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Research Article

Patient Perspective in Obesity Surgery: Goals for Weight Loss and Improvement of Body Shape in a Prospective Cohort Study

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Keywords
Obesity · Patient perspective · Quality of life · Body shape · Expectation

Abstract
Objective: Obesity surgery provides sustainable weight loss, improvement of comorbidities, and improved quality of life (QOL). There is few evidence on the patient perspective and goals. This study compared expected and achieved weight loss, body shape, and QOL. ***Methods:*** Patients completed the Moorehead-Ardelt QOL questionnaire (MAQOL) and questionnaires on actual and expected weight loss and body shape, comorbidities, and goals of obesity surgery preoperatively and within 24 months postoperatively. ***Results:*** 44 patients completed questionnaires pre- and postoperatively. BMI, MAQOL and comorbidities significantly improved postoperatively. Patients' expected weight loss goal corresponded to a postoperative BMI of 32.6 ± 5.6 kg/m^2 and was not different from their achieved BMI within 24 months after surgery (33.9 ± 6.3 kg/m^2, p = 0.276). Self-reported body shape improved but did not reach preoperatively expected goals. During the weight loss period, patients adapted their weight loss and body shape goals to higher levels. Patients attributed a higher part of their success in weight loss to surgery postoperatively (79.5 ± 22.0 vs. 89.1 ± 18.4%, p = 0.028). ***Conclusion:*** Patients lost as much weight as they had expected and later modified the goals to even greater weight loss. Body shape improved but did not reach expected levels. QOL improved independently from weight loss and body shape. Patients attributed successful weight loss predominantly to surgery.

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Introduction

Obesity is an increasing burden in many countries [1–4], which leads to increased all-cause mortality [5, 6] with associated comorbidities such as diabetes mellitus, arterial hypertension, fatty liver disease, obstructive sleep apnea syndrome (OSAS), and depression [6–8]. Obesity surgery has been shown to be safe and to improve long-term mortality and obesity-related comorbidities [9–11]. Due to their excellent risk-benefit combination, laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass (RYGB) are the most frequently performed procedures [12, 13].

Quality of life (QOL) and self-reported body shape are known to be impaired in patients with obesity [14, 15]. Current studies have shown obesity surgery is able to improve both health-related and disease-specific QOL up to 24 months after surgery [16–19]. It has been shown that % excess weight loss (%EWL) is an important reason for undergoing surgery [20]. When asked which amount of weight loss would be "dream", "happy", "acceptable" and "disappointed", patients categorized the %EWL usually achieved by obesity surgery as "disappointed" [21]. Obese women have been shown to be dissatisfied with their body shape before and after obesity surgery [15]. Current studies have shown patients ranked fitness, body shape, self-confidence, and improved comorbidities as the most important reasons for undergoing obesity surgery [21–23]. Yet, there is still little evidence on the effect of unfulfilled weight loss and body shape goals on QOL. Also, the benefits perceived after obesity surgery from a patient's perspective have not been reported yet. The present study investigated patients' achieved and expected weight loss and body shape goals as well as the reasons for undergoing obesity surgery and comorbidities before and after surgery in a prospective cohort study. Further aims included analyzing the effects of possible discrepancies between achieved and expected weight loss and body shape goals on patients' QOL and the influence of gender and age.

Patients and Methods

Patients with morbid obesity who received LSG or RYGB at a University Hospital between April 2012 and March 2014 were asked to complete questionnaires on QOL as well as their goals and expectations toward obesity surgery. The questionnaires were answered two times by each patient: Before obesity surgery and within 24 months after surgery. Patients had to be eligible for obesity surgery according to German S3 guidelines. Other inclusion criteria were an age between 18 and 70 years and a BMI of at least 35 kg/m^2 before surgery. Furthermore, patients had to be able to give written informed consent. Patients with missing questionnaires within 24 months after surgery were contacted by phone call and received the questionnaires by postal mail in order to increase the number of participants.

Two different questionnaires were used. The Moorehead-Ardelt Quality of Life Questionnaire (MAQOL) was developed as a disease-specific instrument to measure postoperative outcomes of self-perceived QOL in obese patients [24]. It examined 5 areas: self-esteem, physical well-being, social relationships, work, and sexuality. Each question offered 5 possible answers, adding + or – points to a total score according to a scoring key. The total score can reach values between +3 and –3 points. It can be translated into a QOL score going from very poor to very high.

The second questionnaire was developed during the second postgraduate training course of the European Obesity Academy in collaboration with endocrinologists, psychiatrists, and statisticians [22]. It consisted of 3 parts. The first part asked patients about medical and socioeconomic data such as height, weight, age, educational status, marital status, and comorbidities. The second part asked about treatment goals in terms of weight loss, body shape, and the expected effect of obesity surgery. Patients were asked to select drawings, standardized according to Bulik et al. [25] (permission to use the drawings was obtained) that they considered representative of their actual body shape as well as representing the body shape goal they expected to achieve after obesity surgery, with a lower body shape score representing a slimmer body shape. The difference between actual body shape and expected body shape goal was called body shape

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mismatch. Weight loss goals were indicated in kilograms and translated in an expected BMI goal according to the formula "BMI goal = (actual weight – expected weight loss goal) / (actual height)^2". The difference between actual BMI and expected BMI goal was called BMI mismatch. The third part proposed different possible goals of obesity surgery presented in a randomized fashion. Patients were asked to indicate which 3 of the 14 proposed goals had the highest priority. The score of each parameter was evaluated, and a scoring system was used giving 3 points to the most important, 2 points to the second most important, and 1 to the third most important parameter. The scores were added to determine the order of importance among the ranking parameters.

Due to German insurance regulations and obesity guidelines, all patients undergo a long-term evaluation from the first visit in the obesity center until cost approval from the insurance companies. Then the patients are followed up in regular intervals in the obesity outpatient clinic. These visits include frequent counseling on nutrition, diet, and physical exercise as well as endocrinologic, psychosomatic, and surgical counseling. Obesity surgery is known to significantly reduce body weight, but we do not routinely give patients an exact amount or range of weight loss to be expected after obesity surgery. We usually mention that the outcome is highly dependent on the behavior after the surgery (e.g. diet, exercise). In addition, we further discuss the downsides of extensive or too fast weight loss, such as malnutrition, skin excess or skin abnormalities. Discussing future surgical possibilities such as body contouring with referral to a plastic surgery department experienced in performing this kind of surgery is part of the pre- and postoperative approach.

To describe the empirical distribution of continuous parameters, the means and standard deviation were calculated. Possible differences were analyzed using *t* test procedure, variance analysis, and Pearson correlation coefficient. Relevant correlation was defined as an r value ≥ 0.3. %EWL was calculated using the formula "(initial BMI – final BMI) / (initial BMI – 25) × 100" based on the weight and height as measured during examination. % Total weight loss (%TWL) was calculated using the formula "(initial weight – current weight) / initial weight × 100". Weight related values were stated in kilograms (1 kg = 2.205 lb). In subgroup analysis, gender and age groups (0–40 and >40) were compared.

Informed consent was obtained from all individual participants included in the present study. Ethical approval was obtained from the local ethics committee (S-618/2011, Amendment 09/2012).

Results

Between April 2012 and March 2014, 112 patients received LSG or RYGB at the Department of General, Visceral and Transplant Surgery at Heidelberg University Hospital. Of these, 53 patients agreed to participate in the study and completed the questionnaires before surgery. Of these, 44 patients also completed the questionnaires within 24 months after surgery and were thus included in the data analysis (25 female and 19 male patients, 17 patients ≤40 years and 27 patients >40 years). Mean age before surgery was 43.4 ± 12.3 years. Mean BMI before surgery was 51.1 ± 8.2 kg/m^2; there was a significant BMI reduction as well as a significant %EWL and %TWL within 24 months after surgery (Table 1). There were no differences in BMI, %EWL, and %TWL with regard to gender or age group (data not shown).

Preoperatively, the mean number of comorbidities per patient was 2.8 ± 1.5; it decreased significantly to 1.8 ± 1.5 within 24 months after surgery ($p < 0.001$). There was a significant reduction of diabetes, arterial hypertension, and hypercholesterolemia within 24 months after surgery (Table 1). The prevalence of OSAS, depression, arthralgia, and infertility did not change significantly after surgery (Table 1). There were no differences in comorbidities with regard to gender, neither before nor within 24 months after surgery. Employment rate was 47.7% before surgery and 63.6% within 24 months after surgery ($p = 0.164$).

Patients reached their preoperatively expected BMI goal (expected BMI goal 32.6 ± 5.6 kg/m^2, actually reached BMI 33.9 ± 6.3 kg/m^2; $p = 0.276$) (Fig. 1). However, during the weight loss process patients adapted their weight loss goals to lose even more weight than they had expected before surgery ($p < 0.001$) (Table 1). Still, the difference between actual BMI and BMI goal decreased significantly after surgery ($p < 0.001$) (Fig. 1). There were no significant

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Table 1. Mean actual BMI, %EWL, %TWL, MAQOL, and body shape, as well as expected BMI and body shape goals, and comorbidities before and within 24 months after obesity surgery

	Before surgery	within 24 months after surgery	*p* value
Actual BMI (kg/m^2)	51.1±8.2	33.9±6.3	**<0.001**
BMI goal (kg/m^2)	32.6±5.6	29.6±4.2	**0.002**
%EWL	n/a	67.5±17.3	n/a
%TWL	n/a	33.2±7.7	n/a
MAQOL	14.5±3.3	19.8±3.5	**<0.001**
Employment rate, %	47.7	63.6	0.164
Actual body shape	10.3±2.0	5.8±1.7	**<0.001**
Body shape goal	5.0±0.9	4.0±1.0	**<0.001**
≥1 Co-morbidity, %	95.0	73.8	**<0.001**
Comorbidities, per patient	2.8±1.5	1.8±1.5	**<0.001**
Diabetes, %	50.0	26.0	**0.027**
Arterial hypertension, %	75.0	45.2	**0.006**
Hypercholesterolemia, %	25.0	4.8	**0.036**
OSAS, %	37.5	31.0	0.535
Depression, %	32.5	19.0	0.166
Arthralgia, %	57.5	47.6	0.373
Infertility, %	5.0	2.4	0.530

%EWL, % excess weight loss; %TWL, %total weight loss; MAQOL, Moorehead-Ardelt quality of life; OSAS, obstructive sleep apnea syndrome; $p < 0.05$.

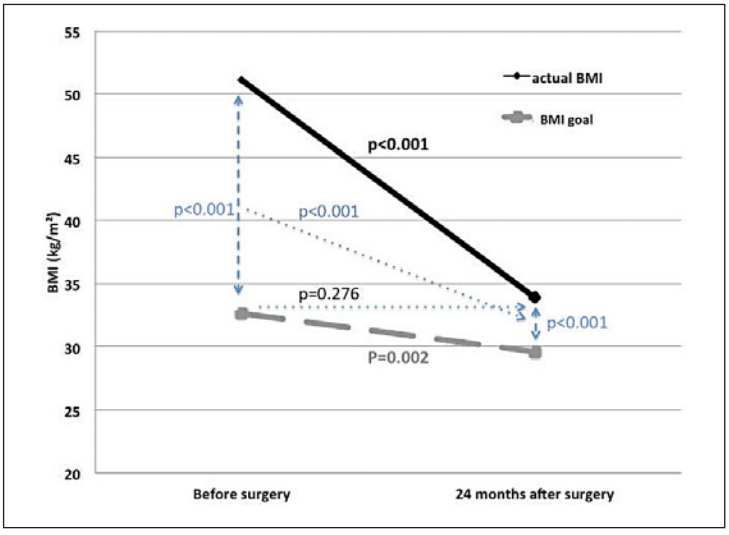

Fig. 1. Actual BMI and expected BMI goals.

differences in expected and modified BMI goals with regard to the subgroups gender and age group (data not shown).

The actual self-reported body shape before surgery was 10.3 ± 2.0, and it improved significantly within 24 months after surgery (Table 1). Mean expected postoperative body shape goal was 5.0 ± 0.9 when patients were asked before surgery, which was significantly better than the actual body shape the patients achieved within 24 months after surgery, hence patients did not achieve their body shape goal ($p = 0.006$). The modified body shape goal changed significantly

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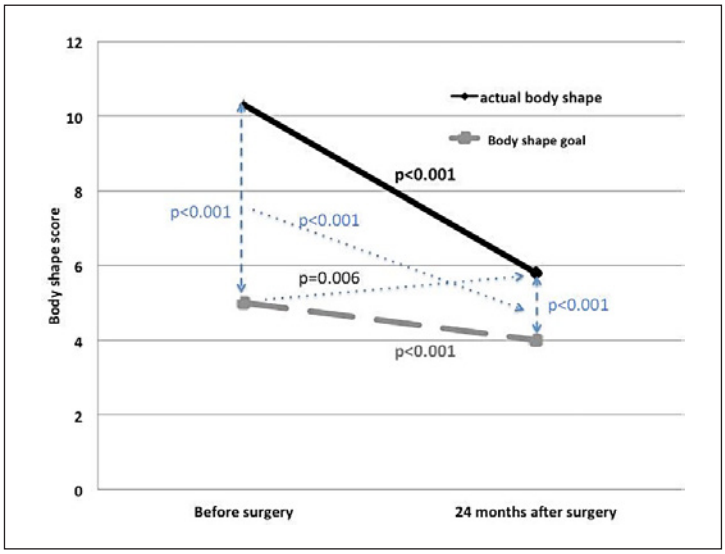

Fig. 2. Self-reported body shape and expected body shape goals (a lower body shape score represents a slimmer body shape).

to even better values within 24 months after surgery that were also significantly better than the actual body shape at that time ($p < 0.001$, Table 1). However, the difference between actual body shape and expected body shape goal declined significantly within 24 months after surgery ($p < 0.001$) (Fig. 2). Actual body shape ($r = 0.71$) and expected body shape goals ($r = 0.37$) were both correlated to BMI before surgery. Similarly, the actual body shape within 24 months after surgery ($r = 0.55$) as well as the modified body shape goal ($r = 0.55$) were both correlated to BMI at that time. The actual self-reported body shape did not differ between men and women before ($p = 0.55$) and 24 months after surgery ($p = 0.855$). Furthermore, there was no gender difference in terms of the expected body shape, both before ($p = 0.581$) and 24 months after surgery ($p = 0.565$). The expected weight loss did not differ between men and women when asked before ($p = 0.23$) or 24 months after surgery ($p = 0.602$).

Before surgery, patients estimated the effects of surgery would lead to 79.5 ± 22.0% of their weight loss. The estimated proportion of the role of surgery in weight loss increased significantly to 89.1 ± 18.4% within 24 months after surgery ($p = 0.028$). Before surgery, patients rated "improved comorbidities" (22.8%), "improved physical activity" (22.2%) and "increased life expectancy" (13.8%) as the 3 most important expectations of obesity surgery. Within 24 months after surgery, "improved comorbidities" (20.9%), "increased life expectancy" (12.6%) and "improved physical activity" (10.2%) were the 3 most important reasons.

MAQOL improved significantly within 24 months after surgery when compared to before surgery (Table 1). MAQOL was moderately correlated to the BMI mismatch before surgery ($r = -0.31$), while there was no correlation after surgery. The difference between expected BMI goals before surgery and actual BMI after surgery was moderately correlated to MAQOL ($r = 0.30$). MAQOL was also correlated to the body shape mismatch before surgery ($r = 0.47$), while there was no correlation after surgery. Improvement of MAQOL was correlated to %TWL within 24 months after surgery ($r = 0.47$).

Discussion

The present study found improved MAQOL, improved comorbidities (comorbidities per patient, diabetes, arterial hypertension, and hypercholesterolemia), and improved body shape within 24 months after obesity surgery. Patients reached the BMI goals they had preop-

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eratively expected to reach within 24 months after surgery. However, patients did not reach the expected body shape goals. In addition, patients modified their expectations and reached for even higher weight loss goals and improvement of body shape when asked postoperatively. Though, the BMI mismatch as well as body shape mismatch became significantly smaller within 24 months after surgery. While MAQOL was correlated to BMI mismatch and body shape mismatch before surgery, it was no longer after surgery. Body shape was correlated to the actual BMI before and within 24 months after surgery. There was no relation between comorbidity improvement and MAQOL improvement even though patients rated "improved comorbidities" as their most important goal in obesity surgery.

In the present study, obesity surgery led to significant weight loss and increased MAQOL within 24 months after obesity surgery. There were no gender and age group differences in BMI, weight loss, and MAQOL, neither before nor within 24 months after surgery. The weight loss achieved in the present study is in line with weight loss reported in recent publications [13]. Consistent with the present findings, a study by Charalampakis et al. [16] found an improved MAQOL within 24 months after LSG. In the present study there was no influence of gender and age on the improvement of MAQOL, which is in line with current literature [26]. Confirming patients' expectations and goals, obesity surgery led to a reduction of comorbidities in the present study. There were no differences in comorbidities with regard to gender, neither before nor within 24 months after surgery. The improvement of comorbidities is in line with current literature [16, 27–30]. Interestingly, even though patients rated "improved comorbidities" as the most important benefit from obesity surgery, the improvement of comorbidities was statistically not related to the improvement of MAQOL.

Within 24 months after surgery, the patients had sufficient weight loss to reach their preoperatively expected BMI goal. Now when patients were asked again after surgery, they had modified their expectations to reach even higher weight loss goals than they had expected before surgery. However, the mismatch between actual BMI and BMI goal became significantly lower with ongoing time. The weight loss goals of the present study are in line with current literature [20, 21, 31]. The actual and expected body shape was not significantly different between men and women. This is in line with a study by Biörserud et al. [32] who reported a similar self-image between men and women 1.5 years after obesity surgery. Several studies reported unrealistic weight loss goals in patients undergoing obesity surgery and warned that this misperception might lead to dissatisfaction [21, 31]. The findings of the present study did not confirm this warning, as the improvement of MAQOL was independent from the weight loss goals. The role of weight loss goals in obesity surgery might thus be overestimated. In line with existing literature, there were no differences in weight loss goals with regard to gender and age [31].

In the present study, the actual body shape and body shape goals were significantly improved within 24 months after surgery. Self-reported body shape was related to BMI before and within 24 months after surgery. The mismatch between the self-reported actual body shape and the body shape goals became smaller with ongoing time, but the body shape goals were always lower than the actual body shape. The mismatch between the self-reported actual body shape and the body shape goal was correlated to MAQOL before surgery, but there was no correlation after surgery. In line with the presented results, Price et al. [15] reported that women seeking obesity surgery misperceived their actual body shape and had unrealistic goals for the body shape they expected to reach after surgery. Contradicting the body shape misperception reported by Price et al. [15], the present study found a strong correlation between body shape and BMI, suggesting patients have a realistic estimation of their own body shape. Although patients' body shape goals remained unfulfilled, in the present study the MAQOL improved independently from the remaining body shape mismatch.

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Limitations

Previous studies have shown that weight regain and stabilization of QOL usually occurs later than 24 months after surgery [17, 33]. Moreover, Ribeiro et al. [34] have shown body shape expectations also tend to get more realistic with ongoing time. Therefore, long-term studies are needed to evaluate goals and achievements in relation to QOL in obesity surgery. However, intensive preoperative counseling can influence the patients' expectations to both higher and lower expectations of weight loss. A comparison of preoperative motivations and postoperative perceived achievements of obesity surgery as seen from the patient perspective has not been reported yet. The preoperative counseling in the present study was not standardized, and patients were not routinely given an exact amount or range of weight loss to be expected. In the present study patients were not asked how they came to their weight loss or body shape expectations. In future studies, the patients should therefore be asked how they come to their expectations. In the present study, only half of the patients eligible agreed to participate. Before handing out the questionnaires for the baseline assessment, we were asking the patients if they would be willing to participate also in the follow-up assessments. Since the patients were frequently asked to fill out questionnaires for research and clinically related information, some patients tended to deny. Furthermore, we wanted answers to be honest and the quality to be high. This is why we asked the patients to read everything carefully and take time for answering. In the busy outpatient clinic there was sometimes a lack of time for this, and some patients did not wish to spend extra time in the clinic. The present study found an increase in employment rates of patients with obesity after surgery, although not of statistical significance. Studies with larger sample size might be able to show whether obesity surgery increases employment rates. This would add to the discussion of reimbursement of obesity surgery by public health insurance.

Conclusion

This is the first study comparing patients' weight loss and body shape goals before and after obesity surgery in relation to MAQOL. While both BMI and body shape significantly improved after surgery, the goals were also readjusted. Thus, patients achieved their initially expected BMI goals, but then modified their goals to lose more weight and reach even better body shape. MAQOL improved significantly after surgery, and this was independent from the mismatch between actual and expected BMI and body shape goals. Patients' most important goal in obesity surgery was "improved comorbidities". In spite of this, the improvement in comorbidities was not related to the improvement in MAQOL. Patients' MAQOL improved after obesity surgery independently from weight loss and body shape goals and comorbidities.

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Statement of Informed Consent

Informed consent was obtained from all individual participants included in the present study.

Ethical 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. Ethical approval was obtained from the local ethics committee (S-618/2011, Amendment 09/2012).

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Disclosure Statement

Drs. F. Nickel, L. Schmidt, J. Sander, C. Tapking, T. Bruckner, B.P. Müller and L. Fischer have no conflicts of interest or financial ties to disclose.

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