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Impact of Previous Cesarean Section on Maternal and Fetal Outcomes in Subsequent Pregnancies

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Abstract

Background: The increasing global prevalence of cesarean sections has led to growing concern about their long-term effects on maternal and fetal health. A previous cesarean section is a known risk factor for complications in subsequent pregnancies, such as uterine rupture, abnormal placentation, placenta previa, placenta accreta spectrum, preterm birthand adverse perinatal outcomes. These risks pose significant challenges for obstetric care and decision-making regarding the mode of delivery. Investigating the impact of prior cesarean deliveries is essential to guide clinical practices and improve maternal and fetal outcomes in future pregnancies.This study aims to evaluate the maternal and fetal outcomes in women with subsequent CS with a history of previous CS.

Materials and methods: This was a prospective observational study of patients who had a previous caesarean section for either maternal or fetal indications. The study lasted for 6 months, from September 2024 to February 2025. A totalof 116 patients were included in this study based on predefined inclusion and exclusion criteria. The indications and maternal and neonatal outcomes were studied.

Results: A total of 116 patients were included in this study. The most common age group of the studied cases was 25-29 years (38%). The mean age of the patients was found to be 27.50±4.40 years. One of the most important indications for C-sections was failure to progress (45%), followed by fetal distress 39%, 9% due to contracted pelvis, and 4% due to Cephalopelvic disproportion. with 3% due to malpresentation. The most common complications during subsequent pregnancy were preterm labour 15 (35.71%), following pre-eclampsia 12 (28.57%) and placenta previa 9 (21.43%). Current study showed 72% of babies following CS were admitted in the NICU due to birth asphyxia for low birth weight and 28% due to neonatal jaundice. 92% of fetuseswere found healthy in the cases studied, whereas only 8% suffered from developmental delay.

Conclusions: The study highlights that previous cesarean sections significantly impact both maternal and fetal outcomes in subsequent pregnancies. Complications such as preterm labor, pre-eclampsia, and placenta previa were notably frequent. Neonatal outcomes also reflected increased risk, with a high NICU admission rate primarily due to birth asphyxia and low birth weight. Despite these challenges, the majority of fetuses (92%) remained healthy, underscoring the importance of vigilant prenatal care in pregnancies following a cesarean delivery.

Key words: Cephalopelvic disproportion; Fetal outcomes; Maternal outcomes; Prior cesarean section.

Introduction

Cesarean Sections (CS) are among the most frequent operations carried out in obstetrics and gynecology practice.[1] A caesarean delivery is the birth of a fetus via uterine wall (Hysterotomy) and abdominal wall (Laparotomy) incisions.[2] When used appropriately, CS can significantly reduce maternal and newborn morbidity and death.[1] Modern critical care surgery, anesthetic procedures and advancements in obstetrics care have made CS a safe procedure.[3] In cases where a normal delivery puts the mother or the fetus at an unacceptably high risk of death or morbidity-such as eclampsia or fetal distress and imminent fetal demise-CS is extremely valuable. Its frequency is rising rapidly worldwide, particularly in emerging nations like India, because of its undeniable benefits in lowering maternal and newborn morbidity and death.[4] The chances of CS increase in young patients, elderly primigravida, grand multipara and women of higher social status than their counterparts of lower socio-economic status[5].Primary CS, whether done due to recurrent indication or not, carries the risk of abnormal placentation in subsequent pregnancy. Morbid adherence of placenta is a rarer but more severe complication, even more so when some caesarean deliveries increase.[4,6]

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"Cesarean Section on Demand" which is a primary cesarean section carried out at the mother's request to prevent a vaginal delivery without any established medical or obstetric rationale for the treatment, is another new indication of CS in contemporary obstetric practice.[7] Compared to vaginal or even instrumental births, one of the major effects of cesarean sections is an increased likelihood of CS delivery in following pregnancies.[8] Therefore, CS should be performed based on evidence-based grounds, particularly for individuals who are primigravida.[9] Given the higher likelihood of problems such uterine rupture, recurrent cesarean sections, morbidly adherent placenta, and postpartum hemorrhage, it is crucial to carefully manage pregnancies affected by prior cesarean sections.[10] The unacceptably high cesarean section rates seen in some parts of India (Such as more than 50% in Telangana) and the difference in CS rates in private and public hospitals in India paint a grim picture of the situation and proves that much needs to be done in this regard.[10,11] The prevalence of CS delivery among Bangladeshi mothers was 24% (Urban: 36.9%, Rural: 17.9%). The prevalence of CS delivery in Chattogram was 20%.[12]One of the important steps in this regard would be to disseminate the information about the fact that while in some cases CS is genuinely indicated it is associated with complications in subsequent pregnancies where normal vaginal delivery becomes less likely.[13] The author has conducted this study to find out the outcome of pregnancies in women who have undergone a cesarean section either for obstetric or fetal indications in the previous pregnancy.

Materials and methods

This was a prospective study of pregnant women who had previously underwent a cesarean section for any reason. The study lasted for 6 months, from September 2024 to February 2025. A detailed history of the present pregnancy and history of previous CS was taken. Data collection was done by the interview technique along with hospital records. A total of 116 patients were included in this study.

Maternal Data was taken with Age, parity, BMI, Obstetric history (Number of C-sections, gestational age at delivery, indications for prior C-sections). Maternal outcomes in subsequent pregnancies, including uterine rupture, placenta previa, placenta accreta, postpartum haemorrhage, preeclampsia and infection.

Fetal Data was taken with Gestational age at birth, birth weight, Apgar score, neonatal morbidity, Incidence of preterm birth, low birth weight, fetal distress and the need for NICU admission.

A percentage analysis was done. Categorical variables were compared with a chi-square test; the P value was calculated with GraphPad Prism-8 Software. All statistical tests were evaluated at the 0.05 significance level. The IRB committee of Marine City Medical College Hospital approved the conduction of the study after protocol review.

Inclusion criteria

- Women who have experienced at least one pregnancy resulting in a cesarean section and have subsequently had at least one additional pregnancy.

Exclusion criteria

- Ectopic pregnancies.
- Women who have a history of repair of a ruptured uterus
- Those who refused informed consent to be part of the study.

Results

The analysis of the age groups of the studied cases showed that the most common age group of the studied cases were 25-29 years (38%) followed by 20-24 years (35%), 30-34 (29%), 9 (7.76%) patients belonged to age group of 35-39 years and 40 and above age groups prevalence found 5%. The mean age of the patients was found to be 27.50±4.40 years (Figure 1).

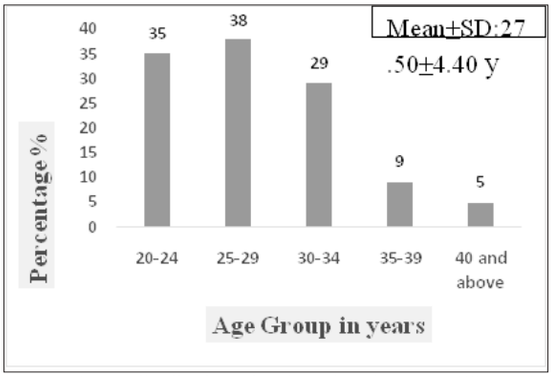

Figure 1 Age distribution of patients in subsequent CS (n=116)

In the current study, patients' BMI on admission showed that 53.45% were from the 25-29.9 (overweight) range, which was the highest, followed by 33.62% from the 18.5-24.9 (Healthy weight) range, 8.62% from <18.5 (Underweight) range and obese (≥30) was 4.31%. (Figure 2)

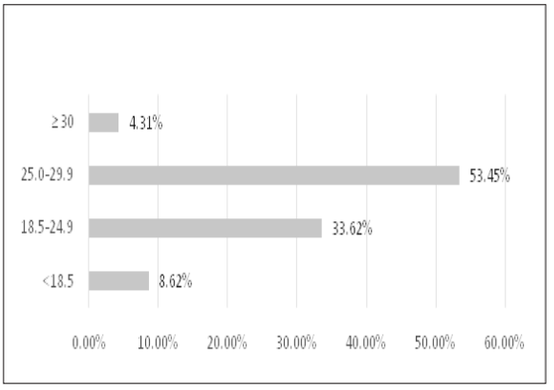

Figure 2 BMI on admission (kg/m^2) (n=116)

This study showed thatone of the most important indicationsfor C-sections was failure to progress (45%) followed by fetal distress 39%, 9% due to contracted pelvis, 4% due to Cephalopelvic disproportion and 3% due to malpresentation (Figure 3).

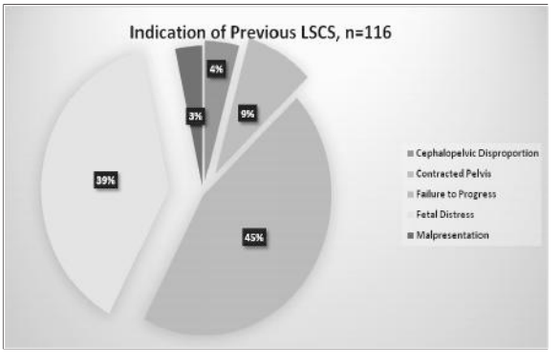

Figure 3 Indication of Previous LSCS

Table 1 showed the gestational age at previous C-sections and subsequent C-sections, mostly full-term pregnancy 78 (67.24%) and 93 (80.17%), followed by pre-term was 26 (22.41%) and 21 (18.0%) respectively. Also, we can see the prevalence of post-term was 10.34% and 1.72%. Tests showed no significance asthe p-value was >0.05.

Table I Gestational age of previous and subsequent C-sections

Term of Pregnancy	Gestational Age at Previous C-Section(s) (%)	Gestational Age at Subsequent C-Section(s) (%)	*p Value	95% CI
<37 weeks (Pre-term)	26 (22.41)	21 (18.10)	1	0.195-2.985
37-40 weeks (Full-Term)	78 (67.24)	93 (80.17)	0.94	0.826-4.634
>40 weeks (post-term)	12(10.34)	2(1.72)	0.69	0.0055-1.530

*Not significant at p >0.05, CI, confidence interval.

Figure 4 showed that the most common complications during subsequent pregnancy were preterm labour 15 (35.71%) following pre-eclampsia 12 (28.57%), placenta previa 10 (23.81%) and placenta accreta 5 (11.90%)

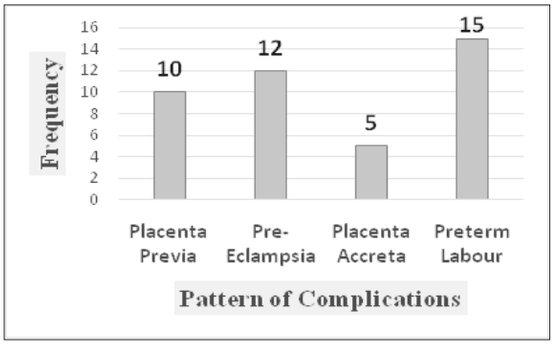

Figure 4 Intra-Partum Complications of Subsequent Pregnancy (n=42)

Figure 5 described post-partum complications at subsequent pregnancy, where we can see postpartum haemorrhagemostly occurred 15 (46.88%) the second complication was wound infection 12 (37.5%) and Catheter associated urinary tract infections was 5 (15.63%).

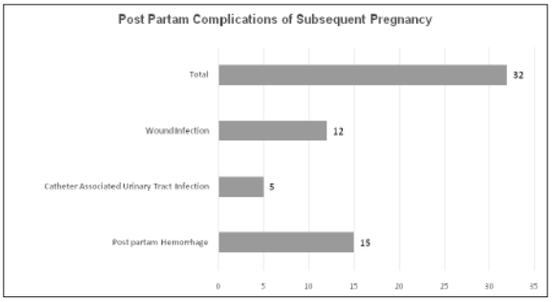

Figure 5 Post-Partum Complications of Subsequent Pregnancy (n=32)

Regarding the Apgar score of babies according to birth weight at 5-minute response and1-minute response showed normal babies were the most responsive with their Apgar score 8 and 7 respectively, low birth weight babies were less responsive. (Table II)

Table II Apgar Score According to Birth Weight of Baby

Birth Weight of the Baby	Frequecny	Apgar Score at 5 minutes (Score between 0-10)	Apgar Score at 1 minute (score between 0-10)	p value
<2500g (Low Birth Weight)	33	6 (24)	7(9)	0.08
>4000g	3	7(2)	8(1)	0.52
2500-4000g (Normal)	80	8 (47)	7(33)	0.69

Not significant at p >0.05

Table III Outcome of the Baby following Subsequent Pregnancy

Postnatal Complications (n=25)	Frequency	Percentage (%)
Birth Asphyxia-Low Birth Weight	18	72
Neonatal Jaundice	7	28
Outcome of the Baby (n=25)		
Developmental Delay	2	8
Healthy Baby	23	92

The current study showed that 72% of babies following CS were admitted to the NICU due to birth asphyxia for low birth weight and 28% due to neonatal jaundice. 92% of fetuseswere healthy in the cases studied, whereas only 8% suffered from developmental delay (Table III).

Discussion

An essential component of obstetric practice is the appropriate handling of pregnancies, including a history of prior cesarean sections. If a trial of labour is performed on these individuals, the risk of obstetric problems increases.[14] In our study, the most common age for doing C-sections was 25-29 years (38%) followed by 20-24 years (35%) and 30-34 years (29%). A study by Jain et al. found that 20-30 years of age was the most common (58.75%).[15] Amongst the cases in our study, most of the patients 61 (52.59%) were primigravida, which differs from another study where the bulk of the patients were second gravida (52.72%).[15]

The crucial decision an obstetrician must make when dealing with a pregnant patient who has already undergone a cesarean section is whether to perform an elective cesarean section or to attempt labour. A trial of labour may be administered to patients without complicating issues, but it is simple to choose a cesarean section when there are complicating conditions like eclampsia or cephalopelvic disproportion.[16] In our study out of 116 women admitted with a history of caesarian section, 35 patients had failure to progress (45%) followed by fetal distress 30 (39%) 2 (9%) due to contracted pelvis, 2 (4%) due to cephalopelvic disproportion and 5 (3%) due to malpresentation. Our study agreed with the other study in which failure to progress was the most common indication (60.1%) and the fetal indication was 5.8%.[17] Conversely, in the Peaceman et al. study, cephalo-pelvic disproportion indicated repeat caesarean section in 44.9% of cases.[18] Our study revealed that post-partum complications at subsequent pregnancy were postpartum haemorrhage 15 (46.88%), contrary to another study,haemorrhage (Operative) was found in 3.73% cases.[15] Our study showed that the most common complications during subsequent pregnancy were preterm labour 15 (35.71%). A Similar study found the absolute risks of preterm delivery in a second pregnancy were 31.1%.[19] The current study revealed that the prevalence of placenta accreta in subsequent Cesarean Sections (CS) was 11.9%. Several studies have examined the incidence of placenta accreta in women with a history of CS, highlighting the increased risk associated with multiple cesarean deliveries. A study conducted in Tabriz Women's Hospital found a prevalence of 17.74% for placenta accreta among women undergoing non-emergency cesarean sections with a history of previous cesarean deliveries.[20] This rate is higher than the 11.9% reported in the current study, possibly due to differences in study populations, healthcare settings, and diagnostic practices. Another study by Silver et al. reported, 11.90% prevalence is consistent with rates seen in women with placenta previa and prior CS, found the risk of placenta accreta increases from 3% with one prior CS and placenta previa to over 11% with multiple prior CS.[21] Our study revealed post-partum complications at subsequent pregnancy, was postpartum

haemorrhage 46.88%, wound infection 37.5% and catheter-associated urinary tract infections 15.63%. Several studies have reported on postpartum complications following cesarean sections, highlighting the Prevalence of Postpartum Hemorrhage (PPH) Wound Infections (WI) and Catheter-Associated Urinary Tract Infections (CAUTIs). A study conducted at King Abdulaziz Medical City in Jeddah, Saudi Arabia, found that 44% of intraoperative complications during cesarean sections were due to PPH.[22] The same study reported a 3.4% incidence of Surgical Site Infections (SSIs) post-cesarean section, with the majority being superficial and caused by Escherichia coli and Staphylococcus aureus.[22] A study from Lagos, Nigeria, found a 2% prevalence of CAUTIs post-cesarean section, emphasizing the importance of catheterization duration and aseptic techniques.[23] The higher prevalence rates observed in our study may reflect differences in patient populations, healthcare settings. Nonetheless, these studies collectively underscore the significance of monitoring and managing postpartum complications to enhance maternal health outcomes. Another study from a private medical college hospital in Bangladesh reported that among 100 cesarean section patients, 11% developed urinary tract infections, which aligns with the 15.63% CAUTI rate observed in our study.[24]

The current study showed that 72% of babies following CS were admitted to the NICU due to birth asphyxia for low birth weight, and 28% due to neonatal jaundice. A study conducted by Saxena et al. at the Indian Journal of Obstetrics and Gynaecology assessed neonatal outcomes following subsequent cesarean deliveries in a hospital setting found 68% of neonates were admitted to the NICUdue to conditions like birth asphyxia and low birth weight and 25% due to neonatal jaundice, which was similar to our study.[25]

A prospective study by Poddar et al. published in BMC Pregnancy and Childbirth analyzed developmental delays in infants born via cesarean section. The study found that 6-8% of infants had developmental delays at follow-up visits, particularly those born with low birth weight or birth asphyxia.The incidence of developmental delays aligns with our study's findings, suggesting that while the majority of fetuses are healthy, a small proportion show developmental issues, especially when there are complications like low birth weight or asphyxia.[26]

Limitations

The study's small sample size may have hampered its statistical power and its capacity to extrapolate the results to the larger group of women who have had cesarean sections. The study only included one center thus, the findings might not be representative of women from other socioeconomic, cultural or geographic backgrounds. The study lacked information on long-term maternal or fetal health effects linked to prior cesarean procedures, instead concentrating on immediate or short-term outcomes.

Conclusions

This study evaluated the impact of previous cesarean sections on maternal and fetal outcomes in subsequent pregnancies, involving a total of 116 patients. The most common age group affected was 25–29 years, with failure to progress being the leading indication for cesarean delivery. Maternal complications in later pregnancies included preterm labor (35.71%) pre-eclampsia (28.57%) and placenta previa (21.43%), indicating increased obstetric risks. Neonatal outcomes were also affected, with 72% of babies requiring NICU admission primarily due to birth asphyxia and low birth weight, while 28% were admitted for neonatal jaundice. Despite these concerns, 92% of fetuses were found to be healthy, with only a small proportion (8%) showing developmental delays. These findings suggest that a history of cesarean section is associated with elevated maternal and neonatal risks, emphasizing the need for vigilant prenatal care and individualized delivery planning in future pregnancies.

Recommendations

Longitudinal studies that track women over time to evaluate the immediate and long-term effects of prior cesarean births may be useful for future study. The results can be more broadly applied if studies are carried out with bigger, more varied populations at several locations. Future research might also examine how women's mental health and decision-making during subsequent pregnancies are affected psychologically by prior cesarean surgery. To ascertain which risk variables have the

most impact on outcomes in subsequent pregnancies, it would be helpful to evaluate additional risk factors, such as maternal age, comorbidities, and the kind of cesarean done (e.g Elective vs. emergency).

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Contribution of Authors
FB-Conception, design, acquisition of data, drafting and final approval.
RB-Conception, design, acquisition of data and final approval.
AAK-Acquisition of data, interpretation of data, manuscript writing, critical revision and final approval.

Disclosure
The authors declared no conflicts of interest.

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