

Maternal and Fetal Outcomes in Caesarean Sections Repeated Fourth and Fifth Times

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ABSTRACT

Objective: To evaluate the maternal and fetal outcomes associated with caesarean sections (CS) repeated fourth and fifth times.

Methods: We performed a retrospective study of 110 patients undergoing CS repeated fourth and fifth times between May 2014 and May 2015. The patients were divided into two groups: group 1 had CS repeated four times ($n = 90$) and group 2 had CS repeated five times ($n = 20$), and the maternal and fetal outcomes of the groups were retrospectively evaluated.

Results: There were no statistically significant differences between fourth and fifth CS groups with regard to the maternal age, gravida, body mass index, gestational age at birth, birth-weight, and Apgar scores at 5 minutes ($p > 0.05$). We found no significant differences between the fourth and fifth CS groups in terms of injury to peripheral organs, intra-abdominal adhesions, caesarean hysterectomy, uterine dehiscence or rupture, time during operation, length of hospital stay, and need for blood transfusions ($p > 0.05$). Compared with the elective cases, perioperative complications and length of hospital stay were significantly higher in the urgent group ($p = 0.034$ and $p = 0.005$).

Conclusion: Women with CS repeated four or five times have increased risks for perioperative complications. Placenta previa with or without accreta and intra-abdominal adhesions seem to be the major causes of increased morbidity.

Keywords: Caesarean section, intraoperative complications, maternal morbidity, placenta previa, uterine rupture.

INTRODUCTION

Caesarean section (CS) is an important surgical procedure that may save life of both the mother and the baby. Its rate has substantially increased over the past three decades (1). In the USA, while the rate of CS was 32% in 2007 which was the country's highest rate ever, health officials reported that it is thought to be over 50% at present (2). In our country, Turkey, the data from Turkish Demographic and Health Survey (TDHS) reported the caesarean delivery rate as 21% in 2003 and this has increased to 37% in 2008 according to TDHS-2008 data (3). Many factors are thought to contribute to an increased CS rate which are including a decline in vaginal birth after caesarean delivery, the increasing primary caesarean delivery due to increasing maternal age and labour induction, decreased

use of and experience with operative vaginal delivery and medico-legal concerns (2).

The increasing number of repeated CSs is an important health problem with regard to the possible maternal and fetal complications and also to the additional economic load. Many studies have reported the effect of multiple CSs on the maternal-fetal morbidity and mortality. There are conflicting data in the literature regarding the safety of multiple repeated procedures and the effect on perioperative complications. Some authors showed that high number CS carry no specific additional risk to both the mother and foetus when compared to lower number CS (4, 5). In contrast, others reported maternal-fetal morbidity increases with multiple repeated CSs (6, 7). The two specific major concerns regarding repeated CSs are

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uterine scar rupture which is rare but causes catastrophic results and the increased risks of placenta previa and placenta accreta.

The aim of this study was to determine and compare the perioperative, post-operative outcomes and associated risks for the mother and the foetus during the repeated fourth and fifth CSs in our tertiary referral hospital (Medical Faculty, Van Yuzuncu Yil University, Van, Turkey).

SUBJECTS AND METHODS

This study was conducted retrospectively at our tertiary hospital's obstetrics and gynecology clinic between May 2014 and June 2015. The institution's ethics committee approved the study. Our centre is a tertiary referral hospital which serves a total of 1.5 million people in three neighbouring cities in eastern region of Turkey. We reviewed the files and medical records of patients who had a CS for the fourth and fifth times. During the study period, a total of 1328 deliveries were performed in our centre. Of these, a total of 114 pregnant women who had undergone CS for the fourth and fifth times were included in the study. Four patients were excluded from the study due to the inadequate data in medical records. The study thus comprised 110 women of which 90 and 20 cases underwent their fourth and fifth CS, respectively. All the medical records in both groups were complete and accessed.

The data extracted from medical files included:

- Demographic data (patient's age, parity status, body mass index), gestational age, type of CS either elective or urgent, tubal ligation during CS, smoking status
- Perinatal data including birthweight, Apgar scores at 5 minutes, admission to neonatal intensive care unit (NICU), incidence of preterm birth before 37 weeks
- Perioperative and post-operative variables including operation time, uterine rupture (rupture or scar dehiscence), intra-abdominal adhesions, placental abnormalities (previa or accreta), need for hysterectomy, bowel or bladder damage and repair, post-operative haemoglobin levels, need for transfusion, post-operative infections (wound infection or endometritis), length of hospital stay.

In our hospital's policy, the elective CSs are performed in cases with one or more previous CSs between 38 and 39 weeks of gestation if there are no any other indications for early delivery. The fourth or fifth repeated CSs

are performed always under the supervision of a senior obstetrician. In general, a pfannenstiell incision is used to enter abdominal cavity and a low segment transverse incision is used to enter the uterus with the exception in cases of prediagnosed placenta previa with accreta or patients having previous midline abdominal incision in which a midline abdominal and classic vertical uterine incision is used. After delivery of baby, the placenta is removed manually and the uterine scar is sutured by a single layer interlocked suture. The parietal and visceral peritonemum are not generally closed after CS. Routine prophylactic antibiotic as a single dose of cephalosporin is given following the cord clamping after delivery of the neonate during CS operation.

The intra-abdominal dense adhesion was defined as the presence of adhesions involving the omentum, peritoneum, bladder, or the front of the uterus which interferes with the feasibility and course of operation. Uterine rupture was defined as when fetal parts were found within abdominal cavity after full thickness separation of uterine scar. Uterine dehiscence is defined as a membranous window in lower uterine segment which is covered by only intact membranes and visceral peritoneum. Placenta accreta was diagnosed based on the histologic findings in cases of hysterectomy or intra-operative observation which the placenta could not be separated easily with gentle traction or profuse bleeding from the adhesion site after the separation attempts. Endometritis was diagnosed when post-operative fever, foul smelling vaginal discharge, uterine tenderness, and leucocytosis were present with no other focus for infection. The length of operation was calculated from the time of anaesthesia induction to the skin closure when the last suture was placed.

Statistical analyses were performed using SPSS (version 20.0, Inc., Chicago, IL, USA). The mean \pm SD, frequencies and descriptive statistics were calculated for continuous variables. Mann-Whitney U test or Chi-square test were used as appropriate when comparing quantitative variables between groups. $p < 0.05$ was considered statistically significant.

RESULTS

During the study period, there were 1328 deliveries with the overall CS rate of 44.4%. Of these CS cases, a total of 114 women underwent the fourth and fifth CS with the rate of 19.3%. A fourth CS was performed for 90 pregnant women and a fifth CS was performed for 20 women. The demographic variables of the cases are presented in Table 1. The mean age was 30.5 ± 5.2 and

32.6 ± 5.8 years for the fourth and fifth CS cases, respectively, which was not statistically different ($p = 0.108$). The major detection in the demographic variables was that the gestational age at birth was statistically earlier in fifth CS group than the fourth CS group (37.08 ± 1.9 vs 34.9 ± 4.02, $p = 0.001$). The early neonatal outcomes regarding birthweight, Apgar score at 5 minutes and admission to NICU were not statistically different between two groups ($p = 0.117$, $p = 0.667$, $p = 1.000$). Two intrauterine fetal deaths were seen in which one was caused by placental abruption in the fourth CS group and the other was a case of fifth CS with intrauterine growth restriction and uterine dehiscence.

Table 1: Comparison of demographic characteristics between CSs repeated fourth and fifth times

Variables	Fourth CS (n = 90)	Fifth CS (n = 20)	p value
Age, year (mean ± SD)	30.5 ± 5.2	32.6 ± 5.8	0.108
Gravida (mean ± SD)	4.09 ± 0.3	5.05 ± 0.2	0.001
BMI (mean ± SD)	23.8 ± 3.8	23.9 ± 2.01	0.925
Gestational age at birth (mean ± SD)	37.08 ± 1.9	34.9 ± 4.02	0.001
Birth weight, g (mean ± SD)	3052 ± 613	2793 ± 859	0.117
Preterm birth, n (%)	22 (24.4%)	7 (35%)	0.362
Apgar score at 5 min (mean ± SD)	8.4 ± 1.7	8.2 ± 2.2	0.667
Admission to NICU, n (%)	8 (8.8%)	2 (10%)	1.000

CS = caesarean section; BMI = body mass index (kg/m²); SD = standard deviation; NICU = neonatal intensive care unit. $p < 0.05$ indicates statistical significance.

Table 2 shows the operative outcomes of the fourth and fifth CSs. We experienced high rate of intraoperative complication, including intra-abdominal adhesions, caesarean hysterectomy, uterine dehiscence, bladder injury, and placental abnormalities in both groups. However, there were no statistical significant differences between fourth and fifth CSs with regard to these complications ($p > 0.05$). Surprisingly and fortunately, no uterine rupture occurred in either group. We had only one case of bowel injury and it was treated with end-to-end anastomosis during the same operation in the fifth CS group. We had five cases of caesarean hysterectomy in the fourth CS group and two cases in the fifth CS group. All of these cases were associated with uncontrolled lower uterine segment bleeding due to placental developmental abnormalities (six cases with placenta previa and accreta and one case with only placenta previa). The mean operation time was 56 minutes for cases with CSs repeated the fourth time and 61 minutes for cases with CS repeated the fifth time which was not statistically different. There was no maternal mortality among both groups.

Table 2: Comparison of perioperative and post-operative outcomes between fourth and fifth surgeries

Variables	Group 1 (n = 90)	Group 2 (n = 20)	p value
Intra-abdominal adhesion, n (%)	12 (13.3%)	4 (20%)	0.486
Tubal ligation, n (%)	35 (38.8%)	12 (60%)	0.128
Placenta previa, n (%)	8 (8.8%)	3 (15%)	0.417
Placenta accreta, n (%)	4 (4.4%)	2 (10%)	0.299
Caesarean hysterectomy, n (%)	5 (5.5%)	2 (10%)	0.609
Uterus rupture, n (%)	0	0	1.000
Uterine dehiscence, n (%)	8 (8.8%)	2 (10%)	1.000
Bladder injury, n (%)	4 (4.4%)	1 (5%)	1.000
Bowel injury, n (%)	1 (1.1%)	0	1.000
Need for drainage, n (%)	8 (8.8%)	3 (15%)	0.417
Time during operation, min (mean ± SD)	56 ± 24	61 ± 22	0.125
Transfusion, n (%)	10 (11.1%)	4 (20%)	0.280
Length of hospital stay, day (mean ± SD)	2.4 ± 1.1	2.4 ± 1.2	0.320
Endometritis, n (%)	5 (5.5%)	1 (5%)	1.000

SD = standard deviation; n = number. $p < 0.05$ indicates statistically significant.

Comparison of elective and urgent CS cases is shown in Table 3. A total of 82 (74.5%) patients underwent CS for the fourth or fifth time under emergent conditions. The most important finding is that the rate of complications in the urgent group is significantly higher than in the elective one ($p = 0.034$). The short term neonatal outcomes including birthweight, gestational age at birth and Apgar score at 5 minutes did not show statistically significant differences between urgent and elective cases ($p > 0.05$).

Table 3: Comparison of variables between urgent and elective cases of fourth and fifth caesarean sections

Variables	Urgent cases (n = 82)	Elective cases (n = 28)	p value
Maternal age, year (mean ± SD)	30.72 ± 4.8	31.4 ± 6.7	0.549
Gravida (mean ± SD)	4.30 ± 0.5	4.14 ± 0.3	0.125
BMI (mean ± SD)	24.4 ± 3.02	22.2 ± 4.4	0.005
Complication*, n (%)	20 (24.3%)	2 (7.1%)	0.034
Hospital stay, day (mean ± SD)	2.4 ± 0.6	2.1 ± 0.8	0.005
Gestational week at birth (mean ± SD)	36.5 ± 2.8	37.1 ± 1.7	0.239
Birth weight, g (mean ± SD)	2978 ± 720	3084 ± 478	0.478
Apgar score at 5 min (mean ± SD)	8.5 ± 1.9	8.5 ± 1.08	0.539

SD = standard deviation. *Include intraoperative bowel and bladder injury, need for hysterectomy, need for blood transfusion, need for drainage. $p < 0.05$ indicates statistical significance.

DISCUSSION

In the modern world, sterilization is suggested to women who have undergone the third CS due to the hypothesis that the risk of uterine scar rupture or other maternal preoperative, intraoperative and post-operative complications increase throughout the pregnancy after three or more CSs (8). However, in the developing countries, there is a trend to have a large family which is affected by religion, culture, tradition and socio-economical factors, and increased parity was also found to be associated with higher order CS number (9). Even in developing countries, there is regional differences such as in rural areas due to the lack of ability to reach contraceptives and having desire to have more children or sometimes to have a male child leads to a higher repeat CS rate. There has been a significant rise in CS rate worldwide which is attributed to the some variable factors such as medico-legal factors, increased reliability of CS, decreased rate of vaginal birth after CS and socio-economic reasons (10).

It is a well-established data that multiple repeated CSs are related to serious maternal and fetal morbidity and mortality when compared to vaginal birth and the first CS, even though with the advances in anaesthesia, pre- and post-operative monitoring and antibiotic use (4). Our hospital is a referral centre which accepts risky patients from the nearby cities in which there is no other tertiary obstetric care centre and so most of the fourth and fifth CSs are carried out in our hospital. This can explain the high rate of CS of 44.4% and also increases our multiple repeated CSs in our centre. The present study outcomes are consistent with data reported by Gedikbasi *et al* which stated that multiple CSs were associated with more surgical difficulties and a statistically significant increase in complications when compared to a number of CSs less than or equal to 2 (7). Although we did not design and compare our study group with the CSs less than or equal to 2, the placenta previa, uterine dehiscence and caesarean hysterectomy were found to be 8.8%, 8.8% and 5.5% in the fourth CS group, respectively and 15%, 10% and 10% in the fifth CS group, respectively.

It has been reported that intra-abdominal adhesion increases with the number of CSs and also causes difficulty in performing operation, prolongation of surgery and importantly, increasing the risk of injury to adjacent organs especially to the bladder (5, 8). Adhesion formation is affected by many factors such as surgical technique, tissue handling, operation time and health status of the patients which affects the tissue healing

process. The adhesion incidence in our study was consistent with many published papers in the literature. A recent study by Kaplanoglu *et al* reported that the fourth CS seems to be the critical level for adhesion formation and they found 16.1% of dense adhesion in cases with a fourth CS (in 336 cases) and 5.1% in cases with a fifth CS (in 79 cases) (11). Our outcomes showed adhesion rate as 13.3% and 20% in fourth and fifth CSs, respectively, which is consistent with that study. However, many studies in the literature reported the incidence of adhesion within the 46%–65% range, depending on the number of CSs (12). Our results are lower than that of the previous studies. This may be related to the fact that we could not evaluate the adhesion formation based on our study's retrospective design and also, in our hospital, only the significant adhesions that create difficulty in operation are noted in the medical files.

Organ injury during multiple repeated CSs is one of the most frightening concerns for obstetricians, and it raises anxiety of surgeons in such operations. In our study, the incidence of bladder injury was higher than in the previous reports (7, 13). The bowel injury occurred only in one case. This case was one of the fourth CS and when we analysed it, the intraoperative records stated that the small intestines were adhered to the whole anterior surface of uterus and also to the abdominal wall. The bowel was damaged during entry into the abdomen with pfannenstiel incision. So, in general, the higher order caesarean number carries the risk of damage to peripheral organs, and careful and meticulous entry into the abdomen either with vertical or low segment transverse incision is the most important step in reducing injury to these organs. In our study, most of the peripheral organ injuries were seen in urgent cases which may indicate that emergent CSs are performed without adequate carefulness and in a timely manner so may have an effect on organ damage.

Rupture of scarred uterus is one the major risk and complication for patients with repeated CS. It may be a complete uterine rupture or asymptomatic scar dehiscence. No uterine rupture case was seen in our study group which was different from the other previous reports (7, 14). This might be due to the fact that majority of our cases were urgent patients who were referred to our centre from peripheral hospital in which patients were transferred quickly without any delay and the obstetricians were alert to any signs of uterine contractions or labour in patients with previous repeated CSs for transferring the patients. However, the incidence of uterine scar dehiscence was 8.8% and 10% for the fourth

and fifth CSs, which was consistent with the literature (15). Most of the uterine dehiscence were urgent and referred cases so, fortunately, any delay in beginning of the operations would cause a complete uterine rupture.

Placenta previa and placental adhesion anomalies including placenta accreta are the major morbidities in repeating caesarean deliveries. We found placenta previa in 8.8% and 15% of fourth and fifth CSs, respectively. The concurrence of placenta previa and placenta accreta is reported to be more than 60% for the fourth and more CSs (16). Similar with this data, the placenta accreta was seen in four patients of the fourth CS group and two patients of the fifth CS group in which all of these cases were also placenta previa. Caesarean hysterectomy is one of the leading cause of increasing morbidity in repeated CSs. Not surprisingly, all of the hysterectomies in our study were associated with placental abnormalities either previa or accreta, and this was consistent with the literature.

Of the parameters analysed regarding the post-operative outcomes, no significant difference was found between the fourth and fifth CS groups in terms of infectious morbidity, endometritis rate and length of hospital stay ($p > 0.05$). The endometritis rate was found to be as 5.5% and 5% in the fourth and fifth CS groups, respectively which was higher than reported in the literature (7, 14). We think that this may be due to the higher number of urgent cases in our study cohort. When comparing the study group as urgent and elective cases, it was found that the complication rate including the need for transfusion, hysterectomy, organ injury and prolonged hospital stay was statistically significantly higher in urgent cases than in elective cases ($p = 0.034$ and $p = 0.005$). So it can be speculated that we can decrease the incidence of complication rate in multiple repeated CSs by increasing follow-up and the number of elective cases until 39 completed weeks of pregnancy and initiation of labour.

CONCLUSION

The results from this study showed that the perinatal outcomes and perioperative complication rates were similar in fourth and fifth times CSs. The placenta previa and adhesions seem to be the major causes of increased morbidity in both the fourth and fifth multiple repeated CSs. All the pregnant women undergoing fourth and fifth CSs should be evaluated for placental development abnormalities before surgery both in urgent and elective cases. The overall complication rate was significantly higher in

urgent cases than in elective cases so the patients should be encouraged to undergo the surgery in elective times. The patient and her family should be informed about the possible risks of complications and tubal ligation needs to be advised.

AUTHORS' NOTE

The authors declare that they have no conflict of interest.

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