Original Article

Maternal Outcomes in Women with Two Previous Cesarean Deliveries: A Case-Control Study

Bhanumathi Vasudeva[1], Sharadha Govindaraju[2], Syeda Maisarah Imam[1], Annu Murali M[1], Anitha G S[3]

[1]Junior Resident, Department of Obstetrics and Gynaecology, Vani Vilas, BMCRI, Bangalore, Karnataka, India.[2]Assistant Professor, Department of OBG, BGS Medical College and Hospital, Bangalore, Karnataka, India.[3]Assistant Professor, Department of Obstetrics and Gynaecology, Vani Vilas Hospital, BMCRI, Bangalore, Karnataka, India

Abstract

Background: The rising global cesarean section rates have contributed to a substantial number of women undergoing repeat cesareans. While cesareans are generally safe, maternal morbidity increases with each successive procedure. This study evaluates maternal operative and postoperative outcomes among women with two previous cesarean deliveries compared with those with one prior cesarean. **Material and Methods:** A retrospective case-control study was conducted at BMCRI, Bangalore. 100 women (>28 weeks' gestation) were enrolled: Group A (n=50, two previous CS) and Group B (n=50, one previous CS). Maternal operative and postoperative complications were compared using Fisher's exact test and descriptive statistics. **Results:** Women with two prior CS had higher rates of adhesions (68% vs 52%, p=0.15), lower-segment thinning (64% vs 38%, p=0.016), scar dehiscence (4% vs 0%, p=0.15), bladder injury (4% vs 0%, p=0.15), ICU admissions (12% vs 4%, p=0.27), and hysterectomy (6% vs 2%, p=0.62). Mean operative time (56.2 vs 45.9 min) and blood loss (580 vs 560 ml) were descriptively higher in Group A. Hospital stay was longer in Group A (6.6 vs 5.2 days). Adhesions and thinning of the lower uterine segment were particularly prominent complications. **Conclusion:** Repeat cesarean deliveries significantly increase maternal operative risks, especially lower-segment thinning and adhesions. Trends toward increased bladder injury, ICU admission, and hysterectomy were also observed. Reducing primary cesarean rates and encouraging VBAC are essential strategies to mitigate these risks.

Keywords: Antenatal care, Maternal mortality, Perinatal outcome, Risk factors, Cesarean section (C-section), Previous cesarean, Trial of labor after cesarean (TOLAC), Vaginal birth after cesarean (VBAC), Obstetric complications, Fetal distress, Postpartum hemorrhage, Placenta previa, Uterine rupture, Scar tenderness, Birth weight, Neonatal morbidity, NICU admission, Maternal morbidity, Parity, Gestational age, Elective repeat cesarean section (ERCS), Indications for cesarean, Emergency cesarean, Scar dehiscence, Mode of delivery, Obstetric history, Complications during labor, Risk assessment and Maternal outcome.

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Introduction

Cesarean delivery has become the most common surgical intervention worldwide, accounting for over 20% of global births.[1] In India, the NFHS-5 survey reported rates exceeding 21% in urban populations.[2] While cesareans are often life-saving, the cumulative risks associated with repeat cesarean sections have emerged as a significant public health concern.[3,4]

Maternal risks increase progressively with the number of cesareans performed. These include intraoperative adhesions, increased operative time, hemorrhage, and risk of visceral injury such as bladder or bowel damage.[5-7] The risk of placenta previa and placenta accreta spectrum also rises with each additional cesarean, representing a major contributor to obstetric hemorrhage and maternal mortality.[8,9] Several studies have demonstrated that women with multiple cesareans face higher likelihoods of blood transfusion, cesarean hysterectomy, and ICU admission.[10-12]

Despite global literature, Indian data remain limited, and institution-based studies are essential to contextualize risks in resource-constrained settings. This study compares maternal complications in women with two versus one previous cesarean delivery to evaluate how repeat cesareans impact surgical and postoperative outcomes.

Materials and Methods

Source of data: Hospitals attached to BMCRI.
Methods of Collection of Data:
Study design: Case control study
Study period: April to June 2023

Address for correspondence: Dr. Annu Murali M, Junior Resident, Department of Obstetrics and Gynaecology, Vani Vilas, BMCRI, Bangalore, Karnataka, India
E-mail: annumuralim95@gmail.com

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Place of study: Hospitals attached to BMCRI, Bangalore

Inclusion:>28 weeks, singleton pregnancies, no comorbidities.

Analysis: Fisher's exact test for categorical outcomes, risk ratios with 95% CI. Continuous variables presented descriptively (means only).

Sample size:

The sample size was estimated on the basis of prevalence of low risk cesarean delivery Martin et a(8), the Odds ratio is

$$N = (Z\alpha - Z1 - \beta)\ 2\ [P1(100-P1) + P2\ (100-P2)]$$
$$d2$$
$$=(1.96+0.84)2\ (1787.11+465.99)$$
$$(13)2$$
$$=51.19$$

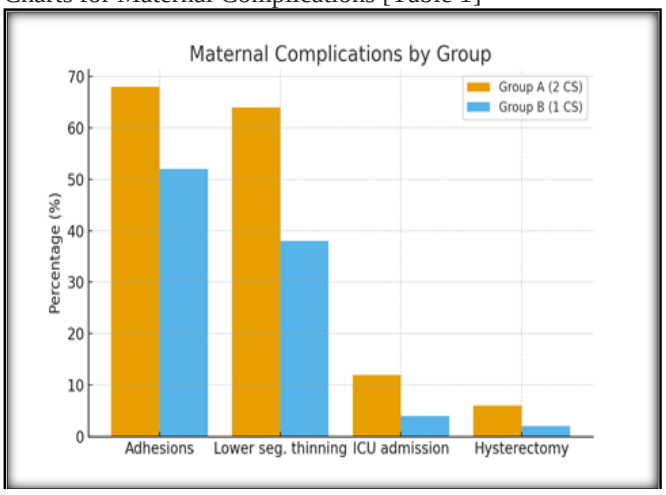
Therefore, the sample size is calculated to be 50 in each group would be required to ensure at least 80% power to detect the anticipated between-group differences, allowing for an attrition or non-response rate of 10%.

Results

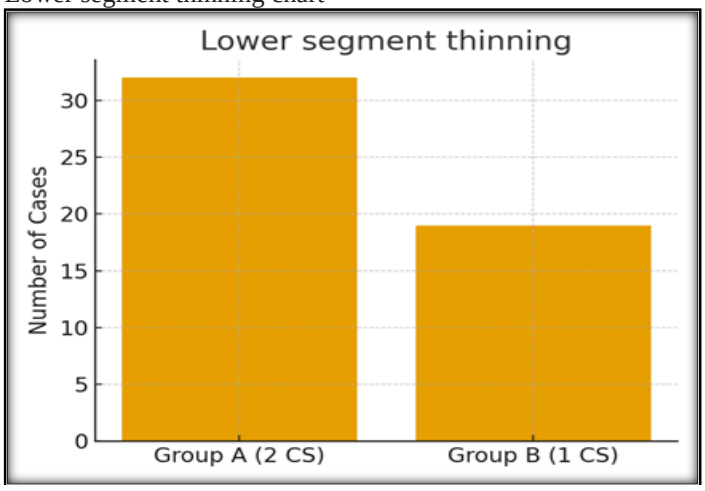
Table 1: Maternal complications with risk ratios and P values

Variable	Group A (n=50)	Group B (n=50)	Risk Ratio	95% CI	P value
Adhesions	34 (68.0%)	26 (52.0%)	1.31	0.94 – 1.81	0.15
Lower segment thinning	32 (64.0%)	19 (38.0%)	1.68	1.12 – 2.54	0.016
Scar dehiscence	2 (4.0%)	0 (0.0%)	5.00	0.25 – 101.59	0.49
PPH	5 (10.0%)	3 (6.0%)	1.67	0.42 – 6.60	0.71
Bladder injury	2 (4.0%)	0 (0.0%)	5.00	0.25 – 101.59	0.49
Cesarean hysterectomy	3 (6.0%)	1 (2.0%)	3.00	0.32 – 27.87	0.62
Blood transfusion	3 (6.0%)	4 (8.0%)	0.75	0.18 – 3.18	1.00
ICU admission	6 (12.0%)	2 (4.0%)	3.00	0.64 – 14.16	0.27
Wound infection	4 (8.0%)	5 (10.0%)	0.80	0.23 – 2.81	1.00

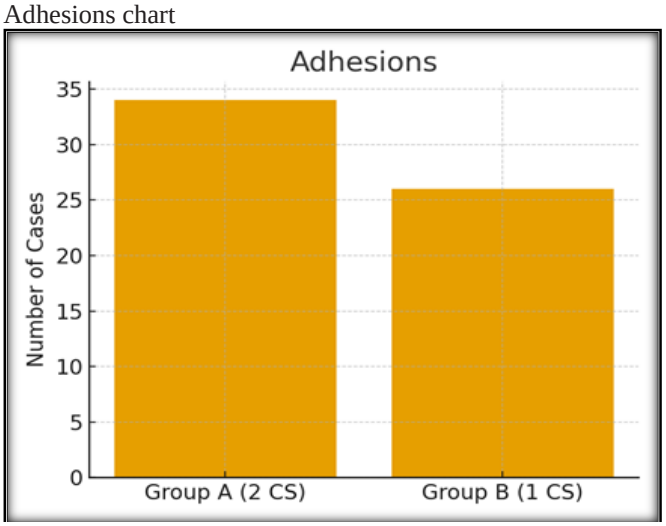
Charts for Maternal Complications [Table 1]



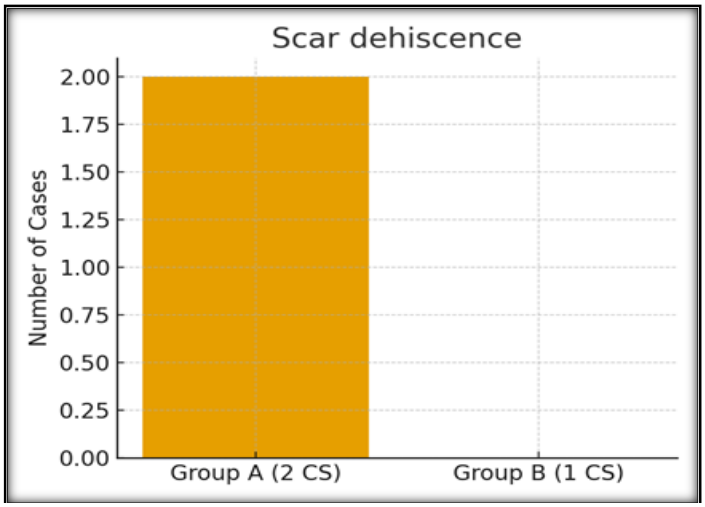
Lower segment thinning chart



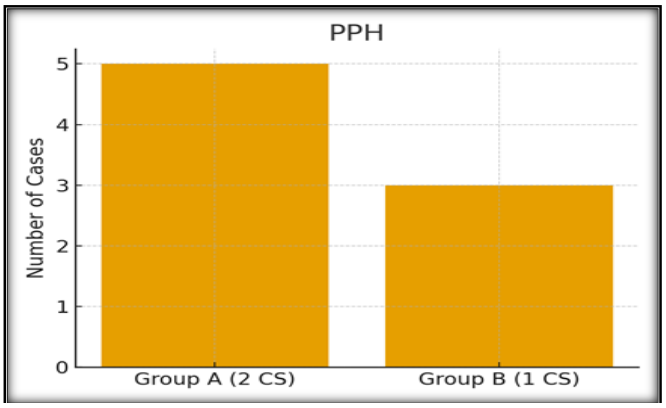
Adhesions chart



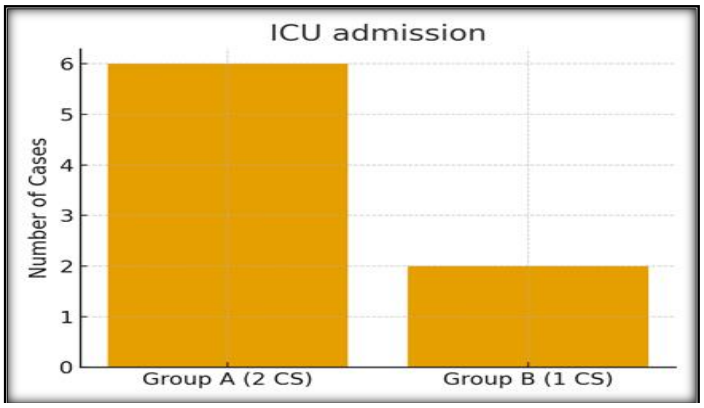
Scar dehiscence chart



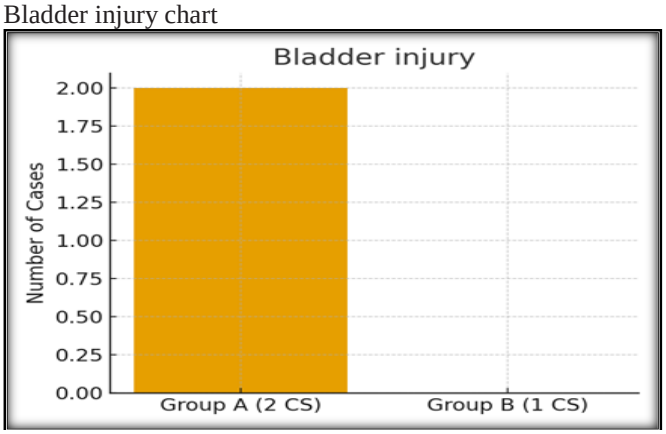
PPH chart



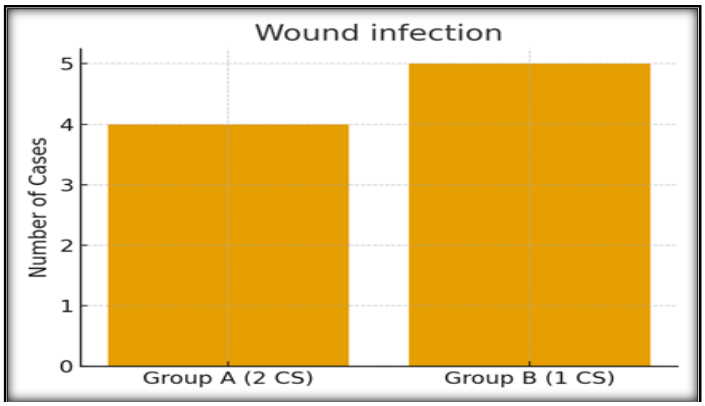
ICU admission chart



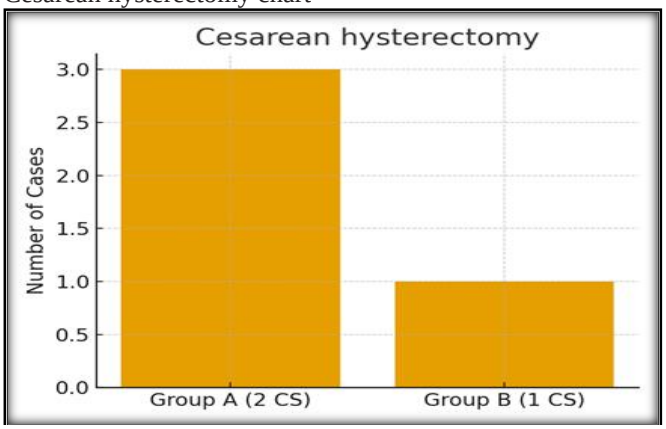
Bladder injury chart



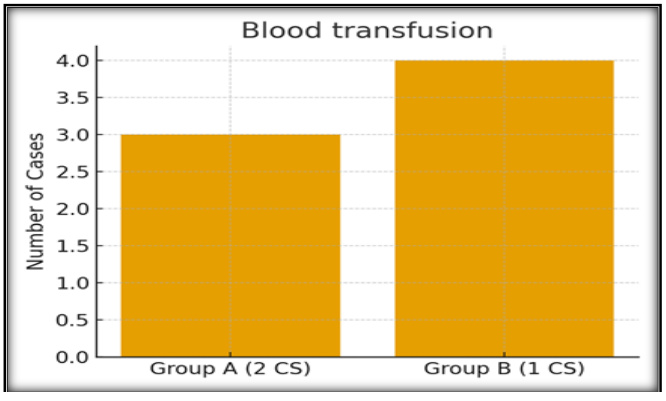
Wound infection chart



Cesarean hysterectomy chart



Blood transfusion chart



A total of 100 women were included in the study, with 50 in Group A (two previous cesarean sections) and 50 in Group B (one previous cesarean section). The baseline characteristics such as age, parity, and gestational age at delivery were comparable between the two groups, ensuring homogeneity for outcome comparison.

Intraoperative Complications

Adhesion formation was the most frequent complication, observed in 34 women (68%) in Group A compared to 26 women (52%) in Group B. Although this difference was not statistically significant (p=0.15), the relative risk was elevated (RR=1.31, 95% CI: 0.94–1.81), suggesting a clinically relevant trend. Lower uterine segment thinning was significantly higher in Group A (64% vs. 38%; RR=1.68, 95% CI: 1.12–2.54; p=0.016), confirming that repeat cesareans compromise scar strength and tissue integrity. Scar dehiscence occurred in 2 women (4%) in Group A, while none were reported in Group B.

Operative and Postoperative Morbidity

Bladder injury was encountered in 2 women (4%) in Group A, compared to none in Group B. Although not statistically significant (p=0.49), this complication was observed only in the multiple-CS group. Intraoperative blood loss averaged 580 ml in Group A versus 560 ml in Group B, with higher transfusion requirements in the two-CS group (6% vs. 8%; p=1.00). Postpartum hemorrhage occurred in 10% of women with two previous CS compared to 6% with one CS.

Three cases of cesarean hysterectomy were recorded in Group A (6%) compared with one in Group B (2%), reflecting a three-fold higher risk, though without statistical significance (p=0.62). ICU admissions were also higher among women with

two CS (12% vs. 4%; RR=3.0, 95% CI: 0.64–14.16), suggesting increased perioperative morbidity. Wound infection rates were similar between groups (8% vs. 10%).

Operative Time and Hospital Stay

Mean operative time was longer in Group A (56.2 minutes) compared with Group B (45.9 minutes). Similarly, mean duration of hospital stay was significantly prolonged in Group A (6.6 vs. 5.2 days), reflecting the increased surgical complexity of repeat cesarean deliveries.

Key Findings

- Adhesions and lower segment thinning were the most common complications, with thinning showing statistical significance.
- Bladder injuries, hysterectomy, and ICU admissions were higher in women with two CS, although not statistically significant, they remain clinically important trends.
- Repeat cesareans were associated with increased operative duration, blood loss, and longer hospitalization.

These findings underscore the cumulative risks associated with multiple cesarean sections, emphasizing the need for cautious surgical planning and preventive strategies.

Discussion

This study highlights the significant increase in maternal complications among women with two prior cesarean sections. Adhesion formation was observed in nearly 68% of women with two CS compared to 52% with one CS. Adhesions complicate surgical entry, increase operative time, and elevate risks of bladder and bowel injuries.[6,7] Lower segment thinning was statistically significant, confirming increased scar fragility with successive surgeries.[9] This finding has important clinical implications, as thin lower segments are associated with a heightened risk of rupture if women attempt labor.[2,3]

Although scar dehiscence, bladder injury, and hysterectomy were not statistically significant, the upward trends are clinically meaningful, particularly in resource-limited settings where advanced surgical support may be lacking.[10,11] ICU admissions were three times higher in Group A, reflecting greater perioperative morbidity. Average hospital stay was prolonged, consistent with the increased surgical difficulty of repeat cesareans.[12]

Our findings align with global studies such as Silver et al., Kaplanoglu et al., and Gasim et al., which consistently demonstrate rising risks with repeat cesareans.[5-7] Notably, placenta accreta spectrum, although not encountered in our study, is an established complication that rises exponentially with number of cesareans.[8] This underscores the importance of limiting primary cesarean rates, as recommended by WHO and professional bodies.[1,4]

Conclusion

Women with two previous cesarean sections face significantly increased risks of maternal morbidity compared to those with only one prior cesarean. Key complications include adhesions, lower uterine segment thinning, hemorrhage, and prolonged hospital stay. Although some complications such as bladder injury and hysterectomy were not statistically significant, their increased frequency is concerning. Preventive strategies should focus on reducing unnecessary primary cesareans and encouraging trial of labor after cesarean (TOLAC) in suitable women, in line with ACOG and RCOG guidelines.[2,3] Delivery of women with multiple prior cesareans should be planned in tertiary care centers with blood bank support and surgical backup. Public health strategies are needed to balance cesarean delivery safety with its long-term risks.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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