

Impact of Cesarean Section Number on Maternal and Obstetric Outcome

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OBJECTIVE: We aimed to evaluate the maternal and obstetric outcomes associated with increasing number of cesarean sections (C/Ss).

STUDY DESIGN: The clinical records of 408 women who were delivered by C/S at our clinic were examined for some maternal and neonatal outcomes, retrospectively. The pregnant women were assigned to groups based on previous number of C/S; group 1 was consisted of the cases that had no C/S, group 2 one C/S, group 3 two C/Ss and group 4 three and more C/Ss.

RESULTS: The most common indication for first C/S was fetal distress with 60 (30.3%) of 198 cases. Mean maternal age, gestational age, birth weight, 1 and 5 minute Apgar scores, operating time, difference of post-op and pre-op hemoglobin level, and length of postoperative hospitalization were similar among groups ($p>0.05$). The ratio of placenta previa, and blood transfusion were significantly high in group 4 compared to group 1, 2, and 3 ($p<0.05$). Hysterectomy was performed in 5 (1.5%) cases and maternal mortality occurred in 2 (0.6%) cases.

CONCLUSION: Among the causes of morbidity clinically most important was the triad of placenta previa, placenta accreta and hysterectomy, was also responsible for the most serious risk to the mother with increasing number of C/S.

Key Words: Increasing number of cesarean section, Maternal outcome, Perinatal outcome

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Introduction

A continuous rise in the rate of cesarean delivery has been reported in many countries during the past decades. Although cesarean section (C/S) is considered relatively safe operation, the number of C/Ss that a woman can safely undergo has long been debated among obstetricians. This question has gained urgency in current practice as a consequence of the steep worldwide rise in primary C/S rates.^{1,2} The number of women who now require more than three successive C/Ss is growing rapidly, as indications for primary C/Ss have become relaxed to the point where a woman's request is sufficient reason for a cesarean delivery.³ The problem is resulted from where access to effective contraception is limited, tubal ligation is not accepted, and social attitudes still favor a large family.

Conventional practice in the developed world has been to discourage pregnancy after three C/Ss, although there is no clear evidence in the literature to validate this condition. There

are few studies with small sample size that examine morbidity in women undergoing multiple C/Ss in the literature. Seidman et al.,⁴ Kirkinen⁵, Soltan et al.⁶ and Tamale-Sali et al.⁷ studied cohorts of 154, 64, 395 and 59 women, respectively. They found no increase in maternal morbidity and indicated that there was no reason to discourage pregnancy in women with multiple C/Ss. However, their conclusions were based on a limited range of morbidity indicators. None of these authors found nor addressed the increased frequency of serious complications associated with abnormal placentation in a scarred uterus, as observed in other studies.^{8,9} More recently, Lynch et al.¹⁰ have also reported that there was no correlation between maternal morbidity and the number of C/Ss.

The aim of the present study was to assess the relation between the number of C/Ss and maternal and obstetric outcomes.

Material and Method

Maternal and obstetric outcome of 408 women delivered by C/S at the Department of Obstetrics and Gynecology of the Kahramanmaraş Sutcu Imam University between June 2008 and May 2009 were retrospectively evaluated. The cases were divided into four groups, according to the number of C/Ss they had previously; Group 1 was consisted of the cases that had no C/S, Group 2 one C/S, Group 3 two C/Ss and Group 4 three or more C/Ss.

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The following data obtained from the files of cases were compared; maternal age, gestational age, C/S indication, birth weight, 1 and 5 minute Apgar scores, operating time, difference of post-op and pre-op hemoglobin (Hb) level, length of postoperative hospitalization, and incidence of cesarean hysterectomy, placenta previa, bladder and bowel injury, blood transfusion, and maternal mortality. Late postoperative morbidity, after discharge, was not included in this study.

In our clinic we usually schedule a cesarean delivery between 38.4 and 39.5 weeks, whereas women with two or more previous cesarean deliveries are scheduled for surgery at 38 weeks. This policy is intended to decrease the risk of uterine rupture associated with multiple uterine scars. Gestational age is either confirmed or recalculated based on an early ultrasound biometry. We usually use a Pfannenstiel incision to enter the abdominal cavity and a transverse incision in the lower segment of the uterus. We provide postpartum thrombophylaxis only to women who are at increased risk for thromboembolism.

All data were analyzed using the Statistical Package for the Social Sciences for Windows version 15.0 (SPSS, Chicago, IL). For statistical analysis One-Way Anova test, Chi-square test, Fischer's Exact test, and Student's t test were used. Statistical significance was defined as $p < 0.05$.

Results

Demographic and obstetric characteristics of the groups are presented in Table 1. Of the 408 women, 198 (48.5%) women underwent one cesarean deliveries, 120 (29.4%) women underwent two cesarean deliveries, 60 (14.7%) women underwent three cesarean deliveries, and 30 (7.4%) women underwent four cesarean deliveries. The first 3 C/S indication in group 1 were; fetal distress with 60 (30.3%) cases, pregnancy induced hypertension with 38 (19.2 %) cases and presentation abnormality

with 22 (11.1%) cases. Mean maternal age, gestational age, birth weight, 1 and 5 minute Apgar scores were similar among groups ($p > 0.05$) (Table 1). Mean operating time, difference of post-op and pre-op Hb levels, and length of postoperative hospitalization were also similar between the groups ($p > 0.05$) (Table 2).

Table 1: Demographic and obstetric characteristics of groups.

	Group 1 (n=198)	Group 2 (n=120)	Group 3 (n=60)	Group 4 (n=30)	p
	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Maternal age (year)	28.7 \pm 6.3	28.5 \pm 5.7	33.0 \pm 4.9	30.9 \pm 4.1	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
Gestational age (week)	37.6 \pm 3.2	37.7 \pm 2.6	38.0 \pm 2.0	4 \pm 2.3	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
Birth weight (gr)	3072.4 \pm 947.1	3007.6 \pm 659.5	3130.8 \pm 645.1	3076.3 \pm 641.8	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
1 minute Apgar	7.6 \pm 1.4	7.9 \pm 1.8	7.9 \pm 1.4	7.8 \pm 2.2	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
5 minute Apgar	9.2 \pm 0.9	9.1 \pm 1.9	9.3 \pm 0.9	9.0 \pm 2.5	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05

All parameters are given mean \pm standart deviation values in table 1.

Comparisons were shown in between groups as ; *: group 1 and 2, **: group 1 and 3, ***: group 1 and 4, ****: group 2 and 3, *****: group 2 and 4, *****: group 3 and 4. n: subject number, p values statistically evaluated as $p > 0.05$ insignificant, $p < 0.05$ significant.

Table 2: Morbidity indicators and their association with number of cesarean sections

	Group 1 (n=198)	Group 2 (n=120)	Group 3 (n=60)	Group 4 (n=30)	p
Duration of operation (minute) (Mean \pm SD)	39.4 \pm 10.6	44.5 \pm 18.7	55.8 \pm 15.4	64.0 \pm 34.6	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
Hb difference (mg/dl) (Mean \pm SD)	1.1 \pm 0.8	1.2 \pm 1.3	1.2 \pm 0.8	1.6 \pm 0.8	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
Postoperative hospitalization (days) (Mean \pm SD)	1.7 \pm 0.8	1.9 \pm 2.8	1.7 \pm 0.7	2.1 \pm 1.9	* ** * ** * ** * ; ; ; ; ***** *****; ; >0.05
Blood transfusion (n)(%)	18.0 (9.1%)	8.0 (6.7%)	8.0 (13.3%)	7.0 (23.3%)	* ** * ** * ** *;>0.05 *** ***** ***** ; <0.05
Placenta previa (n)(%)	2.0 (1.0%)	3.0 (2.5%)	3.0 (5.0%)	6.0 (20.0%)	* ** * ** * ** *;>0.05 *** ***** ***** ; <0.05

Parameters are given mean \pm standart deviation, subject number and ratio values in table 2.

Hb; Hemoglobin.

Comparisons were shown in between groups as ; *: group 1 and 2, **: group 1 and 3, ***: group 1 and 4, ****: group 2 and 3, *****: group 2 and 4, *****: group 3 and 4. n: subject number, %:ratio p values statistically evaluated as $p > 0.05$ insignificant, $p < 0.05$ significant.

When we accepted the group 1, 2 and 3 as one group and compared them with group 4; mean difference of post-op and pre-op Hb level and postoperative hospitalization were significantly higher in group 4 ($p < 0.05$). Totally 38 (9.3%) cases had blood transfusion; 18 (9.1%) in group 1, 8 (6.7%) in group 2, 8 (13.3%) in group 3 and 7 (23.3%) in group 4. The ratio of blood transfusion was similar in group 1, 2, and 3, but it was significantly higher in group 4 compared to other groups ($p < 0.05$).

Placenta previa was present in 14 (3.4 %) women; 2 (1.0%) in group 1, 3 (2.5%) in group 2, 3 (5.0%) in group 3, and 6 (20.0%) in group 4. The rate of placenta previa was similar in group 1, 2, and 3, but it was significantly higher in group 4 than other groups ($p < 0.05$). Hysterectomy was performed in 5 (1.5%) women; one (0.8%) (uterine atony) in group 2, one (1.6%) (placenta accreta) in group 3, and three (10.0%) (two placenta accreta, one placenta percreta) in group 4. Bladder injury occurred only in one women (0.2%) (placenta percreta) in the group 4. Maternal mortality occurred in 2 (0.6%) women; 1 (0.3%) was in group 2 (intra-abdominal hemorrhage), and 1 (0.3%) was in group 4 (placenta accreta).

Discussion

Large families are common in many countries and communities throughout the world. As the rate of primary cesarean deliveries increases and the rate of vaginal delivery decreases, the number of women who will consequently undergo multiple cesarean deliveries will eventually increase.¹¹ In our study primary C/Ss were often emergency procedures (30.3% was due to fetal distress, and 19.2% was due to pregnancy induced hypertension) performed during labor. Although C/S has become a safer procedure, it is still associated with higher maternal morbidity and mortality than vaginal birth. A presumption, therefore, has always been that increasing number of C/Ss elevate the risk and that the risk is such that pregnancy is contraindicated after three C/Ss.¹¹

In our study mean gestational age, birth weight and Apgar scores among groups were similar ($p > 0.05$). Uygur et al.¹² in their study compared the perinatal and maternal results in 1st and more than 2 C/S cases. They found no statistically significant association between the number of previous C/Ss and Apgar scores and birth weight.¹² Soltan et al.⁴ also reported that fetal weight and fetal outcome had no significant effect on, nor influenced, the multiplicity of cesarean sections. Rashid et al.¹³ compared maternal complications between 308 women with five or more cesarean deliveries and 306 women with three or four cesarean deliveries. They concluded that the high number (5-9) of repeat cesarean deliveries carries no specific additional risk for the mother or the newborn when compared with the lower number (3 or 4) cesarean deliveries.¹³

We found mean duration of operation, and difference between post-op and pre-op Hb levels similar between the groups ($p > 0.05$). Although Uygur et al.¹² reported more dense adhesions in multiple C/S group, they found duration of operation, and pre-op and post-op Hb levels similar in both groups. Soltan et al.⁴ also reported similar duration of operation in their study. Nisenblat et al.¹⁴ demonstrated that multiple cesarean deliveries (three or more cesarean deliveries) were associated with more difficult surgery and increased blood loss compared with a second cesarean delivery. They also indicated that the risk of major complications increases with C/S number.¹⁴

Totally 14 (3.4%) placenta previa cases were present in our study and 6 (20%) of them were in group 4. The incidence of placenta previa escalated linearly with rising CS number and it was significantly higher in group 4 than other groups ($p < 0.05$). When placenta previa was present, placenta accreta coexisted in 50.0% (3 in 6 cases with placenta previa in group 4) of women undergoing a fourth or more CS. Hysterectomy was performed in 5 (1.5%) cases and in one case (group 4) also partial bladder resection was performed. Historically, concern about carrying a pregnancy in a uterus previously subjected to multiple C/Ss while justified, was founded on fear of scar rupture. In our study no scar rupture has been seen. Besides, abnormal placentation, which was associated with four of the five hysterectomies in our study, seems to be the leading cause of major complications in women with increasing number of cesarean deliveries. Hershkovitz et al.¹⁵ found no association between the placenta previa risk and C/S number. In contrast to them, our results show that, for placenta previa the risk significantly increases after the third C/S. Makoha et al.¹⁶ studied maternal complications among women who have undergone between one and eight cesarean deliveries. They concluded that maternal morbidity increased with successive cesarean delivery before and through the third cesarean delivery. However, compared with the third, the risk of major morbidity was significantly increased with the fifth and was much worse at the sixth cesarean delivery for placenta previa, placenta accreta, and hysterectomy.¹⁶ These findings indicate that, when a woman with multiple C/S has taken the risk of another pregnancy, secondary preventive management should be focused toward minimizing complications of abnormal placentation. Improved antenatal imaging with ultrasound, power Doppler scans and MRI continues to increase diagnostic accuracy for placenta previa and accreta. Full pre-operative preparation can then be made to avail adequate blood and assign the procedure to the most experienced surgeon on the team.

We recorded two maternal death (0.5%) in our study, one was due to intra-abdominal hemorrhage and the other was followed coagulopathy during hysterectomy at the fourth C/S for

placenta previa with accreta. This is higher than the incidence of 0.02% reported by Broe et al.¹⁷

In conclusion, among the causes of morbidity clinically most important was the triad of placenta previa, placenta accreta and hysterectomy, was also responsible for the most serious risk to the mother with increasing number of C/Ss. With the growing rate of cesarean deliveries worldwide, women should be counseled that approximately 1% of those undergoing 3 or more cesarean deliveries will require hysterectomy, most commonly as a result of abnormal placentation. However, repeated C/Ss do not seriously threaten the fetus or increase the maternal morbidity in patients without any obstetric risk.

Sezeryan Seksiyo Sayısının Maternal ve Obstetrik Sonuçlara Etkisi

AMAÇ: Artan sezeryan seksiyon (SS) sayısı ile ilgili maternal ve obstetrik sonuçları araştırmak.

GEREÇ VE YÖNTEM: Kliniğimizde SS ile doğum yapan 408 gebenin klinik kayıtları bazı maternal ve neonatal morbidite yönünden incelendi. Gebe kadınlar daha önce oldukları SS sayısına göre gruplandırıldılar; grup 1 daha önce hiç SS olmayan, grup 2 bir SS olan, grup 3 iki SS olan ve grup 4 üç ve daha fazla SS olan olgulardan oluşmaktaydı.

BULGULAR: İlk defa SS olan grupta en sık SS endikasyonu 198 olguda 60 (%30,3) olguya fetal distrest. Ortalama anne yaşı, gebelik haftası, doğum ağırlığı, 1 ve 5. dakika Apgar skorları, operasyon süresi, post-op ve pre-op hemoglobin farkı ve postoperatif hastanede kalış süresi bütün gruplarda benzerdi ($p>0,05$). Plasenta previa ve kan transfüzyonu oranları grup 1, 2 ve 3 ile karşılaştırıldığında grup 4'te anlamlı olarak yüksekti ($p<0,05$). Beş (%1,5) olguya histerektomi yapıldı ve 2 (0,5%) olguda maternal mortalite gelişti.

SONUÇ: Morbidite nedenleri arasında klinik olarak en önemli olan plasenta previa, plasenta akreta ve histerektomi triadi, ayrıca artan SS sayısı ile ilgili anne için olan en ciddi maternal riskten de sorumluydu.

Anahtar Kelimeler: Sezeryan seksiyon sayısı, Maternal sonuç, Perinatal sonuç

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