). Table 2 shows examples of every scale of the OPSQ. All scales have a moderate to high reliability. The questionnaire has a five-point rating scale, ranging from 1 (almost never) to 5 (almost always). A lower score on a psycho-social state reflects less problems on that domain and corresponds with a good quality of life. The pre-operative quality of life was measured retrospectively by asking the patients to what extent the items of the questionnaire applied to them at a time point 3 months prior to their reconstructive surgery.

To assess the most invalidating problems of excess skin, we asked for the patients' primary motivation to seek body-contouring surgery, e.g. functional problems, aesthetical problems or complaints of dermatitis. Patients were asked for their satisfaction with the result of the reconstructive surgery and with the scar in particular. The satisfaction was documented on a scale ranging from 1 (very satisfied) to 4 (dissatisfied).

Table 1 Example items of the Obesity Psycho-social State Questionnaire (OPSQ)

Scales	Items
Physical functioning	To kneel or to duck easily
Mental well-being	To feel depressed (reversed score)
Physical appearance	To feel fatty when someone takes a picture (reverse score)
Social acceptance	To be discriminated because of my weight (reverse score)
Self-efficacy	To feel helpless toward my eating behaviour (reversed score)
Intimacy	To have sexual problems because of my weight (reversed score)
Social network	To visit friends and acquaintances

Respondents answer to what extent they agree with the proposition on a 5-point rating format, ranging from 1 (almost never) to 5 (almost always)

Data Collection

The records of all patients were reviewed retrospectively for demographic data and pre- and post-operative weight data.

Statistical Analyses

All statistical analyses were performed using SPSS for Windows version 12.0.1 (SPSS Inc, Chicago, IL, USA). Student's t test and multivariate analysis were used for parametric variables; nominal variables were analysed with the Pearson chi-squared test. A two-sided p value of <0.05 was considered statistically significant.

Results

Of the 61 patients who underwent reconstructive surgery, 43 patients (two males, 41 female) agreed to participate in the study, i.e. response rate of 70.5% (Table 2).

The mean age of the patients was 41.5 years (range 23 to 60 years). The mean weight before the primary bariatric procedure was 138.2 kg (106–230) with a mean body mass index (BMI) of 48.2 kg/m² (35.8–79.5). Forty patients (93%) underwent laparoscopic gastric banding (LAGB); three patients underwent gastric bypass surgery as a primary procedure. Due to unsatisfactory results or band-related problems, 11 of the 40 LAGB patients underwent gastric bypass surgery as a redo operation.

The patients experienced a mean initial weight loss of 36.3% at a mean interval of 42.1 months (8–110) between their primary bariatric procedure and reconstructive surgery. This results in a mean weight of 86.9 kg (57.0–177) and a BMI of 30.7 kg/m² (21.5–65.0) at the time of reconstructive surgery.

A total of 68 reconstructive operations were performed in 43 patients (Table 3); 24 patients (55.8%) underwent one operation; 13 (30.2%) underwent two operations and six (14%) of the patients underwent three operations. Almost all (94%) operations were single reconstructive procedures. Most patients had an abdominoplasty (61%) or breast reduction/augmentation (25%).

Table 2 Patient characteristics

	Number	Percentage	Mean (range)
Patients	43		
Sex (male/female)	2/41	4.7/95.3	
Age			41.5 (23–60)
Comorbidity	24	55.8	
Diabetes mellitus	4	9	
Hypertension	23	53	
Bariatric surgery type			
Laparoscopic adjustable banding	40	93	
Gastric bypass (primary/secondary)	3/11	7.0/25	
Weight pre-bariatric surgery			138.2 (106–230)/SD 23.7
BMI pre-bariatric surgery			48.2 (35.8–79.5)/SD 8.5
Weight pre-reconstructive surgery			86.9 (57.0–177.0)/SD 20.0
BMI pre-reconstructive surgery			30.7 (21.5–65.0)/SD 7,2
Interval between bariatric and reconstructive surgery in months			42.1 (8–110)/SD 26.5

Quality of Life

After reconstructive surgery, patients improved significantly on six of the seven psycho-social states of the Obesity Psychological State Questionnaire (Table 4; Fig. 1).

The most significant improvement was seen in physical functioning and physical appearance. Reconstructive surgery improved physical functioning and patients felt healthier ($p<0.001$). Patients also experienced less depressive symptoms ($p<0.001$). Overall patients were more satisfied with their physical appearance and therefore had more self-confidence ($p<0.001$). In line with this, patients experienced less problems in intimacy and sexuality ($p<0.001$). There was a significant difference in self-efficacy towards eating before and after reconstructive surgery ($p<0.001$); patients had more problems to cope with their eating behaviour after the operation. The improvement in quality of life was independent of the occurrence of complications and weight regain or loss.

For 32 patients (74.4%), improvement in physical appearance was one of the most important motives to seek body-contouring surgery. For eight patients (18.6%), this was the only reason. Another important motive was problems patients experienced in physical functioning. For 27 patients (62.8%), this was one of the reasons. Approximately 50% of the patients experienced problems with personal hygiene and complained of intertriginous dermatitis (51.2%).

Patient Satisfaction

Sixty-seven percent of the patients was satisfied with the overall result of the operation (Table 5, scores 1 and 2).

Table 3 Reconstructive surgery procedures

Type of reconstructive procedure	No. performed	% patients
Abdominoplasty	38	55.9
Breast augmentation/reduction	15	22.1
Liposuction legs	3	4.4
Dermolipectomy legs	4	5.9
Dermolipectomy arms	1	1.5
Dog-ear correction	3	4.4
Abdominoplasty + breast reduction	2	2.9
Abdominoplasty + liposuction tights	1	1.5
Dermolipectomy legs + dog-ear correction	1	1.5
Total	68	100

Table 4 Obesity Psychological State Questionnaire score before and after reconstructive surgery

Psychological states	Before reconstructive surgery, mean (SD)[a]	After reconstructive surgery, mean (SD)[a]	*p* value
Physical functioning	3.58 (0.75)	2.34 (0.74)	<0.001
Mental well-being	3.42 (0.97)	2.48 (0.89)	<0.001
Physical appearance	3.92 (0.73)	2.63 (0.78)	<0.001
Social acceptance	3.42 (1.16)	2.28 (0.77)	<0.001
Self-efficacy toward eating	2.93 (1.4)	3.97 (0.74)	<0.001
Intimacy and sexuality	3.29 (1.13)	2.47 (1.02)	<0.001
Social network	2.79 (0.98)	2.22 (0.78)	<0.05

[a] Score varied from 1 (almost never) to 5 (almost always)

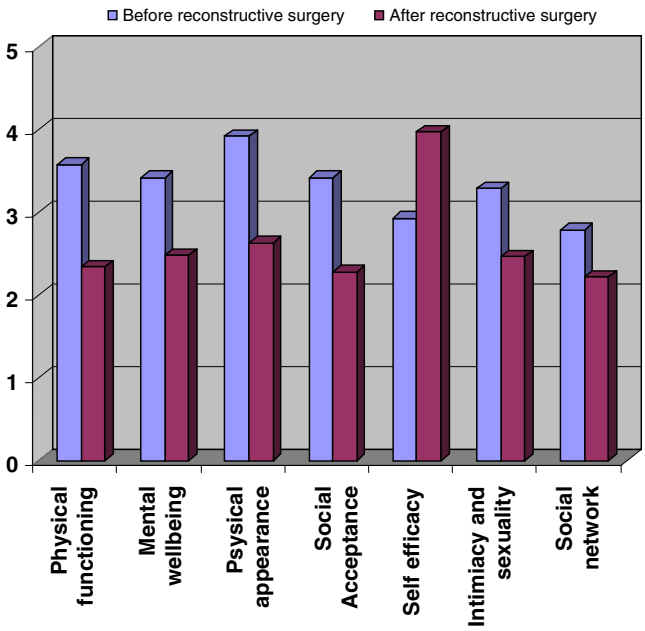

Fig. 1 Quality of life for every psychological state before and after reconstructive surgery

Eight patients (18.6%) were dissatisfied (score 4). In the interview, we asked the patients to elucidate their dissatisfaction. Most patients were not satisfied with the proportions of their body after operation and with the occurrence of dog-ears in the scars in particular. Some patients had high expectations about the aesthetic result, based on examples from the internet, and were in the end disappointed with the result of their own operation.

Regression analysis was performed to determine factors influencing patient satisfaction. The occurrence of postoperative complications did not influence patient satisfaction (satisfaction score of 2.3 vs. 2.5). Weight increase after reconstructive surgery was significantly associated with patient satisfaction: patients with a stable weight after the operation were significantly more satisfied than those with an increase in body weight (satisfaction score 1.9 vs. 2.6; $p<0.05$). All other factors (number of operations, type of operation, hospital stay) failed to show any influence on patients' satisfaction.

Discussion

This study of 43 post-weight-loss-surgery patients shows that reconstructive surgery leads to a significant improvement in quality of life. Irrespective of the occurrence of complications following the reconstructive procedures, the majority of patients were satisfied with the result of reconstructive surgery.

Morbid obesity is an increasingly common disease and its treatment is a challenge for many specialists. Weight loss surgery will lead to a long-lasting and significant weight loss and improvement in quality of life [1–4]. In the literature, studies on subsequent reconstructive surgery focus on the complications associated with the procedures. Our study is unique by reporting on a large cohort of patients with a long-term follow-up.

The overall complication rate was 27.9%, which is in accordance to the literature (20–50%) [8, 9]. Despite the relative high percentage of complications, this was of no influence on patients' satisfaction. A total of 67% of the patients were satisfied to very satisfied with the final result of reconstructive surgery. The positive results of reconstructive surgery apparently justify the complication rate and the sequential operations often required. Patients who were dissatisfied complained about the dog-ears after abdominoplasty or the post-operative contour deformities which sometimes occur after reconstructive procedures.

Massive weight loss results in an excess redundant skin creating new problems, both psychological and functional [5, 6]. The loose hanging skin results in feelings of unattractiveness, embarrassment, limitations in activity, sexual problems and hygienic discomfort such as skin rash and infections.

Although some studies observe a stable long-term quality of life after bariatric surgery [10, 11], patients are normally not well prepared to the sequelae of massive weight loss which may lead to a decline in quality of life [12, 13] and increase the risk of weight regain. It has been suggested that these new problems affect the patients' quality of life to almost the same degree as the problems of overweight prior to the bariatric operation [5, 14]. In our study, patients point out that this new problems do cause a poor quality of life but not in the same degree as before bariatric surgery.

Table 5 Patients satisfaction about reconstructive procedure

Satisfaction reconstructive surgery	Score	No. of patients (%)	Cumulative %
Result scar in specific	Very satisfied	15 (34.9)	34.9
	Satisfied	16 (37.2)	72
	Unsatisfied	6 (14.0)	86
	Very unsatisfied	6 (14.0)	100
Satisfaction overall	Very satisfied	9 (20.9)	20.9
	Satisfied	20 (46.5)	67
	Unsatisfied	6 (14.0)	81
	Very unsatisfied	8 (18.6)	100

Satisfaction score: very satisfied = 1, satisfied = 2, unsatisfied = 3, very unsatisfied = 4

In a previous study of Larsen et al. [15], the quality of life before and after bariatric surgery was measured and compared with the general Dutch reference population. Pre-operative scores of patients on all dimensions of quality of life were significantly lower than scores of the age norm group. This difference diminished 1 year after the operation but increased again in the long-term on all dimensions. The exact cause of this decline is unclear, but one hypothesis might be that the functional and aesthetic deformity is a major factor of influence.

The role of reconstructive surgery following weight loss surgery is still underestimated by medical specialists. Currently, it is seen as a cosmetic adjunct to bariatric surgery. However, previous investigations have concluded that a positive effect on quality of life is also seen after other reconstructive procedures like reduction mammaplasty and cosmetic facial surgery [16, 17].

In our study, some 14% of the patient were scheduled for reconstructive surgery. This may be a conservative figure as some patients may have been operated outside our clinic. Most patients (93%) in our study underwent laparoscopic gastric banding. Compared to the gastric bypass procedure, the average weight loss following banding is substantially less. Therefore, in the bypass population, a higher percentage of patients may be in need of reconstructive surgery.

The surgical treatment of obesity often fails due to failure to maintain the achieved weight. Reconstructive surgery may have an important role [18]. In previous studies analysing predictors of weight loss and control, it is suggested that quality of life is positively associated with long-term outcomes of weight management [19–21]. As reconstructive surgery results in an improvement in quality of life, it may contribute to the management of weight control.

In the interview, patients explicitly mention the great influence of high expectations. The expectations regarding the outcome of reconstructive surgery of most patients are based on examples and success stories on the internet, which often turn out not to be realistic. Patients are generally not prepared for the marked scarring following surgery. It is of great importance therefore to inform patients pre-operatively and outline realistic expectations [5].

Our study has some limitations as it concerns a retrospective evaluation. Only patients who actually had undergone reconstructive surgery were included.

In our study, we used the Obesity Psycho-social State Questionnaire, a self-developed questionnaire. The psychometric characteristics of the OPSQ were established in a previous study [7] and, although not validated, proved to be satisfactory. The pre-operative quality of life was measured retrospective, which may have given some bias to the results. In future, prospective studies with obesity-related questionnaires should verify the current results.

Conclusion

The contribution of the reconstructive surgeon to the multidisciplinary treatment of morbid obesity is substantial and beneficial in the care for these patients. Dissatisfaction was mainly due to technical factors. As these are correctable factors, overall satisfaction could be improved. Reconstructive surgery should be included in the continuum of care and may improve the long-term weight outcome in the surgical treatment of morbid obesity.

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