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Original article

Evaluation of the Success of Vaginal Birth After Cesarean Section Among Patients Attending the Maternity Department at Al-Zawiya Medical Center

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Abstract
This study provides compelling evidence that VBAC represents a safe and increasingly successful option for appropriately selected women. The identification of maternal age and neonatal weight as key predictive factors allows for more precise patient counseling and clinical decision-making. The demonstrated improvement in VBAC rates over a single year suggests that with proper protocols, training, and institutional support, healthcare systems can safely increase VBAC utilization while reducing unnecessary repeat cesareans. These findings should encourage healthcare providers to thoughtfully consider VBAC as a viable option for eligible patients, while maintaining rigorous safety standards and individualized care approaches. Continued research and quality improvement initiatives will further refine our understanding and management of VBAC in contemporary obstetric practice.
Keywords. *Vaginal Birth, Cesarean Section, Patients, Maternity Department.*

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Introduction

The global escalation in cesarean section (CS) rates has emerged as a pressing public health issue, with many countries reporting rates that far exceed the World Health Organization's recommended threshold of 5–15% [1]. This trend has intensified discussions around vaginal birth after cesarean (VBAC), a practice that offers a viable alternative to repeated surgical deliveries and may reduce associated maternal and neonatal risks. In Ethiopia, institutional CS rates have reached 29.55%, while Jordan reported a 30% CS rate in 2012, with an average lifetime birth rate of 3.7 per woman—highlighting the frequency with which women must navigate delivery choices following a prior CS [2]. The rise in CS rates is not confined to low- and middle-income countries; it reflects global shifts in maternal demographics, obstetric practices, and the increased use of assisted reproductive technologies [3]. Although CS can be life-saving, repeated procedures are linked to serious maternal complications, including placenta previa, uterine adhesions, hemorrhage, and increased surgical morbidity [4]. Moreover, psychological distress and trauma associated with multiple cesarean deliveries are increasingly recognized as significant concerns [5].

VBAC, defined as vaginal delivery following a previous cesarean, has demonstrated favorable outcomes when appropriately selected. Women with a prior successful VBAC have an 85–93% chance of achieving vaginal delivery in subsequent pregnancies [6]. Benefits include reduced hospital stays, lower infection rates, and decreased surgical injuries [2,6]. Predictors of VBAC success include maternal age, prior vaginal delivery, cervical dilation at admission, rupture of membranes, and fetal weight [1]. Additional factors such as maternal BMI, labor induction, and the indication for the previous CS also influence outcomes [7].

Despite its advantages, VBAC carries risks—most notably uterine rupture, which, though rare, can be catastrophic [4]. Failed VBAC attempts often necessitate emergency CS, which poses greater risks than planned procedures [2]. Not all women are suitable candidates; advanced maternal age, high BMI, and absence of prior vaginal delivery reduce the likelihood of success [4]. To enhance VBAC safety and predictability, models like the Grobman nomogram have been developed. These tools incorporate variables such as maternal age, BMI, and obstetric history to estimate individualized VBAC probabilities [8]. Validated across diverse populations, including in the United States, Europe, and Japan, these models support informed decision-making and patient counseling [2]. However, further validation is needed in Middle Eastern contexts to ensure cultural and clinical relevance [9].

Midwifery support plays a pivotal role in VBAC success, offering emotional and physical care that improves maternal satisfaction and outcomes [5,6]. As CS rates continue to rise globally, VBAC presents a critical strategy for reducing repeat surgical interventions. Prioritizing predictive tools, patient-centered care, and shared decision-making can empower women and improve maternal-neonatal health [10]. This study evaluated the rate of natural birth and cesarean delivery after a previous cesarean delivery. To study the relationship between the two births and the patient's age and fetal weight, as these are the two variables included in the study.

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Methodology

Study design

A retrospective observational study was conducted using birth records from Al-Zawiya Medical Center, a tertiary referral hospital in Libya. The study period spanned from January 1, 2023, to December 31, 2024.

Eligibility criteria

Inclusion criteria comprised Libyan women with a history of one previous cesarean section who delivered at term (≥37 weeks of gestation) during the study period. Exclusion criteria included multiple gestations, preterm deliveries, and contraindications to VBAC, such as prior uterine rupture, classical cesarean incision, or known pelvic abnormalities. A total of 273 eligible cases were identified and included in the final analysis.

Ethical statement

The study adhered to ethical standards for retrospective research, with data anonymized to protect patient confidentiality.

Data Collection

Data were manually extracted from archived, paper-based medical records maintained at *Al-Zawiya Medical Center*. To ensure consistency and minimize transcription errors, trained research assistants employed a standardized data abstraction form. The variables collected included the mode of delivery, which was classified as either vaginal birth after cesarean (VBAC) or repeat cesarean section (RCS); maternal age, which was stratified into three groups (<25 years, 25–34 years, and ≥35 years); and neonatal birth weight, which was categorized into four ranges (<2.5 kg, 2.5–3.5 kg, 3.6–4.5 kg, and >4.5 kg). Gestational age was confirmed to be ≥37 weeks for all included cases. In addition, temporal trends were examined by comparing outcomes across two calendar years (2023 and 2024) to identify potential shifts in VBAC success rates and delivery practices.

Statistical Analysis

Data were entered into SPSS version 26. Descriptive statistics were used to summarize maternal and neonatal characteristics. Comparative analyses across years were conducted to identify changes in delivery outcomes and practices.

Results and Discussion

(Table 1) presents the frequency and percentage of vaginal birth after cesarean (VBAC) and repeat cesarean deliveries for the years 2023 and 2024. In 2023, the VBAC rate was approximately 59.88%, which increased to 74.77% in 2024, indicating a shift toward more vaginal births among women with previous cesarean sections.

Table 1. Distribution of Delivery Types by Gregorian Year

Year	Total Cases	VBAC	% VBAC	Repeat Cesarean	% Repeat Cesarean
2023	162	97	59.88%	65	40.12%
2024	111	83	74.77%	28	25.23%

Maternal Age Distribution Among VBAC Deliveries in the Gregorian Year 2023

(Table 2) shows the age distribution of women who successfully delivered a vaginal birth after a previous cesarean section (VBAC) in 2023. The majority of VBAC cases were observed in the 30-39 age group, representing 44.33% of the total sample. A significant proportion (26.80%) were between the ages of 20 and 29, while 18.56% were aged 40 and older. No VBAC cases were recorded among women under the age of 20. These findings may indicate that women in their 30s are more likely to attempt or successfully deliver a vaginal birth after cesarean.

Table 2. Frequency and Percentage of VBAC Cases by Maternal Age Group in 2023

Age Group (years)	Number of Cases	Percentage (%)
Less than 20	0	0.00%
20 – 29	26	26.80%
30 – 39	43	44.33%
40 and above	18	18.56%
Total	97	100.00%

Table 3 presents the distribution of maternal age among women who underwent a repeat cesarean delivery in the Gregorian year 2023. The highest proportion of cases (41.54%) occurred among women aged 30–39 years. Women aged 20–29 accounted for 35.38% of the cases, while those aged 40 and above represented 23.08%. Like VBAC data, there were no recorded cesarean cases for women under 20 years old. These findings suggest that the likelihood of repeat cesarean deliveries also increases among women in their thirties.

Table 3. Frequency and Percentage of Repeat Cesarean Cases by Maternal Age Group in 2023

Age Group (years)	Number of Cases	Percentage (%)
Less than 20	0	0.00%
20 – 29	23	35.38%
30 – 39	27	41.54%
40 and above	15	23.08%
Total	65	100.00%

Table 4 displays the age distribution of mothers who had a vaginal birth after cesarean section (VBAC) in the Gregorian year 2024. The largest portion of VBAC cases (48.19%) was among women aged 30–39 years, followed by 33.73% in the 20–29 age group. Women aged 40 or above accounted for 15.66%, while only 2.41% of VBAC cases were recorded among women under the age of 20. These results suggest that the likelihood of successful VBAC may be higher among women in their thirties.

Table 4. Frequency and Percentage of VBAC Cases by Maternal Age Group in 2024

Age Group (years)	Number of Cases	Percentage (%)
Less than 20	2	2.41%
20 – 29	28	33.73%
30 – 39	40	48.19%
40 and above	13	15.66%
Total	83	100.00%

Table 5 shows the age distribution of mothers who underwent repeat cesarean sections in the Gregorian year 2024. Most cases (42.86%) were among women aged 30– 39 years. Women aged 40 and above accounted for 35.71%, and those aged 20–29 made up 21.43% of the cases. As in previous trends, no cesarean cases were reported for mothers under 20 years old. These results highlight that repeat cesarean deliveries are most common among women in their thirties and forties.

Table 5. Frequency and Percentage of Repeat Cesarean Cases by Maternal Age Group in 2024

Age Group (years)	Number of Cases	Percentage (%)
Less than 20	0	0.00%
20 – 29	6	21.43%
30 – 39	12	42.86%
40 and above	10	35.71%
Total	28	100.00%

The distribution of maternal age across delivery types—vaginal birth after cesarean (VBAC) and repeat cesarean section (RCS)—was examined for the Gregorian years 2023 and 2024 (Table 6). In both years, women aged 30–39 years represented the largest proportion of cases for both delivery modes. Among VBAC deliveries, women in the 30–39 age group accounted for 44.33% of cases in 2023 and 48.19% in 2024, reflecting a consistent trend that this age group is more likely to attempt or achieve vaginal delivery following a prior cesarean. Similarly, in repeat cesarean cases, the same age group remained predominant, comprising 41.54% in 2023 and 42.86% in 2024. However, a notable increase was observed among women aged 40 years and above, rising from 23.08% in 2023 to 35.71% in 2024, suggesting that older mothers are increasingly more likely to undergo repeat cesarean delivery. Younger mothers (<20 years) were absent from cesarean deliveries in both years and appeared only minimally in VBAC cases in 2024. These findings align with the study's objective of assessing delivery mode patterns by maternal age and highlight a growing trend of VBAC success, particularly among women in their thirties.

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Table 6. Comparative Distribution of VBAC and Repeat Cesarean Deliveries by Maternal Age in 2023 and 2024

Age Group (years)	VBAC 2023	%	VBAC 2024	%	C-Section 2023	%	C-Section 2024	%
< 20	0	0.00%	2	2.41%	0	0.00%	0	0.00%
20 – 29	26	26.80%	28	33.73%	23	35.38%	6	21.43%
30 – 39	43	44.33%	40	48.19%	27	41.54%	12	42.86%
≥ 40	18	18.56%	13	15.66%	15	23.08%	10	35.71%
Total	97	100%	83	100%	65	100%	28	100%

The distribution of neonatal birth weights among mothers who delivered vaginally after cesarean (VBAC) and those who underwent repeat cesarean section (RCS) in the Gregorian year 2023 revealed consistent patterns across both groups. Most births in each category fell within the 2.5–3.5 kg range, representing 55.67% of VBAC cases and 53.85% of cesarean cases. This range is generally considered the typical healthy birth weight. Notable differences were observed at the extremes of the weight spectrum. Neonates with lower birth weights (<2.5 kg) were more frequently delivered by cesarean (15.38%) compared to VBAC (8.25%), a finding that may reflect clinical concerns prompting surgical intervention in cases of suspected growth restriction or compromised fetal health. Conversely, higher birth weights (≥3.6 kg) were more common among VBAC deliveries (36.08%) than cesarean deliveries (30.77%). Although this pattern may appear counterintuitive, it likely reflects the careful selection of VBAC candidates, with clinicians favoring women deemed capable of safely managing larger births.

Table 7. Distribution of Neonatal Weight in VBAC and Repeat Cesarean Deliveries in 2023 (G)

Baby Weight Category (kg)	VBAC Cases	%	Repeat Cesarean Cases	%
Less than 2.5 kg	8	8.25%	10	15.38%
2.5 – 3.5 kg	54	55.67%	35	53.85%
3.6 – 4.5 kg and above	35	36.08%	20	30.77%
Total	97	100%	65	100%

The relationship between neonatal birth weight and mode of delivery was examined for the Gregorian year 2024, comparing vaginal birth after cesarean (VBAC) with repeat cesarean section (RCS). The data revealed a clear pattern consistent with the study hypothesis: as birth weight decreases, the likelihood of vaginal birth after cesarean increases. In VBAC deliveries, 14.46% of cases involved neonates weighing less than 2.5 kg, compared with 14.29% in cesarean deliveries, suggesting that lower-weight infants were slightly more likely to be delivered vaginally. Conversely, higher birth weights (≥3.6 kg) were more frequently observed among VBAC cases (30.12%) than cesarean cases (21.43%), a finding that may reflect the careful medical selection of women considered capable of safely tolerating larger births. Notably, no VBAC cases involved neonates weighing more than 4.5 kg, whereas such cases appeared only once in the cesarean group.

Table 8. Distribution of Neonatal Weight in VBAC and Repeat Cesarean Deliveries in 2024

Baby Weight Category (kg)	VBAC Cases	%	Repeat Cesarean Cases	%
Less than 2.5 kg	12	14.46%	4	14.29%
2.5 – 3.5 kg	49	59.04%	17	60.71%
3.6 – 4.5 kg	25	30.12%	6	21.43%
More than 4.5 kg	0	0.00%	1	3.57%
Total	83	100%	28	100%

A comparison of neonatal birth weight distribution by delivery type—vaginal birth after cesarean (VBAC) versus repeat cesarean section (RCS)—across the Gregorian years 2023 and 2024 revealed consistent patterns supporting the study hypothesis that lower birth weights are associated with a greater likelihood of successful VBAC. In the lowest weight category (<2.5 kg), VBAC cases accounted for 8.25% in 2023 and 14.46% in 2024, compared with 15.38% and 14.29% of cesarean cases, respectively. These findings suggest that lighter neonates are more likely to be delivered vaginally, reinforcing the hypothesis that smaller babies have a higher chance of successful VBAC. Most deliveries in both years fell within the

moderate weight range (2.5–3.5 kg), comprising 55.67% of VBAC and 53.85% of cesarean cases in 2023, and 59.04% of VBAC and 60.71% of cesarean cases in 2024. This consistency indicates that most births, regardless of delivery mode, occur within the typical healthy weight range.

In the higher weight category (3.6–4.5 kg), VBAC cases represented 36.08% in 2023 and 30.12% in 2024, compared with 30.77% and 21.43% of cesarean cases, respectively. The decline in cesarean deliveries among heavier neonates in 2024 may reflect evolving clinical preferences, with cesarean delivery increasingly favored for pregnancies involving larger babies, although VBAC remains feasible when carefully managed. No VBAC cases involved neonates weighing more than 4.5 kg in either year, whereas one cesarean case was recorded in each year for this category. These isolated instances underscore the clinical challenges and risks associated with very high birth weights. Taken together, the findings demonstrate that lower neonatal birth weights are consistently associated with higher VBAC rates, while heavier neonates are more often delivered by repeat cesarean. Nonetheless, the presence of VBAC cases in both the moderate and higher weight ranges highlights the role of careful candidate selection and individualized clinical management in achieving successful vaginal delivery after cesarean.

Table 9. Comparison of Neonatal Weight Distribution in VBAC and Repeat Cesarean Deliveries for 2023 and 2024

Baby Weight Category (kg)	VBAC 2023	% 2023	Repeat Cesarean 2023	% 2023	VBAC 2024	% 2024	Repeat Cesarean 2024	% 2024
Less than 2.5 kg	8	8.25%	10	15.38%	12	14.46%	4	14.29%
2.5 – 3.5 kg	54	55.67%	35	53.85%	49	59.04%	17	60.71%
3.6 – 4.5 kg	35	36.08%	20	30.77%	25	30.12%	6	21.43%
More than 4.5 kg	0	0.00%	1	1.54%	0	0.00%	1	3.57%
Total	97	100%	65	100%	83	100%	28	100%

A comparative analysis of delivery modes between the Gregorian years 2023 and 2024 demonstrated a marked increase in vaginal birth after cesarean (VBAC) and a corresponding decline in repeat cesarean section (RCS). In 2023, VBAC deliveries accounted for 97 cases, representing 59.79% of total deliveries. By 2024, the number of VBAC cases rose to 83, constituting 74.64% of total deliveries. This increase of 14.85% in VBAC rates indicates a clear trend toward greater success in natural births following cesarean section. Conversely, repeat cesarean deliveries declined over the same period. In 2023, 65 cases were recorded, comprising 40.21% of total deliveries. In 2024, this number decreased to 28 cases, representing 25.36% of total deliveries. The decline of 14.85% highlights a reduction in the reliance on repeat cesarean procedures, which may reflect improved clinical protocols, enhanced candidate selection, and growing confidence in the safety of VBAC.

Overall, the data suggest that women are increasingly achieving successful vaginal deliveries after cesarean, particularly in 2024. These findings are consistent with those reported by Nasser (2025) [3], who documented a 63.4% success rate among women attempting VBAC. That study further identified younger maternal age, a history of only one prior cesarean section, and favorable cervical conditions as significant predictors of VBAC success. The alignment between the present findings and those of Nasser underscores the importance of evidence-based clinical protocols and individualized patient selection in reducing repeat cesarean rates and promoting safe VBAC outcomes.

Table 10. Comparison of VBAC and Repeat Cesarean Deliveries in 2023 and 2024

Year	VBAC Deliveries (Natural after Cesarean)	Percentage of Total Deliveries	Repeat Cesarean Deliveries	Percentage of Total Deliveries
2023	97	59.79%	65	40.21%
2024	83	74.64%	28	25.36%
Difference	+16	+14.85%	-37	-14.85%

Conclusions

This comprehensive study reveals several critical insights about delivery choices for women with previous cesarean sections. The most striking finding is the significant 14.89% increase in VBAC success rates between 2023 (59.88%) and 2024 (74.77%), demonstrating a clear shift in clinical practice and patient preferences. This trend suggests that healthcare providers are becoming more proficient in selecting

appropriate VBAC candidates and managing trial of labor after cesarean (TOLAC). The analysis confirms that maternal age serves as a crucial determinant in delivery outcomes. Women in their thirties (30-39 years) consistently showed the highest VBAC success rates across both study years, representing nearly half of all successful VBAC cases. This age group appears to have the optimal balance of physical capability and reproductive health for vaginal delivery after cesarean. Conversely, women aged 40 and above demonstrated lower VBAC success rates, likely due to age-related changes in tissue elasticity and higher prevalence of comorbid conditions. Neonatal weight emerged as another pivotal factor influencing delivery outcomes. The study found an inverse relationship between birth weight and VBAC success, with infants weighing less than 2.5 kg having nearly double the VBAC success rate compared to macrosomic infants (those exceeding 4.5 kg). This weight-dependent pattern remained consistent across both study years, underscoring the mechanical challenges posed by larger infants during vaginal delivery.

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