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The evaluation of association between body mass index and clinical parameters in women underwent myomectomy

Myomektomi uygulanan kadınlarda vücut kitle indeksi ile klinik parametreler arasındaki ilişkinin değerlendirilmesi

Buğra Çoşkun[1], Demet Kokanalı[2], Ali İrfan Güzel[3], Bora Çoşkun[1], Coskun Şimşir[1], Melike Doğanay[2]

[1] Yüksek İhtisas University, Department of Obstetrics and Gynecology, Ankara, Turkey
[2] University of Health Sciences, Ankara City Hospital, Department of Obstetrics and Gynecology, Ankara, Turkey
[3] Private Obstetrics and Gynecology Clinic, İzmir, Turkey

ABSTRACT

Aim: To evaluate the association between body mass ındex and clinical parameters in women who underwent abdominal myomectomy by using correlation analysis.

Material and Method: In this retrospective study, a total of 273 women underwent abdominal myomectomy during the study period. The patients were classified into two groups according to BMI (≤30 kg/m2 and > 30 kg/m2). Risk factors recorded involved were; age, body mass index (BMI), gravidity, parity, diameter of the fibroid (DOF), preoperative and postoperative hemoglobin (Hb) levels, white blood cell and thrombocyte count, neutrophil-lymphocyte ratio (NLR), Ca125, Ca15-3, Ca19-9, CEA, AFP levels, duration of postoperative hospital stay and postoperative complications. Pearson correlation analysis was used to evaluate the association between body mass index and clinical parameters.

Results: The obese group consisted of 64 patients, and the nonobese group consisted of 209 patients. In the obese group, DOF was more extensive, and postoperative Hb was lower, the length of hospital stay was more prolonged, the level of AFP and the presence of complications were higher than in the nonobese group. According to the correlation analysis, there was a positive correlation between BMI and DOF and AFP levels, while there was a negative correlation between BMI and postoperative Hb level and length of hospital stay.

Conclusion: We think that obesity adversely affects the clinical outcomes of patients who underwent abdominal myomectomy.

Keywords: Fibroid, abdominal myomectomy, obesity, correlation analysis

ÖZ

Amaç: Abdominal myomektomi uygulanan kadınlarda vücut kitle indeksi ile klinik parametreler arasındaki ilişkiyi korelasyon analizi kullanarak değerlendirmek.

Gereç ve Yöntem: Çalışmamıza abdominal myomektomi yapılan toplam 273 kadın dahil edildi. Hastalar vücut kitle indeksi (VKİ) 'ne göre (≤30 kg/m2 ve > 30 kg/m2) iki gruba ayrıldı. Yaş, VKİ, gravida, parite, myom çapı, preoperatif ve postoperatif hemoglobin (hb) düzeyleri, beyaz kan hücresi ve trombosit sayısı, nötrofil-lenfosit oranı (NLR), Ca125, Ca15-3 , Ca19-9, CEA, AFP düzeyleri, postoperatif hastanede kalış süresi ve postoperatif komplikasyonlar gibi değişkenler retrospektif olarak incelendi. Vücut kitle indeksi ve klinik parametreler arasındaki ilişkiyi değerlendirmek için Pearson korelasyon analizi kullanıldı.

Bulgular: Obez grup 64, obez olmayan grup 209 hastadan oluştu. Obez grupta myom boyutu, ameliyat sonrası Hb daha düşük, hastanede yatış süresi daha uzun, AFP düzeyi ve komplikasyon varlığı obez olmayan gruba göre daha yüksekti. Korelasyon analizine göre, VKİ ile myom boyutu ve AFP düzeyleri arasında pozitif korelasyon varken; VKİ ile postoperatif Hb düzeyi ve hastanede kalış süresi arasında negatif korelasyon vardı.

Sonuç: Obezitenin, abdominal myomektomi uygulanan hastaların klinik sonuçlarını olumsuz etkilediğini düşünüyoruz.

Anahtar Kelimeler: Myom, abdominal myomektomi, obezite, korelasyon analizi

Corresponding Author: Buğra Çoşkun, Yüksek İhtisas Üniversitesi, Kadın Hastalıkları ve Doğum Kliniği, Ankara, Türkiye
E-mail: drbugracoskun@gmail.com
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INTRODUCTION

Uterine fibroids (UFs) are the most common neoplasms of the uterus and affect more than 70% of women of reproductive age (1). Of these women, 50 % of them are symptomatic and have complaints such as; vaginal bleeding, pelvic pain, pressure sensation, severe anemia and urethral obstruction (2, 3). Increasing age, early menarche, low parity, tamoxifen use, obesity, and in some studies a high-fat diet has been reported to be the risk factors associated with the development of the UFs (4). Management of UFs depends on women's age, the diameter of the fibroids, indication of treatment and preservation of fertility, and includes medical, laparotomic, laparoscopic and hysteroscopic approach (5, 6).

Myomectomy is mostly performed in women who desire to protect her fertility (7). Although new techniques for myomectomy are developing and being used widely with less complication ratio (decreased hospitalization and blood loss, fewer postoperative adhesions and shorter recovery) still most myomectomies are still being done via laparotomy (8).

Obesity associated with the development of UFs, a 70 kg woman has three times more risk of developing fibroids than 50 kg of the woman (9). Independent of Body Mass Index (BMI), central obesity (excess fat in the upper trunk region) is associated with changed estrogen metabolism, insulin resistance and hyperinsulinemia, and decreases in sex hormone-binding globulin levels that result in the promotion of myometrial smooth muscle cell proliferation (10).

In this study, we evaluated the association between obesity and clinical parameters in women who underwent abdominal myomectomy by using correlation analysis.

MATERIAL AND METHOD

This retrospective study was conducted in Women's Health Education and Research Hospital, from January 2012 to December 2014. This is a tertiary education and research hospital in the middle region of Turkey. The data were collected from hospital records and patient files; subject characteristics and demographics were analyzed descriptively. The study was approved by the Ethics Committee of Dr. Zekai Tahir Burak Women's Health Research and Education Hospital (EPK: 30/03/2015 – 16) before the study began. Informed consent was not needed due to the retrospective study design.

Two hundred seventy-three patients with uterine fibroids who underwent abdominal myomectomies were included in the study. Age, body mass index (BMI= weight[kg]/ height[m]2), gravidity, parity, diameter of the fibroid (DOF), preoperative and postoperative hemoglobin levels, white blood cell and thrombocyte count, neutrophil-lymphocyte ratio (NLR), Ca 125 levels, duration of postoperative hospital stay and postoperative complications (wound infections or dehiscence) were the involved factors analyzed. The patients were divided into two groups according to their BMI value. The patients with BMI ≥30 kg/m2 were defined as an obese group and those with BMI<30 were defined as the non-obese group (11).

After taking a complete history, including an obstetrical and gynecological history, the patients were subjected to abdominal myomectomy. Surgical indications were categorized into symptoms of bleeding, pain or pressure, fertility, and others. The diameter and place of the fibroids were determined preoperatively by using ultrasonography. A Pfannenstiel incision was performed for all of the patients. After the peritoneal cavity opened, an incision onto the fibroids was made by electrocautery and the fibroids were removed. Subsequently, the uterus was repaired by continuous sutures.

Statistics

Mean and standard deviation (SD) were calculated for continuous variables. The normality of the variables was analyzed by the Kolmogorov Smirnov test. Chi-square ($\chi 2$) test and Student's t-test have evaluated associations between the categorical and continuous variables. Pearson's correlation coefficient was used for the influence of BMI on clinical outcomes. Two-sided p values were considered statistically significant at $p<0.05$. Statistical analyses were carried out by using the statistical packages for SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA).

Ethical Consideration

The study was approved by the **Ethics Committee** of Dr. Zekai Tahir Burak Women's Health Research and Education Hospital (EPK: 30/03/2015–16) before the study began. Owing to the retrospective study design, informed consent was not needed.

RESULTS

During the study period, a total of 273 patients underwent abdominal myomectomy at the current clinic. The demographic and clinical characteristics of the patients are shown in **Table 1.**

Table 1. The demographic and clinical characteristics of the cases (N=273)

Clinical characteristics	Mean	SD
Age (years)	37.91	5.72
Gravidity	1.76	1.52
Diameter of fibroid (cm)	6.19	1.67
BMI (kg/m2)	29.51	14.56
Preoperative hemoglobin (g/dl)	12.62	1.29
Postoperative hemoglobin (g/dl)	10.88	1.61
NLR	2.50	2.36

BMI: Body mass index
NLR: Neutrophil-to-lymphocyte ratio

Table 2 summarized the demographic and clinical differences between the groups. The obese group consisted of 64 patients, and the nonobese group consisted of 209 patients.

Table 2. The demographic and clinical differences between the groups

	Group I (n=209)	Group II (n=64)	P value
Age (years)	36,57±5,52	38,33±3,89	0,542
Diameter of fibroid (cm)	7,29±1,47	9,19±1,92	**0,013**
Preoperative Hb (g/dl)	12.02±1.22	11.89±1.11	0.215
Postopoperative Hb (g/dl)	10,61±1,59	9,81±1,66	**0,001**
Gravida	2,57±0,96	2,39±0,92	0,870
Hospital stay days	2,84±0,87	3,39±1,08	**0,003**
Urea (mg/dl)	27,10±2,28	28,38±2,27	0,649
AST (U/L)	18,23±2,54	19,27±2,91	0,142
ALT (U/L)	15,36±4,10	17,81±5,22	0,026
Platelets (K/uL)	273,04±68,66	283,38±66,73	0,415
WBC (K/uL)	7,38±1,94	7,02±2,18	0,208
Ca125 (U/ml)	21,89±7,61	17,67±4,88	0,434
Ca19-9 (U/ml)	16,40±6,48	11,50±2,52	0,163
AFP (ng/ml)	2,32±3,16	8,73±2,48	**0,041**
Ca15-3 (U/ml)	14,54±5,28	13,14±4,32	0,744
CEA (ng/ml)	0,67±0,29	0,56±0,17	0,407
NLR	1,94±0,75	2,25±0,77	0,358
Complication*, n (%)	14 (6,69)	12 (18,75)	**0,016**
Postop. blood transfusion	3	4	
Urinary tract infection	5	4	
Wound complication	6	10	
Re-operation	-	1	

P values were considered statistically significant at p<0.05, Preop Hb: Preoperative hemoglobine, Postop Hb: Postoperative hemoglobine, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, WBC: White blood cell, AFP: alpha-fetoprotein, CEA: Carcinoembryonic antigen, NLR: Neutrophil-to-lymphocyte ratio

In the obese group, DOF was larger (p=0.013) postoperative Hb was lower (p=0.001), length of hospital stay was longer (p=0.003), level of alpha-fetoprotein (AFP) (p=0.041) and the presence of complications was higher (p=0.016) than in a nonobese group. One patient in the obese group was reoperated due to postoperative intraabdominal bleeding. Wound complications (infection, hematoma, opening) were present in 10 people. Postoperative urinary tract infection occurred in 4 patients and blood transfusion requirements occurred in 4 patients. None of the patients in the nonobese group were reoperated and other complications were also less frequent.

According to the correlation analysis, there were positive correlation between BMI and DOF (r=0.201; p=0.002) and AFP levels (r=0.119; p=0.044), while there were negative correlation between BMI and postoperative hb level (r=-0.210; p<0.001) and length of hospital stay (r=-0.295; p<0.001) (**Table 3**).

Table 3. Correlation between BMI and significant demographic and clinical characteristics of the patients

	r	*p*
Diameter of fibroid	0.201	0.002
Postoperative Hb	-0.210	<0.001
Hospital stay days	-0.295	<0.001
AFP levels	0.119	0.044

r: Pearson's correlation coefficient
P values were considered statistically significant at p<0.05

DISCUSSION

UFs are the most common benign gynecological tumors in reproductive-age women. They are the cause of a significant women's health concern, but the etiology of these neoplasms is still not precisely understood (12). Experimental and epidemiological studies have established that ovarian steroid hormones play an essential role in the pathogenesis of this disease. Namely, the growth of leiomyomas depends on the ovarian hormones estrogen and progesterone (13).

In literature, the relation of BMI and UF is inconsistent. Some studies have demonstrated an increased risk of UF with increasing BMI (12,14,15) while others have not (16-18). However, it is generally accepted that obesity is a significant risk factor for UF and the increase in the BMI induces the risk of UF occurrence. It has been reported that the risk of development of UF increases by 21% with every 10 kg increase in body weight (19). Hitherto, the underlying mechanism between this association as well as the interaction between the adipose cells and leiomyoma cells has not yet well established.

In our study, we have found that in obese women the DOF was more extensive as compared to nonobese women. BMI reflects the absolute measurement of body fat composition (20). It may affect the development of UF through changes in steroid hormone metabolism (21). It has been shown that there is an inverse association between BMI and circulating levels of sex hormone-binding globulin. Once the amount of sex hormone-binding globulin decreases, the proportion of free estrogen or the fraction available for biologic activity may increase (10,22,23). Furthermore, obesity induces the hydroxylation of estrone to estriol. Then the increase levels of estriol influence development of UL through the direct promotion of myometrial smooth muscle cell proliferation as well as enlargement of UL (10).

BMI seems to be associated with the risk of complications after most surgical procedures. Obesity may increase the risk of bleeding requiring transfusion (24), length of hospital stay (25) and postoperative complications such as operative related infections (26). In our present study, high BMI was associated with increased risk of the amount of bleeding during surgery requiring blood transfusion, a more extended postoperative hospital stay and a high rate of postoperative complications. These associations can be explained by larger wound surfaces, deeper subcutaneous

adipose tissue and greater DOF which may cause much time to reach the abdominal cavity, increased amount of bleeding, impaired wound healing and high rate of infectious agent exposure leading wound infections.

Another interesting finding of this study is the association between BMI and serum AFP levels, which may point out a significant health problem. AFP is a fetal glycoprotein produced by the yolk sac and fetal liver and decreased rapidly after birth (27). It increases mainly due to liver pathologies (steatosis, hepatitis, cirrhosis, carcinoma..etc) in which the hepatocyte-hepatocyte interactions altered and the typical architectural arrangements are lost. With increasing body weight, the obesity-related inflammatory process probably results in hepatic steatosis resulting in the increased levels of serum AFP (28).

As a result, BMI is associated with the clinical outcomes of patients who underwent abdominal myomectomy. The higher BMI increases the risk of adverse clinical outcomes before, during and after the abdominal myomectomy. Therefore, for all women, necessary precautions should be taken against obesity.

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DECLARATION OF CONFLICTING INTERESTS

The author declared no conflicts of interest with respect to the authorship and/or publication of this article

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