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Physical, psychological and social functioning of patients undergoing surgical treatment of obesity**

Funkcjonowanie fizyczne, psychologiczne i społeczne pacjentów poddanych chirurgicznemu leczeniu otyłości

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Summary

Introduction. The paper deals with physical, psychological and social functioning of patients undergoing surgical treatment of obesity with the Vertical Banded Gastroplasty (VBG). The research project has been set in the bio-psychosocial health model based on the assumption that a patient's health state can be assessed with the use of both objective indices and the patient's subjective evaluation of his or her health state.

Material and methods. The study was based on a longitudinal design. The subjects were measured three times (one month before the VBG and three and six months after the VBG) with Nottingham Health Profile – a questionnaire used to assess patients suffering from somatic diseases. The participants of the study at each of the three stages were 65 patients (52 females and 13 males) at the age 21-58 (M = 38.56; SD = 8.98) with simple obesity.

Results. The VBG surgery led to an average percentage Excess Weight Loss (%EWL) of 39.86% and 58.62% three and six months after the operation, respectively. Three and six months after the operation significant positive changes were noted in physical functioning (Energy, Physical Mobility, Pain, Sleep Disturbances) and psychological functioning (Emotional Distress). Six months after the VBG significant positive changes were noted in the patients' social functioning (Social Isolation).

Conclusions. The VBG surgery is effective in obtaining a body mass reduction. In three and six months after the VBG there is an improvement in obese patients' physical and psychological functioning. Six months after the operation there is an improvement in their social functioning as well.

Key words: obesity, bariatric surgery, bio-psychosocial functioning, Nottingham Health Profile

Streszczenie

Wstęp. Praca dotyczy funkcjonowania fizycznego, psychologicznego i społecznego pacjentów poddanych chirurgicznemu leczeniu otyłości metodą Pionowej Opaskowej Plastyki Żołądka (VBG). Projekt badawczy osadzono w biopsychospołecznym modelu zdrowia, w którym zakłada się, że stan chorego określany jest zarówno za pomocą obiektywnych wskaźników, jak i na podstawie subiektywnej oceny stanu zdrowia dokonywanej przez pacjenta.

Materiał i metody. Badanie zrealizowano w schemacie podłużnym. Osoby badane trzykrotnie (miesiąc przed VBG oraz w trzy i sześć miesięcy po VBG) wypełniały kwestionariusz Nottingham Health Profile, stosowany do oceny funkcjonowania biopsychospołecznego chorych somatycznie. W każdym z trzech etapów badania wzięło udział 65 osób (52 K i 13 M) w wieku od 21-58 lat (M = 38,56; SD = 8,98) z otyłością prostą.

Wyniki. Operacja VBG pozwoliła uzyskać w badanej grupie procentowy spadek nadmiernej masy ciała (%EWL) na poziomie 39,86% w trzy miesiące po zabiegu i odpowiednio 58,62% w sześć miesięcy po zabiegu. W trzy i sześć miesięcy po przebyciu VBG zaszły istotne pozytywne zmiany w funkcjonowaniu fizycznym (Energia, Ograniczenia Ruchowe, Ból, Zaburzenia Snu) i psychologicznym (Negatywne Reakcje Emocjonalne) pacjentów. W sześć miesięcy po VBG zaszły istotne pozytywne zmiany w funkcjonowaniu społecznym (Wyobcowanie Społeczne) pacjentów.

Wnioski. Operacyjne leczenie otyłości metodą VBG prowadzi do skutecznej redukcji masy ciała. W trzy i sześć miesięcy po VBG poprawie ulega funkcjonowanie fizyczne i psychologiczne pacjentów otyłych. W sześć miesięcy po VBG poprawie ulega funkcjonowanie społeczne pacjentów otyłych.

Słowa kluczowe: otyłość, chirurgiczne leczenie otyłości, funkcjonowanie biopsychospołeczne, kwestionariusz Nottingham Health Profile

**This article is based on a fragment of the first author's doctoral dissertation „Physical, psychological and social functioning of patients undergoing surgical treatment of obesity, in the pre- and post-operative period” being written under the supervision of Professor Wojciech Lisik at the Medical University of Warsaw.

INTRODUCTION

The epidemic level of obesity makes it one of the most important problems and health challenges of the contemporary world (1). In spite of the preventive measures being taken, there is a systematic growth of people with overweight and obesity in the general population (2). Excessive adipose tissue accumulation in the organism has a negative influence on the functioning of many organs and organ systems (3, 4). Such a state creates favourable conditions for ailments following directly from obesity and increases the risk of comorbidities related to obesity. Here, one can enumerate such diseases as hypertension, coronary heart disease, sleep apnoea, impaired glucose tolerance, type 2 diabetes, dyslipidemia, osteoarthritis and certain types of cancer (5, 6). Obesity and its health complications significantly lower life expectancy and lead to a person's much worse physical functioning (7, 8).

Obesity has an equally negative influence on a person's psychological and social functioning. A low level of satisfaction with one's weight and appearance often leads to a decrease in self-evaluation and self-acceptance, and, in consequence, to the formation of a negative self-image as a whole (9, 10). In severely obese patients, one often detects mood disorders, mainly dysthymia and depression as well as anxiety disorders (11, 12). The phenomenon of stigmatization and pejorative stereotypes connected with obesity contribute to the deprecation and discrimination of this group of patients in the social environment (13). Obese people have real difficulties in establishing and maintaining satisfactory interpersonal relationships, both in their personal and professional lives (14). The feeling of lack of acceptance and fear of being rejected make them withdraw from social interactions and lead to their social isolation (13, 14).

Lowering body weight as a result of conservative methods of treatment (such as a diet with energy deficit, physical activity, pharmacotherapy, psychological support, or participation in complex weight loss programs) brings obese patients considerable health benefits and improves their psychosocial functioning (15, 16). However, classic methods of treating obesity are not sufficient to ensure optimal and permanent weight loss in all cases. When traditional coping strategies fail and the problems connected with excess weight become more severe, operative treatment should be considered.

Bariatric surgery is the most effective form of treatment of obesity class III, also called pathological obesity (17). It makes it possible to considerably reduce overweight and sustain this effect. At the same time, however, it is the most invasive of the available methods of obesity therapy. The surgical procedures it involves are connected with an increased risk of complications (17). For these reasons, bariatric surgery is used only in the case of patients with unquestionable therapeutic indications who meet strict qualification criteria (18, 19).

There are three main groups of operative techniques used in surgical treatment of obesity: restrictive (limiting the stomach volume), malabsorptive (disturbing the process of absorption) and mixed (restrictive-malabsorptive) (20). Vertical Banded Gastroplasty (VBG) constitutes a typical example of a restrictive operative technique (21). Its mechanism consists in creating conditions of an energy deficit resulting from a significant decrease in the amount of food taken at one time. On average a VBG surgery leads to a 55-65% excess weight loss (22, 23).

The present paper concerns physical, psychological and social functioning of obese patients undergoing surgical treatment with the VBG method. The patients' functioning was studied in the pre-operative period as well as three and six months after the surgery. The research project was conducted within the bio-psychosocial health model. This paradigm assumes that a person's general functioning, both in health and disease, is affected by mutually combined biological, psychological and social factors (24). The psychophysical functioning is regarded as a dynamic process depending on the person's health situation, which is changing in time (25). Furthermore, it is assumed that a person's condition is determined not only on the basis of objective indicators such as laboratory, function, or imaging tests, but also on the basis of a subjective health evaluation done by the patient (26).

RESEARCH QUESTIONS AND HYPOTHESES

In the present study the following research questions and hypotheses have been posed:

1. What is the process of patients' weight reduction like at different stages following the VBG surgery, i.e. three and six months after the operation?
 - H1 The surgical treatment of obesity with the use of the VBG method leads to a significant weight reduction at each successive stage of the study.
2. What is the direction and scope of changes in physical, psychological and social functioning of obese patients undergoing the VBG treatment at each successive stage of the study, i.e. three and six months after the operation?
 - H2.1 Physical functioning of obese patients who have undergone a VBG surgery shows improvement at each successive stage of the study.
 - H2.2 Psychological functioning of obese patients who have undergone a VBG surgery shows improvement at each successive stage of the study.
 - H2.3 Social functioning of obese patients who have undergone a VBG surgery shows improvement at each successive stage of the study.

MATERIAL AND METHODS

Study Design

The study followed a longitudinal design. Obese patients qualified for bariatric treatment with the VBG were measured three times: one month before the

surgery (Stage 1) as well as three (Stage 2) and six months (Stage 3) after the surgery. Access to the peritoneal cavity was obtained by means of the abdominal section. The study was conducted between December 2006 and January 2011 at the Department of General and Transplantation Surgery of the Medical University of Warsaw.

Subjects

The sample for the study included 65 patients (52 females, 13 males) at the age ranging from 21 to 58 years ($M = 38.56$; $SD = 8.98$) with simple obesity class II ($35 \leq BMI < 40$; $N = 3$) and class III ($BMI \geq 40$; $N = 62$). In the pre-operative period the value of BMI ranged from 38.10 to 64.29 kg/m^2 ($M = 48.71$; $SD = 6.77$).

All the subjects had been qualified for the VBG in the process of a multistage evaluation conducted by a multidisciplinary committee. In the sample under study, no medical or psychological contraindications for the surgical treatment had been noted.

Instruments

Apart from weight and excess weight values, the index used for the measurement of the subjects' weight was the value of the Body Mass Index (BMI). The BMI shows the ratio of a person's weight measured in kilograms to the squared value of his or her height measured in metres (27).

The instrument used to measure the quality of the subjects' bio-psycho-social functioning was the Nottingham Health Profile (NHP), a self-descriptive questionnaire developed by S.M. Hunt, J. McEwen and S.P. McKenna and adapted in Poland by B. Bojarska, R. Pikuła and K. Wrześniewski (28, 29). The NHP questionnaire has two parts: the main one and the supplementary one. In the present study, only the main part was used. It contains items related to currently experienced problems in physical, psychological and social functioning related to one's health state. It contains 38 short statements referring to six subscales. For the needs of the present study, each of the original subscales was assigned to one of the three dimensions of the individual's functioning: physical (Energy, Physical Mobility, Pain, Sleep Disturbances), psychological (Emotional Distress) and social (Social Isolation). The results are calculated separately for each of the six subscales. The higher the score, the higher the impairment of a given dimension. Both versions of the NHP, the original one and the Polish one are characterised by

fully acceptable values of validity and reliability measures (29, 30).

Statistical analysis

The initial analyses of the data included computing descriptive statistics, examining the normality of the distributions and checking the relationship between the control variables (gender, age, marital status, education, professional activity, a dwelling place, financial situation, the need of social approval) and the dependent variables under study. The control variables and the dependent variables were not significantly related.

The main analyses involved computations appropriate for repeated measures designs with dependent samples. The first step was the Friedman ANOVA by ranks test – a nonparametric alternative to one-way repeated measures analysis of variance (31). Whenever the Friedman test showed a significant result, in the next step the Wilcoxon matched pairs test was used – the most powerful nonparametric alternative to the t-test for dependent samples (31).

RESULTS

The first research question concerned the process of excess weight reduction resulting from the VBG surgery. In hypothesis H1 it was assumed that the VBG surgery leads to a significant weight reduction at each successive stage of the study. Table 1 shows the values of the subjects' weight-related variables (BMI, weight, excess weight) at each of the three stages of the study together with the measures of statistical significance of the differences between individual stages. For the sake of clarity, instead of ranks, the values of means and standard deviations have been reported, which better illustrates the distribution of weight-related variables at each stage of the study.

As can be seen from the comparative analyses presented in table a, VBG leads to a statistically significant ($p < .001$) weight reduction three and six months after the operation, which confirms hypothesis H1. The average loss of excess weight in the first three months following the VBG surgery amounted to 27 kg and was larger than the average weight loss of 12.7 kg between the third and sixth month after the operation.

The second research question concerned the direction and scope of changes in bio-psycho-social functioning of obese patients undergoing the VBG treatment. In hypothesis H2.1 it was assumed that physical functioning of the patients who have undergone a VBG

Table 1. Descriptive and inferential statistics for body mass ($N = 65$).

	Stage 1		Stage 2		Stage 3		Friedman ANOVA	Differences between stages
	M	SD	M	SD	M	SD		
BMI [kg/m^2]	48.72	6.78	39.18	5.92	34.68	5.32	129.51*	1i2*, 2i3*, 1i3*
Weight [kg]	138.91	21.48	111.91	18.52	99.20	16.54	129.51*	1i2*, 2i3*, 1i3*
Excess weight [kg]	67.74	19.31	40.74	16.76	28.04	15.07	129.51*	1i2*, 2i3*, 1i3*

* $p < .001$

surgery shows improvement at each successive stage of the study, i.e. after three and six months following the operation. The results of comparative analyses summarized in table 2 and presented in figure 1 fully confirm hypothesis H2.1 in the case of three indices of physical functioning: Energy, Physical Mobility and Pain, and partially in the case of Sleep Disturbances. As regards Sleep Disturbances, the difference between Stage 2 and Stage 3 of the study turned out to be statistically nonsignificant.

The assumption in hypothesis H2.2 was that psychological functioning of VBG patients shows improvement at each successive stage following the operation. The measure of the quality of psychological functioning was the index of Emotional Distress. The comparison of the Emotional Distress scores between the consecutive stages fully supported hypothesis H2.2 (see table 2 and figure 1).

In hypothesis H2.3 it was assumed that social functioning of the VBG patients shows improvement at each successive stage of the study. The measure of the quality of social functioning was the index of Social Isolation. The comparison of the Social Isolation scores between the consecutive stages partially supported hypothesis H2.3 (see table 2 and figure 1). The only statistically significant difference was found between Stage 2 and Stage 3 of the study.

DISCUSSION

The results of the study point to significant changes that take place as an effect of surgical treatment of obesity with the VBG method with time both with respect to weight-related measures and the patients' biopsychosocial functioning.

A commonly used criterion of the effectiveness of the bariatric surgery is % Excess Weight Loss of 50% or more (32). The VBG leads to %EWL of 55-65% on average (23, 33). In the sample under study, the VBG surgery resulted in an average %EWL of 38.86% and 58.62% three and six months after the operation, respectively. Thus, the average expected %EWL following the VBG surgery can be obtained as soon as six months after the operation, a result which can be considered more than satisfactory (22, 32). It should be remembered that that the period of gradual reduction of body mass after the VBG lasts about a year and a half. The above-mentioned result, therefore, should not be seen as its final effect.

The level of excess weight loss is not and should not be the only criterion used in assessing the effectiveness of the bariatric procedure. Equally important is the patient's subjective judgement of his or her health state and quality of functioning.

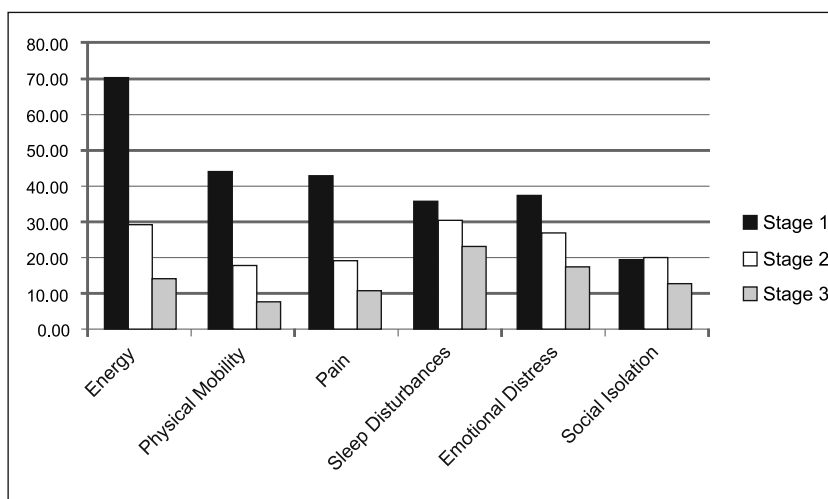


Fig. 1. Physical, psychological and social functioning of VBG patients at three stages of the study.

Table 2. Physical, psychological and social functioning at three stages of the study (N = 65).

Functioning	Stage 1	Stage 2	Stage 3	Friedman ANOVA	Differences between stages
	Sum of Ranks	Sum of Ranks	Sum of Ranks		
Physical					
Energy	177.00	118.50	94.50	80.93***	1-2***; 1-3***; 2-3***
Physical Mobility	187.00	118.50	84.50	102.86***	1-2***; 1-3***; 2-3***
Pain	178.50	117.50	94.00	78.44***	1-2***; 1-3***; 2-3***
Sleep Disturbances	144.00	130.00	116.00	10.52**	1-3**; 2-3*
Psychological					
Emotional Distress	155.50	128.00	106.50	23.43***	1-2**; 1-3**; 2-3***
Social					
Social Isolation	135.00	136.50	118.50	5.70*	2-3**

*p < .05; **p < .01; ***p < .001

In the physical dimension of functioning a significant improvement was noted in all the four measures: Energy, Physical Mobility, Pain, and Sleep Disturbances. These advantageous changes occurred in a relatively short time, in the case of the first three of the above-mentioned measures in three months after the surgery. In this time, the observed weight loss is the fastest, which is highly satisfactory for the patients. The sudden loss of weight is, however, accompanied by unpleasant sensations, being the result of the open surgery on the gastrointestinal tract. These might include pains in the abdominal cavity, gastric problems, and increased fatigability resulting from a fast decrease in weight occurring at very low calorie intake. Yet, the biggest improvement can be noted in the very measures of physical functioning – Energy, Physical Mobility and Pain – in which, paradoxically, one could expect a temporary worsening in the post-operative period. This means that in the patients' evaluation, the physical gains resulting from the reduction of body mass clearly exceed the temporary inconveniences associated with the abdominal surgery. This is undoubtedly an argument in favour of using the bariatric treatment, as it brings positive health effects in a relatively short period of time, which has special significance to obese patients, usually coping for years with their excess weight. As regards the measure of Sleep Disturbances, an improvement is noticeable no sooner than six months after the operation. This finding points to the need of paying special attention by the medical team taking care of bariatric patients to the issue of the quality of their sleep in the period immediately following the surgery.

Another effect of the VBG was an improvement in the patients' psychological functioning, which is reflected in a significant decrease in intensity of negative emotional reactions (Emotional Distress). This result is in line with the findings of numerous research studies designed to investigate the changes in psychological functioning of patients undergoing surgical obesity treatment where a significant improvement of their psychological state was consistently reported (33-37). Dymek, le Grange, Neven and Alverdy showed that in the group of obese patients who had undergone Roux-en-Y Gastric Bypass, a significant decrease in the level of depressive symptoms (measured with Beck Depression Inventory and SF-36 Mental Health) and an increase in self-esteem (assessed with Rosenberg Self-Esteem Scale) could be observed in just a few weeks

after the operation (38). The results of this research deserve special attention, as they point to the fact that advantageous changes in psychological functioning of patients who have undergone a bariatric surgery can be noticed much earlier than it used to be thought.

As far as social functioning of bariatric patients is concerned, no significant change in the Social Isolation scores was noted between Stage 1 and Stage 2 of the study, which might indicate that dealing with the physical and psychological consequences of obesity is easier than dealing with its social consequences. It is to be noticed, however, that out of the six indices analysed in this paper, it is Social Isolation that had the lowest intensity before the surgery. The analysis of the differences between Stage 2 and Stage 3 of the research reveals a significant decrease of Social Isolation. The positive influence of bariatric treatment on the patients' social functioning may be considered as a secondary impact in relation to the positive physical and psychological changes (39). An increased level of energy and physical fitness as well as a lower level of emotional distress can enhance the quality of social interactions.

The first six months following a bariatric surgery is the period of significant changes in the physical, psychological and social functioning of obese patients. The changes taking place in that period are worth further attention in subsequent research, as this area has not yet been widely explored, especially in Poland.

Extending knowledge in this area will help bariatric teams better understand the situation of patients in the early post-operative period and adjust their support to the patients' actual needs. The patients themselves, while preparing for the bariatric surgery, should thus be able to formulate realistic expectations as to the changes taking place in the first few months following the operation.

CONCLUSIONS

1. Bariatric treatment of obesity with the VBG method leads to a significant body mass reduction three and six months after the operation.
2. In three and six months after the VBG surgery there is an improvement in physical functioning of obese patients.
3. In three and six months after the VBG surgery there is an improvement in psychological functioning of obese patients.
4. In six months after the VBG surgery there is an improvement in social functioning of obese patients.

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received/otrzymano: 19.02.2013

accepted/zaakceptowano: 27.03.2013

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