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ORIGINAL RESEARCH

Investigating the Success Rate of Vaginal Delivery After Cesarean Section and Its Associated Factors in Afghan Women: Insights from a Maternity Hospital in Kabul

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Background: Vaginal Birth After Cesarean delivery (VBAC) is widely regarded as one of the most effective methods to reduce unnecessary Cesarean section and their complications. Despite its proven benefits, data on the success rate of VBAC and the associated factors remain scarce in Afghanistan. This study aimed to address this gap by determining the VBAC success rate and identifying its associated factors in a maternity hospital in Kabul, Afghanistan.

Methods: This cross-sectional study was conducted at Malalai Obstetrics and Gynecology Hospital in Kabul, Afghanistan. The study sample included women with a history of previous cesarean section who visited the hospital between March 21 and September 22, 2023. Demographic and clinical information were collected from client files. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study sample. The association between VBAC and various categorical variables were examined using chi-square tests, with a significance level set at $p < 0.05$. Logistic regression analysis was performed to identify independent predictors of VBAC, with VBAC as the outcome variable and multiple predictors included in the model.

Results: Among the 567 women included in the study, 449 (79.2%) had a successful VBAC. Factors associated with successful VBAC and their adjusted odds ratio (95% CI) were lower gestational age: 1.25 (1.05–1.48), absence of gestational hypertension: 2.71 (1.26–5.85), cervical dilation of > 4 cm on admission: 2.77 (1.38–5.55), effacement of ≥ 50% on admission: 2.13 (1.04–4.35), and absence of fetal distress: 7.35 (4.29–12.6).

Conclusion: The rate of successful VBAC observed in this study is at a high level (79.2%). This study is the first study to determine the VBAC success rate and its associated factors in Afghanistan. Further research is needed to validate these findings and explore additional factors influencing VBAC success.

Keywords: vaginal delivery after cesarean, dilatation, effacement, fetal distress, gestational age, Afghanistan

Introduction

Globally, the rate of cesarean deliveries has been steadily rising. Currently, cesareans account for 21% of all births and are projected to reach 29% by 2030.[1,2] This upward trend raises concerns about a future increase in repeated cesarean deliveries and their associated risks.[1,2] While cesarean delivery is often necessary to save the lives of mothers and babies in case of prolonged or obstructed labor, fetal distress, or abnormal fetal presentation, it also carries significant risks.[3–5] These risks include both short-term or long-term complications, such as heavy bleeding, infections, prolonged hospitalization, delay in the

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initiation of breastfeeding and skin-to-skin contact between mother and child, chronic pain, and increased complications in subsequent pregnancies, such as placenta previa, placenta abruption, placenta accreta, and fertility disorders.[3–6]

Trial Of Labor After Cesarean section (TOLAC), is an attempt to perform a vaginal birth in a woman who previously had a cesarean delivery.[7] When TOLAC is successful, it is referred to as Vaginal Birth After Cesarean delivery (VBAC), which offers significant benefits over repeat cesarean sections by reducing the rate of unnecessary cesarean sections and their complications.[7,8] VBAC is widely recognized as a safe and effective option for women with up to two transverse scars when performed in well-equipped centers.[8,9] It is especially important that this operation be carried out in centers equipped with emergency cesarean section facilities, ensuring greater safety for both the mother and the fetus.[10] Successful VBAC has numerous advantages, including shorter hospital stays, increased chances of future vaginal births, reduced risk of infections and surgical complications, lower incidence of placental disorders, fewer anesthesia-related issues, improved maternal and neonatal well-being, and earlier breastfeeding initiation.[11–13]

The success rates of VBAC vary across different countries, with Vietnam at 54.14%,[14] Pakistan at 72.1%,[15] Iraq at 73%,[16] Ethiopia at 48.8%,[17] Taiwan at 80.70%,[18] England at 63.4%,[19] and Germany at 70.1%.[20] Factors such as high body mass index (BMI), lack of spontaneous onset of labor, fetal distress, prolonged gestation, and issues like improper station can negatively affect VBAC success.[15,20] A systematic review has found that various factors-including maternal age, obesity, diabetes, hypertensive disorders in pregnancy, Bishop score, labor induction, fetal macrosomia, white race, history of vaginal delivery before cesarean section, prior VBAC, and previous cesarean indications (eg, cephalopelvic disproportion, dystocia, failed induction, or abnormal fetal presentation) can influence the likelihood of VBAC success.[21]

In a conflict-affected, low-resource country such as Afghanistan, maternal and neonatal health outcomes remain among the poorest globally, with one of the highest maternal and neonatal mortality rates.[22–25] Despite significant efforts to improve healthcare services, about half (44%) of all deliveries in Afghanistan still occur outside healthcare facilities, with limited access to institutional delivery and skilled birth attendance.[26,27] The cesarean delivery rate is critically low at only 3.6%,[23,28] far below the World Health Organization's recommended threshold of 10–15% to minimize maternal and neonatal complications.[29]

However, facility-based data shows a different trend. A 2020 study reported a cesarean rate of 29.3% in one Kabul hospital,[30] rising to 39% in another by 2025,[31] indicating growing reliance on surgical delivery in institutional settings. These hospitals are major tertiary centers, referral hubs for high-risk cases, and training sites for new doctors, factors that may justify higher cesarean rates. However, the underlying reasons for these elevated rates remain underexplored and require further study.

A 2012 study reported 27 maternal deaths, 28 stillbirths, and 3 neonatal deaths among 173 cesarean births, with only 28% of cases managed with a partograph and just 30% of emergency surgeries performed within one hour.[32] In the absence of updated research, the 2012 findings continue to reflect systemic challenges such as inadequate monitoring, delayed emergency response, and limited surgical capacity in rural areas. A review of 62 EmONC-designated facilities found cesareans often unavailable in rural centers due to staff and equipment shortages.[32] Cultural barriers and limited health literacy further reduce facility-based care access,[32,33] underscoring the need for safe vaginal delivery options like VBAC. This limited access to safe and timely surgical interventions puts women, especially those with a prior cesarean section, at increased risk of severe complications during subsequent pregnancies, as emergency obstetric care is often unavailable.

In this context, promoting the thorough use of cesarean delivery alongside safer alternatives such as VBAC could be crucial. Given Afghanistan's fragile healthcare infrastructure and shortage of skilled professionals,[34,35] VBAC offers an opportunity to manage births more effectively in controlled clinical settings, alleviating pressure on overburdened maternity hospitals. Importantly, VBAC can reduce the long-term risks associated with multiple cesarean sections, such as uterine rupture, placenta accreta, and other pregnancy-related complications.[11–13] Successful implementation of VBAC in Afghanistan requires strengthening maternal healthcare by improving access to equipped facilities, training providers in VBAC management, ensuring emergency care, and raising community awareness about supervised deliveries.

Currently, as far as we know, there is no published data on the success rate of VBAC in Afghanistan, highlighting a critical gap in maternal health research.[36] This study aims to determine the success rate of VBAC in Afghanistan and identify the factors influencing successful outcomes. The findings can offer valuable insights for healthcare policymakers and providers, supporting efforts to promote vaginal delivery, minimize unnecessary repeated cesarean sections, and ultimately improve maternal and neonatal health outcomes in the country.

Materials and Methods

Study Setting and Design

This cross-sectional study was conducted at Malalai Obstetrics and Gynecology Hospital, one of the three largest maternity hospitals in Kabul, Afghanistan. It often has one of the highest maternity caseloads in the country, including during the study period from March 21 to September 22, 2023. The hospital provides comprehensive obstetric and neonatal care services, including emergency cesarean delivery, making it a suitable site for studying VBAC outcomes. Each year, the facility hosts approximately 15,000 deliveries; of these, over 30% of them are cesarean sections.

Study Population

The study included women with a history of at least one previous cesarean section who presented for a TOLAC during the study period. Inclusion criteria were a history of a previous cesarean section with a low-transverse uterine incision, singleton pregnancy at a gestational age of 37 weeks or more, no contraindications to vaginal delivery such as placenta previa or active herpes infection, and being candidates for vaginal delivery as determined by the attending obstetrician. Exclusion criteria were women scheduled for elective cesarean section upon admission and the presence of contraindications to labor, such as previous uterine rupture or classical cesarean scar.

Data Collection

Data were collected using a structured data collection form designed specifically for this study. Trained medical personnel extracted the data from patient records. The collected variables were classified into demographic, obstetric, and clinical characteristics. Demographic variables included the participant's age (in completed years), residence (urban or rural), and educational status (categorized as no formal education, primary, secondary, or bachelor).

Obstetric history variables included gestational age at the time of admission (in weeks), presence of gestational hypertension (yes or no), time interval between the current and previous pregnancy (categorized as less than 2 years, 2 to 3 years, or more than 3 years), history of previous vaginal delivery (yes or no), history of successful VBAC (yes or no), and the indication for the prior cesarean section (categorized as fetal distress, malpresentation, cephalopelvic disproportion, or macrosomia).

Clinical findings at admission included cervical dilation (categorized as ≤ 4 cm or > 4 cm), cervical effacement (categorized as $< 50\%$ or $\geq 50\%$), fetal station (categorized as high or low), fetal engagement (engaged or not engaged), status of membranes (intact or ruptured), and presence of fetal distress (yes or no). Labor characteristics such as duration of labor (categorized as less than 6 hours or ≥ 6 hours) were also recorded.

Outcome Definition

The primary outcome of interest was the success of VBAC, which was defined as a vaginal delivery following TOLAC without requiring an emergency cesarean section or resulting in significant maternal or neonatal complications.

Statistical Analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study participants. Categorical variables were presented as frequencies and percentages. Chi-square tests were conducted to examine the association between VBAC success and various categorical variables, with a statistical significance level set at $p < 0.05$. Logistic regression analysis was performed to identify independent predictors of VBAC success. The variables included in the logistic regression model were gestational age, presence of gestational hypertension, interpregnancy interval, history of previous vaginal delivery and VBAC, cervical dilation, cervical effacement, fetal station, engagement, and fetal distress. Multicollinearity among independent variables was assessed using variance inflation factors (VIF), and a backward stepwise method was employed for model selection. The effect size (odds ratios) with 95% confidence intervals (CI) were reported. All statistical analyses were carried out using SPSS software (version 21).

Results

A total of 567 women underwent the TOLAC procedure at Malalai Obstetrics and Gynecology Hospital during the study period. The majority of participants were between 25 and 30 years old (52%), resided in urban areas (76%), and had no formal education (67.9%). Further details are presented in Table 1.

In terms of obstetric characteristics, most women had gestational ages between 36 and 42 weeks (78.5%), and 92.1% did not have gestational hypertension. More than half (56.4%) had an interval of 2 to 3 years between their previous and current pregnancies. Approximately 54.9% had a history of prior vaginal delivery, while only 26.8% had a previous successful VBAC. The most common indication for the previous cesarean section was malpresentation (44.4%), followed by fetal distress (42.2%) (Table 2).

At the time of admission, 65.8% of the participants presented with cervical dilation of ≤ 4 cm, and 69.5% had cervical effacement of < 50%. A low fetal station was noted in 85.7% of cases, and 83.2% of the fetuses were not engaged. Intact membranes were observed in 90.7% of participants, and fetal distress was absent in 84.1% of cases. The duration of labor was less than 6 hours for 92.9% of the participants.

Out of the 567 women who underwent TOLAC, 449 (79.2%) successfully achieved VBAC (Figure 1).

The results of bivariable and multivariable logistic regression are presented in Table 3. A logistic regression model was applied to assess the independent predictors of successful VBAC. After adjusting for potential confounders, lower gestational age was significantly associated with a higher likelihood of VBAC (AOR: 2.15; 95% CI: 1.15–4.04), while the absence of gestational hypertension was also linked to increased odds of VBAC success (AOR: 2.71; 95% CI: 1.26–5.85). Greater cervical dilation and effacement, as well as the absence of fetal distress, remained significant predictors of VBAC success (details in Table 3).

Discussion

The aim of this study was to investigate the rate of successful VBAC practice in Afghanistan and examine associated factors. The results of this study showed that the success rate of the VBAC procedure among women who underwent TOLAC at Malalai Hospital was 79.2%. Factors associated with successful VBAC ($p < 0.05$) in this study included low gestational age, absence of gestational hypertension, cervical dilation, effacement at the time of admission, and fetal distress.

The results indicate a higher prevalence of VBAC success in Afghanistan compared to several other developing countries, such as Pakistan (68.3%),[10] Congo (57.6%),[37] Anatolia (55%),[38] and Ethiopia (41% in 2021 and 35% in 2023).[2,39] Moreover, the success rate of VBAC in Afghanistan was comparable to that of Taiwan (80.7%),[18] and higher than those reported in

Table 1 Demographic Characteristics of the Patients (n=567)

Variables	Frequency (%)
Age (In completed years)	
17–20	31 (5.5)
21–24	121 (21.3)
25–30	295 (52.0)
31–44	120 (21.2)
Residence	
Urban	431 (76.0)
Rural	136 (24.0)
Educational status	
No formal education	385 (67.9)
Primary	74 (13.1)
Secondary	69 (12.2)
Bachelor	39 (6.9)

Table 2 Obstetrics History of the Patients (n=567)

Variables	Frequency (%)
Gestational age (weeks)	
25–35	122 (21.5)
36–42	445 (78.5)
Gestational hypertension	
Yes	45 (7.9)
No	522 (92.1)
Space between previous and current births	
< 2 years	92 (16.2)
2–3 years	320 (56.4)
> 3 years	155 (27.3)
Prior history of vaginal delivery	
Yes	311 (54.6)
No	256 (45.1)
Prior successful VBAC	
Yes	152 (26.8)
No	415 (73.2)
Indication of primary cesarean section	
Fetal distress	239 (42.2)
Malpresentation	252 (44.4)
CPD	65 (11.5)
Macrosomia	11 (1.9)
Cervical dilation on admission	
≤ 4 cm	373 (65.8)
> 4 cm	194 (34.2)
Cervical effacement on admission	
< 50%	394 (69.5)
≥ 50%	173 (30.5)
Fetal station	
High	81 (14.3)
Low	486 (85.7)
Duration of labor (hours)	
< 6	527 (92.9)
≥ 6	40 (7.1)
Fetal distress	
Yes	90 (15.9)
No	477 (84.1)

(*Continued*)

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Table 2 (Continued).

Variables	Frequency (%)
Status of membranes at admission	
Intact	514 (90.7)
Ruptured	53 (9.3)
Engagement	
Yes	95 (16.8)
No	472 (83.2)

Abbreviations: VBAC, Vaginal Birth After Cesarean; CPD, Cephalopelvic Disproportion.

England (63.4%),[19] and Germany (70.1%).[20] These findings are notable, given the numerous maternal health challenges and limited healthcare infrastructure in Afghanistan.[40,41] Several contextual and systemic factors may plausibly explain this comparatively high VBAC success rate. First, patient selection criteria at Malalai Hospital may be highly restrictive, with TOLAC being offered predominantly to women presenting favorable prognostic indicators such as adequate cervical dilation, absence of hypertensive disorders, and no fetal distress. This selective practice increases the likelihood of successful outcomes but may limit generalizability to the wider population.[39] Second, limited access to surgical resources, exacerbated by funding cuts and infrastructure constraints;[34] may inadvertently encourage a stronger reliance on vaginal delivery when clinically appropriate. Following the collapse of the internationally assisted government in August 2021, international development aid, which previously constituted a significant portion of Afghanistan's healthcare funding, was drastically reduced.[34] Third, cultural preferences for vaginal birth in Afghan society may further contribute to the high success rate. Vaginal delivery is often viewed as the natural or socially preferred mode of childbirth, and cesarean sections may carry economic, social, and reproductive limitations.[42] This cultural inclination may lead to stronger persistence with labor once TOLAC is initiated, potentially improving success rates. Moreover, Afghanistan has one of the highest total fertility rates globally,[43] with many women having multiple prior pregnancies. Although this study did not find a significant association between prior vaginal delivery and current VBAC outcomes, in general, multiparous women are more likely to have favorable labor patterns and better VBAC outcomes, suggesting a possible underlying demographic influence.[39] Since 2021, Afghan government-imposed restrictions on women's education and family planning have reduced the number of female healthcare workers and access to

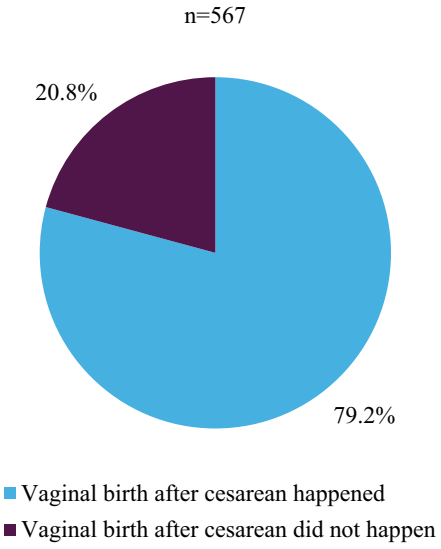

Figure 1 Success rate of vaginal birth after cesarean delivery at Malalai Obstetrics and Gynecology Hospital from March 21 to September 22, 2023 (n=567).

Table 3 Logistic Regression Analysis on Results of VBAC; Crude and Adjusted Odds Ratios with 95% CIs

Characteristics	Categories	VBAC		COR (95% CI)	P-Value	AOR (95% CI)	P-Value
		Yes	No				
Gestational age	27–37 48–42	105 344	17 101	1.81 (1.03–3.17) Ref	0.037	2.15 (1.15–4.04) Ref	**0.016**
Gestational hypertension	Yes No	29 420	16 102	Ref 2.72 (1.18–4.34)	0.013	Ref 2.71 (1.26–5.85)	**0.011**
Birth spacing	< 2 years 2 years or more	71 378	21 97	Ref 1.60 (1.06–2.41)	0.023	-	-
Prior history of vaginal delivery	Yes No	261 188	50 68	1.88 (1.25–2.84) Ref	0.02	-	-
History of VBAC	Yes No	126 323	26 92	1.38 (0.85–2.23) Ref	0.18	-	-
Cervical dilation on admission	≤ 4 cm > 4 cm	274 175	99 19	Ref 3.32 (1.96–5.63)	<0.001	Ref 2.77 (1.38–5.55)	**0.004**
Effacement on admission	< 50% ≥ 50%	293 156	101 17	Ref 3.16 (1.82–5.47)	<0.001	Ref 2.13 (1.04–4.35)	**0.037**
Fetal station	High Low	73 376	8 110	2.67 (1.24–5.71) Ref	0.011	-	-
Fetal distress	Yes No	41 408	49 69	Ref 7.06 (4.34–11.5)	<0.001	Ref 7.35 (4.29–12.6)	**<0.001**
Engagement	Yes No	86 363	9 109	2.86 (1.39–5.89) Ref	0.003	-	-

Notes: Significant *p*-values are in bold.
Abbreviations: VBAC, Vaginal birth after Cesarean; COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio; CI, Confidence Interval.

contraception, contributing to strained maternal health services and higher fertility rates.[44] Despite these plausible explanations, it is critical to interpret the findings considering potential biases. The success rate may be overestimated due to selection bias, as only women deemed ideal candidates were likely offered TOLAC. Additionally, reporting bias or inconsistencies in documentation across lower-tier facilities could result in an underreporting of failed VBAC attempts or complications.

Gestational age was a significant factor associated with VBAC success in this study, with women having gestational ages of less than 38 weeks being more likely to experience a successful VBAC. This finding aligns with the results reported by Ansari et al (2021) and Siddiqui et al (2010) in Pakistan, which found that lower gestational age positively predicted VBAC success.[10,15] Similarly, Kaname et al (2020) in Japan found that higher gestational ages reduced the likelihood of VBAC success.[45]

In this study, the absence of gestational hypertension was associated with a higher rate of successful VBAC. Women without gestational hypertension were more likely to achieve successful VBAC compared to those with a history of hypertensive disorders. This finding is consistent with the study by Levin et al (2022), which reported that hypertensive disorders negatively impacted VBAC outcomes.[46]

Cervical dilation and effacement at the time of admission were also found to be significant predictors of VBAC success. Women with greater cervical dilation and effacement upon admission had higher odds of achieving VBAC. Similar observations have been reported in studies conducted in Pakistan,[15] Congo,[37] Anatolia,[38] and Ethiopia.[39] These findings highlight the critical role of clinical assessment in selecting appropriate candidates for TOLAC and increasing the likelihood of successful VBAC.

Fetal distress was identified as a negative predictor of VBAC success in this study. The absence of fetal distress was significantly associated with successful VBAC. This observation aligns with findings from Taiwan,[18] and Ethiopia,[39]

where lower VBAC success rates were reported in cases involving fetal distress. Effective intrapartum monitoring and timely clinical interventions are essential to reducing fetal distress and improving VBAC outcomes.

Additionally, this study did not find any significant association between a prior history of vaginal delivery or previous successful VBAC and current VBAC outcomes. This finding differs from studies conducted in Ethiopia and other low-resource settings, which reported that women with a history of vaginal delivery were more likely to achieve successful VBAC.[10,37,47,48] These inconsistencies point to the necessity of further investigation to determine whether cultural, clinical, or healthcare system factors in Afghanistan contribute to the observed differences.

Study Limitations

Although this study provides valuable insights into the feasibility of VBAC in Afghanistan, it has several limitations. First, the data were collected from a single hospital over a six-month period, which may limit the generalizability of the findings. Second, the secondary data restricted our analysis of factors that influence VBAC success, such as body mass index (BMI) and labor induction methods. Future studies with larger, multi-center samples and more comprehensive data collection are recommended to validate these findings and explore additional predictors of VBAC success.

Conclusion

This study found a high VBAC success rate of 79.2% among women undergoing TOLAC in a major maternity hospital in Kabul. Success was associated with lower gestational age, absence of gestational hypertension, greater cervical dilation and effacement, and no fetal distress at admission. These findings have significant implications for clinical practice and maternal health policy, particularly in low-resource settings like Afghanistan, where cesarean delivery access remains limited. Promoting safe, well-managed VBAC can optimize surgical resource use and improve outcomes. However, the study's single-hospital design and lack of data on key variables such as BMI and labor induction methods limit generalizability. Future research should adopt multi-center, prospective designs and examine broader clinical, cultural, and systemic influences. Integrating VBAC protocols into national guidelines, strengthening provider training, and ensuring emergency obstetric support are essential to expanding safe VBAC access and improving maternal health outcomes in Afghanistan and similar settings.

Data Sharing Statement

The primary data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

The study protocol was reviewed and approved by the Research and Ethics Committee, Faculty of Medicine, Kandahar University. Since this study involved secondary data collection from existing patient records and did not require direct interaction with participants, informed consent was waived by the IRB. Confidentiality and anonymity of the participants were strictly maintained throughout the study. Moreover, the study strictly adhered to the Declaration of Helsinki.

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Disclosure

The authors report no conflicts of interest in this work.

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