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Evolution of Leiomyomas with FIGO classification regarding parity, body-mass index and admission symptoms

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ABSTRACT

Aims: To examine the outcomes of leiomyomas classified by FIGO in relation to the demographic, clinical, and laboratory characteristics of patients who underwent laparotomic myomectomy.

Methods: A total of 199 patients were found between September 2019 and September 2023 according to the criteria for study. Data were analyzed and compared in terms of FIGO leiomyoma classification, leiomyoma size, admission symptoms, body-mass index (BMI) and parity. All demographical and operational features were compared in each group for issues including leiomyomas >8 cm, <8 cm; single or multiple leiomyomas; BMI >30, <30; multiparous and nulliparous patients. Moreover, patients' admission symptoms as abnormal uterine bleeding, pelvic pain and compression were also recorded and compared.

Results: The mean leiomyoma size, compression symptoms and pelvic pain of those with abnormal uterine bleeding was 8.5±3.2 cm, 9.6±3.1 cm, and 10.9±3.6 cm; respectively. The mean leiomyoma size of individuals with pelvic pain was significantly larger than that of those with abnormal uterine bleeding ($p<0.05$). Nulliparous patients exhibited a higher incidence of multiple myomas than multiparous patients. Nulliparous patients experienced a lower incidence of abnormal uterine hemorrhage than multiparous patients; however, the incidence of pelvic pain and pressure symptoms was more common ($p=0.013$). The mean leiomyoma size of those with BMI <30 and BMI ≥30 was 9.8±3.6 cm, and 9.2±3.1 cm; respectively. No statistically significant difference was observed between these groups in terms of mean leiomyoma size, operation time, hospital stay and postoperative complications ($p>0.05$).

Conclusion: When evaluating laparotomic myomectomy patients, the patient's parity status, location and size of the leiomyoma should be taken into consideration before surgery.

Keywords: Leiomyomas, parity, FIGO classification, laparotomic myomectomy

INTRODUCTION

Leiomyomas are the most common tumors seen in women that develop from smooth muscle cells.[1,2] The incidence increases with age, but the rate of increase alleviates at older ages. Leiomyomas are more frequent in nulliparous and overweight women.[3] They represent the predominant cause of abnormal uterine bleeding and hysterectomies.[4] Most leiomyomas are small and asymptomatic; nevertheless, several patients with leiomyomas experience substantial issues that disrupt certain facets of their lives and necessitate treatment.[5] Leiomyomas are primarily observed when symptomatic, typically present as abnormal uterine bleeding and/or pelvic pain or pressure.[6] The number, size, and location of the tumors are all factors that contribute to the development of these symptoms. Myomas can occur as single or multiple tumors and can range in size from microscopic to tens of centimeters.

Leiomyomas are classified based on their anatomical position within the uterus, but numerous leiomyomas may possess multiple location designations. The International Federation of Gynecology and Obstetrics (FIGO) has classified myomas according to their location.[7] Intramural myomas (FIGO type 3, 4, 5) are situated within the uterine wall. They may expand to the extent that the uterine cavity or serosal surface is distorted. Certain fibroids may be transmural, extending from the serosal to the mucosal surface. Myometrial cells located beneath the endometrium (the lining of the uterine cavity) are the source of FIGO type 0, 1, 2 leiomyomas. These neoplasms protrude into the uterine cavity. The FIGO/European Society of Hysteroscopy classification system delineates the extent of this protrusion, which is clinically pertinent for predicting the results of hysteroscopic myomectomy.[8] FIGO types 6 and 7 leiomyomas arise from the myometrium at the serosal surface of the uterus, while FIGO type 8 parasitic leiomyomas are situated in the cervix or adnexa, rather than the uterine corpus.

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Treatment options for leiomyoma include medical therapy, non-excisional procedures (e.g., endometrial ablation, uterine artery embolization), and surgical therapy (e.g., myomectomy, hysterectomy). Myomectomy is the surgical excision of leiomyomas from the uterus while preserving the organ. This surgical technique may be executed using abdominal, laparoscopic, hysteroscopic, or vaginal methods.[4]

The size, number, and location of the leiomyoma determine the incidence and severity of symptoms. These also affect surgical treatment options. Consequently, the objective of our investigation was to evaluate the demographic, clinical, and laboratory findings, as well as the results of operational reports, of patients who underwent laparotomic myomectomy. We believe that this analysis data and results of the patients will shed light on the preoperative patient selection and will also help with postoperative patient follow-up.

METHODS

The study was carried out with the permission of the Adana City Hospital Clinical Researches Ethics Committee (Date: 14.09.2023, Decision No: 2826). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This retrospective case control study was performed at a territory hospital, between September 2019 and September 2023. During the time period covered, 305 myomectomy procedures were performed. We excluded 5 patients because of missing data, 50 patients because myomectomy was performed at the time of cesarean section, 18 patients because it was performed vaginally, 10 patients because it was hysteroscopic, and 23 patients because other concomitant operations were performed. Finally, 199 patients who underwent laparotomic myomectomy were included the study. The inclusion criteria consisted patients aged 18-45 who underwent laparotomic myomectomy. Patients with uterine anomalies, myomectomies performed without laparotomic way, myomectomies with concomitant operations and patients with malignancy were excluded. Demographic data and clinical features of the patients in the study group were recorded as follows: age, body-mass index (BMI), gravida, parity, preoperative complaints, leiomyoma size, number of leiomyomas, leiomyoma localization according to FIGO leiomyoma uteri classification system. The pre-postoperative hemoglobin (Hb), specimen pathology, incision type, operation time, hospital stay and postoperative complication parameters were also noted.

According to the inclusion criteria, the patients included in the study were grouped separately according to their admission symptoms (abnormal uterine bleeding, compression symptoms and pelvic pain) and BMI limits (below and above 30) and compared in terms of their hospital stay, postoperative complications, myoma sizes and locations.

Statistical Analysis

In order to determine whether continuous data were normally distributed, we implemented the Shapiro-Wilk test. Categorical variables were collected as numbers and percentages. While the mean±standard deviation was employed for continuous variables that were normally distributed, the median (25%-75%) was employed for all other variables. The Mann-Whitney U test was employed for two independent groups in the absence of normal distribution, while the independent samples T test was utilized in its presence. One-way ANOVA was employed to analyze the data across the three categories, and the Tukey test was employed for the post-hoc analysis. We accepted $p<0.05$ as statistically significant.

RESULTS

The study was conducted with a total of 199 myomectomy cases. The study included 126 patients with singular myomas and 73 patients with multiple myomas. 148 of these patients with leiomyoma, the largest leiomyoma diameter was greater than 8 cm, and in 51 of them, the largest myoma diameter was less than 8 cm. The means of age and the BMI were 38.6±9.7 years and 25.8±4.3 kg/m^2 respectively. Demographic and clinical characteristics of all the cases were shown in **Table 1**.

Patients were classified into three groups according to their presenting symptoms (abnormal uterine bleeding, compression symptoms, and pelvic pain). There were 83 (41.7%) patients with abnormal uterine bleeding, 83 (41.7%) patients with pelvic pain, and 33 (16.6%) patients with compression symptoms. Comparison of clinical outcomes among groups regarding of admission complaints was shown in **Table 2**. Accordingly; the mean leiomyoma size of those with abnormal uterine bleeding was 8.5±3.2 cm, the mean leiomyoma size of those with compression symptoms was 9.6±3.1 cm, and the mean leiomyoma size of those with pelvic pain was 10.9±3.6 cm. The mean leiomyoma size of individuals with pelvic pain was significantly larger than that of those with abnormal uterine bleeding ($p<0.05$). No statistically significant difference was observed in mean myoma size between those with compression symptoms and those with abnormal uterine bleeding and pelvic pain ($p>0.05$). In nulliparous patients, the rate of abnormal uterine bleeding was lower, and the rate of compression symptoms and pelvic pain was higher than in multiparous patients ($p<0.05$). Operation time, postoperative complications, and duration of hospital stay did not show statically significant between groups ($p>0.05$). Patients were additionally divided according the Figo leiomyoma classification as type (2, 3, 4, 5) and type (6, 7, 8) and in those with abnormal uterine bleeding, a higher rate of type (2, 3, 4, 5) myoma and a lower rate of type (6, 7, 8) myoma were detected compared to those with pelvic pain ($p<0.05$).

The patients were categorized into two groups based on their BMI and compared with the size of the leiomyoma, the location of the leiomyoma, the duration of the operation, the length of their hospital stay, and the presence of postoperative complications. Comparison of clinical outcomes among groups regarding of BMI was shown in **Table 3**. The mean leiomyoma size of those with BMI <30 was 9.8±3.6 cm, and the mean leiomyoma size of those with BMI ≥30 was 9.2±3.1 cm. Between the groups, there was no statistically significant difference in the mean size of the leiomyomas ($p>0.05$). No statistically significant difference was seen between the groups regarding mean postoperative complications, operation time, and length of hospital stay ($p>0.05$). In addition, the relationship between BMI and leiomyoma size was shown in **Figure**.

Table 1. Demographic and clinical outcomes of all patients

	n=199
Age (years)	38.6±69.7
BMI (kg/m²)	25.8±4.3
Gravida	1 (0-9)
Parity	1 (0-7)
Multipara	128 (64.3%)
Nulliparous	71 (35.7%)
Operation time (minute)	61.2.±21.5
Preoperative Hb (g/dl)	12.0.±1.5
Postoperative Hb (g/dl)	10.2.±1.4
Admission complaint (%)	
Abnormal uterine bleeding	83 (41.7%)
Pelvic pain	83 (41.7%)
Compression symptoms	33 (16.6%)
Leiomyoma size (%)	38.6±69.7
≥8 cm	148 (74.4%)
<8 cm	51 (25.6%)
Number of leiomyomas in the operation (%)	
Single	126 (63.3%)
Multiple	73 (36.7%)
Compression symptoms	33 (16.6%)
FIGO classification (%)	
Type 6	58 (29.1%)
Type 5	54 (27.1%)
Type 4	47 (23.6%)
Type 3	20 (10.1%)
Type 7	9 (4.5%)
Type 8	8 (4%)
Type 2	3 (1.5%)
Incision type (%)	
Pfannenstiel	169 (89.4%)
Lower abdominal longitudinal	24 (12.1%)
Lower and upper abdominal longitudinal	6 (3%)
Pathology results (%)	
Leiomyoma	193 (97%)
Leiomyoma+adenomyosis	4 (2%)
STUMP+leiomyoma	2 (1%)
Postoperative complications (%)	
None	194 (97.5%)
Wound infection	3 (1.5%)
Bowel injury	1 (0.5%)
Relaparotomy	1 (0.5%)

BMI: Body-mass index, Hb: Hemoglobin, FIGO: The International Federation of Gynecology and Obstetrics, STUMP: He uterine smooth muscle tumors of uncertain malignant potential

Table 2. Comparison of clinical outcomes among groups regarding of admission complaints

	Abnormal uterine bleeding n=83	Compression symptoms n=33	Pelvic pain n=83	p-value
Leiomyoma size (cm)	8.5±3.2[a]	9.6±3.1[a,b]	10.9±3.6[b]	0.001
Leiomyoma size (%)				
<8 cm	34 (41%)[a]	6 (18.2%)[a,b]	11 (13.1%)[b]	0.001
≥8 cm	49 (59%)[a]	27 (81.8%)[a,b]	72 (86.7%)[b]	
Operation time (minute)	59.9±18.8	62.7±19.6	61.9±23.8	0.754
Hospital stays (day)	4.2±6.3	3.7±0.9	3.3±0.9	0.442
Postoperative complications (%)				
(+)	3 (3.6%)	1 (3%)	1 (1.2%)	0.753
(-)	80 (96.4%)	32 (97.0%)	82 (98.8%)	
FIGO classification (%)				
Type 2,3,4,5	67 (80.7%)[a]	20 (60.6%)[a,b]	37 (44.6%)[b]	0.001
Type 6,7,8	16 (19.3%)[a]	13 (39.4%)[a,b]	46 (55.4%)[b]	
Number of delivery (%)				
Nulliparous	20 (24.1%)[a]	16 (48.5%)[b]	35 (42.2%)[b]	0.013
Multiparous	63 (75.9%)[a]	17 (51.5%)[b]	48 (57.8%)[b]	

p-value is calculated by ANOVA and Tukey test is used for post-hoc test, different superscripts indicate significant mean differences, FIGO: The International Federation of Gynecology and Obstetrics

Table 3. Comparison of clinical outcomes among groups regarding of BMI

	BMI ≥30 n=167	BMI <30 n=32	p
Leiomyoma size (cm)	9.8±3.6	9.2±3.1	0.354
Leiomyoma size (%)			
<8 cm	44 (26.3%)	7 (21.9%)	0.596
≥8 cm	123 (73.7%)	25 (78.1%)	
Operation time (minute)	61.3±21.5	60.9±21.6	0.935
Hospital stays (day)	3.8±4.5	3.8±0.8	0.682
Postoperative complications (%)			
(+)	4 (2.4%)	1 (3.1%)	0.790
(-)	163 (97.6%)	31 (96.9%)	
FIGO classification (%)			
Type 2,3,4,5	108 (64.7%)	16 (50.0%)	0.117
Type 6,7,8	59 (35.3%)	16 (50.0%)	
Number of delivery (%)			
Nulliparous	62 (37.1%)	9 (28.1%)	0.33
Multiparous	105 (62.9%)	23 (71.9%)	

BMI: Body-mass index, Hb: Hemoglobin, FIGO: The International Federation of Gynecology and Obstetrics

Comparison of clinical outcomes among groups regarding of leiomyomas singularity or multiparity was shown in Table 4. The largest myoma size of those with a single myoma in the patients with 8 cm> and ≥8 cm was 19.0% and 81.0%, respectively, and the ratio of the largest myoma size of those with multiple myomas in the patients with 8 cm> and ≥8 cm was 37.0% and 63.0%; respectively. The mean largest myoma size in the single leiomyoma group was larger than in the multiple leiomyoma group ($p<0.05$). No statistically significant difference was found between the groups in terms of operation time, hospital stay and postoperative complications. The rate of multiple myomas was higher in nulliparous patients than in multiparous patients, and this difference was statistically significant ($p<0.05$).

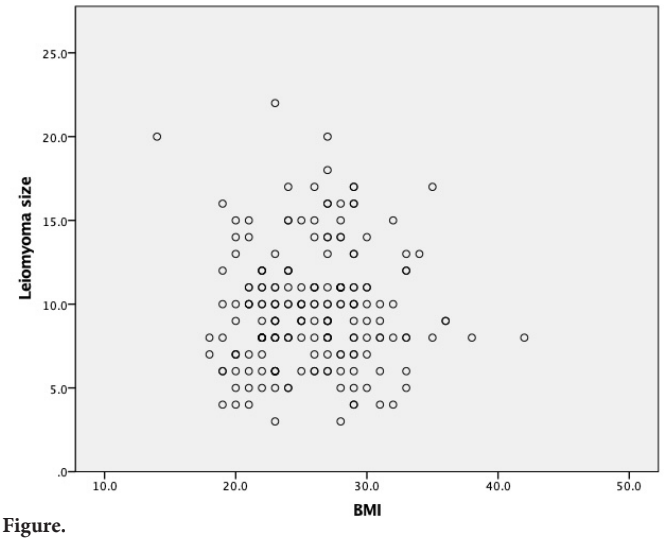

Figure.

Table 4. Comparison of clinical outcomes among groups regarding of leiomyomas singularity or multiparity

	Single n=126	Multiple n=73	p
Leiomyoma size (cm)	10.1±3.4	9.0±3.7	0.044
Leiomyoma size (%)			
<8 cm	24 (19%)	27 (37%)	0.005
≥8 cm	102 (81%)	46 (63%)	
Operation time (minute)	61.0±21.2	61.6±22.0	0.833
Hospital stays (day)	3.8±5.1	3.7±1.1	0.963
Postoperative complications (%)			
(+)	4 (3.2%)	1 (1.4%)	0.756
(-)	122 (96.8%)	46 (63%)	
FIGO classification (%)			
Type 2,3,4,5	80 (63.5%)	44 (60.3%)	0.652
Type 6,7,8	46 (36.5%)	29 (39.7%)	
Number of delivery (%)			
Nulliparous	36 (28.6%)	35 (47.9%)	0.006
Multiparous	90 (71.4%)	38 (52.1%)	

BMI: Body-mass index, Hb: Hemoglobin, FIGO: The International Federation of Gynecology and Obstetrics

DISCUSSION

This study showed that the mean myoma size of patients with pelvic pain was larger than those with abnormal uterine bleeding. In nulliparous patients, the rate of multiple myomas, pressure symptoms and pelvic pain was higher than those who had given birth, while the rate of abnormal uterine bleeding was lower.

The most prevalent pelvic tumors in women are leiomyomas. However, the majority of leiomyomas are asymptomatic. Peak incidence occurs between the ages of 35 and 40 in the reproductive age group.[9] The symptoms associated with leiomyomas correlate closely with their size, number, and location. The histopathological incidence in the population is 80%, as indicated by the study conducted on hysterectomy sections of leiomyomas. Nevertheless, clinical findings are observed in only 20-30% of the samples.[10]

In patients with an indication for myomectomy; If the uterus is larger than the 20th week of pregnancy or if there are more than three myomas larger than 5 cm in size, laparotomic myomectomy is the primary surgical option. The probability of a myomectomy operation performed by experienced surgeons leading to a hysterectomy is less than 1%. In our study, there was no conversion to intraoperative hysterectomy in any of the 199 myomectomies.

In our study, patients with single and multiple myomas were compared according to myoma size. The mean largest myoma size in the single myoma group was larger than in the multiple myoma group and this difference was statistically significant ($p<0.05$). The rate of the largest myoma size being larger than 8 cm in the single myoma group was significantly higher than in the multiple myoma group. The fact that the rate of abnormal uterine bleeding is lower and the rate of pressure symptoms and pelvic pain is higher in nulliparous patients than in patients who have given birth also supports this result. In addition, myoma types 2-5 are more often accompanied by abnormal bleeding. As a result, the larger myoma size in nulliparous patients who underwent surgery may be due to the fact that they have reached the last stage of their pressure complaints. It was also observed that multiple myomas were more common in nulliparous patients. This condition may also be associated with infertility.

In a study conducted by Sato et al.[11] in Japan in 2000, 91 women who underwent hysterectomy due to leiomyoma were compared with age-matched control patients in terms of reproductive factors. It was concluded that women with leiomyoma were more likely to be nulliparous than controls and that the risk of leiomyoma increased as the number of births decreased. Numerous studies indicate that parity diminishes the chance of leiomyoma development, with subsequent pregnancies further decreasing this risk.[12-14] The protective effect of parity on leiomyomas is thought to involve the postpartum uterine involution process.[15,16] In the animal experiment study, research indicates that myocyte autophagy may significantly contribute to uterine involution, myometrial functional adaptations during gestation, and the physiological significance of autophagy in uterine remodeling processes throughout the postpartum phase.[16]

Pelvic pain is a prevalent symptom in individuals with leiomyoma. The two most common symptoms associated with uterine leiomyomas are anormal uterine bleeding and pelvic pain.[17] One epidemiologic study reported that pelvic pain was experienced by 49% of women with symptomatic uterine leiomyomas.[18] In a study by Lacey et al.[19] investigating benign diseases of the uterine corpus, pelvic pain was observed in 30% of cases with large leiomyomas. In our study, 40% of the patients had complaints of pelvic pain, and the mean leiomyoma size of the patients with complaints of pelvic pain was found to be 10.9±3.6, which is similar to the literature data.

In a retrospective study by Puri et al.[20] investigating the relationship between submucosal leiomyomas and severe menstrual bleeding and anemia in 912 women, anemia was recorded more in women with submucosal leiomyomas (34%) than in women with leiomyomas in different

locations (25%). Pelvic pain increased as the leiomyomas approached the serosa and abnormal uterine bleeding increased as the leiomyomas approached the mucosa. In the 2016 study by David et al.,[21] 1548 leiomyoma patients were retrospectively examined using patient questionnaires and ultrasound examinations. The patients' pain was grouped as premenstrual, menstrual and during sexual intercourse. It was found that submucosal myomas were significantly more common in women with severe dysmenorrhea compared to all other myoma localizations. It was concluded that the number of myomas did not have a significant effect on the severity of dysmenorrhea. They also concluded that severity of menstrual pain depended on the location and size of the largest myoma. Although this study has different aspects from our study, it is a good example in terms of showing the relationship between myoma localization and symptoms. Further research is required to elucidate the degree to which the problems experienced by patients with leiomyomas are attributable to the characteristics of the fibroids.

In our study, patients were also categorized into two groups: obese and non-obese. No substantial difference was seen between the groups regarding clinical indicators ($p>0.05$). Different from our results; Cinar et al.[22] in 2016 found a correlation between complications and clinical parameters in 273 women who underwent abdominal myomectomy, comparing obese (BMI ≥30) and non-obese (BMI <30) groups regarding leiomyoma diameter, length of hospital stay, and complications. Patients in the obese group exhibited larger leiomyoma sizes and increased complications, including bleeding, postoperative fever, wound infection, and ileus. Wen et al.[23] also found that obese women were significantly more likely to have both early and late complications, such as increased length of hospital stay. while in another study Gürbüz et al.[24] found that the obese and non-obese women showed no significant difference in terms of the leiomyoma size, complications, and bleeding requiring transfusion.

Limitations

The major strength of our study is evaluating leiomyomas using FIGO classification and comparing clinical parameters among groups in terms of admission complaints, BMI and leiomyomas singularity or multiparity. Retrospective design of the study is the major limiting factor.

CONCLUSION

The mean leiomyoma size was found to be larger in patients with pelvic pain than in those with abnormal uterine bleeding. Nulliparous patients exhibited a higher incidence of multiple leiomyomas than multiparous patients. Nulliparous patients experienced a lower incidence of abnormal uterine bleeding than multiparous patients; however, the incidence of pelvic pain and pressure symptoms was elevated. While the size of the myomas, whether they were single or multiple, the number of pregnancies of the patient and the history of infertility affected the laparotomic surgical approach in myomas, obesity did not. Decisions regarding laparotomic myomectomy surgeries should be made on an individual basis.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Adana City Hospital Clinical Researches Ethics Committee (Date: 14.09.2023, Decision No: 2826).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Baird DD, Dunson DB, Hill MC, Cousins D, Schectman JM. High cumulative incidence of uterine leiomyoma in black and white women: ultrasound evidence. *Am J Obstet Gynecol*. 2003;188(1):100-107. doi:10.1067/mob.2003.99
2. Serden SP, Brooks PG. Treatment of abnormal uterine bleeding with the gynecologic resectoscope. *J Reprod Med*. 1991;36(10):697-699.
3. Ahrendt HJ, Tylkoski H, Rabe T, et al. Prevalence of uterine myomas in women in Germany: data of an epidemiological study. *Arch Gynecol Obstet*. 2016;293(6):1243-1253. doi:10.1007/s00404-015-3930-8
4. Giuliani E, As-Sanie S, Marsh EE. Epidemiology and management of uterine fibroids. *Int J Gynaecol Obstet*. Apr 2020;149(1):3-9. doi:10.1002/ijgo.13102
5. Borah BJ, Nicholson WK, Bradley L, Stewart EA. The impact of uterine leiomyomas: a national survey of affected women. *Am J Obstet Gynecol*. 2013;209(4):319-320. doi:10.1016/j.ajog.2013.07.017
6. Stewart EA. Clinical practice. Uterine fibroids. *N Engl J Med*. 2015;372(17):1646-1655. doi:10.1056/NEJMcp1411029
7. Munro MG, Critchley HO, Fraser IS, Group FMDW. The FIGO classification of causes of abnormal uterine bleeding in the reproductive years. *Fertil Steril*. 2011;95(7):2204-2208. doi:10.1016/j.fertnstert.2011.03.079
8. Wamsteker K, Emanuel MH, de Kruif JH. Transcervical hysteroscopic resection of submucous fibroids for abnormal uterine bleeding: results regarding the degree of intramural extension. *Obstet Gynecol*. 1993;82(5):736-740.
9. Marshall LM, Spiegelman D, Barbieri RL, et al. Variation in the incidence of uterine leiomyoma among premenopausal women by age and race. *Obstet Gynecol*. 1997;90(6):967-973. doi:10.1016/s0029-7844(97)00534-6
10. Stewart EA, Friedman AJ. Steroidal treatment of myomas: preoperative and long-term medical therapy. Copyright© 1992 by Thieme Medical Publishers, Inc.; 1992:344-357.
11. Sato F, Miyake H, Nishi M, Kudo R. Fertility and uterine size among Asian women undergoing hysterectomy for leiomyomas. *Int J Fertil Womens Med*. 2000;45(1):34-37.
12. Ross RK, Pike MC, Vessey MP, Bull D, Yeates D, Casagrande JT. Risk factors for uterine fibroids: reduced risk associated with oral contraceptives. *Br Med J (Clin Res Ed)*. 1986;293(6543):359-362. doi:10.1136/bmj.293.6543.359

13. Parazzini F, Negri E, La Vecchia C, Chatenoud L, Ricci E, Guarnerio P. Reproductive factors and risk of uterine fibroids. *Epidemiology*. 1996; 7(4):440-442. doi:10.1097/00001648-199607000-00018
14. Marshall LM, Spiegelman D, Goldman MB, et al. A prospective study of reproductive factors and oral contraceptive use in relation to the risk of uterine leiomyomata. *Fertil Steril*. 1998;70(3):432-439. doi:10.1016/s0015-0282(98)00208-8
15. Wachsberg RH, Kurtz AB, Levine CD, Solomon P, Wapner RJ. Real-time ultrasonographic analysis of the normal postpartum uterus: technique, variability, and measurements. *J Ultrasound Med*. Mar 1994;13(3):215-221. doi:10.7863/jum.1994.13.3.215
16. Hsu KF, Pan HA, Hsu YY, Wu CM, Chung WJ, Huang SC. Enhanced myometrial autophagy in postpartum uterine involution. *Taiwan J Obstet Gynecol*. 2014;53(3):293-302. doi:10.1016/j.tjog.2013.01.030
17. Foth D, Röhl FW, Friedrich C, et al. Symptoms of uterine myomas: data of an epidemiological study in Germany. *Arch Gynecol Obstet*. 2017; 295(2):415-426. doi:10.1007/s00404-016-4239-y
18. Monleón J, Cañete ML, Caballero V, et al. Epidemiology of uterine myomas and clinical practice in Spain: an observational study. *Eur J Obstet Gynecol Reprod Biol*. 2018;226:59-65. doi:10.1016/j.ejogrb.2018.05.026
19. Lacey CG. Myoma of the uterus. Current gynecologic and obstetric diagnosis and treatment 4th ed Lange, Los Altos. 1982.
20. Puri K, Famuyide AO, Erwin PJ, Stewart EA, Laughlin-Tommaso SK. Submucosal fibroids and the relation to heavy menstrual bleeding and anemia. *Am J Obstet Gynecol*. 2014;210(1):38 e1-7. doi:10.1016/j.ajog.2013.09.038
21. David M, Pitz CM, Mihaylova A, Siedentopf F. Myoma-associated pain frequency and intensity: a retrospective evaluation of 1548 myoma patients. *Eur J Obstet Gynecol Reprod Biol*. 2016;199:137-140. doi:10.1016/j.ejogrb.2016.02.026
22. Cinar M, Tokmak A, Guzel AI, et al. Association of clinical outcomes and complications with obesity in patients who have undergone abdominal myomectomy. *J Chin Med Assoc*. 2016;79(8):435-439. doi:10.1016/j.jcma.2016.02.008
23. Wen KC, Horng HC, Wang PH. Hemorrhage: A strong indicator for myomectomy-related complication. *J Chin Med Assoc*. 2016;79(8):413-414. doi:10.1016/j.jcma.2016.02.004
24. Gürbüz T, Yardımcı O, Udum S, Günay T. The relationship between body-mass index and clinical complications among patients undergoing myomectomy. *J Surg Med*. 2020;4(11):1027-1030.