







Changes in Sexual Functions and Effects on Partner Sexual Functions in Obese Men after Bariatric Surgery

Obez Erkeklerde Bariatrik Cerrahi Sonrası Cinsel Fonksiyonlardaki Değişiklikler ve Partner Cinsel Fonksiyonları Üzerine Etkileri

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Abstract

Background: The aim of this study was to evaluate the efficacy of bariatric surgery (BS) by evaluating preoperative and postoperative sexual functions in obese men undergoing BS.

Materials and Methods: Male patients who underwent BS due to obesity between January 2013 and September 2021 were included in this observational study. Patients underwent standardized laparoscopic Roux-en-Y gastric bypass or laparoscopic sleeve gastrectomy. For sexual function, the International Index of Erectile Function (IIEF) inquiry form was filled in before, and one year after BS. In addition, the age, Body Mass Index (BMI) and Female Sexual Function Index (FSFI) scores of the female partners were recorded before and after the operation. Follow-up weight, waist circumference, serum biochemistry and hormone values of the patients were re-evaluated in the 6-12 month period after the operation.

Results: A total of 1027 patients were included in the study. The mean age of the male patients was 37.33±12.40 years, and the mean preoperative BMI was 38.51±3.98kg/m² (35.20-49.80). The postoperative follow-up period of the patients was 9.72±2.98 months. There was a significant increase in the IIEF (all sub-dimensions) scores of the patients after the operation (p<0.001 for each). An increase in FSFI scores was found in female partners after surgery (21.67±6.78 vs. 27.55±5.48; p<0.001). The change in IIEF-EF scores was moderately inversely correlated with partner BMI, moderately correlated with vitamin D levels, and linearly correlated with testosterone levels (p=0.034, r=-0.434; p=0.012, r=0.537 and p=0.027, r=0.476, respectively).

Conclusions: BS provides a significant increase in the sexual functions of obese men. This increase shows a significant relationship with partner BMI and vitamin D levels.

Keywords: Bariatric surgery, Erectile function, Sexual function, Partner satisfaction, Vitamin D

Öz

Amaç: Bu çalışmanın amacı, bariatrik cerrahi (BC) geçiren obez erkeklerde ameliyat öncesi ve sonrası cinsel işlevleri değerlendirilerek BC'nin etkinliğini incelemektir.

Materyal ve Metod: Bu gözlemsel çalışmaya Ocak 2013 ile Eylül 2021 arasında obezite nedeniyle BC geçiren erkek hastalar dahil edildi. Hastalara standardize laparoskopik Roux-en-Y gastrik bypass veya laparoskopik sleeve gastrektomi uygulandı. Cinsel işlev için, BC'den önce ve bir yıl sonra Uluslararası Ereksiyon Fonksiyonu İndeksi (IIEF) sorgulama formu dolduruldu. Ayrıca, kadın partnerlerin yaşı, Vücut Kitle İndeksi (BMI) ve Kadın Cinsel İşlev İndeksi (FSFI) skorları operasyon öncesi ve sonrası kaydedildi. Hastaların takip kilosu, bel çevresi, serum biyokimyası ve hormon değerleri operasyondan sonraki 6-12 aylık dönemde yeniden değerlendirildi.

Bulgular: Çalışmaya toplam 1027 hasta dahil edildi. Erkek hastaların yaş ortalaması 37.33±12.4 yıl, ameliyat öncesi ortalama BMI 38.51±3.98 kg/m² (35.20-49.80) idi. Ameliyat sonrası takip süresi 9.72±2.98 ay idi. Hastaların IIEF (tüm alanlarda) skorlarında ameliyattan sonra anlamlı artış vardı (her biri için p<0.001). Ameliyat sonrası kadın partnerlerin FSFI skorlarında artış olduğu saptandı (21.67±6.78'e karşı 27.55±5.48; p<0.001). IIEF-EF skorlarındaki değişimin partner BMI ile orta düzeyde ters korelasyon gösterdiği, D vitamini düzeyleri ile orta düzeyde korelasyon gösterdiği ve testosteron düzeyleri ile doğrusal korelasyon gösterdiği bulundu (sırasıyla p=0.034, r=-0.434; p=0.012, r=0.537 ve p=0.027, r=0.476).

Sonuç: BC obez erkeklerin cinsel fonksiyonlarında önemli bir artış sağlar. Bu artış partner BMI ve D vitamini seviyeleri ile önemli bir ilişki göstermektedir.

Anahtar Kelimeler: Bariatrik cerrahi, Erektile fonksiyon, Cinsel fonksiyon, Partner memnuniyeti, D vitamini

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Introduction

Obesity is a worldwide public health problem and has serious psychological and social effects. According to a 2013 study worldwide, 2.1 billion people sweat in the overweight or obese class (1). Obesity is associated with diabetes mellitus, cardiovascular diseases, depression and other chronic diseases (2). It both threatens life and reduces the quality of life with accompanying chronic diseases (3). Coexistence of chronic diseases, depression, sleep apnea syndrome and sexual dysfunction are common in obese men (4).

Obesity is associated with significant disturbances in endocrine function. Hyperinsulinemia and insulin resistance are the best-known changes in obesity. Leptin secretion is increased in obesity. Testosterone and gonadotropin levels are low, especially in men with morbid obesity. Cortisol production and clearance are increased in these patients. Ghrelin, an orexigenic factor, has been found to be reduced in obese individuals. There is also a tendency for TSH and free T3 levels to increase in obesity (5).

Candidates for bariatric surgery are more likely to have mood disorders, anxiety, alcohol use, or personality disorders compared to controls (6,7). In terms of psychological characteristics, obese patients report higher levels of depression, anxiety, stress, and lower self-esteem and quality of life scores compared to those with normal body weight. Obese patients also have higher rates of eating behavior disorders, such as binge eating episodes and eating anxiety (8,9).

Erectile function has been associated with obesity in studies. One study found that 79% of men with erectile dysfunction (ED) were obese or overweight (10). Abdominal obesity and the loss of self-confidence caused by obesity also contribute to the formation of ED (11). The association of obesity with low testosterone levels also causes a decrease in sexual desire. In addition, high reactive oxygen production and antioxidant reduction lead to endothelial damage that can cause ED (12,13).

Bariatric surgery (BS) is operations performed to treat morbidly obese patients, complications of type 2 diabetes mellitus, sleep apnea syndrome, and to improve renal and cardiovascular functions. Recent studies have shown that BS not only improves weight loss, but also improves sexual functions. However, the reasons such as the small sample size and heterogeneity in the studies cannot show the relationship exactly.

The aim of this study is to evaluate pre- and post-surgical sexual functions in obese men undergoing BS and to examine the effectiveness of BS.

Materials and Methods

Male patients who underwent BS due to obesity between January 2013 and September 2021 were included in this observational study. Ethics committee approval was obtained for the study. Written informed consent was obtained from each patient participating in the study. The study was designed and implemented in accordance with the Declaration of Helsinki.

Patients with a previous diagnosis of hypogonadism, diabetes-related complications (such as neuropathy, retinopathy, nephropathy), patients with GFR<60, patients who had previous pelvic surgery, and patients with psychiatric problems were excluded from the study.

Detailed medical and sexual histories of all patients were taken before BS. Height, weight, abdomen and arm region measurements of the patients were made, fasting blood glucose, urea, creatinine, AST, ALT, total testosterone values were examined.

Weight was measured using an electronic balance while the patient was barefoot and wearing light clothing, and was recorded as closest to 0,1 kg. Length was measured to the nearest 0,5 cm using a fixed wall. Waist circumference was measured with a standard flexible tape measure. Body mass index (BMI) was calculated by dividing weight (kg) by the square of height (m). In addition, the age, BMI and Female sexual Function Index (FSFI) scores of the female partners were recorded before and after the operation.

For sexual function, the International Erectile Function Index (IIEF) inquiry form was filled in before and 1 year after BS. IIEF is a 15-question test on sexual function during the previous 4 weeks. IIEF, erectile function (EF; maximum score 30 points), orgasmic function (OR; maximum score 10 points), sexual desire (SD, maximum score 10 points), intercourse satisfaction (IS; maximum score 15 points), and overall satisfaction (OS has ratings that include a maximum score of 10 points).

The Turkish validated form of the FSFI was used to assess partner sexual functions (14). This form, consisting of 19 questions, evaluated six areas: sexual desire (questions 1,2), arousal (questions 3-6), lubrication (questions 7-10), orgasm (questions 11-13), satisfaction (questions 14-16) and pain (questions 17-19) in the last 4 weeks. Each question was scored between 0-5 (total score 2-36). Those with a total score of >26.55 were considered as having sexual dysfunction.

Venous blood samples of the patients before the operation were taken between 08.00 and 11.00 in the morning after 8 hours of fasting. LDL, HDL, triglyceride, urea, creatinine, AST, ALT, total testosterone, FSH, LH and prolactin levels were examined from the patients.

Patients underwent standardized laparoscopic Roux-en-Y gastric bypass (LRYGB) or laparoscopic sleeve gastrectomy (LSG) (15). After surgery, nutritional and medical counseling was provided according to guidelines published by our obesity unit multidisciplinary staff (16).

Follow-up weight, waist circumference, serum biochemistry and hormone values of the patients were re-evaluated in the 6-12 month period after the operation. The IIEF questionnaire was used once again to assess sexual functions. The parameters in the group with and without improvement in sexual functions were examined.

Statistical analysis

SPSS 25.0 (IBM, USA) program was used for statistics. Distribution of cases was evaluated with Kolmogorov-Smirnov test. Dependent sample t-test, fisher exact test were used. Multivariate logistic regression analysis was performed. Significant p value was determined as <0.05.

Results

A total of 1027 patients were included in the study. The mean age of the male patients was 37.33 ± 12.40 years, and the mean preoperative BMI was $38.51 \pm 3.98 \text{ kg/m}^2$ (35.20-49.80). The mean age of their partners was 39.35 ± 8.42 . The mean preoperative total testosterone levels of the patients were $272.55 \pm 110.42 \text{ ng/ml}$. Testosterone level was below 400 ng/ml in 78.09% (802/1027) of the patients. Demographic data of the patients are given in Table 1.

The postoperative follow-up period of the patients was 9.72 ± 2.98 months. The BMI levels of the patients had decreased to 23.25 ± 2.18 . The preoperative IIEF-EF score of the patients was 14.65 ± 6.10 . The IIEF-OF score was 7.58 ± 1.33 , the IIEF-SD score was 6.54 ± 2.81 , the IIEF-IS score was 7.76 ± 2.21 and the IIEF-OS score was 6.72 ± 1.97 . There was a significant

increase in the IIEF-EF, OF, SD, IS and OS scores of the patients after the operation ($p < 0.001$ for each). While the mean FSFI score of the female partners of the patients was 21.67 ± 6.78 before the operation, the mean FSFI score of the women after the operation increased to 27.55 ± 5.48 ($p < 0.001$). There was a significant increase in vitamin B12 and vitamin D levels in the postoperative period ($p = 0.010$ for vitamin B12; $p = 0.012$ for vitamin D) (Table 2).

Table 1. Demographic characteristics

	Mean \pm SD
Age	37.33 \pm 12.40
BMI	38.51 \pm 3.98
Partner Age	39.35 \pm 8.42
Total Testosterone	272.55 \pm 110.42
Vitamin B12	341.42 \pm 134.43
Vitamine D	15.55 \pm 5.52
Preoperative IIEF-EF	14.65 \pm 6.1
Preop. Partner FSFI	21.67 \pm 6.78

BMI: Body Mass Index, IIEF-EF: International Index of Erectile Function-Erectile Function, FSFI: Female Sexual Function Index

Table 2. Comparison between preoperative and postoperative values of patients

	Preoperative	Postoperative	p value
Total Testosterone	272.55 \pm 110.42	356.78 \pm 115.91	<0.001
Vitamin B12	341.42 \pm 134.43	410.92 \pm 135.45	0.010
Vitamine D	15.55 \pm 5.52	17.08 \pm 4.01	0.012
IIEF-EF	14.65 \pm 6.1	20.91 \pm 3.45	<0.001
IIEF-OF	7.58 \pm 1.33	8.97 \pm 1.03	<0.001
IIEF-SD	6.54 \pm 2.81	8.78 \pm 1.33	<0.001
IIEF-IS	7.76 \pm 2.21	8.95 \pm 1.73	<0.001
IIEF-OS	6.72 \pm 1.97	8.03 \pm 1.89	<0.001
Partner FSFI	21.67 \pm 6.78	27.55 \pm 5.48	<0.001

IIEF: International Index of Erectile Function, EF: Erectile Function, OF: Orgasmic Function, SD: Sexual Desire, IS: Intercourse Satisfaction, OS: Overall Satisfaction, FSFI: Female Sexual Function Index

In the univariate and multivariate regression analysis, the improvement of postoperative sexual functions was associated with a decrease of more than 10 units in BMI (OR: 2.012), high preoperative vitamin D levels (OR: 2.365), and low partner BMI value (OR: 0.774) (Table 3).

The change in IIEF-EF scores was moderately inversely correlated with partner BMI ($p = 0.034$, $r = -0.434$), moderately

correlated with vitamin D levels ($p = 0.012$, $r = 0.537$), and linearly correlated with testosterone levels ($p = 0.027$, $r = 0.476$). No statistically significant correlation was found between patient age and partner FSFI scores ($p = 0.413$, $r = 0.155$ and $p = 0.521$, $r = 0.289$ respectively). (Table 4).

Table 3. Univariate and multivariate regression analysis of factors affecting postoperative sexual functions.

	Univariate Analysis			Multivariate Analysis		
	OR	p	CI	OR	p	CI
Age	0.358	0.511	0.256-0.456			
Post-operative BMI reduction	1.789	0.001	1.112-1.987	2.012	<0.001	1.582-2.231
Partner Age	1.315	0.568	0.871-1.512			
Partner BMI	0.892	0.001	0.595-1.001	0.774	<0.001	0.601-0.912
Total Testosterone	1.012	0.135	0.998-1.025			
Vitamin B12	1.345	0.341	1.001-1.701			
Vitamine D	2.561	0.001	1.801-4.056	2.365	<0.001	2.035-2.714
Preoperative IIEF-EF	1.511	0.056	1.034-1.988			
Preop. Partner FSFI	1.341	0.109	0.788-2.561			

BMI: Body Mass Index, IIEF-EF: International Index of Erectile Function-Erectile Function, FSFI: Female Sexual Function Index

Table 4. Univariate analysis of the change in IIEF-EF scores

	Δ IIEF-EF	
	r	p
Age	-0.155	0.413
Partner FSFI	0.289	0.521
Partner BMI	-0.434	0.034
Vitamin D	0.537	0.012
Total testosterone	0.476	0.027

FSFI: Female Sexual Function Index, IIEF-EF: International Index of Erectile Function-Erectile Function, BMI: Body Mass Index.

Discussion

As a result of our study, significant improvements in sexual function were observed in obese men after BS. This improvement was found to be associated with preoperative vitamin D and testosterone levels, postoperative BMI reduction, and partner BMI.

Obesity is a very common health problem. This condition, which affects the quality of life and can be fatal, can also affect sexual functions. Due to many factors, individuals experience sexual function problems. Especially in studies conducted with men, symptoms such as erectile function, ejaculation dysfunction, decreased desire and desire can be seen.

In obese men, erectile function may be affected due to organic and psychological causes. These patients may have erectile dysfunction due to hypoandrogenism secondary to obesity, the presence of metabolic syndrome, and mechanical difficulty in retracting the foreskin and achieving penetration (17). The increased risk of oxidative stress due to obesity can damage arteries and veins, leading to impaired blood flow to the penis (18). Postoperative follow-up of patients who underwent BS showed improvement in their sexual functions (19). Due to both changes in body structure and decrease in adipose tissue, the individual increases his/her self-esteem (20). The decrease in symptoms related to comorbidities (hypertension, diabetes) after BS also contributes to the improvement in erectile functions (21). A recent review found an increase of 19% more in IIEF scores after BS (22). In our study, significant improvement was found in all sub-dimensions of IIEF. This situation was found to be related to the literature.

Changes in sex hormones after BS have been demonstrated in previous studies. A recent meta-analysis found a significant increase in total testosterone levels in male patients (23). It is argued that there is an increase in testosterone levels with the decrease of aromatase enzyme in adipose tissue after BS (24). In addition, the leptin hormone has been shown to affect testosterone synthesis and levels in obese patients (25). In our study, a significant relationship was found between testosterone levels and BMI decrease and erectile function in the post-surgical period.

Vitamin D has effects on many mechanisms such as nitric oxide release and endogenous androgen receptor in the endothelial system (26). Previous studies have shown the negative effects of vitamin D deficiency on sexual functions (27,28). Vitamin D plays an important role in steroidogenesis by regulating the expression of the CYP19A1 gene (29).

It has been shown that the vitamin D levels of obese individuals in the society are lower than those of normal weight (30). In our study, it was found that patients with high vitamin D levels had better effects on sexual functions after BS and there was a significant difference. Since vitamin D indirectly affects the synthesis of testosterone, we think that this benefit is related to the synthesis of testosterone.

LSG is one of the most frequently preferred methods in BS. In addition, LRYGP, laparoscopic adjustable gastric band and biliopancreatic diversion with duodenal switch are also used (31). The most important advantage of LSG compared to other methods is the low mortality, morbidity, and cost, and the higher patient satisfaction and weight loss. However, Calderón et al., found that all methods were equally effective in achieving normal testosterone levels after BS (32). Sarwer et al., in their prospective study of 32 men undergoing LRYGB, found no significant change in sexual function at 3 years (33). A meta-analysis found that the rate of improvement in sexual function was lower with gastric bypass surgery than with other surgical methods (34).

The study has some limitations. Studies generally report an average follow-up of one year after bariatric surgery (22,34). The most important limitation of this study is that the follow-up period was shorter than one year. Psychological and social factors were not evaluated in the study. In addition, aromatase, leptin, etc., which can affect secondary hormone synthesis not being evaluated is another limitation.

Conclusion

At the end of the study, BS provides a significant increase in the sexual functions of obese men. This increase shows a significant relationship with partner BMI and vitamin D levels. A large number of studies with participation are needed to evaluate the effects of BS on male sexual health.

Ethical Approval: In accordance with the 1964 Helsinki Declaration and its layer amendments, our study was approved by the Clinical Research Ethics Committee of the Health Sciences University, Adana City Training and Research Hospital (Ethical Committee approval number: 106/1963 Date: 30.05.2022). Written informed consent was obtained from each patient participating in the study.

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Literature Review: M.A., E.V., B.A., A.A.

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