Predictability of Outcome in Laparoscopic Gastric Banding

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Key Words

Gastric banding · Morbid obesity · Outcome predictors · Pre-operative selection

Summary

Background: The success rate of laparoscopic adjustable gastric banding (LAGB) in the treatment of morbid obesity is very variable. A reasonable preoperative selection of eligible patients seems to be important for a successful outcome of LAGB. In the present study, criteria were investigated to predict the outcome of LAGB. **Methods:** 85 morbidly obese patients were operated with LAGB between 1999 and 2005. 71 of these patients were analysed according to several possible predictive parameters of success or failure of LAGB. Success was defined as excess body weight loss (EBWL) > 50% without band removal, failure was defined as EBWL < 20% and/or band removal. Median follow-up was 27 months (range 8–90 months). **Results:** After LAGB a median EBWL of 43% (–41 to 171.5%) was observed in all patients with a decrease in BMI of 8.0 kg/m² (–9 to 35 kg/m²). The success rate after LAGB was 37%, the failure rate 19.7%. Female sex ($p = 0.023$), baseline weight ($p = 0.024$), and eating behaviour after LAGB ($p = 0.008$) were significant predictors of success following LAGB, whereas complications such as port dislocation and reoperation after LAGB did not have a significant impact on a successful course following LAGB. Significant predictors of failure were male sex ($p = 0.038$) and missing physical activity after LAGB ($p = 0.045$), whereas the eating behaviour did not have a significant effect concerning failure following LAGB. Baseline excess body weight (EBW) was identified as an independent predictor of failure in a multivariate analysis. **Conclusion:** According to the results of this study, female patients with a lower EBW who improve their postoperative eating behaviour have the best chance of success following LAGB.

Introduction

Within 5 years, the number of operations for bariatric surgery has increased more than five-fold in most industrialised countries due to the worldwide epidemic of obesity [1]. In recent cohort studies it has been shown that bariatric surgery reduced long-term mortality in morbidly obese patients [2, 3]. Thus, surgery is considered the treatment of choice for morbid obesity at the present time. Laparoscopic adjustable gastric banding (LAGB) as a purely restrictive procedure with a simple and standardised technique has been found to provide significant weight loss in morbid obesity and a good reduction in comorbidities with a very low mortality rate. However, the outcome of this procedure is variable and absence of weight loss or even weight regain may occur in the long-term postoperative period [4]. Additionally, LAGB-associated complications like port problems, band migration/leakages, and slippage leading to a reoperation rate of up to 8.5% have been recently reported [5, 6]. It has been hypothesised that success or failure of LAGB is not only a function of the surgical procedure alone. Obviously, other criteria like physical activity, social and familiar circumstances as well as different personality traits with impact on eating behaviour and adjustment following surgery play a critical role in achieving and maintaining weight reduction [7]. Taking these considerations into account, a gastric band-specific patient selection seems crucial for the prediction of success or failure after LAGB.

The aim of this study was to examine individual pre- and post-operative criteria predicting the outcome of gastric banding.

Patients and Methods

Patients

A number of 85 patients were operated for morbid obesity with gastric banding between 1999 and 2005. The laparoscopic approach was standardised in all patients and has been described before [8]. The Swedish adjustable gastric banding (SAGB; Obtech, Ethicon Endo-Surgery, Norderstedt, Germany)

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was used in all cases and positioned through the pars flaccida technique. The patients were considered as candidates for LAGB when the following conditions were met: age > 18 years and body mass index (BMI) > 40 kg/m² or BMI > 35 kg/m² with obesity-related comorbidities. In total, there were 69 women and 16 men with a median age of 40 years (18–64 years). Pre-operative medium body weight (BW) was 136 kg (88–202 kg) with a BMI of 49 kg/m² (37–73 kg/m²) and an excess body weight (EBW) of 52 kg (17–110 kg). A medium of 2.4 obesity-related comorbidities per patient was recorded.

Study Design

Primary endpoints of this study were, firstly, the rate of success after gastric banding defined as excess body weight loss (EBWL) > 50% without band removal and, secondly, the rate of failure after gastric banding defined as EBWL < 20% and/or band removal.

Data Collection

All patients were compared in terms of general features, comorbidities, post-operative complications, social and familiar circumstances, eating behaviour, and physical activity. Eating behaviour and eating attitudes were evaluated according to the following patterns: Sweet eating was diagnosed when the patient continuously craved simple carbohydrates triggered by emotional and physiological situations. Stress eating was diagnosed when any food ingestion other than carbohydrates could be triggered by emotional and physiological stress situations. Additionally, patients were asked regarding events of vomiting of food remnants after eating and considered positive if this happened more than once a day. The patients were considered as physically active when endurance sports (e. g. swimming, running, power walking, aerobics, cycling) was performed more than 3 times a week for more than 30 min.

Statistical Analysis

All data are presented as median (range) unless otherwise stated. Statistical evaluations used Fisher's exact test, χ^2 tests, and nonparametric tests (Mann-Whitney U test, Kruskal-Wallis test). Multivariate analysis was done using logistic regression with backward elimination of variables with SAS[®] software (SAS Institute, Cary, NC, USA). $P < 0.05$ was considered significant.

Results

11 of 85 patients were lost to follow-up (13%) in a median of 27 months (8–90 months). 2 patients were excluded due to band infection as this complication was considered independent from post-operative compliance or misbehaviour. Another patient was excluded after band removal and switch to gastric bypass at the patient's request, leaving 71 patients (84%) for the analysis in this study. The groups for statistical analyses in this study were success ($n = 26$, 37%) versus no success ($n = 45$, 63%) and failure ($n = 14$, 20%) versus no failure ($n = 57$, 80%).

General Outcome

General outcome of all patients is summarised in table 1. Overall, there was no mortality, with a morbidity rate of 21.9%.

Procedure-related complications were band migration and port site infection in 2.4%, band leakage and pouch dilatation in 3.7%, port dislocation in 7.3%, and band slippage in 8.5%. Due to procedure-related complications, 17.1% of all patients ($n = 14$) required one or more reoperations under general anaesthesia, including band replacement (9.8%) and band removal (4.9%).

Table 1. General outcome of LAGB in all patients

	Median	Range
Body weight (kg)	115	70 to 200
BMI (kg/m ²)	38	24 to 66
Excess weight (kg)	28	–17 to 102
EWL (kg)	23	–30 to 100
EBWL (%)	43.2	–41 to 171.5
Loss of BMI (kg/m ²)	8.0	–9 to 35

Table 2. Relevant factors predicting success or failure of gastric banding

Criteria	RR (odds ratio)	95% CI	p value
<i>Success vs. no success</i>			
Female sex	5.5	1.2–26.1	0.023
BMI < 50 kg/m ²	3.0	1.2–7.7	0.024
Port dislocation	3.3	0.37–29.3	0.401
Reoperation	4.5	0.9–21.5	0.068
Band replacement	1.9	0.4–10.2	0.704
Sweet eating	0.2	0.05–0.7	0.008
Stress eating	0.1	1.3–11.7	0.015
Physical activity, postop.	4.2	1.5–11.7	0.007
<i>Failure vs. no failure</i>			
Male sex	3.9	1.2–12.7	0.038
BMI > 50 kg/m ²	1.9	0.7–5.5	0.291
Port dislocation	8.9	1.5–53.3	0.019
Reoperation	5.2	1.5–17.7	0.011
Band replacement	0.5	0.06–4.2	0.678
Sweet eating	0.6	0.2–2.0	0.530
Stress eating	0.4	0.1–1.2	0.121
Physical activity, postop.	4.0	1.0–15.7	0.045

CI = Confidence interval.

Regarding obesity-related comorbidities, there was a significant improvement in patients with a successful outcome following LAGB compared to patients with no success in hypertension ($p = 0.002$), diabetes ($p = 0.07$), degenerative joint disease ($p < 0.001$) and dyspnoea ($p < 0.001$).

Predicting Outcome

All relevant factors predicting success or failure following gastric banding are listed in table 2.

Female sex predicted success after LAGB whereas male sex was identified as a statistically significant predictor for failure. Furthermore, the baseline BMI was detected as an additional objective preoperative parameter predicting success or failure following LAGB with a cut-off value of 50 kg/m². Port- or gastric banding-related complications leading to a reoperation did not seem to be of predictive value regarding success following LAGB, whereas port dislocation and reoperations were predictors of failure. Changes in eating behaviour after LAGB, especially the termination of sweet and stress eating, were a significant predictor of success whereas this did not play a role in predicting a failure after LAGB. Improving the physical activity postoperatively was also a significant predictor of success as much as the absence of activity was a significant predictor of failure following LAGB.

Baseline EBW and eating behaviour were identified as independent predictors of success in multivariate analysis ($p = 0.008$). In contrast, only EBW was of significant importance in a multivariate analysis when predicting failure ($p = 0.005$).

Discussion

Although there is little doubt that gastric banding is an effective treatment for severe obesity, there is a large variability in weight outcome ranging from fairly good results to complete failures [9, 10]. Besides physiological and technical reasons contributing to failure after LAGB, motivational and psychological factors have been considered to have an important impact on the postoperative course following gastric banding [11]. This has been challenged by another report in which the role of personality assessments as psychological screening for admission has been considered as less relevant for the prediction of a poor or successful weight outcome after bariatric surgery [12]. In a study published recently, patients treated with LAGB had a lower short-term morbidity than those treated with Roux-en-Y gastric bypass, but reoperation rates were higher among patients who received LAGB [13]. Thus, valid factors for the prediction of success or failure following LAGB are mandatory.

In the present study, baseline BMI with a cut-off value of 50 kg/m^2 was identified as a predictor of success or failure following LAGB which is in accordance with other studies [14, 15]. It is an accepted agreement that super-obese patients may require more complex procedures, e.g. Roux-en-Y gastric bypass, to achieve satisfactory weight loss [13]. Furthermore, gender seems to be an important factor when predicting success or failure: female sex was significantly associated with success while male sex predicted failure. Keeping in mind that the baseline EBW was the main predictor of success in the multivariate analysis, we can state that gender and preoperative weight are of major importance for the decision whether patients should be treated with LAGB or not. This is of high relevance insofar as gender and baseline weight are objective preoperative parameters which are irrevocable. In contrast, postoperative modification of eating behaviour which predicted statistically significant success even in

the multivariate analysis of this study is difficult to assess preoperatively. As long as valid and objective tools for the assessment of the patients' compliance do not exist, the preoperative predictive value of aspects like modification of eating behaviour, physical activity, and motivation for changing one's lifestyle is limited. Nevertheless, these aspects are obviously of great importance for the outcome following LAGB. Thus, a sufficient motivational and psychological support in the postoperative course is necessary to influence postoperative eating behaviour and physical activity. Regular postoperative meetings with nutrition technicians and psychologists addressing these behaviour modifications are absolutely recommendable and important for maintaining postoperative weight loss after gastric banding.

Complications after LAGB resulting in the necessity of reoperation were statistically significant in predicting the failure of the procedure. This, however, can be related to the fact that band removals were considered as failures and required a reoperation. Differences became insignificant when band removals were excluded from the failure group. Nevertheless, all situations leading to reoperations, like band migration, port site infections, pouch dilatation, and band slippage, should be avoided by a subtle, standardised operation technique and a consistent postoperative surveillance.

In conclusion, it has been shown that LAGB provides sustained weight loss in a large proportion of obese patients. The efficiency of this procedure can be increased by a reasonable preoperative patient selection. Its lower efficacy in comparison to malabsorptive procedures must be balanced against its lower rate of life-threatening complications as well as the postoperative adjustability and its complete reversibility. Based on the present analysis, we recommend LAGB for female patients with a $\text{BMI} < 50 \text{ kg/m}^2$ and an evident motivation to change eating behaviour and physical activity postoperatively. This is based partly on the personal impression of the surgeon who still has a significant influence on the final treatment decision. Gender and baseline BMI, however, are objective criteria which might help to reach the right decision.

Disclosure

The authors declared no conflict of interest.

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