

Original article

# Effects of Repeated Caesarean Sections on Maternal and Fetal Outcomes

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## Abstract

The occurrence of birth via cesarean section has become a prevalent intervention in contemporary obstetric practice. Presently, patients with a prior cesarean section constitute a significant proportion of the obstetric population. Furthermore, the incidence of both primary and repeat cesarean deliveries is experiencing an upward trend globally. The objective of this investigation is to evaluate the outcomes associated with repeat cesarean sections in women with a history of one or more previous cesarean deliveries, and to compare these outcomes concerning maternal and neonatal morbidity and mortality. This study employed a retrospective case series design, conducted within the Department of Obstetrics and Gynecology at the University Hospital, spanning from July 2023 to June 2024. A total of 500 pregnant women who underwent cesarean sections due to a history of one or more prior cesarean deliveries were systematically assessed and analyzed. The average age of the subjects was determined to be 32.17 years, accompanied by a standard deviation of 4.5. Approximately 63.6% of the subjects experienced multiple cesarean sections (C/S), while the remaining 36.4% underwent a single C/S. Antepartum complication observed included placenta previa (3.2%), premature rupture of membranes (13%), uterine rupture (2.6%), and other complications (13%). Postoperative complications identified within this investigation included; 5.6% experiencing postpartum hemorrhage (PPH), 1% developing deep vein thrombosis (DVT), 3.3% suffering from wound infections, 16.6% enduring prolonged hospital stays, and 3.6% encountering various other complications. The incidence of preterm infants was recorded at 5.6%. Respiratory distress syndrome (RDS) was noted in 19.6% of the neonates. Neonatal mortality was reported in ten cases (2%), alongside intrauterine fetal demise (IUID) in eight cases (1.6%). This study showed that the risk of maternal morbidity and mortality rises in tandem with the number of cesarean sections performed. This relationship is still debatable even though the study found no correlation between the number of cesarean sections and newborn morbidity and mortality.

**Keywords:** Cesarean Section, Maternal Outcomes, Fetal Risk.

## Introduction

Cesarean birth has become a significant topic of concern due to the steady increase in cesarean section rates, rising from approximately 5% to over 25% [1]. In modern obstetric practice, many pregnant women have a history of prior cesarean deliveries. The risks associated with previous cesarean sections are complex and challenging to quantify. However, prior cesarean delivery has been linked to an increased likelihood of placental abruption and placenta previa in subsequent pregnancies, conditions that elevate the risk of low birth weight, neonatal mortality, and preterm delivery. According to Cynthia Chazotte's retrospective analysis of severe complications following cesarean sections, 2.4% of patients who underwent a second cesarean delivery experienced critical complications, including placenta previa, placenta accreta, and uterine rupture [2]. Repeated cesarean sections may contribute to unintended maternal morbidity due to surgical complications and increased procedural complexity [3]. These challenges include a higher likelihood of technical difficulties, an increased risk of postoperative complications, and potential injury to adjacent structures [4].

Cesarean sections have become a routine intervention in modern obstetrics. Some experts argue that the rising prevalence of cesarean deliveries necessitates a fundamental reassessment of obstetric practices. The increasing cesarean rate has been attributed to various factors [5]. Notably, a substantial proportion of the obstetric population now consists of patients with a history of previous cesarean deliveries. While advancements in surgical techniques have improved the safety of cesarean procedures, concerns persist regarding the risks associated with both vaginal birth after cesarean (VBAC) and repeat cesarean deliveries [6]. Although some maternal fatalities occur following cesarean sections due to causes unrelated to the procedure, [7] existing research suggests that multiple cesarean sections are associated with complications such as placenta previa, uterine rupture, intraperitoneal adhesions, and cesarean hysterectomy. (8) Furthermore, patients with a history of multiple cesarean sections are at a higher risk of postoperative complications, including endometritis, wound infection, pulmonary atelectasis, venous thromboembolism, and significant blood loss exceeding one liter [9]. However, some studies have found no significant correlation between repeated cesarean deliveries and increased maternal morbidity [10]. This study was conducted to evaluate the outcomes associated with repeat cesarean sections in women with a history of one or more

previous cesarean deliveries, and to compare these outcomes with maternal and neonatal morbidity and mortality.

## Methods

### Study design and place

This was a retrospective case series study conducted at the Department of Obstetrics and Gynecology at University Hospital between the period 2023 and 2024. A total of 500 pregnant women who underwent a cesarean section because of a history of one or more cesarean sections were randomly selected for this study.

### Data collection

Data was collected from patients' files by using specific data sheets. The used case sheet includes 14 variables to determine the timing of elective cesarean deliveries and early neonatal outcomes in singleton-term newborns.

### Statistical analysis

Statistical Program for Social Sciences (SPSS version 21) was used for data entry and analysis. Descriptive statistics were used and all results, and data were presented as frequencies, means  $\pm$  standard deviation, and percentages. Categorical data were compared using the Chi-square test and Fisher's exact test if appropriate. A P-value of less than or equal to 0.05 was considered statistically significant.

## Results

Five hundred pregnant women with a previous history of cesarean section (C/S). were selected for this study. The mean age of the patients was 32.17 years with a standard deviation of 4.5. About 63.6% of the patients had more than one C/S. Of the rest of the patients, 36.4% had only one C/S. Regarding the parity distribution, most of the patients (74%) were between Para 1 and Para 3. About 23.6% of women were between Para 4 and Para 6 and 2.4% were more than Para 6. The maximum parity was 11 and the minimum parity was 1 with a mean of 2.7. Most of the women were term (91.6%) and the rest of the women were pre-term (8.4%).

The number of C/S in this study ranged between 1 and 8. Most of the women (36.4%) had previous 1 C/S. About 35% had a history of previous 2 C/S, 16 % had 3 C/S, 7.3% had 4 C/S, 3.6% had 5 C/S and 1.4% had more than 5 C/S (Table 1). Indication for C/S in this study was due to the following: 51% because of repeated C/S, 3.4% CPD, 5% Mal-presentation, 4.4% placenta previa, 7% GDM, 6.8% preeclampsia, 8.8% failure in progression, 12.8% due to other causes (Table 2).

**Table 1. Demographic distribution of patients, H U, 2023-2024.**

Variables	Mean and SD	Minimum and Maximum age
Maternal age	32.17, 5.54	19 – 44 years
Parity	2.7, 2.3	1 – 11
Gestation age	37.2, 2.5	32- 39
Previous cesarean section	1.7, 1.1	1 - 8

**Table 2. Indication of cesarean section**

Indication of C/S	N(%)
Repeated C/S	257(51.4%)
CPD	17(3.4%)
Mal-presentation	25(5%)
Placenta previa	22(4.4%)
GDM	35(7%)
Preeclampsia	34(6.8%)
Failure in progression	44(8.8%)
GDM and Preeclampsia	14(2.8%)
Others	52(10%)

\*CPD. Cephalopelvic disproportion GDM. \* Gestational Diabetes mellitus.

The relation between antepartum complications and the number of C/S was statistically significant with p-value = 0.05. The percentage of antepartum complications was higher in patients with more than 1 C/S compared with patients who had only one C/S. About 56.3% of patients with placenta accrete had more than 1 C/S. About 47.7% of patients with premature rupture of the membrane had more than 1 C/S. In patients with a ruptured uterus, 69.2% of the patients had more than 1 C/S (Table 3).

**Table 3. Relation between antepartum complications and the number of C/S**

Antepartum complication	Number of C/S			P value
	Previous 1 C/S	More than 1 C/S	Total	
Placenta previa	7(43.8%)	9(56.3%)	16(100%)	0.57
Premature rupture of membrane	34(52.3%)	31(47.7%)	65(100%)	
Rupture uterus	4(30.8%)	9(69.2%)	13(100%)	
Others	20(30.8%)	45(69.2%)	65(100%)	
No complication	117(34.3%)	224(65.7%)	341(100%)	

Regarding the Relation between Intrapartum complications and the number of C/S, the result showed that most of the complications occur in patients with more than 1 C/S. The result was statistically significant with p value of 0.0001. The percentage of patients who had more than 1 C/S was 55.8% in patients with blood loss, 69.3% in patients with adhesion, 100% in patients with bladder injury, 82.9% in patients with impending rupture, 50% in patients with hysterectomy and above 60% in patients with mixed complications (Table 4).

**Table 4. Relation between Intrapartum complications and the number of C/S**

Intrapartum complication	Number of C/S			P value
	Previous 1 C/S	More than 1 C/S	Total	
Blood loss	23(44.2%)	29(55.8%)	52(100%)	0.0001
Adhesion	66(30.7%)	149(69.3%)	215(100%)	
Bladder injury	0(0%)	1(100%)	1(100%)	
Impending rupture	7(17.1%)	34(82.9%)	41(100%)	
Hysterectomy	1(50%)	1(50%)	2(100%)	
No complication	63(71.6%)	25(28.4%)	88(100%)	
Bleeding+ hysterectomy+ bladder injury	0(0%)	4(100%)	4(100%)	
Bleeding + adhesion + bladder injury	2(10%)	18(90%)	20(100%)	
Bleeding+ adhesion	20(26%)	57(74%)	77(100%)	

Postoperative complications include; PPH (60.7% in patients with 1 C/S and 39.3% in patients with more than 1 C/S), DVT (100 % in patients with more than 1 C/S), wound infection (43.8% in patients with 1 C/S and 56.2% in patients with more than 1 C/S), long hospital stay (27.7% in patients with 1 C/S and 72.3% in patients with more than 1 C/S), death (100% in patients with more than 1 C/S). The relation between Postoperative complications and the number of C/S was statistically significant (p-value = 0.026) (Table 5).

**Table 5. Relation between Postoperative complications and the number of C/S**

Postoperative complication	Number of C/S			P value
	Previous 1 C/S	More than 1 C/S	Total	
No complication	129(37.1%)	219(62.9%)	348(100%)	0.026
PPH	17(60.7%)	11(39.3%)	28(100%)	
DVT	0(0%)	5(100%)	5(100%)	
Wound infection	7(43.8%)	9(56.2%)	16(100%)	
Long hospital stays	23(27.7%)	60(72.3%)	83(100%)	
Death	0(0%)	2(100%)	2(100%)	
Others	6(33.3%)	12(66.7%)	18(100%)	

The relation between Neonatal outcome and the number of C/S was statistically insignificant with p-value = 0.269. The result showed that more preterm babies occur in patients with only 1 C/S (53.6%). the percentage of RDS was higher in patients with more than 1 C/S (68.4%). 70 % of NN death occurs in patients with more than 1 C/S and about 75% of IUFD occurs in patients with more than 1 C/S. the number of healthy babies was more in patients with more than 1 C/S (Table 6).

**Table 6. Relation between Neonatal outcome and the number of C/S**

Neonatal outcome	Number of C/S			P value
	Previous 1 C/S	More than 1 C/S	Total	
Preterm	15(53.6%)	13(46.4%)	28(100%)	0.269
RDS	31(31.6%)	67(68.4%)	98(100%)	
Healthy	131(36.8%)	225(63.2%)	356(100%)	
NN death	3(30%)	7(70%)	10(100%)	
IUFD	2(25%)	6(75%)	8(100%)	

## Discussion

A cesarean section (C/S) is one of the most frequently performed procedures for women, with nearly one-third of births in many developed countries occurring via C/S. The rising rate of cesarean births is influenced by multiple factors. However, this procedure carries well-documented risks for both the mother and infant, affecting both the current and future pregnancies. Addressing modifiable risk factors is essential to reducing the number of women experiencing severe complications related to C/S [11]. This study aims to assess maternal and neonatal outcomes in women with a history of C/S, with a specific focus on comparing outcomes between those with one previous C/S and those with multiple C/S.

The majority of participants were between 25 and 35 years old, with an average age of 32 years. Similar findings were reported in studies by Wuttikonsammakit P et al., and Choudhary G A et al., where the mean ages were 32.5 and 32.4 years, respectively [12-13]. However, other studies have indicated different results, with a predominant age range of 21–30 years and a mean age of 27 years [14].

The number of prior C/S among participants ranged from 1 to 11, with most women (63.6%) having undergone multiple cesarean deliveries. This contrasts with findings from other studies where the majority (over 65%) had only one previous C/S [15]. However, a study by Jinturkar A. reported similar results, with 73% of participants having had more than one C/S [16]. This study also observed a similar trend, with only 1.4% of participants having more than five C/S, likely because many women choose to avoid pregnancy after two C/S to prevent complications.

Regarding antepartum complications, the study found that premature rupture of membranes (PROM) was the most common issue associated with a history of C/S. A significant correlation was observed between the number of prior C/S and antepartum complications, with those who had multiple C/S experiencing more complications. Choudhary G A et al., reported similar findings, identifying PROM as the most prevalent complication [17]. A higher percentage of women with multiple previous C/S experienced intrapartum complications ( $p$ -value  $<0.05$ ). Similar findings have been reported in various studies, where adhesions were a predominant complication [18]. The study by Wuttikon et al., also noted a higher incidence of adhesions in women with multiple C/S compared to those with a single C/S. The presence of adhesions prolonged surgical time and increased the likelihood of requiring blood transfusions [19]. Additionally, repeated cesarean deliveries were linked to a higher risk of injury to adjacent organs due to increased intraperitoneal adhesions [20].

Postoperative complications in this study primarily included postpartum hemorrhage (PPH) and wound infections, with two cases of maternal death reported. A statistically significant relationship was found between the number of prior C/S and the incidence of postoperative complications. The study showed that as the number of C/S increased, so did the likelihood of postoperative complications. Although the overall complication rates were higher than those reported in other studies, similar trends were observed, with PPH and wound infections being the most common postoperative issues [21]. Regarding neonatal outcomes, no significant correlation was found between the number of prior C/S and neonatal complications. The most common neonatal complication observed was respiratory distress syndrome (RDS) (19.6%). Additionally, 10 cases of neonatal death were reported.

## Conclusion

This study demonstrates that an increasing number of cesarean sections (C/S) is associated with a heightened risk of maternal morbidity and mortality. Although no significant correlation was observed between the number of C/S and neonatal morbidity or mortality, this relationship remains inconclusive and warrants further investigation.

**Conflict of interest.** Nil.

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### المستخلص

أصبح حدوث الولادة عن طريق العملية القيصرية تدخلاً شائعاً في ممارسة التوليد المعاصرة. في الوقت الحاضر، يشكل المرضى الذين خضعوا لعملية قيصرية سابقة نسبة كبيرة من سكان التوليد. علاوة على ذلك، يشهد معدل حدوث الولادات القيصرية الأولية والمتكررة اتجاهاً تصاعدياً على مستوى العالم. الهدف من هذا البحث هو تقييم النتائج المرتبطة بالولادات القيصرية المتكررة لدى النساء اللاتي لديهن تاريخ من ولادة قيصرية واحدة أو أكثر سابقة، ومقارنة هذه النتائج فيما يتعلق بالمرض والوفيات لدى الأمهات والأطفال حديثي الولادة. استخدمت هذه الدراسة تصميم سلسلة حالات بأثر رجعي، أجريت داخل قسم التوليد وأمراض النساء في المستشفى الجامعي، في الفترة من يوليو 2023 إلى يونيو 2024. تم تقييم وتحليل ما مجموعه 500 امرأة حامل خضعن لعمليات قيصرية بسبب تاريخ من ولادة قيصرية واحدة أو أكثر سابقة بشكل منهجي. تم تحديد متوسط عمر الخاضعات ليكون 32.17 عامًا، مصححاً بانحراف معياري قدره 4.5. حوالي 63.6% من النساء خضعن لعمليات قيصرية متعددة، بينما خضعت النسبة المتبقية (36.4%) لعملية قيصرية واحدة. وشملت المضاعفات التي لوحظت قبل الولادة المشيمة المنزاحة (3.2%)، وتمزق الأغشية قبل الأوان (13%)، وتمزق الرحم (2.6%)، ومضاعفات أخرى (13%). وشملت المضاعفات التي تم تحديدها بعد الجراحة في هذا البحث: تعرض 5.6% لنزيف ما بعد الولادة (PPH)، وتطورت لدى 1% خثار الأوردة العميقة (DVT)، وتعرضت 3.3% لالتهابات الجروح، وتحملت 16.6% فترات إقامة طويلة في المستشفى، وواجهت 3.6% مضاعفات أخرى مختلفة. تم تسجيل حدوث الأطفال الخدج بنسبة 5.6%. ولوحظت متلازمة الضائقة التنفسية (RDS) لدى 19.6% من الأطفال حديثي الولادة. تم الإبلاغ عن وفيات الأطفال حديثي الولادة في عشر حالات (2%)، إلى جانب وفاة الجنين داخل الرحم (IUFD) في ثماني حالات (1.6%). أظهرت هذه الدراسة أن خطر الإصابة بالأمراض والوفيات لدى الأمهات يرتفع بالتوازي مع عدد عمليات الولادة القيصرية التي يتم إجراؤها. لا تزال هذه العلاقة قابلة للنقاش على الرغم من أن الدراسة لم تجد أي ارتباط بين عدد عمليات الولادة القيصرية والإصابة بالأمراض والوفيات لدى الأطفال حديثي الولادة.