Multiple Repeated Cesarean Deliveries: Operative Complications in the Fourth and Fifth Surgeries in Urgent and Elective Cases

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SUMMARY

Objective: To evaluate the maternal and neonatal risk related with multiple repeated cesarean sections.

Material and Methods: A case control study was conducted in a single tertiary maternity and children's center. The outcome of a study group including 122 pregnant women undergoing cesarean section for the fourth or fifth time was compared with a control group comprising 146 women sectioned for the second and third time. All multiple repeated cesarean sections were divided into urgent and elective groups to compare the outcome measures of demographic, neonatal, intra- and post-operative data.

Results: Compared with the control group, the study group had significantly lower birth weights ($p = 0.026$), lower Apgar scores at 1 minute ($p = 0.0001$) and 5 minutes ($p = 0.042$), higher numbers of fetal death ($p = 0.03$), higher rate of omentum adhesions ($p = 0.0001$) and peritoneal adhesions ($p = 0.008$), increased risk of cesarean hysterectomy ($p = 0.014$), increased need for transfusion ($p = 0.018$), and an increase in hospitalization days ($p = 0.005$). Compared with the elective group, preterm birth incidence was higher ($p = 0.01$) and birth weight was lower ($p = 0.004$) in the urgent group. The risk for myometrium herniation ($p = 0.018$), need for drainage during operation ($p = 0.018$), and post-operative fever ($p = 0.001$) was also more common in the urgent group.

Conclusion: Multiple repeated cesarean sections increase the risks for operative complications and poor perinatal outcomes. Patients must be informed about the related risks of multiple repeated cesarean sections and tubal ligation needs to be encouraged. [*Taiwan J Obstet Gynecol* 2010;49(4):425–431]

Key Words: cesarean section, operative complications, urgent and elective cases

Introduction

The rate of cesarean delivery (CD) has substantially increased over the past three decades [1]. There are numerous factors which contribute to an increased CD rate, including a decline in vaginal birth after cesarean delivery due to the risk of uterine rupture, increasing maternal age and rates of labor induction, decreased use of operative vaginal delivery, and medico-legal concerns [2]. Some authorities have even advocated routine, elective primary CD [3].

It is general practice to suggest sterilization to a woman following two or three CDs because of the hypothesis that there is a risk of scar rupture and several catastrophic complications throughout pregnancy after three or more CDs [4,5]. However, in countries where large families are encouraged for social and cultural reasons, most women do not accept sterilization [6]. Therefore, a prior CD has become increasingly common as an indication for delivery by CD in a subsequent pregnancy.

The latest improvements in the safety of anesthesia, pre- and post-operative monitoring, antibiotic use, and the accessibility of blood and blood products

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has had an impact on the increase in the number of repeat CDs [7].

Rupture of a previously scarred uterus is a rare but serious complication of pregnancy [8]. It may present in different ways, which can vary from asymptomatic scar dehiscence to obvious uterine rupture, and is often accompanied by elevated morbidity and mortality, not only in the mother, but also in the fetus.

The aim of this study was to determine the operative outcomes and associated risks for the mother and the fetus following a high number (≥4) of repeated CDs, as well as the problems related to repeat operative procedures.

Materials and Methods

Istanbul Bakirkoy Maternity and Children Diseases Hospital is a tertiary referral hospital which 92.239 deliveries between January 2002 and December 2006, of which 28.829 (31.2%) were performed by CD. A total of 127 pregnant women who had undergone four or more previous cesarean sections were included in the study. Of these, five patients were excluded from the analyses because of imperfect hospital records. The study group thus comprised 122 women of which 13 cases underwent their fifth CD and 109 cases undergoing their fourth CD. A control group of 146 cases was formed by selecting the previous and/or next women delivered by cesarean section with one or two previous CDs operated on the same day as the study group of 122 cases. Those women undergoing their first CD were also excluded from this control group as they represent a unique subgroup with respect to maternal and neonatal complications. In our hospital, elective CDs are planned between 38.0 and 39.5 gestational weeks for those women who have undergone two or fewer CDs. Gestational age is confirmed or calculated based on an early first trimester ultrasonographic crown-rump-length measurement. Women with three or more previous CDs are scheduled for surgery at 37.0 and 38.0 weeks.

During the study, a group of 20 senior obstetricians supervised CDs and took part in surgery. In our department, one senior obstetrician was always present in the labor room to decide on, and give an indication for, CD and another senior obstetrician was always present to perform the CD.

Data were obtained by retrospective analysis of medical records with two of the authors performing the chart review. Patients with multiple pregnancies were excluded. The data included the following demographic parameters of pregnant women: age, parity, gravidity, number and date of the previous CDs, gestational week at delivery, and pelvic examination on admission for delivery. Intra-operative parameters included rate of tubal ligations, myometrial herniation, uterine scar fenestration, uterine rupture, adhesions involving the omentum, peritoneum and cranial bladder, incidences of placenta previa, placental abruption and placentation abnormalities, the need for additional surgical interventions, such as hysterectomy, repair of bladder injuries, repeat laparotomy and the need for drainage during surgery because of hemostatic instability, and required time for the entire operative intervention. Post-operative complications included the need for transfusion following measurement of pre- and post-operative hemoglobin levels and patient complaints, incidences of post-operative fever and infection, and length of hospital stay for the entire procedure. The study also included the following fetal parameters: birth weight, Apgar scores (1 and 5 minutes), incidence of small for gestational age (SGA), rate of preterm delivery before 35 weeks, need of neonates for observation in different neonatal units, and fetal mortality rate.

We divided patients that had repeated CD into two groups: (1) those underwent the procedure electively; and (2) those underwent the procedure urgently. Statistical analyses were performed with an explanation of the data.

In general, standard pre- and postoperative care included intravenous antibiotics given prophylactically during surgery, removal of the urinary catheter and encouragement of early ambulation (12 hours following the operation), resumption of oral intake when bowel sounds were present, and discharge on the second or third postoperative day after defecation.

The duration of the operation was calculated from the time when anesthesia commenced and the skin incision was made to the time the last skin suture was placed. We used a Pfannenstiel incision to enter the abdominal cavity and a low transverse incision to enter the uterus, with the exception of two cases, in which classic incisions were made due to dense adhesions. After delivery of the neonate, the placenta was manually removed, the uterus was exteriorized, the membranous or fibrotic borders of the isthmic uterine wound were resected when necessary, the myometrium and endometrium were closed by a single-layer interlocking suture with #1 Vicryl (Ethicon Inc. Somerville, NJ, USA), additional haemostatic suturing was performed if necessary, the pelvic cavity was carefully dried, and the parietal peritoneum was closed.

Myometrial herniation is a condition in which a non-transparent but very slight layer of muscular fibers forms, with an estimated thickness less than 2 mm. Uterine scar fenestration is defined as a membranous

or lacerated isthmic layer (fenestration), during which the fetal membranes can be seen. Uterine rupture is defined as a disruption of the uterine muscle and visceral peritoneum.

This study was approved by the ethics committee of Istanbul Bakirkoy Maternity and Children Diseases Hospital. Analyses of data were performed using the χ^2 test for categorical variables and Student's *t* test for means of continuous variables. The odds ratios (ORs) and 95% confidence intervals were used to establish the proportional rate of differences between the case and control groups.

Results

During this 5-year period, we carried out 28.8 CDs from 92.2 total deliveries in our hospital with a mean CD rate of 31.23%. The CD rate rose almost every year; it increased from 30.05% in 2002 to 35.13% in 2006. The most frequent indication for CD was a previous CD (29.0%). The rate of CDs greater than or equal to four was 0.4% (122 cases). We had 109 cases with four CDs and 13 cases with five CDs.

Demographic clinical features of the study and control groups are presented in Table 1. One major finding was that delivery occurred 1 week earlier in the study group compared with the control group ($p < 0.0001$), perhaps because of 62 urgent CDs in the study group, although we planned delivery in gestational week 38. The mean gestational age at delivery was 36.61 ± 1.62 weeks in the study group and 37.84 ± 1.56 weeks in the control group. No maternal deaths occurred in either of the groups studied.

The neonatal data are presented in Table 1. Birth weight, along with 1- and 5- minute Apgar scores were significantly lower in the study group. There were six (4.91%) fetal and/or neonatal deaths in the study group and 1 (0.68%) neonatal death in the control group ($p = 0.03$). The causes of fetal death were placental abruption and intrauterine fetal death in two cases, uterine rupture and fetal death in one case, intrauterine fetal death of unknown cause in one case and severe neonatal abnormalities in two cases (1 cardiac and 1 cranial abnormality). The cause of neonatal death in the control group was premature birth with respiratory distress. We found no differences in small for gestational age fetuses, preterm birth rates and postpartum neonatal follow-up with related morbidity conditions.

The intraoperative complications are shown in Table 2. We experienced more complications associated with adhesions. Intraperitoneal adhesions, adhesion formation between the omentum and adjacent organs, and high and tight attachment of the bladder flap over the isthmic area were more common in the study group. We had two cases with uterine rupture and one with a fetal loss. Although the OR for uterine rupture was 6.07, our data were insufficient for statistical significance. Placental abruption and abnormalities were seen more often in the study group, but were without clinical significance. During the study, we had five cases with subtotal hysterectomy. The indications for hysterectomy were placentation abnormalities with placenta increta in three cases and placental abruption in two cases. The mean operating time in the study group was 62 minutes and was statistically significant compared with the control group.

The postoperative data presented in Table 2 illustrates that the need for postoperative transfusion and time in the hospital was higher in the study group.

Although elective CD is the planned method of delivery for each of these women with repeated previous

Table 1. Demographic features and neonatal data of patients in the study and control groups*

	Study group (*n* = 122)	Control group (*n* = 146)	*p*	OR (95% CI)
Maternal age (yr)	31.24 ± 4.49	29.86 ± 4.59	0.0140	–
Gravida	4.75 ± 1.12	3.42 ± 1.14	0.0001	–
Parity	3.30 ± 0.64	1.90 ± 0.64	0.0001	–
Gestational age at delivery (wk)	36.61 ± 1.62	37.84 ± 1.56	0.0001	–
Birth weight (g)	2,985.9 ± 489.24	3,130.27 ± 555.08	0.0260	–
1 minute Apgar	6.79 ± 1.31	7.91 ± 1.11	0.0001	–
5 minute Apgar	8.78 ± 1.08	9.01 ± 0.82	0.0420	–
SGA fetus	2	1	0.5920	2.41 (0.21–26.99)
Preterm birth (< 35 wk)	10	6	0.0910	2.52 (0.83–7.58)
Observation†	24	24	0.4520	1.27 (0.67–2.37)
Fetal death	6	1	0.0300	7.00 (0.88–63.20)

**Data are presented as mean ± standard error of the mean or n; †neonates were observed in three different neonatal units: the prematurity unit, neonatology unit, and neonatal intensive care unit; all other neonates remained with their mothers. OR = odds ratio: CI = confidence interval; SGA = small for gestational age.*

Table 2. Intraoperative and post-operative data of the study and control groups*

	Study group ($n=122$)	Control group ($n=146$)	p	OR (95% CI)
Tubal ligation	106 (86.9)	129 (88.4)	0.0001	1.14 (0.55–2.37)
Myometrium herniation	12	8	0.177	1.88 (0.74–4.76)
Uterine scar fenestration	6	6	0.750	1.20 (0.37–3.84)
Uterus rupture	2	–	0.120	6.07 (0.28–127.90)
Omentum adhesion	44	12	0.0001	6.29 (3.13–12.64)
Peritoneal adhesion	27	15	0.008	2.48 (1.25–4.92)
Cranial bladder adhesion	36	9	0.0001	6.37 (2.92–13.88)
Placenta previa	2	3	0.802	0.79 (0.13–4.83)
Placental abruption	3	–	0.057	8.58 (0.44–167.90)
Abnormal placentation	3	–	0.057	8.58 (0.44–167.90)
Cesarean hysterectomy	5	–	0.014	13.71 (0.70–250.74)
Bladder injury	1	1	0.898	1.19 (0.07–19.37)
Re-laparotomy	1	–	0.273	3.62 (0.14–89.67)
Need for drainage	12	5	0.058	3.07 (1.05–8.99)
Time during operation (min)	62.09 ± 23.9	42.09 ± 9.45	0.0001	–
Transfusion	17	8	0.018	2.79 (1.16–6.72)
Postoperative fever	21	24	0.866	1.05 (0.50–2.09)
Wound infection	6	7	0.963	1.02 (0.33–3.14)
Days of hospitalization (d)	2.5 ± 1.37	2.12 ± 0.59	0.005	–

**Data are presented as n, n (%) or mean ± standard error of the mean. OR = odds ratio; CI = confidence interval.*

Table 3. Statistical analysis of demographic and neonatal data of urgent and elective repeated cesareans*

	Urgent group ($n=62$)	Elective group ($n=60$)	p	OR (95% CI)
Maternal age (yr)	32.08 ± 4.93	30.37 ± 3.83	0.035	–
Gravida	4.98 ± 1.27	4.50 ± 0.89	0.017	–
Parity	3.42 ± 0.78	3.17 ± 0.42	0.0001	–
Gestational age at delivery (wk)	36.32 ± 1.79	36.90 ± 1.39	0.049	–
Birth weight (g)	2,860.97 ± 523.10	3,115.00 ± 417.88	0.004	–
1 min Apgar	6.82 ± 1.50	6.77 ± 1.09	0.835	–
5 min Apgar	8.72 ± 1.34	8.83 ± 0.74	0.556	–
SGA fetus	2	0	0.206	6.07 (0.28–127.3)
Preterm birth (< 35 wk)	9	1	0.010	10.01 (1.22–81.77)
Observation†	13	11	0.648	1.23 (0.50–3.02)
Fetal death	4	2	0.426	2 (0.35–11.35)

**Data are presented as mean ± standard error of the mean or n; †neonates were observed in three different neonatal units: the prematurity unit, neonatology unit, and neonatal intensive care unit; all other neonates remained with their mothers. OR = odds ratio: CI = confidence interval; SGA = small for gestational age.*

CDs, 62 (50.8%) patients were in active labor upon admission and urgently underwent CD. Table 3 shows us the distribution of clinical findings in demographic and neonatal data in the urgent and elective groups. We found a higher incidence of preterm birth and lower birth weight in the older gravidas and higher gravidity and parity, respectively. In the urgent group, there was statistical significance for myometrium herniation only (Table 4). The need for drainage after surgery was higher in the urgent group and post-operative complications were limited to fever and hospital stay, which was likely a result of the urgent circumstances.

Discussion

Even if CD has become safer [7], it is still associated with elevated maternal morbidity and mortality compared with vaginal birth [9]. As the rate of primary CDs increases and the rate of vaginal birth after cesarean decreases, the number of women who will undergo multiple CDs will increase. One of the main contributing factors to increasing CD rates is elective repeat CD. In 1991, 23.5% of more than 4 million births in the USA were CDs, and 35% of these were repeat elective procedures [10]. Recent studies support these statistics, with

Table 4. Statistical analysis of intra- and post-operative data of urgent and elective repeated cesareans*

	Urgent group ($n=62$)	Elective group ($n=60$)	p	OR (95% CI)
Tubal ligation	52 (83.9)	54 (90.0)	0.316	1.73 (0.58–5.10)
Myometrium herniation	10	2	0.018	5.57 (1.16–26.64)
Uterine scar fenestration	5	1	0.102	5.17 (0.58–45.70)
Uterus rupture	2	–	0.161	5.00 (0.23–106.40)
Omentum adhesion	24	20	0.536	1.26 (0.60–2.65)
Peritoneal adhesion	15	12	0.577	1.27 (0.54–3.01)
Cranial bladder adhesion	21	15	0.283	1.53 (0.69–3.37)
Placenta previa	1	1	0.981	0.96 (0.05–15.83)
Placental abruption	3	0	0.084	7.11 (0.35–140.9)
Abnormal placentation	2	1	0.578	1.96 (0.17–22.29)
Cesarean hysterectomy	4	1	0.183	4.06 (0.44–37.52)
Bladder injury	1	0	0.323	2.95 (0.11–73.93)
Re-laparotomy	0	1	0.307	0.31 (0.01–7.95)
Need for drainage	10	2	0.018	5.57 (1.16–26.64)
Time during operation (min)	65.65 ± 27.57	58.42 ± 18.94	0.095	–
Transfusion	12	5	0.079	2.64 (0.86–8.02)
Postoperative fever	18	3	0.001	7.77 (2.15–28.07)
Wound infection	3	3	0.967	0.96 (0.18–4.98)
Days of hospitalization (d)	2.76 ± 1.82	2.23 ± 0.53	0.034	–

**Data are presented as n, n (%) or mean ± standard error of the mean. OR = odds ratio; CI = confidence interval.*

an increased rate of previous CD evident [11]. Previous and repeat CD was a frequent indication (29%) in our hospital, which supports this finding. Currently, the rate for high order repeat CDs in our hospital is 0.4%.

Our outcomes demonstrate that compared with a number of CDs less than or equal to two, multiple CDs were associated with more surgical difficulties and a statistically significant increase in complications. Adhesions, which have also been reported by other investigators [4, 6,7,12–18] not only make for difficulties for the surgeon, but may also create an increased risk to the patient by prolonging the operation time and by increasing the risk of injury to adjacent organs. Fortunately, there was no single incidence of bowel injury, even among the patients with dense adhesions and those who underwent CD under urgent conditions. In this study, the major maternal morbidity was associated with placental abruption and placentation abnormalities of the placenta, known risk factors associated with previous uterine scarring and increased parity. We advise that women that have undergone a previous CD be identified as high risk because of a placental abruption and placentation abnormalities and should be warned of the increased risk of caesarean hysterectomy.

Our results clearly show a considerably lower mean gestational age in women with multiple CDs and a significantly higher rate of low 1 and 5 minute Apgar scores and birth weight. Our data shows that the greater part of preterm CDs and neonatal morbidity were associated with non-elective CDs. Poor prenatal care with respect to timing of the planned CD was not the main reason for unfavorable neonatal outcome as suggested in other series [19,20]. The higher frequency of fetal depression, as reflected by low Apgar scores, between obstetrically-indicated CDs could reflect, in addition to the contribution of prematurity, the less than optimal circumstances in the delivery rooms when a repeat high-order CD is performed at a non-scheduled time. Repeat CDs may require a challenging dissection of the abdominal wall with an adherent bladder, omentum and/or peritoneum, aspiration of amniotic fluid during attempts at delivery, fetal hypoxia if the placenta is encountered beneath the prior incision, and, occasionally, version to accomplish delivery [12].

Concern about carrying a pregnancy in a uterus previously subjected to multiple CDs, while justified, is founded on the fear of scar rupture. However, our data shows that placental abruption and placentation abnormalities, which often cause hemorrhage and require hysterectomy, are more common and more severe causes of morbidity than uterine rupture or dehiscence. We found no statistical significance in myometrial herniation, uterine scar fenestration, and uterus rupture, which is identical with the findings of other studies [8,16]. Juntunen et al [15] reported that patients with abdominal pain in the third trimester often have operative findings of a thin or membranous isthmic myometrium. We speculate

that in patients who undergo repeat CDs on an urgent basis, perceived pain may be the reason for preterm delivery and associated consequences.

Patients with repeat CD had very few post-operative complications (Table 2). The need for post-operative transfusion was statistically higher in the study group. The fall in the hemoglobin level from the pre-operative to the post-operative level was greater in the study group compared with the control group. This is consistent with a longer operating time, resulting in greater blood loss. We found no differences in post-operative fever/pyrexia or post-operative wound infections. The rate of post-operative fever was 17.2% and 16.4% in the study and control groups, respectively, which is similar to the reports in the literature [16]. The incidences for wound infection in both groups were 4.9% and 4.8%, respectively, and showed no statistical significance [12].

Our hospital is a tertiary care center for obstetrics and gynecology and pediatrics, with referrals received from other hospitals, polyclinics and maternity homes in the city and the nearby regions. Although elective CD is the preferred method for repeated previous CD and 62 (50.8%) patients underwent CD urgently. We found a higher incidence of preterm birth at less than 35 gestational weeks in the urgent group for nine cases ($p=0.01$; OR=10.1 [1.22–81.77]). The mean age, gravidity and parity between urgent and elective repeated CD cases was also statistically significant (Table 4). We had 18 cases in the urgent group aged over 35 years, as opposed to nine cases in the elective group. This also affected birth weight, which was significant in the urgent study group.

We found only minor pre-operative differences between both groups (Table 4). Although, myometrial herniation was more common in the urgent group, these cases had no effect on preterm and urgent operations. The need for drainage during surgery was higher in the urgent study group, which mainly depended on the technical circumstances and the surgeon ($p=0.018$; OR=5.57 [1.16–26.64]). Post-operative fever was also more common in the urgent group (29.0% *vs.* 5.0%; $p=0.001$; OR=7.77 [2.15–28.07]); this may reflect the less than optimal conditions in the delivery rooms when a repeat high-order CD is performed at a non-scheduled time.

We had a high incidence of tubal ligation with rates in the control, urgent and elective study groups at 88.4%, 83.9% and 90.0%, respectively.

In conclusion, the rate of CD will continue to increase. Multiple repeated cesarean sections will increase the risks of operative complications and poor perinatal outcomes. Patients must be encouraged to undergo tubal ligation with the families involved being informed of the risks of high order repeated CD.

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