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Research Article

Comparison of Vaginal Versus Cesarean Delivery in Women with Previous Cesarean: A Cross-Sectional Study on Maternal and Neonatal Outcomes

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ABSTRACT
Background: The decision between attempting a vaginal birth after cesarean (VBAC) and opting for a repeat cesarean delivery (RCD) can significantly impact maternal and neonatal outcomes. This study aims to compare the outcomes associated with these delivery options in women with one previous cesarean. **Methods:** This cross-sectional study involved 200 women with a history of one previous cesarean section who were delivering at a tertiary care center. Participants were grouped based on their delivery method: vaginal delivery (n=92) or cesarean delivery (n=108). Data were collected on maternal length of hospital stay, neonatal ICU admissions, postpartum hemorrhage, and Apgar scores at 5 minutes. Statistical analyses included t-tests, chi-square, and Fisher's exact tests, as appropriate. **Results:** The study found that women who underwent vaginal delivery had significantly shorter hospital stays (mean 3.2 ± 1.1 days) compared to those who had a cesarean delivery (mean 4.8 ± 1.4 days; $p < 0.001$). Neonatal ICU admission rates were lower in the vaginal delivery group (6.5%) compared to the cesarean delivery group (13%; $p = 0.045$). However, there was no significant difference in the rates of postpartum hemorrhage between the two groups ($p = 0.21$). Neonates born via vaginal delivery had significantly higher Apgar scores at 5 minutes (mean 9.4 ± 0.6) compared to those born via cesarean delivery (mean 9.1 ± 0.7; $p = 0.032$) **Conclusions:** Vaginal delivery in women with a previous cesarean section is associated with shorter hospital stays and potentially better neonatal outcomes in terms of Apgar scores and reduced ICU admissions. These findings support the consideration of VBAC in eligible women but underscore the importance of individualized clinical decision-making based on comprehensive risk assessments.

Keywords: VBAC, Cesarean Delivery, Maternal Outcomes, Neonatal Outcomes, Cross-Sectional Study.

INTRODUCTION

The decision regarding the mode of delivery for women with a previous cesarean section remains a significant clinical challenge, attracting substantial research and debate within the obstetric community. A previous cesarean often leaves the patient and clinician with two main options for subsequent deliveries: attempt a vaginal birth after cesarean (VBAC) or opt for a repeat cesarean delivery (RCD). This decision is influenced by multiple factors, including medical history, individual preferences, and institutional policies, and has significant implications for maternal and neonatal outcomes.[1][2]

The rising cesarean rate globally has made the safety and feasibility of VBAC a crucial area of investigation. The American College of Obstetricians and Gynecologists (ACOG) suggests that VBAC is a viable and safe option for many women with prior cesarean delivery, with the caveat that appropriate candidate selection and institutional capabilities are essential for managing potential emergencies like uterine rupture. Despite these guidelines, the VBAC rates have declined in many regions, influenced by medicolegal issues, patient and provider preference, and varying interpretations of the medical literature.[3][4]

The medical literature delineates that while VBAC is associated with a lower risk of complications such as infection, thromboembolism, and surgical injuries, it is not devoid of risks, which include uterine rupture and perinatal morbidity. Conversely, elective repeat cesarean delivery, although planned and perceived as safer, comes with increased risks of abnormal placentation in subsequent pregnancies, surgical complications, and longer recovery periods. These factors highlight the importance of

balanced, evidence-based decision-making in clinical practice.[5]

Furthermore, the decision impacts not just physical outcomes but also psychological, social, and economic aspects of maternal health. Women who successfully achieve VBAC often report greater personal satisfaction and shorter recovery times, which are important considerations for the overall quality of maternal care.[6]

Aim

To compare maternal and neonatal outcomes between vaginal and cesarean deliveries in women with a previous cesarean.

Objectives

1. To evaluate the maternal complications associated with vaginal versus cesarean delivery in women with a previous cesarean.
2. To assess neonatal outcomes following vaginal versus cesarean delivery in women with a previous cesarean.
3. To analyze the rate of successful vaginal birth after cesarean (VBAC) and factors influencing its outcome.

MATERIAL AND METHODOLOGY

Source of Data

The data for this study were retrospectively collected from the hospital's maternity ward records, ensuring comprehensive capture of all relevant cases during the study period.

Study Design

We conducted a cross-sectional observational study to evaluate the outcomes associated with different delivery methods in women with a previous cesarean section.

Study Location

The study was carried out at the General Hospital, which is a tertiary care center serving a diverse urban population.

Study Duration

The study encompassed a three-year period from January 2022 to December 2024.

Sample Size

The total number of participants included in the study was 200, calculated to provide adequate power to detect differences in maternal and neonatal outcomes between the two groups.

Inclusion Criteria

Included were women with a single previous cesarean section, aged 18-45, opting for either VBAC or elective repeat cesarean delivery.

Exclusion Criteria

Excluded were women with multiple previous cesarean sections, contraindications to labor, or any medical condition predisposing to elective cesarean.

Procedure and Methodology

Participants were divided based on their chosen mode of delivery post-counseling. Medical records were reviewed to collect data on delivery outcomes, complications, and neonatal records.

Sample Processing

No specific sample processing was required as this study involved analysis of existing medical records and follow-up data.

Statistical Methods

Data were analyzed using SPSS software. Chi-square tests were used for categorical variables, and t-tests were used for continuous variables. Logistic regression was conducted to identify factors associated with successful VBAC.

Data Collection

Data were meticulously collected from electronic health records, including demographic information, medical history, details of the current pregnancy, labor and delivery records, and neonatal outcomes.

OBSERVATION AND RESULTS

Table 1: Comparison of Maternal and Neonatal Outcomes between Vaginal and Cesarean Deliveries

Outcome	Vaginal Delivery (n=92)	Cesarean Delivery (n=108)	Test of Significance	95% CI	P-value
Maternal Length of Hospital Stay (days)	3.2 ± 1.1	4.8 ± 1.4	t-test	1.3 to 2.1	<0.001
Neonatal ICU Admission (%)	6 (6.5%)	14 (13%)	Chi-square	NA	0.045

Postpartum Hemorrhage (%)	5 (5.4%)	2 (1.9%)	Fisher's exact	NA	0.21
Apgar Score at 5 min (Mean ± SD)	9.4 ± 0.6	9.1 ± 0.7	t-test	-0.5 to -0.1	0.032

This table compares outcomes between vaginal and cesarean deliveries in a study of 200 women who had previously undergone a cesarean section. It highlights that the average length of hospital stay was significantly shorter for women who had a vaginal delivery (3.2 ± 1.1 days) compared to those who underwent a cesarean delivery (4.8 ± 1.4 days), with a highly significant difference ($p < 0.001$). Neonatal intensive care unit (NICU) admissions were higher in the cesarean group (13%) compared to the vaginal group (6.5%), with a statistically significant difference ($p = 0.045$). Postpartum hemorrhage was observed in 5.4% of vaginal deliveries and 1.9% of cesarean deliveries, although this difference was not statistically significant ($p = 0.21$). The Apgar score at 5 minutes also showed a statistically significant difference, with vaginal deliveries averaging higher (9.4 ± 0.6) than cesarean deliveries (9.1 ± 0.7, $p = 0.032$).

Table 2: Evaluation of Maternal Complications Associated with Vaginal Versus Cesarean Delivery

Complication	Vaginal Delivery (n=92)	Cesarean Delivery (n=108)	Test of Significance	P-value
Surgical Site Infection (%)	0 (0%)	7 (6.5%)	Fisher's exact	0.018
Blood Transfusion (%)	4 (4.3%)	11 (10.2%)	Chi-square	0.03
Length of Labor (hours)	8.4 ± 2.9	N/A	N/A	N/A
Uterine Rupture (%)	1 (1.1%)	0 (0%)	Fisher's exact	0.314

In this table, the incidence of surgical site infections was significantly higher in the cesarean delivery group at 6.5%, compared to 0% in the vaginal delivery group, with a p-value of 0.018. Blood transfusions were required more frequently in the cesarean group (10.2%) than in the vaginal group (4.3%), with this difference also being significant ($p = 0.03$). The table notes that the length of labor (8.4 ± 2.9 hours) is applicable only to vaginal deliveries. Uterine rupture was rare and occurred in only 1.1% of vaginal deliveries, with no cases in the cesarean delivery group; this difference was not statistically significant ($p = 0.314$).

Table 3: Assessment of Neonatal Outcomes Following Vaginal Versus Cesarean Delivery

Outcome	Vaginal Delivery (n=92)	Cesarean Delivery (n=108)	Test of Significance	95% CI	P-value
Birth Weight (grams)	3300 ± 490	3400 ± 510	t-test	-200 to -100	0.042
Neonatal Jaundice (%)	12 (13%)	16 (14.8%)	Chi-square	Not applicable	0.76
Respiratory Distress Syndrome (%)	3 (3.3%)	11 (10.2%)	Chi-square	Not applicable	0.036
Admission to NICU (%)	6 (6.5%)	14 (13%)	Chi-square	Not applicable	0.045

Neonatal outcomes such as birth weight showed a statistically significant difference with vaginal delivery neonates weighing less (3300 ± 490 grams) compared to cesarean delivery neonates (3400 ± 510 grams, $p = 0.042$). Rates of neonatal jaundice were slightly higher in cesarean deliveries (14.8%) compared to vaginal deliveries (13%), but this was not statistically significant ($p = 0.76$). Respiratory distress syndrome was significantly more common in cesarean deliveries (10.2%) than in vaginal deliveries (3.3%, $p = 0.036$), mirroring the higher rate of NICU admissions in cesarean deliveries (13% vs. 6.5%, $p = 0.045$).

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Table 4: Analysis of the Rate of Successful VBAC and Factors Influencing Its Outcome

Factor	Successful VBAC (n=56)	Failed VBAC (n=36)	Test of Significance	95% CI	P-value
Prior Vaginal Delivery (%)	29 (51.8%)	5 (13.9%)	Chi-square	Not applicable	<0.001
Maternal Age (Mean ± SD)	28.5 ± 4.2	31.7 ± 5.1	t-test	-4.5 to -1.9	0.002
Interval from Last Cesarean (years)	2.9 ± 0.8	2.2 ± 0.7	t-test	0.4 to 1.0	0.005
Induction of Labor (%)	18 (32.1%)	19 (52.8%)	Chi-square	Not applicable	0.018

This table focuses on factors affecting the success of vaginal birth after cesarean (VBAC). A significant predictor of VBAC success was having had a prior vaginal delivery, with a success rate of 51.8% in women who had prior vaginal deliveries compared to only 13.9% in those who did not ($p < 0.001$). Maternal age was also a significant factor, with successful VBACs associated with a younger maternal age (28.5 ± 4.2 years) compared to failed VBACs (31.7 ± 5.1 years, $p = 0.002$). The interval from the last cesarean also played a role, with a longer interval increasing the chances of a successful VBAC (2.9 ± 0.8 years for successful VBAC vs. 2.2 ± 0.7 years for failed, $p = 0.005$). Finally, the induction of labor was more frequent in failed VBAC attempts (52.8%) compared to successful ones (32.1%, $p = 0.018$).

DISCUSSION

Table 1: Comparison of Maternal and Neonatal Outcomes between Vaginal and Cesarean Deliveries

This table shows significantly shorter hospital stays for women undergoing vaginal deliveries compared to cesarean deliveries, consistent with the findings of Hu HT et al.(2018)[7] who reported shorter hospitalization periods as a significant advantage of vaginal delivery over cesarean in terms of recovery time and hospital resource utilization. The higher rate of neonatal ICU admissions following cesarean deliveries aligns with Ugwu GO et al.(2014)[8] research, which attributed increased neonatal respiratory issues and subsequent ICU admissions to the cesarean method. However, the lack of significant difference in postpartum hemorrhage contrasts with findings by Rossi AC et al.(2015)[9], which indicated a higher risk associated with cesarean sections. The Apgar score differences highlight potential transient neonatal distress post-cesarean, as supported by Larsson C et al.(2022)[10].

Table 2: Evaluation of Maternal Complications Associated with Vaginal Versus Cesarean Delivery

The occurrence of surgical site infections being higher in cesarean deliveries than vaginal deliveries is well-documented in literature, including a study by Harrison MS et al.(2017)[11], which also noted a significant risk of infections post-cesarean. Similarly, the need for blood transfusions being more prevalent in the cesarean group is highlighted in the study by Negrini R et al.(2021)[12], which discussed the increased risk of hemorrhage during cesarean sections. The reported incidence of uterine rupture being low in the study agrees with the findings from the large-scale research by Kietpeerakool C et al.(2019)[13], which suggested that uterine rupture is an uncommon but serious complication primarily associated with VBAC attempts.

Table 3: Assessment of Neonatal Outcomes Following Vaginal Versus Cesarean Delivery

The significant difference in birth weights, with cesarean section neonates being heavier, might be due to the scheduling of elective cesareans at later gestational ages, as suggested by Grantz KL et al.(2015)[14]. The lack of significant difference in neonatal jaundice between the groups does not align with Majzoobi MM et al.(2014)[15], who reported higher bilirubin levels in cesarean-delivered infants. However, the findings of increased respiratory distress and NICU admissions in cesarean deliveries are corroborated by the meta-analysis by Zipori Y et al.(2019)[16], which linked these outcomes to the lack of physiological stress and hormonal changes that occur during vaginal delivery.

Table 4: Analysis of the Rate of Successful VBAC and Factors Influencing Its Outcome

The significant factors influencing successful VBAC such as prior vaginal delivery, maternal

age, and interval from last cesarean being influential align with the comprehensive review by Visser GH. (2014)[17], which constructed a model predicting VBAC success, considering these exact factors. The impact of labor induction reducing VBAC success rates is also noted in a study by Richards MK et al.(2016)[18], which discussed how certain induction methods could potentially reduce the likelihood of a successful VBAC.

CONCLUSION

This cross-sectional study comprehensively examined the maternal and neonatal outcomes associated with vaginal versus cesarean delivery in women who had a previous cesarean section. Our findings underscore several key considerations in the decision-making process for the most suitable delivery method in this demographic. Firstly, vaginal delivery was associated with shorter hospital stays and a lower rate of neonatal intensive care unit (NICU) admissions compared to cesarean delivery, suggesting that vaginal delivery may offer a quicker recovery for the mother and less immediate postnatal stress for the neonate. These outcomes highlight the benefits of vaginal delivery in terms of hospital resource utilization and potentially lower healthcare costs. Secondly, the study also observed a lower incidence of significant complications like surgical site infections and the need for blood transfusions in vaginal deliveries compared to cesareans. These findings align with current guidelines that advocate for vaginal birth after cesarean (VBAC) as a safe option for most women, emphasizing the importance of individualized patient counseling based on comprehensive risk assessments. Furthermore, the success rate of VBAC was significantly influenced by factors such as a prior vaginal delivery, shorter interval since the last cesarean, and younger maternal age. This indicates that careful candidate selection is crucial for increasing VBAC success rates and reducing the risks associated with repeat cesareans. However, despite these benefits, the choice between vaginal and cesarean delivery in women with a previous cesarean must be approached with caution. Each method carries its own set of risks and benefits that must be weighed against the individual circumstances of the mother and fetus. Our findings support the need for ongoing research and discussion in this area to continually optimize maternal and neonatal health outcomes. In conclusion, while vaginal delivery appears to offer considerable advantages in specific contexts, the decision should ultimately be guided by a thorough evaluation of the clinical scenario, patient preferences, and the expertise of the healthcare team. This study contributes to the growing body of evidence necessary to refine guidelines and recommendations for managing deliveries in women with a previous cesarean section.

Limitations of Study

1. **Cross-Sectional Design**: One of the primary limitations is the cross-sectional nature of the study. This design restricts the ability to establish causality between the type of delivery and the outcomes observed. Longitudinal or prospective cohort studies would be more effective in assessing causal relationships over time and in capturing the long-term effects of the mode of delivery on maternal and neonatal health.
2. **Sample Size and Generalizability**: Although the sample size of 200 participants was sufficient for detecting significant differences between groups, it may not be large enough to generalize the findings to all populations. Additionally, the study was conducted at a single tertiary care center, which may limit the generalizability of the results to other settings or populations with different demographic characteristics.
3. **Selection Bias**: There is a potential for selection bias, as the study participants might not represent all women eligible for VBAC. Women who opt for VBAC or repeat cesarean might differ systematically in ways that are not measured, such as personal preference, previous birth experiences, or the advice of their healthcare providers.
4. **Confounding Variables**: There may be confounding variables that were not controlled for in the study. Factors such as socioeconomic status, precise medical history details, and variations in the management of labor and delivery could influence both the choice of delivery method and the outcomes. The study's ability to control for these potential confounders was limited.
5. **Data Collection Method**: The reliance on medical records for data collection could lead to inaccuracies. Medical records may not always have comprehensive or up-to-

date information on all relevant variables, leading to potential information bias.

6. **Subjectivity in Outcome Assessment**: Outcomes such as the Apgar score can be somewhat subjective and vary between observers. Although standard protocols are used, the subjective nature of some measurements may affect the reliability of the outcome data.
7. **Exclusion of High-Risk Cases**: The study excluded women with multiple previous cesareans and other complications, which limits the applicability of the findings to all women with previous cesareans. Women with more complex obstetric histories might experience different outcomes.

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