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The relationship between body mass index and clinical complications among patients undergoing myomectomy

Myomektomi olan hastalarda vücut kitle indeksi ve klinik komplikasyonlar arasındaki ilişki

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Abstract

Aim: Obesity, a chronic disease which significantly causes disability, is a critical public health concern all over the world. A possible correlation between the complications of uterine leiomyoma and obesity has been recently considered, but no definitive conclusions have been made. The purpose of this study is to investigate the association between body mass index (BMI) and clinical complications among the patients undergoing myomectomy to see whether BMI can affect the clinical outcomes and complications of women with uterine leiomyoma.

Methods: This retrospective cohort study was conducted on the patients undergoing abdominal myomectomy for uterine leiomyoma from September 2016 to December 2019. A total of 287 patients undergoing abdominal myomectomy participated in the study. The patients were divided into two groups based on BMI: BMI <30 kg/m^2 (Group 1) and BMI ≥30 kg/m^2 (Group 2).

Results: The mean ages of the patients in Groups 1 and 2 were 37.08(6.17) years and 37.53 (5.98) years, respectively. Among all, 196 patients had a BMI of <30 kg/m^2 and 91 patients had a BMI of ≥30 kg/m^2. There was no statistically significant difference between the two groups in terms of surgical indication (P=0.970), leiomyoma localization (P=0.793), leiomyoma size (P=0.335), the mean number of fibroids removed (P=0.537), postoperative pathological diagnosis (P=0.189), complications, and the mean duration of hospital stay (P=0.249). There was a statistically significant difference between the two groups in terms of BMI (P<0.001), ALT (P=0.039), and Urea (P=0.018).

Conclusion: BMI did not adversely affect the clinical outcomes of patients undergoing abdominal myomectomy. Obesity is not regarded as a risk factor for poor outcomes.

Keywords: Body mass index, Uterine leiomyoma, Abdominal myomectomy, Obesity

Öz

Amaç: Obezite, tüm dünyada önemli ölçüde engelliliğe ve kritik bir halk sağlığı sorununa neden olan kronik bir hastalıktır. Son zamanlarda uterin leiomyom ve obezite komplikasyonları arasında olası bir ilişki düşünülmüştür, ancak kesin sonuçlara varılmamıştır. Bu çalışmanın amacı, myomektomi olan hastalarda vücut kitle indeksi (VKİ) ve klinik komplikasyonlar arasındaki ilişkiyi araştırmak ve VKİ'nin uterus leiomyomu olan kadınların klinik sonuçlarını ve komplikasyonlarını etkileyip etkilemediğini görmektir.

Yöntemler: Bu retrospektif kohort çalışmaya, Ekim 2016 ve Aralık 2019 arasında uterin leiomyom tanısı alan ve abdominal myomektomi geçiren hastalar alındı. Çalışmaya abdominal miyomektomi uygulanan 287 hasta katıldı. Hastalar VKİ'ye göre iki gruba ayrıldı: VKİ <30 kg/m2 (Grup 1) ve VKİ 30 kg/m2 (Grup 2).

Bulgular: Birinci gruptaki hastaların ortalama yaşı 37,08 (6,17), 2. gruptaki hastaların ortalama yaşı ise 37,53 (5,98) olarak bulundu. VKİ 30 kg/m2 altında olan hasta sayısı 196, VKİ 30 kg/m2 üzerinde olan hasta sayısı ise 91'di. Cerrahi endikasyon (P=0,970), leiomyom lokalizasyonu (P=0,793), leiomyoma boyutu (P=0,335), çıkarılan ortalama myom sayısı (P=0,537), postoperatif patolojik tanı (P=0,189), komplikasyonlar ve ortalama hastanede kalış süresinde (P=0,249) iki grup arasında istatistiksel olarak anlamlı fark yoktu. İki grup arasında VKİ (P<0,001), ALT (P=0,039) ve Üre (P=0,018) açısından istatistiksel olarak anlamlı fark vardı.

Sonuç: VKİ, abdominal myomektomi geçiren hastalarda klinik sonuçları olumsuz bir şekilde etkilemedi. Myomektomi geçiren hastalar arasında obezite, sonuçlar açısından bir risk faktörü olarak değerlendirilmemektedir.

Anahtar kelimeler: Vücut kitle indeksi, Uterin leiomyom, Abdominal myomektomi, Obezite

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Introduction

Uterine leiomyomas, also called myomata or fibroids, are benign pelvic tumors which are common among women [1,2]. The uterine fibroids (UFs) are the monoclonal tumors of the smooth muscle cells of the myometrium, which are composed of large extracellular matrix containing fibronectin, proteoglycan, and collagen [2,3]. The severe symptoms of leiomyomas are anemia and prolonged, irregular menstrual bleeding despite their benign nature. Other disorders such as infertility, recurrent abortion, and preterm labor may occur [4]. The risk factors for UFs are family history, black ethnicity, obesity, and parity [1,3].

Myomectomy is the common surgical method for those who want to have children or retain their uterus. The classic laparotomy incision, laparoscopy, or the robotic approach can be used for myomectomies [5].

Obesity is a chronic disease that causes significant disability and constitutes a critical public health concern all over the world. A correlation between obesity and uterine fibroids has been recently considered, but there are no definitive conclusions [6].

There are various obese patients who undergo surgeries for UFs among studies [7,8]. A study focusing on the outcome and feasibility of laparoscopy showed that 24% of the patients who underwent UF surgery were overweight or obese. It has been reported that BMI may significantly affect the development of fibroids [9]. The risk of fibroids among women weighing 70 kg is three times as much as that among women weighing 50 kg [10].

In this study, we investigated the association between Body mass index (BMI) and clinical complications among patients undergoing myomectomy.

Materials and methods

This retrospective cohort study was conducted on patients who underwent abdominal myomectomy for uterine leiomyoma from September 2016 to December 2019, at Istanbul Medeniyet University Goztepe Training Hospital Gynecology & Obstetrics Clinic. This study was approved by the university /local human research ethics committee and all procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was carried out with the permission of Research Ethics Committee of Istanbul Medeniyet University Goztepe Training Hospital (Permission granted /CAAE number: 21.01.2020, Decision no: 2020/0013). Patients who had been diagnosed with UFs and operated in our hospital were included in our study. All patients were in the reproductive age (15-49 years). Laparoscopic cases and those who underwent hysterectomy were excluded.

The subjects were divided into two groups based on BMI: BMI <30 kg/m^2 (Group 1) and BMI ≥30 kg/m^2 (Group 2). BMIs were calculated based on the height and weight of the patients during the operation. In addition to the demographic information such as age, gravida, parity, smoking, the complaints (bleeding, pain, infertility, and pelvic pressure), preoperative and postoperative hemogram parameters (Hb: hemoglobin; WBC: white blood cell; PLT: Platelet) and preoperative ALT: alanine transaminase, AST: aspartate transaminase, Urea, Creatinine values, pre-operative endometrial biopsy, fibroid localization (subserous, intramural or submucous), fibroid size, postoperative pathology result (leiomyoma or leiomyosarcoma), hospital stay, complications if any (bleeding, hematoma, ileus, postoperative fever (>38˚), wound infection and bleeding requiring transfusion) were recorded.

When the sample size was calculated with GPower 3.1 (http://www.gpower.hhu.de/) program, the total sample size of two groups compared with the Student's t-test at the effect size of 2%, power of 95% and 0.05 type 1 error, was at least 262 patients.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 26.0 (SPSS Inc., Chicago, IL, USA) was used to perform statistics. The normal distribution of the data was evaluated using the Kolmogorov-Smirnov test. To evaluate the differences between groups for normally and non-normally distributed variables, Independent student t-test and Mann-Whitney U test, respectively, were used. Chi-square test was applied to demonstrate the differences between groups for categorical variables.

Results

A total of 287 patients undergoing abdominal myomectomy participated in this study. The mean ages of Groups 1 and 2 were 37.08 (6.17) years and 37.53 (5.98) years, respectively. One hundred and ninety-six patients had a BMI of <30 kg/m^2 and 91 patients had a BMI of ≥30 kg/m^2.

Table 1 shows the clinical and demographic features of the patients. There was no statistically significant difference in the mean age, parity, smoking, preoperative Hb, postoperative Hb, AST, Platelet, WBC, Creatinine, and Preoperative Endometrium Biopsy between the two groups. Two groups were significantly different in terms of BMI (P<0.001), ALT (P=0.039), and Urea (P=0.018). BMI ≥30kg/m^2 indicated obesity.

Table 1: Clinical and demographic features of the patients

Parameters	Group 1 (BMI <30) (n=196)	Group 2 (BMI ≥ 30) (n=91)	*P*-value
Age	37.08 (6.17)	37.53 (5.98)	0.469**
Parity	1.54 (0.89)	1.67 (1.09)	0.410**
BMI (kg/m$^{2)}$	27.11 (2.20)	31.89 (1.81)	<0.001**
Smoking	8 (4.08%)	5 (5.49%)	0.592***
Preoperative Hb (g/dL)	11.84 (1.47)	12.03 (1.37)	0.301*
Postoperative Hb (g/dL)	10.38 (1.32)	10.44 (1.14)	0.632*
AST (U/L)	17.23 (6.90)	17.43 (5.33)	0.453**
ALT (U/L)	15.87 (9.71)	17.55 (8.77)	0.039**
PLT (x10^3/μL)	230.83 (59.79)	236.01 (59.99)	0.571*
WBC (x10^3/μL)	12.54 (3.60)	12.57 (3.62)	0.994*
Urea (mg/dL)	23.49 (10.10)	24.63 (7.01)	0.018**
Creatinine (mg/dL)	0.68 (0.11)	0.69 (0.06)	0.095**
Preoperative Endometrium Biopsy			
No	60 (30.6%)	34 (37.3%)	0.698***
Proliferative Endometrium	98 (50%)	40 (44%)	
Secretuary Endometrium	14 (7.1%)	8 (8.8%)	
Endometrial Polyp	16 (8.2%)	7 (7.7%)	
Epithelial	8 (4.1%)	2 (2.2%)	

ALT: alanine transaminase, Hb: hemoglobin, WBC: white blood cell, AST: aspartate transaminase, * Student t-test, ** Mann-Whitney U test, *** Chi-square test. Continuous variables are presented as mean (SD) and categorical variables are expressed as n (%).

Table 2 shows the features and complications of leiomyoma. Ninety-one patients (46.4%) in Group 1 and 39 patients (42.9%) in Group 2 had abnormal bleeding which was the most common surgical indication but there was no statistically significant difference between the two groups (P=0.970).

Table 2: Leiomyoma features and complications

Feature	Group 1 (BMI <30) (n=196)	Group 2 (BMI ≥ 30) (n=91)	*P*-value
Surgical indication			0.970**
Ache	35 (17.9%)	17 (18.7%)	
Infertility	31 (15.8%)	17 (18.7%)	
Abnormal bleeding	91 (46.4%)	39 (42.9%)	
Pelvic pressure	25 (12.8%)	12 (13.2%)	
Suspected malignancy	14 (7.1%)	6 (6.5%)	
Leiomyoma localization			0.793**
subserosal	66 (33.7%)	28 (30.8%)	
intramural	97 (49.5%)	45 (49.4%)	
submucosal	33 (16.8%)	18 (19.8%)	
Leiomyoma size (cm)	7.68 (3.82)	8.23 (4.13)	0.335*
Number of fibroids removed	3.08 (4.61)	3.21 (3.8)	0.537*
Postoperative pathological			0.189**
diagnosis	190 (97%)	86 (94.5%)	
Leiomyoma	2 (1%)	-	
Leiomyosarcoma	4 (2%)	5 (5.5%)	
Adenomyosis			
Complications			0.876**
Bleeding requiring	21 (10.7%)	12 (13.2%)	
transfusion	3 (1.5%)	1 (1.1%)	
Intraabdominal hematoma (≥4	6 (3%)	2 (2.2%)	
cm)	5 (2.5%)	3 (3.3%)	
Abdominal wall hematoma	7 (3.6%)	2 (2.2%)	
Postoperative fever (≥38º)	8 (4.1%)	2 (2.2%)	
Ileus	1 (0.5%)	1 (1.1%)	
Wound infection	1 (0.5%)		
Wound separation	1 (0.5%)	-	
Pelvic organ injury		1 (1.1%)	
Bowel damage			
Bladder damage			
Duration of hospital stay	2.35 (0.96	2.27 (1.04	0.249*
(day)			

* Mann-Whitney U test, ** Chi-square test. Continuous variables are presented as mean (SD and categorical variables are expressed as n (%).

Ninety-seven patients (49.5%) in Group 1 and 45 (49.4%) in Group 2 had intramural leiomyomas, which was the most common site, and leiomyoma localizations were similar between the two groups (P=0.793).

The mean size of leiomyoma was 7.68 (3.82) in Group 1 and 8.23 (4.13) in Group 2. The leiomyoma size did not show a statistically significant difference between the two groups (P=0.335). The mean number of fibroids removed was 3.08(4.61) in Group 1 and 3.21(3.8) in Group 2 (P=0.537). One hundred and ninety patients (97%) in Group 1 and 86 patients (94.5%) in Group 2 had leiomyomas, which was the most common postoperative pathological diagnosis (P=0.189). Twenty-one patients (10.7%) in Group 1 and 12 patients (13.2%) in Group 2 needed a blood transfusion (P=0.876). Results also show that the mean duration of hospital stay was 2.35(0.96) in Group 1 and 2.27(1.04) in Group 2 (P=0.249).

Discussion

The aim of this study was to investigate the association between body mass index (BMI) and clinical complications among patients undergoing myomectomy. UFs are common benign gynecological tumors of women at reproductive age. There is not enough information about the etiology of these neoplasms despite the significant issues which they cause for health [11].

Some studies have reported conflicting results about the relationship between BMI and UFs.

A study by Çinar et al. [12] found significant differences between the obese and non-obese groups in duration of hospital stay, gravidity, age, postoperative Hb, the diameter of fibroid (DOF), and complications. In their study, the obese group had higher complications including hemorrhage, postoperative fever, ileus wound, and infection, which is not consistent with our study results.

Wen et al. [13] also found that obese women were significantly exposed to both early and late complications, such as increased hospital stay. Non-serosal types were positive correlated with more complications, and the most common complication during the operation was hemorrhage in obese and non-obese women undergoing abdominal myomectomy. The uterine fibroids were larger in the obese women, who had more wound infection and ileus in the postoperative period, while our study found that the obese and non-obese women showed no significant difference in terms of the leiomyoma size, complications, and bleeding requiring transfusion.

There was a reverse association between BMI and sex hormone-binding globulin (SHBG) levels. A decrease of the SHBG caused an increase in the fraction of biological activity and free estrogen ratio [14,15]. He et al. [16] found lower levels of SHBG in obese individuals.

Burke et al. [17] and Smith et al. [18] found a positive association between central obesity, age, and parity, while our study results found no association between BMI, age and parity.

Some studies found an association between BMI and the risk of post-operative complications. Our study results are not consistent with the results of the studies which found an association between obesity and the risk of bleeding requiring transfusion [19], postoperative complications including infections [20], and the length of hospital stay [21].

Our study results are also not in line with the results of the study by Çoşkun et al. [22] who found a positive correlation between BMI, Alpha–feto protein (AFP) levels and DOF, and a negative correlation between BMI, length of hospital stay and postoperative Hb level, and an association between BMI, bleeding requiring blood transfusion and increased complications after surgery.

Amruta et al. [23] found a direct association between BMI and the risk of fibroids, which does not support our study results.

Our study results support the results of the study by Parazzini [24] who found no positive association between BMI and increased risk of UFs and differs from the study by Lumbiganon who found a positive association between UFs and obesity and the study by Wise et al. [25] who found 21% increase of the risk of UFs development with 10 kg increase of the body weight.

Siedhoff et al. [26] and Lamvu et al. [27] found more clinical usage of less invasive approaches such as laparoscopic myomectomy which can be performed safely for the obese patients.

George et al. [28] reviewed the data of 77 patients who underwent robotic myomectomy and showed no associations between BMI, estimated blood loss, length of hospital stay, or duration of procedure. Nawfal et al. [29] retrospectively reviewed 135 robotic-assisted hysterectomies and found no correlation between BMI and estimated blood loss, the length of

stay, or duration of procedure and no association between BMI and increasing complications.

Sparic et al. [30] reported that obesity was not consistently associated with the risk of leiomyomas. All the above-mentioned studies are consistent with our study results.

Limitations

Like any other studies, the present study has some limitations. The most important limitation of this study is that there was a statistically significant difference between the patients in the two groups in terms of ALT and Urea. This may affect the results of the study, and careful evaluation should be done considering this difference while evaluating the results. Different studies have found conflicting results.

Conclusion

According to the findings of the study, BMI did not adversely affect the clinical outcomes in patients who underwent abdominal myomectomy. Abdominal myomectomy may be a less invasive surgical procedure for both obese and non-obese patients with uterine leiomyoma. Obesity is not regarded as a risk factor for the poor outcomes in patients undergoing myomectomy.

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