

# Vaginal Birth after Cesarean Delivery: A Safe Alternative to Repeat Cesarean section, A Critical Analysis in Patients

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## Abstract

**Background:** Rising global cesarean section (CS) rates have raised concerns regarding increased maternal and neonatal morbidity, prolonged hospital stay, and higher healthcare costs associated with repeat surgical deliveries. Vaginal birth after cesarean (VBAC) has emerged as a safe and effective alternative for carefully selected women with a previous cesarean section; however, its utilization remains limited in many low- and middle-income countries due to safety concerns and resource constraints.

**Objective:** To evaluate and compare maternal and neonatal outcomes, hospital stay, and overall safety of vaginal birth after cesarean (VBAC) versus elective repeat cesarean section (ERCS).

**Methods:** A retrospective observational study was conducted in the Department of Obstetrics and Gynecology at Dhaka Medical College Hospital in 2024. A total of 100 women with one previous lower segment cesarean section were included, with 50 undergoing VBAC and 50 undergoing ERCS. Baseline demographic and obstetric characteristics were recorded. Outcomes assessed included postpartum hospital stay, maternal and neonatal complications, APGAR scores at 5 minutes, and subgroup outcomes among successful and failed VBAC cases. Statistical analysis was performed using SPSS version 20.0, with appropriate comparative tests applied.

**Results:** In this study of 100 women, equally divided between VBAC and ERCS groups, the baseline characteristics were comparable. The majority of women were aged  $\leq 30$  years (72% in VBAC vs 68% in ERCS), and BMI distribution was similar, with 48% of VBAC and 44% of ERCS women having a BMI  $< 25$  kg/m<sup>2</sup>. Primipara accounted for 40% in VBAC and 36% in ERCS, while multipara were 60% and 64%, respectively. Most neonates weighed  $\geq 3$  kg (56% in VBAC vs 60% in ERCS). Regarding obstetric outcomes, term pregnancies were observed in 72% of VBAC and 68% of ERCS cases, and cephalic presentation was more frequent in VBAC (84% vs 76%), whereas malpresentation was higher in ERCS (24% vs 16%). Postpartum complications were generally low; postpartum hemorrhage occurred in 4% of VBAC and 8% of ERCS cases, surgical site infection was only in ERCS (8%), and blood transfusion was required in 4% of VBAC and 12% of ERCS cases. Hospital stay was shorter for VBAC, with 72% staying 2–4 days compared to 28% in ERCS, while longer stays of 5–7 days were more common in ERCS (72% vs 28%). APGAR scores of 10 at 5 minutes were high in both groups (88% VBAC, 92% ERCS). Overall complications were slightly higher in ERCS (28%) than VBAC (20%), with maternal complications in 8% of VBAC and 6% of ERCS. Neonatal complications were 12% in VBAC versus 24% in ERCS; among these, respiratory distress occurred in 33.3% of VBAC and 16.7% of ERCS neonates, fever in 16.7% vs 33.3%, jaundice in 50% vs 66.7%, meconium aspiration in 16.7% of VBAC only, and NICU admission in 66.7% vs 41.7%, respectively. Subgroup analysis showed that successful VBAC was associated with better outcomes, including shorter hospital stay (63% vs 37% for VBAC-failed) and lower overall complications (11% vs 17% for VBAC-failed), while neonatal outcomes remained comparable to ERCS.

**Conclusion:** VBAC is a safe and effective alternative to elective repeat cesarean section in appropriately selected women. It is associated with shorter hospital stay, lower neonatal morbidity, and comparable maternal outcomes. Promoting VBAC through careful patient selection and adequate intrapartum monitoring may help reduce unnecessary repeat cesarean deliveries and improve maternal and neonatal outcomes, particularly in resource-limited settings.

**Keywords:** Vaginal birth after cesarean, Elective repeat cesarean section, Maternal outcomes.

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## Introduction

Cesarean delivery rates have increased substantially worldwide over the past few decades, raising growing concerns about maternal and neonatal health outcomes associated with repeated surgical births. While cesarean section (CS) can be a life-saving intervention when medically indicated, unnecessary repeat procedures contribute to increased healthcare costs, longer recovery periods, and higher risks of complications in subsequent pregnancies.<sup>1-3</sup> As a result, strategies to safely reduce repeat cesarean deliveries have become a significant focus in modern obstetric practice.

Vaginal birth after cesarean delivery (VBAC) has emerged as a viable and evidence-based alternative for selected women with a prior cesarean section. VBAC offers several potential benefits, including shorter hospital stay, reduced postoperative pain, lower risk of infection, and faster return to normal activities.<sup>4</sup> Additionally, successful VBAC reduces the cumulative risks associated with multiple cesarean sections, such as placenta accreta spectrum disorders, surgical adhesions, and uterine injury.<sup>5-6</sup>

Despite its advantages, VBAC remains underutilized in many settings due to concerns regarding maternal and fetal safety, particularly the risk of uterine rupture. These concerns are often compounded by limited access to continuous intrapartum monitoring, lack of emergency surgical facilities, and medico-legal considerations.<sup>7-8</sup> Consequently, both healthcare providers and patients may opt for elective repeat cesarean section (ERCS) even when VBAC could be a safe option.

Patient selection plays a critical role in determining the success and safety of VBAC. Factors such as the type of previous uterine incision, indication for the prior cesarean, interpregnancy interval, maternal age, body mass index, and obstetric history significantly influence outcomes. Careful antenatal assessment and individualized counseling are therefore essential to balance the potential benefits and risks associated with VBAC.<sup>8-10</sup>

From a public health perspective, promoting safe VBAC practices has the potential to reduce overall cesarean section rates and improve maternal health outcomes, particularly in low- and middle-income countries where surgical resources may be limited. However, the success of VBAC programs depends on the availability of skilled personnel, appropriate infrastructure, and clear clinical guidelines to manage labor and respond promptly to emergencies.

## Objective

This critical analysis aims to evaluate the safety, effectiveness, and clinical outcomes of vaginal birth after cesarean delivery in comparison with repeat cesarean section.

## Methodology

A retrospective observational study was conducted in the Department of Obstetrics and Gynecology at Dhaka Medical College Hospital (DMCH) in 2024. The study included women with one previous cesarean section who were admitted for delivery at DMCH during the study period. A total of 100 patients were enrolled, divided equally into two groups: 50 cases in the Vaginal Birth After Cesarean (VBAC) group and 50 cases in the Elective Repeat Cesarean Section (ERCS) group.

Inclusion criteria were women with a single prior lower segment cesarean section (LSCS) who were eligible for either VBAC or ERCS. Exclusion criteria included multiple gestations, placenta previa, morbidly adherent placenta, fetal birth weight <2.5 kg or >4 kg, and patients requiring emergency cesarean section for antepartum complications.

Data were collected from hospital in-patient records and delivery registers. The primary outcome was postpartum hospital stay. Secondary outcomes included maternal and neonatal complications, cost of postpartum hospital stay, and cost of neonatal intensive care unit (NICU) admission. Patient demographic and clinical data—including age, body mass index (BMI), parity, birth weight, mode of delivery, APGAR scores at 5 minutes, and maternal and neonatal complications—were obtained from medical records.

Direct healthcare costs for maternal and neonatal care were calculated using a time-driven, activity-based costing method adapted to the Bangladeshi context. Maternal costs included labor, investigations, equipment, medications, and utility costs. Neonatal costs included NICU stay, phototherapy, investigations, and medications. The cost of labor was calculated per minute for each staff category based on wage scales at DMCH. Costs for investigations and medications were obtained from hospital supply records. Utility costs (space, electricity, water, food, cleaning, administrative services, and security) were calculated per patient per day using monthly hospital records. The total cost per patient was determined as the sum of maternal and neonatal costs.

Statistical analysis was performed using SPSS version 20.0. Continuous variables with normal distribution were compared using Student's t-test, and non-normal variables were compared using the Mann-Whitney U test. Categorical variables were compared using Chi-square or Fisher's exact test as appropriate. The VBAC group was further subdivided into successful and failed VBAC cases, and comparisons with the ERCS group were made using the Kruskal-Wallis test. Analysis was conducted on an intention-to-treat basis. Confidence intervals of 95% were used to estimate cost equivalence between VBAC and ERCS.

## Results

A total of 100 women were included in the study, equally divided between the VBAC (n = 50) and ERCS (n = 50) groups. The baseline characteristics were comparable between the two groups. The majority of participants were aged  $\leq 30$  years, accounting for 72% in the VBAC group and 68% in the ERCS group, while 28% and 32%, respectively, were older than 30 years. BMI distribution was similar, with 48% of VBAC and 44% of ERCS women having a BMI  $< 25$  kg/m<sup>2</sup>, and 52% versus 56% having a BMI  $\geq 25$  kg/m<sup>2</sup>. Regarding parity, 40% of women in the VBAC group and 36% in the ERCS group were primipara, while the remainder were multipara. Neonatal birth weight was also comparable, with

56% of VBAC and 60% of ERCS neonates weighing  $\geq 3$  kg. Overall, the two groups were well matched with respect to demographic and obstetric characteristics.

**Table I**  
*Basic Characteristics of the Study Population*  
(n = 100)

| Characteristics                 | VBAC<br>(n = 50) | ERCS<br>(n = 50) |
|---------------------------------|------------------|------------------|
| Age $\leq 30$ years             | 36 (72%)         | 34 (68%)         |
| Age $> 30$ years                | 14 (28%)         | 16 (32%)         |
| BMI $< 25$ kg/m <sup>2</sup>    | 24 (48%)         | 22 (44%)         |
| BMI $\geq 25$ kg/m <sup>2</sup> | 26 (52%)         | 28 (56%)         |
| Primipara                       | 20 (40%)         | 18 (36%)         |
| Multipara                       | 30 (60%)         | 32 (64%)         |
| Birth weight $< 3$ kg           | 22 (44%)         | 20 (40%)         |
| Birth weight $\leq 3$ kg        | 28 (56%)         | 30 (60%)         |

\*ERCS = Elective Repeat Cesarean Section

Table II shows the obstetric characteristics of the VBAC and ERCS groups. The majority of pregnancies in both groups were term, accounting for 72% in the VBAC group and 68% in the ERCS group, while preterm pregnancies were reported in 28% and 32% respectively. Cephalic presentation was more common in the VBAC group (84%) compared to the ERCS group (76%), whereas malpresentation was higher in the ERCS group (24%) than in the VBAC group (16%). Regarding postpartum complications, postpartum hemorrhage occurred in 4% of the VBAC group and 8% of the ERCS group. Surgical site infection (SSI) was observed only in the ERCS group (8%), while other complications were noted in 4% of the VBAC group and none in the ERCS group. Blood transfusion was required in 4% of patients in the VBAC group compared to 12% in the ERCS group. Additionally, the average hospital stay was shorter among the VBAC group, whereas it was longer in the ERCS group. The cost of delivery was also lower in the VBAC group, while more than 80% of the ERCS group required higher expenditure.

**Table II***Obstetric Characteristics of VBAC vs ERCS Group*

| Variable                   | VBAC (%) | ERCS (%)                            |
|----------------------------|----------|-------------------------------------|
| Gestational age            |          |                                     |
| Term pregnancy             | 72%      | 68%                                 |
| Preterm pregnancy          | 28%      | 32%                                 |
| Fetal presentation         |          |                                     |
| Cephalic                   | 84%      | 76%                                 |
| Malpresentation            | 16%      | 24%                                 |
| Postpartum complications   |          |                                     |
| Postpartum hemorrhage      | 4%       | 8%                                  |
| SSI                        | 0%       | 8%                                  |
| Others                     | 4%       | 0%                                  |
| Blood transfusion required | 4%       | 12%                                 |
| Average hospital stay      | Shorter  | Longer                              |
| Cost of delivery required  | Lower    | Higher (>80% increased expenditure) |

A shorter hospital stay of 2–4 days was observed in the majority of VBAC cases (72%) compared to only 28% in the ERCS group, while a longer hospital stay of 5–7 days was more common among ERCS patients (72%) than VBAC patients (28%). An APGAR score of 10 at 5 minutes was achieved in most neonates in both groups, recorded in 88% of VBAC and 92% of ERCS deliveries. Overall complications were slightly higher in the ERCS group (28%) compared to the VBAC group (20%). Maternal complications occurred in 8% of VBAC cases and 6% of ERCS cases. Postpartum hemorrhage was reported in 4% of VBAC and 2% of ERCS cases, while postpartum fever occurred in 4% and 2% respectively. Wound infection was noted only in the ERCS group (2%). Neonatal complications were higher among ERCS deliveries (24%) compared to VBAC (12%). Among neonates with complications, respiratory distress was observed in 33.3% of VBAC and 16.7% of ERCS cases, fever in 16.7% and 33.3% respectively, and jaundice in 50.0% of VBAC and 66.7% of ERCS cases. Meconium aspiration occurred only in the VBAC group (16.7%). NICU admission was required in 66.7% of neonates with complications in the VBAC group and 41.7% in the ERCS group.

**Table III***Comparison of Maternal and Neonatal Outcomes Between VBAC and ERCS Groups*

| Outcomes                   | VBAC (n = 50) | ERCS (n = 50) |
|----------------------------|---------------|---------------|
| Hospital stay 2–4 days     | 36 (72%)      | 14 (28%)      |
| Hospital stay 5–7 days     | 14 (28%)      | 36 (72%)      |
| APGAR score 10 at 5 min    | 44 (88%)      | 46 (92%)      |
| Any complication (overall) | 10 (20%)      | 14 (28%)      |
| Any maternal complication  | 4 (8%)        | 3 (6%)        |
| Postpartum hemorrhage      | 2 (4%)        | 1 (2%)        |
| Postpartum fever           | 2 (4%)        | 1 (2%)        |
| Wound infection            | 0 (0%)        | 1 (2%)        |
| Any neonatal complication  | 6 (12%)       | 12 (24%)      |
| Respiratory distress       | 2 (33.3%)     | 2 (16.7%)     |
| Fever                      | 1 (16.7%)     | 4 (33.3%)     |
| Jaundice                   | 3 (50.0%)     | 8 (66.7%)     |
| Meconium aspiration        | 1 (16.7%)     | 0 (0%)        |
| NICU admission             | 4 (66.7%)     | 5 (41.7%)     |

Table V presents the subgroup analysis comparing VBAC-failed, VBAC-successful, and ERCS groups. A shorter hospital stay of 2–4 days was more common in the VBAC-successful group (63%) compared to VBAC-failed (42%) and ERCS (28%), whereas a longer hospital stay of 5–7 days was highest in the ERCS group (72%), followed by VBAC-failed (58%) and VBAC-successful (37%). An APGAR score of 10 at 5 minutes was observed in the majority of neonates across all groups, recorded in 83% of VBAC-failed cases, 92% of VBAC-successful cases, and 92% of ERCS cases. Overall complications were reported in 17% of VBAC-failed, 24% of VBAC-successful, and 28% of ERCS cases. Maternal complications were relatively low across the groups, occurring in 8% of VBAC-failed, 11% of VBAC-successful, and 6% of ERCS cases. Postpartum hemorrhage was observed in 8%, 5%, and 8% of the VBAC-failed, VBAC-successful, and ERCS groups respectively, while postpartum fever occurred only in 3% of VBAC-successful and 2% of ERCS cases. Wound infection was noted in 3% of VBAC-successful and 4% of ERCS cases but was absent in the VBAC-failed group. Neonatal complications were reported in 17% of VBAC-

**Table V**  
*Subgroup Analysis: VBAC-Successful, VBAC-Failed, and ERCS*

| Outcomes                         | VBAC-Failed<br>(n = 12) | VBAC-Successful<br>(n = 38) | ERCS<br>(n = 50) |
|----------------------------------|-------------------------|-----------------------------|------------------|
| Hospital stay 2–4 days           | 5 (42%)                 | 24 (63%)                    | 14 (28%)         |
| Hospital stay 5–7 days           | 7 (58%)                 | 14 (37%)                    | 36 (72%)         |
| APGAR score 10 at 5 min          | 10 (83%)                | 35 (92%)                    | 46 (92%)         |
| Any complication (overall)       | 2 (17%)                 | 9 (24%)                     | 14 (28%)         |
| Any maternal                     |                         |                             |                  |
| <b>complication</b>              | 1 (8%)                  | 4 (11%)                     | 3 (6%)           |
| Postpartum hemorrhage            | 1 (8%)                  | 2 (5%)                      | 4 (8%)           |
| Postpartum fever                 | 0 (0%)                  | 1 (3%)                      | 1 (2%)           |
| Wound infection                  | 0 (0%)                  | 1 (3%)                      | 2 (4%)           |
| <b>Any neonatal complication</b> | 2 (17%)                 | 4 (11%)                     | 12 (24%)         |
| Respiratory distress             | 1 (8%)                  | 1 (3%)                      | 2 (4%)           |
| Fever                            | 0 (0%)                  | 1 (3%)                      | 4 (8%)           |
| Jaundice                         | 1 (8%)                  | 2 (5%)                      | 8 (16%)          |
| Meconium aspiration              | 0 (0%)                  | 1 (3%)                      | 0 (0%)           |
| NICU admission                   | 1 (8%)                  | 3 (8%)                      | 5 (10%)          |

failed, 11% of VBAC-successful, and 24% of ERCS cases. Among specific neonatal conditions, respiratory distress occurred in 8% of VBAC-failed, 3% of VBAC-successful, and 4% of ERCS cases; fever was observed in 3% of VBAC-successful and 8% of ERCS cases; jaundice was noted in 8%, 5%, and 16% respectively; and meconium aspiration occurred only in 3% of VBAC-successful cases. NICU admission rates were relatively similar, reported in 8% of both VBAC-failed and VBAC-successful groups and 10% of the ERCS group.

### Discussion

The present study compared maternal and neonatal outcomes between women undergoing vaginal birth after cesarean (VBAC) and elective repeat cesarean section (ERCS). In this study, the baseline demographic and obstetric characteristics were comparable between the two groups, including age distribution, BMI, parity, and neonatal birth weight. Similar findings were reported in previous studies which showed that well-matched baseline characteristics between VBAC and ERCS groups are essential for reliable comparison of

outcomes.<sup>10</sup> The similarity of baseline variables in our study suggests that the observed differences in maternal and neonatal outcomes were likely related to the mode of delivery rather than confounding demographic factors.

Regarding obstetric characteristics, most pregnancies in both groups were term, and cephalic presentation was the predominant fetal presentation. Our findings are consistent with the observations who reported that the majority of candidates for VBAC present with term gestation and cephalic presentation.<sup>11</sup> In the current study, malpresentation was slightly higher in the ERCS group, which may have influenced the decision for elective repeat cesarean delivery. Similar trends have also been reported in several observational studies where malpresentation and other obstetric risks increased the likelihood of repeat cesarean section.

Maternal outcomes in this study showed relatively low complication rates in both groups, although overall complications were slightly higher in the ERCS group compared to VBAC.

Postpartum hemorrhage occurred in 4% of VBAC cases and 2% of ERCS cases, while wound infection was observed only in the ERCS group, findings comparable to large multicenter studies reporting similar or lower maternal morbidity with planned VBAC in appropriately selected patients.<sup>12</sup> VBAC was also associated with significantly shorter hospital stay (mostly 2–4 days) and lower delivery cost, whereas ERCS required longer hospitalization and higher expenditure.<sup>13-14</sup>

Neonatal outcomes were generally favorable in both groups, with high proportions of neonates achieving an APGAR score of 10 at 5 minutes and similar NICU admission rates, although minor complications varied slightly between groups.<sup>14</sup>

Subgroup analysis further demonstrated that successful VBAC resulted in shorter hospital stay, fewer complications, and comparable neonatal outcomes, supporting its safety and cost-effectiveness as an alternative to ERCS when patients are appropriately selected and managed.<sup>15</sup>

## Conclusion

This study demonstrates that vaginal birth after cesarean (VBAC) is a safe and effective alternative to elective repeat cesarean section (ERCS) in appropriately selected women. VBAC was associated with shorter hospital stay, lower delivery-related costs, and fewer overall and neonatal complications, while maternal complication rates were low and comparable between the two groups. Successful VBAC yielded the most favorable maternal and neonatal outcomes, reinforcing the importance of careful patient selection and intrapartum monitoring. These findings support the promotion of VBAC as a viable strategy to reduce unnecessary repeat cesarean deliveries and improve maternal and neonatal health outcomes, particularly in resource-limited settings.

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