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Retrospective evaluation of patients who underwent myomectomy during cesarean section

Sezaryen sırasında myomektomi yapılan hastaların retrospektif değerlendirilmesi

Hüseyin Aytuğ AVŞAR[1], Onur YAVUZ[2], Can ATA[3], Tevfik Berk BİLDACI[4], Selçuk ERKILINÇ[5]

[1]Tınaztepe Galen University Faculty of Medicine, İzmir, Türkiye
[2]Dokuz Eylul University School of Medicine, İzmir, Türkiye
[3]Buca Seyfi Demirsoy Training and Research Hospital, İzmir, Türkiye
[4]Izmir Democracy University Faculty of Medicine, OB/GYN Department, Türkiye
[5]Izmir Democracy University Faculty of Medicine, Oncology Department, Türkiye

ABSTRACT

Aim: To evaluate the obstetric and neonatal outcomes of patients who underwent myomectomy at the time of cesarean section (C/S).

Materials and Methods: A total of 480 patients aged 19-45 who presented to the gynecology and obstetrics clinic between 2018-2023, underwent pregnancy follow-up and C/S delivery in our hospital, and met the inclusion criteria were included in our study. Myomectomy was performed during C/S in 220 patients included in the study, and it was not performed in 260 patients. Age, number of pregnancies, abortion status, fetal weight at birth, Apgar scores, C/S indication, myoma localization, and hemoglobin values of all patients were compared retrospectively.

Results: The number of abortions was significantly higher in the myomectomy (+) group ($p<0.001$). Mean gestational age at birth was significantly lower in the myomectomy (+) group ($p=0.020$). Operation time and hospital stay were significantly higher in the myomectomy (+) group ($p<0.001$). Myoma size was significantly higher in the myomectomy (+) group ($p<0.001$). Postoperative hemoglobin value was significantly lower in the myomectomy (+) group ($p<0.001$). Change in hemoglobin value was significantly higher in the myomectomy (+) group ($p<0.001$). 5th minute Apgar score was significantly lower in the myomectomy (+) group ($p=0.022$). Fetal weight at birth was significantly lower in the myomectomy (+) group ($p=0.046$).

Conclusion: C/S-myomectomy can be performed safely by an experienced gynecologist. We believe that myomectomy generally does not cause a significant increase in maternal morbidity and mortality. A detailed discussion of the risks associated with the patient should be conducted. Large population and prospective studies are needed to clarify the long-term risks and benefits.

Keywords: Birth, cesarean section, hysterectomy, myomectomy

ÖZ

Amaç: Çalışmamızın amacı sezaryen (C/S) sırasında myomektomi yapılan hastaların obstetrik ve neonatal sonuçlarını değerlendirmektir.

Gereçler ve Yöntem: Çalışmamıza 2018-2023 yılları arasında kadın hastalıkları ve doğum polikliniğine başvuran, gebelik takibi ve sezaryen doğumu hastanemizde yapılan, dahil edilme kriterlerine uyan 19-45 yaş arası toplam 480 hasta dahil edildi. Çalışmaya dahil edilen 220 hastaya sezaryen sırasında myomektomi uygulandı, 260 hastaya ise uygulanmadı. Tüm hastaların yaş, gebelik sayısı, abortus durumu, doğumdaki fetal ağırlık, Apgar skorları, sezaryen endikasyonu, myom yerleşimi, hemoglobin değerleri retrospektif olarak karşılaştırıldı.

Bulgular: Myomektomi (+) grubunda abortus sayısı anlamlı yüksek saptandı ($p<0.001$). Doğumda ortalama gebelik yaşı myomektomi (+) grubunda anlamlı düşük saptandı ($p=0.020$). Myomektomi (+) grubunda operasyon süresi ve hastanede kalış süresi anlamlı yüksek saptandı ($p<0.001$). Myomektomi (+) grubunda myom boyutu anlamlı yüksek saptandı ($p<0.001$). Myomektomi (+) grubunda postoperatif hemoglobin değeri anlamlı düşük saptandı ($p<0.001$). Myomektomi (+) grubunda hemoglobin değerindeki değişim anlamlı yüksek saptandı ($p<0.001$). Myomektomi (+) grubunda 5. dakika Apgar skoru anlamlı düşük saptandı ($p=0.022$). Myomektomi (+) grubunda doğumda fetal ağırlık anlamlı düşük saptandı ($p=0.046$).

Sonuç: C/S-myomektomi deneyimli bir jinekolog tarafından güvenli bir şekilde yapılabilir. Myomektominin genellikle maternal morbidite ve mortalitede önemli bir artışa neden olmadığına inanıyoruz. Hastayla ilişkili riskler hakkında ayrıntılı bir tartışma yapılmalıdır. Uzun vadeli riskler ve faydaları açıklığa kavuşturmak için geniş popülasyonlu ve prospektif çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Doğum, histerektomi, myomektomi, sezaryen

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Sorumlu Yazar/Corresponding Author: Hüseyin Aytuğ AVŞAR, Tınaztepe Galen University Faculty of Medicine, İzmir, Türkiye
E-mail: aytugavsar@hotmail.com

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INTRODUCTION

Uterine myomas, commonly known as uterine fibroids, are the most common benign gynecologic tumors (1,2). Most leiomyomas are asymptomatic and may not require any treatment, but some are associated with symptoms such as heavy menstrual bleeding, pelvic pain, and constipation and may lead to reproductive problems such as recurrent miscarriage and abruptio placentae (3). The incidence of uterine leiomyomas during pregnancy varies between 1.6% and 10.7% depending on the trimester of evaluation, and is more common depending on maternal age (4). Continuing to increase Cesarean section (C/S) rates and increasing pregnancy rates at advanced maternal age may increase the likelihood that obstetricians will detect myomas during C/S (5,6).

C/S-myomectomy should be considered with caution because of concerns about persistent bleeding requiring hysterectomy and increased postoperative morbidity. Roman et al. suggested that myomectomy could be performed at the time of C/S delivery in selected patients (7). Such an approach may have several benefits, including avoiding another surgery (8). Appropriate management of newly identified or previously known leiomyomas at the time of C/S delivery requires a multifactorial approach.

The aim of study was to evaluate the obstetric and neonatal outcomes of patients who underwent myomectomy at the time of C/S delivery.

MATERIALS AND METHODS

The present study was designed as a retrospective cross-sectional study. The study was designed according to the Helsinki Declaration and signed informed consent forms were obtained from all patients. The study was initiated after receiving ethics committee approval numbered 2024/224 dated 31/01/24 from the Buca Seyfi Demirsoy Training and Research hospital ethics committee. A total of 480 patients aged 19-45 who presented to the gynecology and obstetrics clinic between 2018-2023, underwent pregnancy follow-up and C/S delivery in our hospital, and met the inclusion criteria were included in our study. Myomectomy was performed during C/S in 220 patients included in the study, and it was not performed in 260 patients. All of myomas were confirmed pathologically. Its dimensions were calculated pathologically as half the sum of width and length.

Inclusion criteria for these women were: being over 18 years old, no history of uterine atony, documentation of uterine myoma during pregnancy by antepartum ultrasonography or intraoperative findings, presence of C/S delivery, availability of preoperative and postop laboratory values in the database. Patients were included in the study if they had no evidence of antepartum hemorrhage (e.g. due to placenta previa or abruption), had not undergone another procedure (e.g. cystectomy or planned hysterectomy), and had no evidence of coagulopathy. While the case group consisted of patients who underwent myomectomy during C/S delivery, the control group consisted of patients who were documented to have myomas during pregnancy and gave birth by C/S without myomectomy. Age, gravidity, parity, BMI (body mass index), abortion, gestational age at birth, fetal weight at birth, 1st and 5th minute Apgar scores, C/S indication, myoma location, number and size, preoperative and postoperative hemoglobin values, hemoglobin difference and postoperative transfusion needs of all patients was evaluated and it was investigated whether there was a difference between the groups. Preoperative blood preparation was decided on a patient-by-patient basis according to the localization and size of the myoma. Statistical analysis was performed by SPSS version 26.0 (IBM Inc., Chicago, IL, USA). The normality of the distribution was evaluated with Kolmogorov-Smirnov. Not normally distributed parameters were analyzed with the Mann-Whitney U test. Chi-square test and Fisher precision test were used in the analysis of categorical data. The quantitative data of the patients were demonstrated as mean ± Standard-Deviation (SD) and (minimum-maximum). Qualitative data were presented as numbers and percentages (%). Results were evaluated at a 95% confidence interval (CI). The p value considered statistically significant was <0.05.

RESULTS

The number of abortions was significantly higher in the myomectomy (+) group than in the myomectomy (-) group ($p<0.001$) (Table 1).

The mean gestational age at birth was found to be significantly lower in the myomectomy (+) group than in the myomectomy (-) group ($p=0.020$). The operation time in the myomectomy (+) group was significantly higher than in the myomectomy (-) group ($p<0.001$). The duration of hospital stay in the myomectomy (+) group was found to be significantly higher than in the myomectomy (-) group ($p<0.001$). Myoma size was significantly higher in the myomectomy (+) group than in the myomectomy (-) group ($p<0.001$). Postoperative Hb value was found to be significantly lower in the myomectomy (+) group than in the myomectomy (-) group ($p<0.001$). The decrease in hemoglobin value was found to be significantly higher in the myomectomy (+) group than in the myomectomy (-) group ($p<0.001$) (Table 2).

Table 1. Comparison of demographic data according to the presence of myomectomy

Variables	Myomectomy (+) group (n=220)	Myomectomy (-) group (n=260)	p
	(min-max)		
Age (year)	31 (18-43)	31.5 (19-45)	0.910
BMI (kg/m2) (mean±SD)	24.4±2.7	25.2±2.6	0.380
Smoking (n, %)	50 (22.7%)	60 (23%)	0.760
Gravidity	2 (1-8)	2 (1-7)	0.920
Parity	2 (1-6)	2 (1-5)	0.240
Abortion	0 (0-7)	0 (0-4)	<0.001

*Continuous variables without a normal distribution were presented as medians (minimum-maximum) and with normal distribution as mean ± standard deviations. Categorical variables were presented as numbers (percentages). *BMI: Body mass index,

Table 2. Comparison of obstetric data according to the presence of myomectomy

Variables	Myomectomy (+) group (n=220)	Myomectomy (-) group (n=260)	p
	(min-max)		
Gestational age at birth (week)	39 (29-41)	39 (32-41)	0.020
Operation time (min)	82 (66-112)	54 (46-74)	<0.001
Hospital stays (day)	1 (1-4)	1 (1-3)	0.028
Indications for C/S, % *Previous C/S* *Cephalopelvic disproportion* *Fetal distress* *Malpresentation* *Non-progressive labor* *Macrosomia* *Placental abruption* *Severe preeclampsia*	 53.6 - (118/220) 17.3 - (38/220) 11.4 - (25/220) 9.1 - (20/220) 7.7 - (17/220) 0 - (0/220) 0.5 - (1/220) 0.5 - (1/220)	 57.7 - (150/260) 16.5 - (43/260) 10.8 - (28/260) 8.8 - (23/260) 5 - (13/260) 0.8 - (2/260) 0.4 - (1/260) 0 - (0/260)	0.620
Myoma location, % *Incision* *Intramural* *Subserous*	 53.6 - (118/220) 1.8 - (4/220) 44.5 - (98/220)	 55 - (143/260) 0.8 - (2/260) 44.2 - (115/260)	0.520
Number of myomas	1 (1-2)	1 (1-2)	0.840
Myoma size (cm)	3 (1-7)	2.5 (2-3.5)	<0.001
Preop Hb (gr/dL)	12 (8.7-14.7)	11.9 (8.6-14.1)	0.240
Postop Hb (gr/dL)	11 (7.3-13.8)	11.4 (7.7-13.6)	<0.001
ΔHb (preop -postop) (gr/dL)	0.9 (0.1-4)	0.4 (0.1-2.8)	<0.001
Blood Transfusion, %	9 - (20/220)	7.3 - (19-260)	0.360

*Continuous variables without a normal distribution were presented as medians (minimum-maximum). Categorical variables were presented as numbers (percentages). *C/S: Cesarean section, *Hb: hemoglobin

Table 3. Comparison of neonatal data according to the presence of myomectomy

Variables	Myomectomy (+) group (n=220)	Myomectomy (-) group (n=260)	p
	(min-max)		
1st minute Apgar score	8 (4-8)	8 (4-9)	0.820
5th minute Apgar score	9 (4-9)	9 (6-9)	0.022
Fetal weight at birth (grams)	3360 (1180-4460)	3400 (1520-5010)	0.046

*Continuous variables without a normal distribution were presented as medians (minimum-maximum).

The 5th minute Apgar score was significantly lower in the myomectomy (+) group than in the myomectomy (-) group (p=0.022). Fetal weight at birth was found to be significantly lower in the myomectomy (+) group than in the myomectomy (-) group (p=0.046) (Table 3).

DISCUSSION

Most obstetricians make a patient-based decision after careful evaluation regarding myomectomy during C/S due to massive hemorrhage, persistent bleeding and consequently increased risk of hysterectomy. In our study, abortion rate, operation time, hospital stays, myoma size and ΔHb value were found to be significantly higher in the myomectomy (+) group compared to the myomectomy (-) group. In the myomectomy (+) group, gestational age at birth, postop Hb value, 5th minute Apgar score and fetal weight at birth were found to be significantly lower than the myomectomy (-) group.

The most important risk of performing myomectomy during a C/S is bleeding. Many obstetricians avoid performing myomectomy during a C/S due to unstoppable bleeding and the necessity of hysterectomy (9). Gbadebo et al. state that myomectomy can be performed safely during a C/S if patients are selected appropriately (10). However, if myomas are not removed, complications such as preterm birth, intrauterine growth restriction, placenta previa, and postpartum hemorrhage may not be prevented in future pregnancies. However, the safety of C/S-myomectomy for large myomas has not been extensively evaluated (11). In the study by Kwon et al., although the mean myoma size was larger in the C/S-myomectomy group compared with the non-myomectomy group, no statistically significant differences were found in neonatal weight, gestational age at birth, hemoglobin changes, and days of hospital stay (11). In our study, the mean birth weight and 5th minute Apgar score were significantly lower in the myomectomy (+) group than in the myomectomy (-) group. It was thought that these results might be due to lower gestational age and intramural myomas causing fetal growth restriction.

In Kaymak et al.'s study, 40 cases who underwent myomectomy during C/S were examined and intraoperative bleeding was observed in 5 patients (12). However, there are studies showing that myomectomy performed during C/S causes severe, uncontrollable bleeding that can be terminated by hysterectomy (13). Most obstetricians have been taught not to perform myomectomy during C/S delivery due to the risks of uncontrolled bleeding, massive hemorrhage, and hysterectomy. A meta-analysis by Song et al. showed that the outcomes of patients who underwent C/S-myomectomy were not significantly different from those who underwent C/S delivery alone. The meta-analysis revealed that blood loss and transfusion requirements were not significantly different between the two groups (14). In the study by Park et al., when myomectomy and control group patients with similarly sized myomas were compared in terms of surgery time, it was found that the myomectomy group had a longer surgery time (15). In the study by El-Refaie et al., when the myomectomy group and the control group were compared, no significant difference was found in terms of the amount of blood transfusion and postoperative hemoglobin level, while the surgery time and hospital stay were found to be significantly longer in the myomectomy group than in the control group (8). In our study, while the postoperative Hb level was found to be significantly lower in the myomectomy (+) group, the hospital stay was found to be significantly higher.

There is no clear consensus in the current literature regarding the criteria for selecting suitable candidates for C/S-myomectomy. Kim et al. advocated the idea of surgery for myomas inaccessible areas such as subserosal or pedunculated myomas (13). Roman et al. suggested that intramural myomectomies should be performed carefully in their study (7). Hassiakos et al. suggested that intramural myomas in the fundus, myomas located proximal to the fallopian tubes, and myomas located in the cornua may not be good candidates for removal during C/S delivery because this may affect subsequent fertility (16). In the study by Zhao et al., the rate of subserous myomas was significantly higher in the C/S-myomectomy group than in the control group, while the rates of cervical and intramural myomas were lower in the C/S- myomectomy group than in the control group. This suggests that myomectomy is performed more frequently in those with subserous myomas, and cervical and intramural myomas should be avoided during C/S (17). Radmila et al. suggested that pedunculated and subserous myomas can be removed, and intramural and multiple myomas should be avoided (18). Celal et al. suggested that surgery should be avoided in intramural myomas (19). In our study, serous myomas were observed to be common in both groups, and a tendency was observed to perform myomectomy in myomas in this region, taking into account the myoma diameter.

In the study conducted by Sakinci et al., no statistically significant difference was found between the groups in terms of pre- and postoperative Hb values or blood transfusion rates (20). In the study conducted by Güler et al., no statistically significant difference was found between the two groups in terms of mean Hb change in the cesarean myomectomy groups (21). In the study conducted by Simsek et al., it was reported that the mean difference in postoperative hemoglobin and hemoglobin change

was significantly different between women who had cesarean myomectomy and women who had cesarean delivery without cesarean myomectomy (22). Pergialiotis et al.'s meta-analysis included 19 studies with a total of 3,900 women. Of these, 2,301 women had myomectomy at the time of cesarean delivery and 1,599 had only cesarean delivery. Women who had concurrent myomectomy had a slight decrease in hemoglobin compared with those who had only cesarean delivery (23). Although it is known that cesarean myomectomy in other cases generally should be avoided, observational data suggest that it is possible without a high risk of life-threatening events as long as the surgeon has appropriate expertise, appropriate patients are selected (eg, symptomatic pedunculated fibroids), and blood products are available. In meta-analyses of mostly retrospective studies of patients with fibroids undergoing cesarean, those undergoing concomitant myomectomy had greater drops in hemoglobin (mean difference 0.25 to 0.27 mg/dL), an approximately 40 percent increase in use of blood transfusion, and longer hospital stay (23, 24). In our study, ΔHb level was found to be significantly higher in the myomectomy (+) group than in the myomectomy (-) group. In our study, although the need for transfusion did not increase, it was found that delta hemoglobin increased. Therefore, when making a decision for cesarean myomectomy, the patient's need for transfusion and the adequacy of the center where the transfusion will be performed should be taken into consideration. The factors affecting bleeding are multifactorial and occur both from the incision site and from myomectomy. However, it is very difficult to measure the amount of bleeding separately for these factors. In more than half of the patients who underwent C/S myomectomy, the myomas were removed because they were in the incision line and were preventing the baby from being born. Pedunculated myomas with a low risk of bleeding consist of cases that are discussed with the patient before the caesarean section and are performed voluntarily in order to prevent a second operation.

Various methods have been tried to prevent hemorrhage during C/S-myomectomy. The most common application in the literature is intraoperative and postoperative high-dose oxytocin application (14). Some authors argued that specific operative techniques such as tourniquet, uterine artery ligation and purse-string suture are helpful in limiting intraoperative bleeding during C/S-myomectomy (25-27). Although we have not used the techniques described in our patients, double-layer sutures, bimanual uterine massage, and intraoperative and postoperative uterotonic agents have been effective in hemostasis in all of our patients, regardless of myoma size. Leaving uterine myomas in situ during C/S delivery may seem like a good strategy to prevent intraoperative complications. However, this may be a short-term perspective and does not properly account for long-term risks. Among 22 patients who underwent C/S delivery, a study by AbdRabbo et al reported a mean 34% increase in myoma volume over a 38-month follow-up period. 40.9% of these patients underwent myomectomy or hysterectomy within 38 months due to their symptoms (28). Overall, uterine myomas are the most common indication for hysterectomy in the United States. According to the National Center for Women's Health Information, approximately 175,000 hysterectomies are performed annually for myomas, and their economic impact is significant (29). Given the possibility of reoperation for recurrent myomas, it may be a more cost-effective course of action to make a patient-based decision and remove the myomas at the time of C/S delivery. Despite the long operation time and hospital stay, the reason for its cost-effectiveness may be the avoidance of an additional myomectomy operation throughout life.

The retrospective design and small sample size of our study can be shown as a limitation of the study. However, the evaluation of many maternal and fetal parameters and the evaluation of an objective parameter such as ΔHb data can be shown as a strength of the study.

CONCLUSION

When we evaluate the results of our study and the literature, myomectomy during C/S can be performed safely by an experienced gynecologist. We believe that myomectomy during C/S does not generally cause a significant increase in maternal morbidity and mortality. A detailed discussion should be made about the risks associated with the patient. The risks will depend on the size and location of the myoma, and most risks are similar to those of C/S delivery. However, the long-term risks and benefits, especially in terms of future pregnancies, are not yet clear. Large population or reliable prospective studies are needed to clarify these issues.

Ethics Committee Approval:
The study was initiated after receiving ethics committee approval numbered 2024/224 dated 31/01/24 from the Buca Seyfi Demirsoy Training and Research Hospital Ethics Committee.

Conflict of Interest
The authors declare no conflict of interest.

Author Contributions
Surgical and Medical Practices and Writing were handled by H.A.A. and S.E.; Concept and Design were handled by O.Y.; Data Collection and Literature search were handled by H.A.A. and C.A.; Analyses were handled by T. B.B.

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