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A safe procedure for myomectomy during cesarean section

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Summary

Purpose of Investigation: A retrospective cohort study was performed to identify whether myomectomy at the time of cesarean delivery leads to an increased risk of intrapartum and short-term postpartum complications. The authors' aim is to investigate the short-term outcomes of women who have undergone a cesarean myomectomy. *Materials and Methods:* This study included the cases that had undergone cesarean myomectomy between January, 2008 and December, 2015. Two hundred twenty-seven pregnant women with uterine myomas who delivered via cesarean section were identified. One hundred two women underwent cesarean myomectomy. The authors compared the maternal characteristics, type of myomas, neonatal weight, and operative outcomes between the two groups. *Results:* Two group analysis revealed that there were no significant differences in the mean hemoglobin change (1.5 ± 1.0 *vs.* 1.2 ± 0.9 mg/dL), and the length of hospital stay (3.9 ± 1.2 *vs.* 3.3 ± 1.4 days) between two groups. The operative time of myomectomy group was significantly longer (88.5 ± 19.5 *vs.* 58.0 ± 20.4 min, $p < 0.01$). No patient in either group required hysterectomy or embolization. *Conclusions:* Myomectomy during cesarean delivery does not appear to result in an increased risk of intrapartum or short-term postpartum morbidity.

Key words: Cesarean myomectomy; Cesarean section; Myomectomy; Pregnancy.

Introduction

Uterine fibroids are the most common benign tumors of reproductive age with an incidence rate between 3.2% and 5% in pregnancy [1-3]. Due to increasing tendency towards delayed childbearing, the incidence of pregnant women with fibroids increase gradually with advanced maternal age [4]. Although uterine fibroids grow due to the high levels of estrogen and progesterone they are generally asymptomatic in pregnancy. However poor obstetric outcomes such as miscarriage, intrauterine growth restriction, preterm birth, placenta previa, fetal malpresentation, placental abruption and postpartum hemorrhage may be encountered frequently [5]. Traditionally, cesarean section with myomectomy is considered to be dangerous due to increased vascularity of the pregnant uterus causing severe intraoperative bleeding tendency and risk of uterine atony [6]. However, myomectomy during cesarean section is not always a hazardous procedure and it can be performed without significant complications by experienced obstetricians [7]. The safety of cesarean myomectomy has been reported recently. Ma *et al.* [8] and Tinelli *et al.* [9] suggested that cesarean myomectomy did not increase the risk of intraoperative hemorrhage, and uterine atony compared to cesarean sections without myomectomy.

For defining the obstetric outcomes and risks of myomectomy procedure during cesarean delivery, we evaluated the pregnant women with uterine fibroids treated at our institute over a seven year-period.

Materials and Methods

Two hundred sixty eight pregnant women with documented uterine fibroids who underwent cesarean delivery with or without myomectomy at this University Hospital between January 2008 and December 2015 were enrolled into the study. An observational cohort study using prospectively collected data was designed and hospital electronic patient information system was used. The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki, and an approval was obtained from the Ethics Committee of the Institution. Treatment options and potential risks of the myomectomy with cesarean section were explained and approval was obtained with an informed consent form from all patients. The study group consisted of pregnant women who underwent myomectomy at the time of cesarean delivery and the control group consisted of patients with documented fibroids during pregnancy, but did not accept myomectomy operation with cesarean section. The pregnancy outcomes of women with cesarean myomectomy and women with cesarean without myomectomy were compared. Patients with antenatal bleeding such as placenta previa, uterine rupture, and placental abruption, patients who underwent additional surgery during cesarean section, including tubal ligation and ovarian cystectomy, and patients having co-morbid conditions leading to bleeding disorders were excluded from the study. Patients diagnosed with uterine fibroid by antepartum ultrasound or by intraoperative evaluation and delivered by cesarean section were enrolled into the study. The demographic and clinical characteristics of the study groups were recorded at hospital admission. Cesarean section decision was made according to obstetric indications. In patients with indications, an elective cesarean delivery was planned at 38th to 39th gestational week. Three units of erythrocyte suspension and three units of fresh frozen plasma

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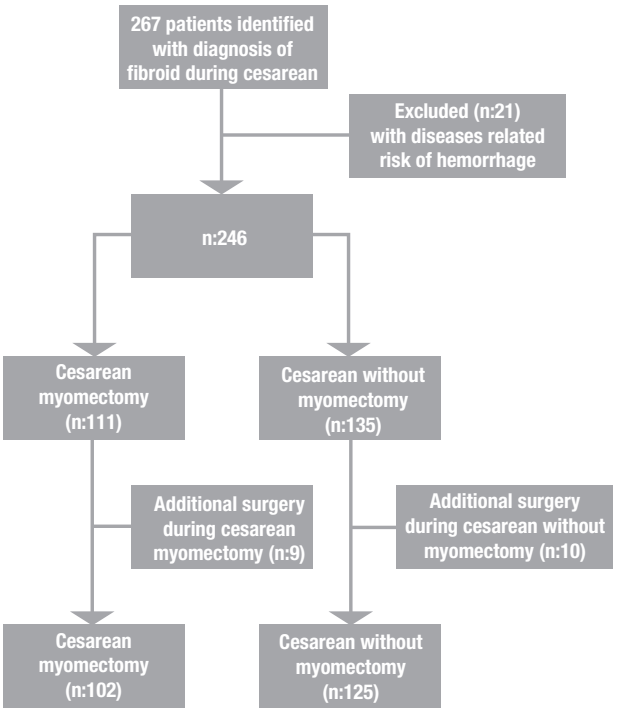

Figure 1. — Flow chart showing study population.

were prepared for each patient scheduled to undergo myomectomy. General anesthesia was preferred. All patients received a single dose of cefazolin (1 g, i.v.) within ten minutes of surgical incision after the umbilical cord clamping.

Technique of surgery: a Pfannenstiel incision was made for abdominal entrance and the fetus was extracted via a lower uterine segment Kerr incision. After extraction of the placenta, myomectomy was performed. Fibroids, those localized on the lower uterine segment incision site, and obstructing the uterine cavity entry for safe fetal delivery, were removed after the fetal extraction via subfundal transverse incision. Fibroids, localized near the cesarean section incision were removed via the same incision. A linear incision was made on the fibroid using bipolar electrocautery (60 to 100 W of intensity for cutting and 50 W for clotting) and subsequently, the fibroid nodule was removed from its capsule by a clamp. The uterine defect was sutured in a minimum of two layers with no. 1 delayed absorbable polyglactin 910 sutures. The uterine serosa was sutured utilizing absorbable 2-0 absorbable polyglactin 910 sutures. Bimanual uterine compression was made to enhance the uterine contraction and intravenous oxytocin infusions per our standard protocol. After fetal and placental extraction, 10 IU i.v. oxytocin was administered as an uterotonic drug, plus 40 IU i.v. within the first 24 hours. The visceral peritoneum was left open in all patients, with a drainage 32 Ch placed in the retrovesical region. All patients received thromboprophylaxis with enoxaparin 30 mg/day at eight hours after surgery. All patients received three doses of cefazoline 1 g i.v. after the surgery. After six and 24 hours postoperatively, routine hematological tests were performed. The gynecologic controls were performed after ten and 30 days.

The size of the fibroid was recorded according to the maximum diameter measurements specified in pathological specimens. The location, number, and type of the fibroids were recorded based on operative findings. The transfused blood products, intraoperative and postoperative complications, and the duration of hospital stay were all recorded.

Statistical analysis was performed using SPSS Statistics version 16.0 software package program. Descriptive data were expressed as mean ± standard deviations (SDs) and range. Student *t*-test and chi-square test were used to determine statistical significance. *P* value <0.05 was accepted as statistically significant.

Table 1. — *Comparision of maternal characteristics and pregnancy outcomes between the groups.*

	Cesarean with myomectomy (n=102)	Cesarean without myomectomy (n=125)	*p* value
Maternal age (years)	31.9±4.3 (20–41)	32.1±4.1 (21–39)	NS
Gravidity	3.2 ± 1.6 (2-6)	3.3 ± 1.5 (2-7)	NS
Parity	2.1±1.1 (1–4)	1.9±1.1 (1–5)	NS
Gestational week at delivery	38.5±1.8 (35–41)	38.2±1.3 (36–40)	NS
Birth weight (grams)	2,895.5±720.1	2,923.6±619.2	NS
Body mass index (kg/m^2)	28.1±3.2 (21.1-36.5)	27.1±2.9 (19.5-33.6)	NS

Mann–Whitney U and Chi-square tests were used for analysis. Data are given as mean ± standard deviations (range within parentheses).

Table 2. — *The comparison of fibroids' types, localization, and sizes between the groups.*

	Cesarean with myomectomy (n = 102)	Cesarean without myomectomy (n= 125)	*p* value
Type of fibroid			
Subserosal	25 (24.5)	37 (29.6)	NS
Intramural	22 (21.6)	25 (20.0)	NS
Submucosal	8 (7.8)	12 (9.6)	NS
Pedunculated	11 (10.8)	0	0.005
Multiple sites	26 (25.5)	32 (25.6)	NS
Not recorded	10 (9.8)	19 (15.2)	NS
Localization of fibroid			
Fundus	52 (50.9)	61 (48.8)	NS
Corpus	36 (35.3)	49 (39.2)	NS
Cervix	5 (4.9)	8 (6.4)	NS
Not recorded	9 (8.9)	7 (5.6)	NS
Size of fibroid (cm)			
≤ 5	67 (65.7)	75 (60.0)	NS
> 5	26 (25.5)	35 (28.0)	NS
Not recorded	9 (8.8)	15 (12.0)	NS

Mann–Whitney U and Chi-square were used for analysis. Data are given as numbers (percentages within parentheses).

Results

A hundred and eleven (41%) patients out of 267 with fibroids identified on antenatal ultrasound and during cesarean, met the inclusion criteria and had myomectomy with cesarean section. Twenty-one patients were excluded from the study due to accompanying morbidities that could lead to postpartum hemorrhage risk and nine because of having additional surgery, such as tubal sterilization and

Table 3. — *Comparison of operative outcomes between the groups*.

	Cesarean with myomectomy (n = 102)	Cesarean without myomectomy (n = 125)	*p* value
Preoperative hemoglobin (mg/dL)	12.4±1.2	11.9±1.2	NS
Postoperative hemoglobin (mg/dL)	11.3±1.3	11.2±1.5	NS
Mean hematocrit change (%)	1.5±1.0	1.2±0.9	NS
Postoperative fever	4 (3.9)	6 (4.8)	NS
Number of blood transfusion	5 (4.9)	5 (4)	NS
Mean operative time (min)	88.5±19.5	58.0±20.4	0.005
Mean length of hospital stay (day)	3.9±1.2	3.3±1.4	NS

Mann–Whitney U and Chi-square were used for analysis. Values are presented as mean ± standard deviation or N (percentages within parentheses).

ovarian cystectomy due to possible contributing factors that may cause the prolongation of the operation and increase the amount of bleeding. Study flowchart with included and excluded patients is shown in Figure 1.

Table 1 outlines the comparisons of clinical characteristics in patients with and without cesarean myomectomy, revealing no significant differences regarding maternal age, parity, gestational age at delivery, fibroid size, body mass index, and birth weight.

Table 2 shows the comparison of features of fibroids between the two groups: There were no significant differences in types, location, and size of fibroids between the groups. Twenty-five and a half percent (n=26) of the removed fibroids were multiple, 24.5% (n=25) of them were subserosal and 21.6% (n=22) were intramural fibroids. Fundal fibroids were present in 50.9% (n=52) of the cesarean myomectomy group followed by those located at the uterine corpus (35.3%) and cervix, (4.9%). In the cesarean myomectomy group, 25.5% (n=26) of the fibroids were over 5 cm.

Six percent of the patients who underwent myomectomy had indications such as pain in pregnancy, obstruction in lower uterine segment, or other atypical symptoms. In 94% of patients the indication for the procedure was maternal request. The comparison of operative outcomes between the two groups is shown in Table 3. Postoperative blood transfusion was required in five (4.9%) patients in the cesarean myomectomy group and also in five (4%) patients in the control group, including two of them with intraoperative transfusion. In the cesarean myomectomy group, the mean change in hematocrit was 1.5 ± 1.0 and ten of 102 (9.8%) patients in this group had a change in hematocrit of more than 10%. In the cesarean without myomectomy group, the mean change in hematocrit was 1.2 ± 0.9, and nine of 125 (7.2%) patients in this group had a hematocrit decrease of more than 10%. No patient in either group required an additional procedure such as bilateral uterine artery ligation, embolization or hysterectomy. There was also no significant difference between the groups in terms of postoperative fever, and mean length of hospital stay. However, the duration of operation was significantly longer when a cesarean myomectomy was performed (Table 3).

Discussion

In this study, the authors have demonstrated that myomectomy performed at time of cesarean delivery does not increase the risk of hemorrhage, postoperative fever, or prolong hospital stay. Cesarean myomectomy has not been made frequently, because of the risk of abundant hemorrhage and the probability of hysterectomy [10]. If fibroids are not removed, complications such as preterm labor, preterm delivery, intrauterine growth restriction, placenta previa, and postpartum bleeding cannot be prevented in future pregnancies. Many studies have reported that cesarean myomectomy is safe in carefully selected cases when performed by experienced surgeons [11-13]. However, the safety of cesarean myomectomy in large fibroids has not been completely evaluated [2]. Therefore, the management of fibroids encountered during cesarean delivery attitude a therapeutic dilemma. The present study supported the previous studies about the safety of cesarean myomectomy in terms of operative outcomes.

The increasing detection rate of uterine fibroids during cesarean is probably associated with high rate of cesarean and advanced maternal childbearing age [14]. Obstetric complications arising from the presence and treatment of fibroids can result in significant financial costs [15]. This causes obstetricians to more frequently meet the dilemma of how to properly manage fibroids during a cesarean.

Cesarean myomectomy is associated with significant risk of hemorrhage due to increased vascularity of the pregnant uterus. There are numerous studies revealing that myomectomy performed during caesarean section can cause severe, unstoppable hemorrhage, which may result in hysterectomy [12, 16, 17]. On the other hand, no bleeding was observed in this study, and no hysterectomy cases were present.

Topcu *et al.* [18] compared a cesarean myomectomy group of 76 women to 60 women with fibroids, who had only cesarean section. Duration of surgery was significantly longer in the cesarean myomectomy group, while the incidence of substantial intraoperative hemorrhage, hemoglobin change after surgery, febrile morbidity, and length of hospital stay did not differ between the groups. In the present study, the operative time of cesarean myomectomy group was significantly longer than cesarean without myomectomy group (88.5 ± 19.5 min *vs.* 58.0±20.4 min, $p < 0.005$). However, there was no significant difference in the duration of hospital stay between the two groups. Per-

forming myomectomy did not change the length of stay in the hospital. Intensive care unit admissions and even maternal death due to disseminated intravascular coagulopathy following cesarean myomectomy have been also described in the literature. A research evaluating obstetric intensive care unit admissions following cesarean myomectomy, was limited by a liberal intensive care unit admission policy and documented intraoperative hemorrhage as the most common indication of intensive care unit admission in 35 out of 57 patients [19].

Cesarean myomectomy group demonstrated no statistical differences in neonatal weight, gestational age at delivery, and hemoglobin changes, compared to cesarean without myomectomy group. The present authors supported that cesarean myomectomy is a safe procedure, and the result is consistent with other published papers [6, 11, 20].

Several studies have described techniques which can minimize blood loss at cesarean myomectomy, including the injection of diluted oxytocin into the myoma pseudocapsule, purse-string suture, combination of tourniquet, electrosurgery and oxytocin infusion, dissection with electrocautery, uterine artery occlusion, selective uterine devascularization, combination of bilateral ascending uterine artery ligation and tourniquet [1, 7, 16, 20-25]. There is no data showing the superiority of any techniques to another. In the present study, the authors used electrocautery dissection technique with bimanual uterine compression and intravenous oxytocin infusions. If used, uterine devascularization may further reduce blood loss during cesarean myomectomy.

This study has some limitations. The study design was not randomized. Additionally myomectomy was performed due to maternal request in 94% of patients who underwent myomectomy. Thus there may be some degree of selection bias.

In conclusion, cesarean myomectomy is a safe process when performed by experienced surgeons. Obstetricians should not give up cesarean myomectomy for the anxiety of the risk of uterine atony and persistent bleeding. Further large randomized prospective studies are needed.

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