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Original Articles

Factors Associated with Successful Vaginal Birth after a Caesarean Section: a Cross-sectional Study at Institute of Woman and Child Health, Bangladesh

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Abstract:

Background: *The rate of caesarean section (CS) deliveries has been increasing considerably worldwide and is a rising concern in many countries like Bangladesh. Now-a-days, the majority of CS in an institution is usually done for history of previous CS. Planning a vaginal birth after caesarean (VBAC) is considered a reasonable choice for women in a subsequent pregnancy. However, this may increase the risk of adverse outcomes such as uterine rupture. The factors affecting VBAC should be evaluated to reduce the risk. This study aimed to determine the factors associated with successful VBAC.*

Materials & Methods: *A cross-sectional study was conducted on 137 women selected for VBAC at the Institute of Woman and Child Health, Dhaka, Bangladesh, from August 2020 to September 2022. Information regarding previous and current pregnancies were recorded. A descriptive and inferential analysis was performed using SPSS version 25.0.*

Results: *The mean age of the participants was 25.4±3.2 years and majority of participants were in the age group 20-29 years (67.9%) and housewives (89.1%). About 8.8% of women had more than one previous CS. The VBAC success rate was 69.3%. Factors associated with successful VBAC were average body mass index (BMI) (p=0.002), gestational age 37-40 weeks at delivery (p=0.037), the ruptured membrane at admission (p<0.001), spontaneous labour (p<0.001), sweeping or stretching as the type of induction (p<0.001), and in ultrasonography estimated fetal weight (EFW) 2.5-3.0 kg (p=0.002).*

Conclusions: *In properly selected cases, a reasonable success rate of VBAC can be achieved. Factors that are associated with successful VBAC include having an average BMI, gestational age of 37-40 weeks, spontaneous onset of labor, ruptured membranes at admission, specific types of induction, and EFW between 2.5-3.0 kg.*

Keywords: *Vaginal birth after caesarean section, Caesarean section, trial of labour.*

Introduction:

Caesarean section (CS) is a common obstetric operation that can save the life of the mother and foetus.[1] However, this is associated with increased adverse events for the mother, including maternal death.[2] In addition, CS has been reported to be

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associated with changes in immune development, late childhood obesity, and asthma, and reduced diversity of gut microbiota.[3] The World Health Organization (WHO) expert group recommended a CS rate of 10–15%, but the rate has risen sharply in most countries.[4] This rising CS rate has become a significant public and professional concern.

One of the most significant and challenging issues in obstetric practice is a vaginal birth after caesarean (VBAC), and this can be a way to reduce the overall caesarean section rates.[5] It is an opportunity for women who want to experience vaginal birth to deliver their second baby after delivering their first baby by caesarean section (CS) to avoid major complications related to repeated abdominal surgery.[6] VBAC is a reasonable and safe choice for most women who had a CS.[7]

There is a wide variation in VBAC rates (i.e., successful VBAC per all women with a previous caesarean section) among different countries. There has been a reported decline in the use of VBAC in recent years in several countries. In the USA, the overall rate of VBAC decreased from 24% in 1996 to 8% in 2010.[8] The caesarean delivery rate reached an all-time high of 26.1% in 2002, while the VBAC rate decreased from 55% to 12.6%.[9]

One of the crucial factors leading to an overall increase in CS is repeated CS for women with a history of previous CS.[10] Previous studies have identified factors predicting uterine rupture and emergency repeated CS, such as a short interval from the previous CS or more than one previous CS.[11] Because of the risk of uterus rupture and medico-legal consequences, many obstetricians have several concerns regarding the safety of VBAC. Moreover, in some cases, clinicians refuse to offer epidural anaesthesia to patients who want to experience VBAC to better identify a uterine rupture during labour or to avoid the use of oxytocin implementation.[7]

Although VBAC is appropriate for many women, many factors increase the likelihood of VBAC failure, which in turn is associated with increased perinatal complications when compared with a successful VBAC.[1] It has been suggested that this decline in VBAC has been a response to new evidence on the risks associated with VBAC and providers' fear of liability.[12] Therefore, effective measures need to be taken to help obstetricians predict and reduce the risks associated with VBAC. In the last years, many efforts have been made to decrease the rate of unnecessary CS and to increase the rate of women undergoing VBAC to decrease the rate of complications and to satisfy patients' feelings.[9]

Our study was conducted to determine the factors associated with VBAC to strengthen prenatal management and evaluation and to elaborate practical recommendations for counselling and managing patients who attempt to give birth vaginally after a previous caesarean delivery.

Material and methods:

This cross-sectional study was conducted at the Institute of Woman and Child Health with data from August 2020 to September 2022. A total of 137 women attempting VBAC were recruited for the study after meeting following inclusion and exclusion criteria. Inclusion criteria were: a history of previous one or two CS and a transverse incision of the lower uterus, ≥37 gestation weeks and singleton live birth, pelvis with normal shape and size, the time of having the previous CS was more than 2 years, and no contraindications to vaginal trial. Exclusion criteria were: pregnancies complicated by a history of uterine rupture during previous delivery, suffering from other serious medical or obstetric complications, and foetal abnormality, aneuploidy or TORCH infection. Data were collected by history taking, physical examination, necessary investigations and follow-up. Ethical clearance was obtained from ethical review board of IWCH. Privacy and confidentiality were strictly maintained.

Descriptive analyses were done using the collected information on maternal characteristics, obstetric history such as maternal age, parity, body mass index (BMI), number of previous CS, history of vaginal birth, number of antenatal visits, gestation age, Bishop's score, and time interval from previous CS. Chi-square (÷2) test and Fisher's exact test were performed to determine factors related to successful VBAC. A p-value <0.05 was considered statistically significant. The SPSS version 25.0 was employed for statistical analysis.

Results:

Table 1 shows the basic characteristics of the participants. The mean age of the participants was 25.4±3.2 years and most women were in the age group of 20-29 years (67.9%). About 89.1% of participants were housewives and had average BMI. Regular antenatal check-up was taken by 47.4% of women, and about 92.0% had no maternal comorbidities.

Table-I

Basic characteristics of study participants

Characteristics	Number	Percentage
Age (years)		
20-29	93	67.9
30-39	44	32.1
Occupation		
Housewife	122	89.1
Student	5	3.6
Service holder	10	7.3
Body mass index		
Below average (<18.5 kg/m^2)	7	5.1
Average (18.5-24.9 kg/m^2)	122	89.1
Overweight (e”25.0 kg/m^2)	8	5.8
Antenatal care status		
Regular	65	47.4
Irregular	60	43.8
No ANC	12	8.8
Maternal comorbidities		
None	126	92.0
Gestational diabetes mellitus	2	1.5
Diabetes mellitus	3	2.2
Hypertension	5	3.6
Hypothyroidism	1	0.7

In Table 2, about 91.2% of participants had a previous history of one CS, and the indication of previous CS was foetal distress (30.7%), maternal desire (20.4%), oligohydramnios (13.9%) and failure to the progress of labour (12.4%) mainly.

Table-II

Characteristics related to previous caesarean section

Characteristics	Number	Percentage
Number of previous caesarean section		
One	125	91.2
Two	12	8.8
Indication of previous primary caesarean section		
Foetal distress	42	30.7
Maternal desire	28	20.4
Oligohydramnios	19	13.9
Failure to the progress of labour	17	12.4
Malpresentation	13	9.5
Post-dated pregnancy	12	8.8
CPD	6	4.4

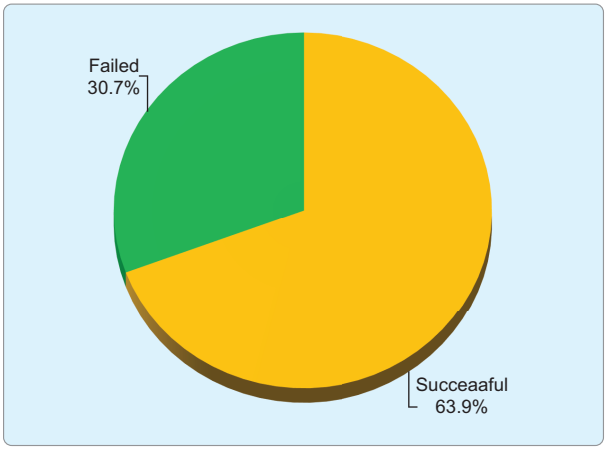

Figure 1: *Outcome of women admitted for the trial of labour after caesarean section*

Of the 137 women studied, the success rate was 69.3% (Figure 1).

Table 3 shows that factors associated with successful VBAC were average body mass index (BMI) (p=0.002), gestational age 37-40 weeks at delivery (p=0.037), ruptured membrane at admission (p<0.001), spontaneous labour (p<0.001), sweeping or stretching as the type of induction (p<0.001), and in ultrasonography EFW 2.5-3.0 kg (p=0.002). Ultrasonography report was not available for 15 patients and CTG on admission was not performed for 12 patients.

Table-III

Factors associated with a successful vaginal birth after caesarean section

Characteristics	Successful VBAC N (%)	Failed VBAC N (%)	p-value
Age (years)			
20-29	63 (67.7)	30 (32.3)	0.555[a]
30-39	32 (72.7)	12 (27.3)	
Body mass index			
Below average	1 (14.3)	6 (85.7)	0.002[b]
Average	90 (73.8)	32 (26.2)	
Overweight	4 (50.0)	4 (50.0)	
Antenatal care status			
Regular	42 (64.6)	23 (35.4)	0.237[b]
Irregular	46 (76.7)	14 (23.3)	
No ANC	7 (58.3)	5 (41.7)	
Number of previous caesarean section			
One	87 (69.8)	38 (30.4)	1.000[b]
Two	8 (66.7)	4 (33.3)	
Inter-delivery interval			
<2 years	3 (60.0)	2 (40.0)	0.642[b]
> 2 years	92 (69.7)	40 (30.3)	
Prior VBAC			
Yes	6 (75.0)	2 (25.0)	1.00[b]
No	89 (69.5)	39 (30.5)	
Prior vaginal birth before caesarean section			
Yes	13 (68.4)	6 (31.6)	0.925[a]
No	82 (69.5)	36 (30.5)	
History of stillbirth			
Yes	2 (100.0)	0 (0.0)	1.000[b]
No	93 (68.9)	42 (31.1)	
History of wound infection or puerperal sepsis			
Yes	4 (57.1)	3 (42.9)	0.676[b]
No	91 (70.0)	39 (30.0)	
Gestational age at delivery			
37-40 weeks	75 (74.3)	26 (25.7)	0.037[a]
>40 weeks	20 (55.6)	16 (44.4)	
Modified Bishop's score			
<4	4 (57.1)	3 (42.9)	0.38[b]
4-6	17 (53.1)	15 (46.9)	
>6	74 (75.5)	24 (24.4)	
Membrane status at admission			
Intact	69 (62.7)	41 (37.3)	<0.001[a]
Ruptured	25 (96.2)	1 (3.8)	
Labour status			
Spontaneous	76 (80.0)	19 (20.0)	<0.001[a]
Induction	19 (45.2)	23 (54.8)	
Type of induction (n=42)			
Sweeping or stretching	15 (75.0)	5 (25.0)	<0.001[b]
Dinoprostone gel	1 (14.3)	6 (85.7)	
IC catheter	3 (20.0)	12 (80.0)	
EFW in ultrasonography (n=122)			
2.5-3.0 kg	57 (80.3)	14 (19.7)	0.002[b]
3.1-3.5 kg	23 (51.1)	22 (48.9)	
>3.5 kg	3 (50.0)	3 (50.0)	
AFI in ultrasonography (n=122)			
<5 cm	4 (80.0)	2 (20.0)	0.761[b]
5-10 cm	69 (63.3)	40 (36.7)	
>10 cm	6 (85.7)	1 (15.3)	
CTG on admission (n=125)			
Reactive	77 (67.0)	38 (33.0)	0.500[b]
Non-reactive	8 (80.0)	2 (20.0)	

[a]Chi-Square Test; [b]Fisher's Exact Test

Discussion:

In the study, VBAC was implemented in 137 cases that were included, yielding a success rate of 69.3%, and factors contributing to the success of VBAC were identified and analysed.

A review reported that VBAC is safe and feasible for most women with a history of CS. The success rate of vaginal trial delivery is more than 75%, and the serious complications are less than 1%.[13] In a study conducted in Japan, 1532 women who tried VBAC successfully gave birth with a success rate of 88.6%.[14] The VBAC success rate reported in our study was 69.3%, which was just moderate. VBAC is a potential strategy for decreasing the caesarean section rate, and successful trials would reduce some important adverse outcomes.

In this study, most women were in the age group of 20-29 years. But the success of VBAC increased as the maternal age increased among 30-39 years. In another study, the success of VBAC declined significantly as the maternal age increased beyond 35 years.[12] Bujold et al. reported from their study covering 2493 women that maternal age at the time of VBAC equal to or greater than 35 years old was associated with a lower rate of successful vaginal delivery.[15] Though the results are not similar across the studies, lower maternal age can be considered as a factor for successful VBAC.

The success rate of VBAC was significantly higher in women whose BMI was average in this study. A previous study has shown that weight gain during pregnancy and maternal BMI are both associated with successful VBAC.[16] Whether weight gain during pregnancy affects VBAC is currently unclear. Therefore, more studies are needed to confirm whether BMI during pregnancy will affect the success rate of VBAC.

In this study, a regular antenatal check-up was taken by 47.4%, and for those who had received regular ante natal check-up, about 64.6% had a successful VBAC. The success rate of VBAC was high in women who had received regular antenatal care compared to those who were under no check-up. This was highlighted by the TOLAC guidelines,[17] which clearly stated that proper counselling and evaluation of women with previous CS is essential to ensure successful VBAC, as well as to reduce the rate of complications like uterine rupture.

Of the current study's participants, 91.2% had a prior history of one CS, with 69.8% of them having a successful VBAC, while 8.8% had a history of two CS, with a 66.7% success rate for VBAC in this group. About 75.0% of patients had successful VBAC with a history of previous vaginal delivery. Prior vaginal delivery subsequent to CS was also associated with higher chances of VBAC in our study. In a study of 318 women by Iyer, there are more chances of successful VBAC in women with a history of previous vaginal delivery compared to ones with CS.[18] In our study, eight women had a history of previous VBAC, and among them about 75% VBAC was successful in the current pregnancy. Therefore, it can be said that prior VBAC is one of the key factors for successful VBAC.

The indication of prior CS was significantly associated with the success of the current VBAC in our study. The indication of previous CS was foetal distress (30.7%), maternal desire (20.4%), oligohydramnios (13.9%), failure to the progress of labour (12.4%), and malpresentation (9.5%) mainly. VBAC was maximally successful in patients previously operated on for non-recurrent indications such as malpresentations, foetal distress, dystocia, and antepartum haemorrhage.[19] This underlines the need to evaluate such women with more precision while subjecting them to a primary CS and to clinically correlate the cases subjected to CS. In a prospective study on 263 women by Doshi et al., significantly higher success rates were observed for VBAC in women with a prior caesarean for non-recurrent indications- 91% for breech, 88% for foetal distress and 70% for dystocia.[12] Brill and Windrim systematically reviewed describing the impact of various factors on outcomes when VBAC is attempted. They concluded that a non-recurrent indication for previous CS, such as foetal distress, is associated with a much higher successful VBAC rate than a recurrent indication, such as cephalopelvic disproportion (CPD).[20]

VBAC was associated with higher success rates in women whose inter-delivery period exceeded two years. Another study concluded that an inter-delivery period of <19 months was associated with adverse outcomes of VBAC.[19] In a retrospective study, a uterine rupture occurred in 1.05% if the interval was more than 18 months from the last delivery. In contrast, a shorter interval (<18 months) uterine rupture occurred in 2.25%.[15] VBAC was associated with higher

success rates in women whose Modified Bishop's score was >6 in this study. Another study showed Cervix Bishop scoree"5,[21] which corresponds to this study. The success rate of VBAC was higher when the gestational age at delivery was 37-40 weeks (74.3%) when the AFI in ultrasonography was >10 cm (83.3%), and significantly higher in women whose membrane at admission was ruptured (96.2%), spontaneous labour (80.0%), induction was done by sweeping (75.0%). Landon et al. also revealed that for successful VBAC, spontaneous labour (80.6%) and gestational age at delivery was 37-40 weeks (75.0%) act as a factor.[22] In this study, women with EFW in ultrasonography 2.5-3.0 kg (80.3%) had more chances of successful VBAC than those with neonatal weights >=3 kg. A similar study concluded that the chances of vaginal delivery decreased as the foetal weight exceeded 3.5 kg.[18] The success rate of VBAC was significantly higher in women who had infants weighing <=3 kg.

The factors present in women's obstetric history and during her intrapartum course in the current pregnancy and birth weight that had significant differences in this study can be used as a predictor of a successful trial of labour. These will help obstetricians identify women who are more likely to attempt labour and have a successful vaginal birth after a previous CS.

Conclusion:

This study demonstrates that VBAC is successful in over two-thirds of the participants. Factors such as average BMI, gestational age of 37-40 weeks, spontaneous labor onset, ruptured membranes at admission, specific types of induction, and EFW between 2.5-3.0 kg are associated with VBAC success. Considering these factors can lead to improved outcomes in VBAC trials. Further research is needed to explore additional factors and refine our understanding of VBAC predictors, ultimately enhancing the care and support offered to women pursuing VBAC.

Limitations of the study:

1. The study population was selected from one selected hospital in Dhaka city and for a very short period. Therefore, the study results may not reflect the exact picture of the country.
2. The sample size was limited. If the study could be done in a large group of people, then the results of the study would be more producible.

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