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Evaluation of success of vaginal birth after caesarean section in patients attended Ain Shams University maternity hospital between 2017 and 2019

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SUMMARY

AUTHORS' CONTRIBUTION: (A) Study Design · **(B)** Data Collection . **(C)** Statistical Analysis · **(D)** Data Interpretation · **(E)** Manuscript Preparation · **(F)** Literature Search · **(G)** No Fund Collection

Background: The rate of cesarean sections has significantly increased in recent years; therefore, evaluation of delivery techniques following a caesarean section is necessary to determine the safety of the mother and child and to lower the caesarean delivery rate.

Objective: This study aimed to determine success rate of VBAC in Ain Shams University Maternity Hospital, duration of latent and active phase, rate of cesarean section and its indications, instrumental deliveries, maternal and neonatal complications, factors contributing to successful VBAC and settle out guideline of VBAC in Ain Shams Maternity University Hospital.

Methods: This retrospective cross-sectional study was carried out on all patients admitted between 2017 and 2019 for vaginal delivery following one caesarean section at the Department of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University Maternity Hospital. The final data base to be evaluated includes the years 2017 and 2019 after official administrative and scientific approval. The original suggested time frame was from 2015 to 2019, but records from 2015 to 2016 were formally culled and were not available at the hospital archive.

Results: Total of 264 patient files was analyzed, 229 (86.74 %) patients had successful VBAC, and 65 (13.26 %) patients delivered by repeated Caesarean Section. As shown in the flow chart. Cases of rupture uterus were diagnosed intrapartum, and repair of the uterus was done, no reported cases of intrapartum hysterectomy. By analyzing data over the years. Number of successful VBACs decreased, from an initial percentage of 38 % in 2017 to 29 % in 2019. There was a highly statistically significant difference between the two groups as regards maternal age, head station patients admitted in active labor. The comparison between successful and failed VBAC as regard maternal and neonatal outcomes showed no statistically significant difference between them.

Conclusion: The VBAC process is secure. Increased chances of a successful VBAC include a single cephalic infant with just one prior cesarean delivery, maternal age (25-29 years), cervical dilatation ≥ 4 cm, and fetal head zero station. Conversely, a cervical dilatation of less than 4 cm, a mother's age of 35–40 years, and a high fetal head station (–2) reduce the likelihood of a successful VBAC. A successful VBAC significantly reduces the risk of problems for both the mother and the newborn.

Keywords: Vaginal birth after cesarean section; Ain Shams University Maternity Hospital

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INTRODUCTION

A well-recognized standard of care for vaginal delivery after cesarean section (VBAC) is the trial of labor [1].

VBAC success rates after a single lower segment cesarean incision vary from 60% to 80% [2].

Age under 40, a history of vaginal birth, any indication of a previous caesarean section, with the exception of the first birth's failure to progress, cervical effacement greater than 75% upon admission, and cervical dilatation of 4 cm or more upon admission are all associated with successful vaginal birth in a trial of labor. But not every woman who has had a previous cesarean scar can have a VBAC because there is a chance that the experiment will cause serious problems for both the mother and the fetus [3].

Previous reports have detailed the dangers of a failed trial, which include hysterectomy, uterine rupture, and chronic urine incontinence [4].

However, some 30 years ago, advances in obstetric care made laboring after a prior cesarean delivery safer for the mother and the child, which led to a shift in the adage "once a caesarean, always a caesarean" [5].

"Once a caesarean, always a hospital delivery" has taken its place. Therefore, it is thought that attempting to birth a baby after one previous cesarean surgery is a crucial strategy for lowering the total rate of cesarean sections [6].

However, the information currently available about the safest and most optimal delivery route for these women—a repeat caesarean section or a VBAC—is contradictory and complicated [7].

While there are risks associated with both approaches, improving maternal and perinatal outcomes is the most important goal. Uterine rupture is the primary adverse result of a VBAC study. Selecting patients carefully after extensive counseling, estimating the patient's risk of uterine rupture, and strictly adhering to the most recent guidelines for managing labor in units with facilities for immediate access to surgery in the event of complications are all important considerations when deciding when to attempt a vaginal birth canal (VBAC) [8].

The current study aimed to determine success rate of VBAC in Ain Shams University Maternity Hospital, duration of latent and active phase, rate of cesarean section and its indications, instrumental deliveries, maternal and

neonatal complications, factors contributing to successful VBAC and settle out guideline of VBAC in Ain Shams Maternity University Hospital.

METHODS

This retrospective cross-sectional study was carried out on all patients admitted between 2017 and 2019 for vaginal delivery following one caesarean section at the Department of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University Maternity Hospital. The originally proposed time was from 2015 to 2019; however records from 2015 to 2016 were officially culled and were not available at the hospital archive therefore the final data base to be analyzed included the years from 2017 and 2019 after official administrative and scientific approval.

Inclusion criteria:

All patients admitted for vaginal delivery with previous lower segment cesarean section, which was uncomplicated, with the following criteria:

- Age between 20 and 40 years.
- Time interval more than 1.5 years from previous CS.
- Single viable full-term pregnancy in vertex presentation.
- Estimated fetal weight between 2.5-3.5 kg.
- Reactive cardiotocography (CTG) on admission.
- Spontaneous labor onset.
- Clinically adequate pelvis.

Exclusion criteria:

- Women with previous upper segment cesarean section or hysterotomy scar.
- Any obstetric complications such as fetal malpresentation, placenta previa, or medical disorders like diabetes mellitus or preeclampsia.
- Presence of any signs and symptoms of scar dehiscence or rupture uterus , known uterine fibroid or anomaly.
- Suspected fetal macrosomia (weight more than 4 kg).
- Multifetal pregnancy.
- Parturient women who refused the trial of vaginal birth after caesarean section.

Data collection:

The following data were collected from patients' medical record files: maternal age, parity, BMI, gestational age based on last menstrual period or early ultrasound scans available, patients' full medical and surgical history, previous CS details as an indication, and previous complications. Patients' clinical abdominal and per vaginal examination on admission (cervical dilatation, effacement head station, and position), CTG attached on admission (to exclude fetal distress), laboratory investigations that were done before delivery and postpartum as per-hospital standard protocols were revised, labor progress on the partogram was assessed as regard duration of both first and second stages of labor if any instrumental delivery was done. Records for patients' vital signs, fetal cardiac activity during labor, vaginal bleeding, delivery notes, fetal weight, and 5 minutes APGAR score, and any recorded maternal or fetal complications. If failed VBAC: Causes of failure maternal and fetal outcomes were recorded. After excluding non-eligible files, data were collectedfrom672filesfor analysis, dividingpatientsinto two groups.

Group 1: Successful VBAC group (n=208)

Group 2: Failed VBAC group (n=464)

The primary outcome was to assess the VBAC success rate. Secondary outcomes assessed factors associated with increased VBAC success rate, maternal morbidity or mortality, fetal complications, NICU admission, and neonatal death.

Statistical analysis

Version 20 of the Statistical Program for Social Science (SPSS Inc., Chicago, IL, USA) was used for data analysis. The mean and standard deviation were used to characterize the quantitative variables. Numbers and percentages were used to characterize qualitative factors. To compare parametric quantitative factors between the two groups, a student test was administered. When frequencies were less than five, the Fisher's exact test or the chi-square(X2) test were used to compare the qualitative variables. The Pearson correlation coefficient was utilized to evaluate the relationship between two normally distributed variables. A P value less than 0.05 was deemed significant for variables that were not regularly distributed.

RESULTS

The number of patients admitted to our hospital during the assessment period was 18563; out of them, 3304were excluded as they were not matching the inclusion criteria. Finally, 264 patient files were analyzed. From the 264 patients documented within the study, 229 (86.74%) patients had successful VBAC, and 65(13.26 %) patients delivered by repeated Caesarean Section. As shown in the flow chart. Cases of rupture uterus were diagnosed intrapartum, and repair of the uterus was done, no reported cases of intrapartum hysterectomy. By analyzing data over the years, as shown in **Tab. 1.** the number of successful VBACs decreased, from an initial percentage of 38%in2017to29%in2019.**Tab.2.** shows that there was a highly statistically significant difference between the two groups as regards maternal age, head station patients admitted in active labor. **Tab. 3.** shows the comparison between successful and failed VBAC as regard maternal and neonatal outcomes with no statistically significant difference between them. Flow chart of studied patients (**Fig. 1.**).

Tab. 1. Description of all study variables among study participants.

Variables		N	%ofVBAC
Time at admission			
	2017	101	38%
	2018	86	33%
	2019	77	29%
Patients,age(years)	20-24 years	91	34.47%
	25-29 years	95	35.98%
	30-34 years	56	21.21%
	35-40 years	22	8.33%
HeadStation	0	152	57.57%
	-1	90	34.09 %
	-2	22	8.3%
CXdilatation	<4 cm	43	16.28%
	≥ 4 cm	221	83.71%
ActivePhaseAdmission(HRS)Mean±SD,Min-Max		2.92±1.01	1-4
SecondStage(min.)Mean±SD,Min-Max		56.18±13.0	30-90
OutcomeofDelivery	Successful VBAC	229	86.74%
	Failed VBAC	35	13.26%
Causesoffailed VBAC (n=35)	Fetal distress	13	37.14%
	Tender scar	11	31.43%
	Failure of progress	9	25.71%
	Vaginal bleeding	2	5.71%

Tab. 2. Comparison between successful and Failed VBACS as regard personal and obstetric characteristics.

Variables		Outcome of Delivery				P	Sig.
		Successful VBAC (n=229)		Failed VBAC (n=35)			
		N	%	N	%		
Time at admission	2017	81	80.2%	20	19.8%	0.042*	HS
	2018	77	89.5%	9	10.5%		
	2019	71	92.2%	6	7.8%		
Age(years)	20-24 years	84	92.31%	7	7.69%	0.001*	HS
	25-29 years	91	95.79%	4	4.21%		
	30-34 years	41	73.21%	15	26.79%		
	35-40 years	13	59.09%	9	40.91%		
Head Station	0	148	97.4%	4	2.6%	0.001*	HS
	-1	81	90.0%	9	10.0%		
	-2	0	0.00%	22	100.00%		
CX dilatation	<4 cm (n=43)	10	23.3%	33	76.7%	0.001*	HS
	≥ 4 cm (n=221)	219	99.1%	2	0.9%		
Active Phase Admission		2.27	0.98	3.21	0.87	0.001**	HS
Second Stage(min.)		44.98	10.51	61.19	10.68	0.001**	HS

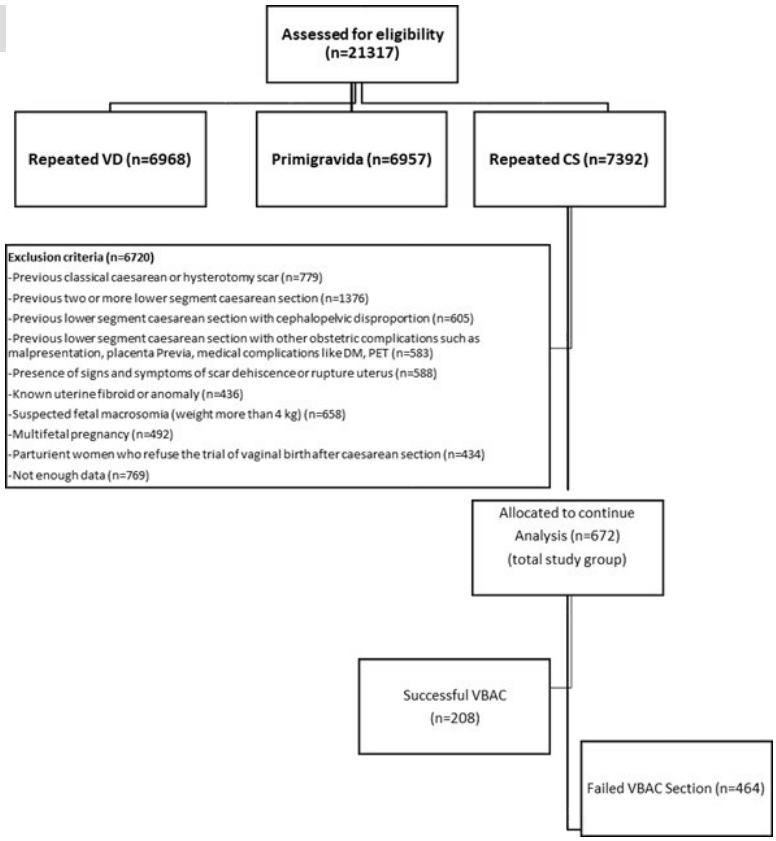
*Chi-square test;**Student test;‡Confidence interval

Tab. 3. Comparison between successful and Failed VBACS as regard Maternal and neonatal outcomes.

Variables		Outcome of Delivery				P	Sig	Odds ratio (CI)‡
		Successful VBAC (n=229)		Failed VBAC (n=35)				
		N	%	N	%			
Maternal Complication	**Rupture Uterus**	0	0%	1	2.86%	0.069**	NS	
	Bladder Injury	0	0%	1	2.86%	0.069**	NS	
	Scar dehiscence	3	1.3%	2	5.7%	0.075**	NS	4.57 (0.74-28.35)
	Hemodynamic instability	3	1.3%	2	5.7%	0.075**	NS	4.57 (0.74-28.35)
	Sphincter injury	2	0.87%	0	0.0%	0.580**	NS	
Neonatal Complication	**HIE**	3	1.31%	1	2.86%	0.485**	NS	2.22 (0.22-21.9)
	RDS	25	10.92%	3	8.57%	0.675**	NS	0.77 (0.22-2.68)
	TTN	18	7.86%	2	5.71%	0.6550**	NS	0.71 (0.16-3.20)
	Neonatal death	1	0.44%	1	2.86%	0.126**	NS	6.71 (0.41-109.7)

*Chi-square test;**Fisherexacttest;‡Confidenceinterval

Fig. 1. Flow chart of studied patients.



DISCUSSION

CS Trials of labour after previous CS in Ain Shams University Maternity Hospital during the 3-year period from January 2013 to December 2015 were retrospectively evaluated in an earlier Thesis at Ain Shams University [9]. It was found that TOLAC was attempted by 368 of 4003 women with one prior CS, representing an **attempt rate** of 9.2%. The TOL was successful in 317 women, representing an 86.1% **success rate** (from women who underwent TOLAC), and a 7.9% **VBAC rate** (from women with one prior CS)[9].

Interpretation of results of the present study

Our current study showed that the absolute number of women with successful TOLAC was lower in the study timeframe, but also total admissions and candidates for TOLAC, thus maintaining the *success rate* (86.74%) fairly stable across the years. However, the *attempt rate* may be slightly less in the current study (8%). This may be attributable to restricted offering of TOLAC due to increased medico-legal concerns, or more women declining TOLAC for fear of complications. Unfortunately, the exact cause was not clearly mentioned in the records.

Both studies agree that success rate was highest in the age group (25-29 years), being 96% in our study and 92.5% in the previous study.

In order to investigate the impact of counseling on the incidence, mother, and neonatal outcomes of VBAC, Mohamed and colleagues carried out a study at the Manial University Hospital, which is associated with Cairo University, in the Outpatient Clinic and Casualty Department. Ninety people in all were signed up for the trial. After counseling, 79 women (87.8%) decided to have a VBAC, whereas only 11 women (12.2%) declined to have a VBAC and opted for CS. 40.5% of cases involved a trial of labor after cesarean section. VBAC occurred at an incidence of 31.6%. The TOLAC success rate was 78.1%, while the failure rate was 21.9%. This difference from our study may be the result of various local examination data, such as head station and cervical dilation [10].

Azadeh Asgarian conducted a cross-sectional study on 150 pregnant women who were candidates for VBAC and admitted at maternity hospitals in Qom, Iran from 2016 to 2018. The success rate of VBAC was estimated to be 85.33%, and 14.67% of the patients had to repeat a CS after failure in vaginal delivery. Results of those results matched with our success rate [11].

Minh and Phuoc identified the success rate of vaginal birth after caesarean section (VBAC) and factors associated with vaginal delivery in women who previously had a caesarean section. A prospective observational study was conducted on 399 women who were ≥28 week's gestation and previously had a caesarean section. Data was collected from November 2013 to March 2014 from participants that were admitted to the delivery department at Tu Du hospital, Vietnam. They stated that the success rate of VBAC was 54.14% [95% CI: 49.11-59.10]. That results showing that our trial has higher success rate that could be explained by different demographic pattern or clinical selection criteria [12].

In our study, the highest success rate was seen in the

group of age 25-29 years (95.79%) and they had successful vaginal delivery. On the other hand, the majority of patients who required emergency CS and failed in the trial, was seen in eldest group of age "35-40" years at (40.9%).

In agreement with the present study, Srinivas and colleagues stated that women who were of advanced maternal age (>or=35 years) were more likely to experience an unsuccessful trial of labour (OR = 1.14 [1.03, 1.25], P = 0.009). In addition, women >or=35 years of age had 39% more risk of experiencing one of the VBAC-related operative complications (OR = 1.39 [1.02, 1.89], P = 0.039). As women increase in age, they are less likely to attempt VBAC and more likely to have an unsuccessful labour trial. While teenage patients do not appear to be at increased risk for VBAC-related complications [13].

Michelle and Osterman study for Recent Trends in Vaginal Birth after Cesarean Delivery in United States, 2016–2018 concluded that VBAC rates increased for women in their 20s and 30s during 2016–2018. Rates increased from 12.7% to 13.6% for women aged 20–29 and from 12.4% to 13.3% for women aged 30–39 that show success almost the same in different ages group [14].

In our trial we found that the patient with prior vaginal delivery were more likely to have successful VBAC 72.9% of total successful group n=229.

Chen and colleagues agreed with us and stated that higher success rate was found in women with previous vaginal birth than in women without vaginal birth (100% vs. 81.8%) [15].

In the current study (n=264), about 83.7 % patients admitted with cx dilatation ≥ 4cm. Out of them 91.4% delivered vaginally while the patients admitted with cervix <4cm represented 16.2% of total study number, 62.7% only delivered vaginally. The mean duration of the active phase in successful VBAC (n=229) was 4.51 ± 1.08 hours.

Of our entire trial group, the highest success rate was in the group admitted with lower head station (zero) 91.45 % which matches other studies results.

Dayoub and Alani evaluated the factors of successful VBAC delivery at Bahrain Defense Force Hospital. Patients with previous caesarean section who had an attempt for vaginal delivery between 1 January2014 and 31 January 2015 were reviewed. 568 patients with previous one only CS delivery. Successful VBAC was documented in 236 (41.5%). In agreement with our results, they found significant successful VBAC in patients, presented with cervical dilatation more than or equal to 4 cm. (P<0.0001) [16].

In our study we found variable causes of failure in the group n=35, who underwent emergency cesarean. Fetal distress was the most common cause in our failure group 37.1% which is also matching other studies results. Also scar tenderness represented 31.4%. this may be explained by no one to one care giver service, less diagnostic equipment's (scalp PH-less CTG machines) and also increased physician fears from scar dehiscence or rupture and also some physicians were scared from medico legal responsibility so were not insisting to continue VBAC.

Elnahas and Ahmed agreed with us and reported that fetal distress was the most common cause for previous C/S (39.77%) and failure to progress account for 24.56% [17].

Epakchi and colleagues agreed with us and stated that decline of FHR and failure of descent were the most common causes of failure. 255 was the study group number. VBAC was successful in 77.6% of cases and lack of delivery progress and lack of response to induction were the cause of 85.5% of failures. They agree with our result that most common cause of failure in TOLAC same fetal distress but we have second most common cause different which was scar tenderness 31% [18].

In our trial group (n=264 patients) we could see that uncomplicated deliveries were 95.83% as regards to maternal out comes, also healthy neonates represented 253 out of 264 about 95%.but both the maternal complications and fetal complications were seen to be more likely happen in the failed group than the successful group. Maternal and neonatal complications in failed VBAC 4.1% and 20% consequently.

This might be due to less staff (one to one medical care giver to the patient) in our hospital, less diagnostic equipment (like scalp PH machine, less CTG machines so not in fact continuous monitoring as it should be), but noticeably that we also did not have incidence of mortality either in mothers or babies.

After receiving approval from the Student Ethics Committee, Noori et al.'s descriptive-analytical study from 2022 was conducted by visiting the Ali Ibn Abi Talib Hospital's archive in Zahedan to examine the medical records of women who were admitted to the gynecological ward for vaginal birth following a cesarean section. Data was abstracted by the researcher and organized into checklists. Lastly, data analysis was done using SPSS software. The current study found that blood transfusion (n = 4, 2.3%), cervical rupture (1.7%), infant death (1.7%), and uterine rupture (6%) (Seen in one person) were the complications of vaginal birth following cesarean section. According to an extensive study, there is a 0.3% chance of uterine rupture after a VBAC [19].

Younger age groups, particularly those between the ages of 25 and 29, have higher success rates (95.79%), prior vaginal deliveries (72.9%), cx examinations on admission ≥ 4 cm (83.7%), and low head station at zero (91.45%). These findings suggest that younger individuals are more likely to succeed and deliver vaginally during the trial, and their overall success rate has a positive impact on the success rate.

According to Tessmer-Tuck et al., there was no significant correlation found between the following factors: age <30 years, body mass index <30, previous vaginal delivery, prior VBAC, and lack of recurrent cause for caesarean section. We disagree because the characteristics (age, previous vaginal delivery) highlighted in the current study are cofactors for the greater success rate [20].

In agreement with us, Mirteymouri et al., came to the conclusion that VBAC is a safe delivery technique for both patients and infants. VBAC had a 91% success rate. 1.3% of CS cases and 2.7% of women who had successful VBACs experienced postpartum hemorrhage. During the course of the trial, no maternal or neonatal deaths occurred, and there were no incidences of uterine rupture, dystocia, or neonatal tachypnea. newborn resuscitation rates in VBAC and CS were 6.8% and 57.1%, respectively ($p = 0.002$), indicating the presence of newborn problems such as NICU admission [21].

Despite having a better overall success rate than our trial, that trial had a higher likelihood of maternal and neonatal problems than ours did.

The younger age (25-29) years old, a single prior cesarean section with a prior vaginal delivery, being in labor, a CS dilatation of at least 4 cm upon admission, and a low head station were the main factors that boosted the success rate.

Maroyi and colleagues sought to ascertain the success rate of vaginal birth after cesarean section (VBAC) and the factors associated with obtaining VBAC in women who had a subsequent pregnancy that occurred later than or equal to 18 months after the initial CS at a referral hospital in the Democratic Republic of the Congo. They concurred with our research and found that in patients with spontaneous labor onset and a higher Bishop score, TOLAC leads to a more effective VBAC. An RCS was more likely to occur from an unsuccessful VBAC in women carrying a fetus with macrosomia. Similar to the current study's findings, successful vaginal delivery following a caesarean section was associated with lower head station and cervical dilation of more than 4 cm [22].

The study revealed that there was a higher failure rate and a higher number of patients who underwent emergency cesarean sections. Specifically, 40.9% of older patients, or those in the 35–40 year age range, had a cx examination of less than 4 cm, 37.2% had a higher head station, and 27.9% of patients had never had a VD.

The goal of Vikhareva and colleagues' study was to examine, in two historical cohorts, the rate of vaginal birth after caesarean section (VBAC), together with the maternal and perinatal outcomes, before and after the application of particular changes in clinical practice. A retrospective study was carried out at Skane University Hospital in Malmö, Sweden, involving all women who had previously undergone a caesarean section (CS) and who gave birth within two 4-year timeframes: Group I, 2005–2008, and Group II, 2013–2016. They reported that, among the study's 2017 participants, the rates of trial of labor after cesarean (TOLAC) were 65.0% and 76.9%, respectively, while the rates of VBAC were 49.8% and 62.0%. Without having an adverse effect on maternal or perinatal outcomes, appropriate care of women who have had one prior CS may raise the VBAC rate [23].

STUDY STRENGTHS AND LIMITATIONS

The study's strength is that it was conducted over a long period on a relatively large number of patients .Limitations of this study are that it was performed in one hospital, which could cause statistical bias.

Implications in clinical practice: VBAC is a safe procedure and is the only solution to decrease the rates of CS; patients should be counselled for induction by mechanical ways to decrease the financial and medical burden of recurrent CS.

RECOMMENDATIONS OF FURTHER STUDIES

Multicentre studies should be performed to give real figures of TOLAC and VBAC in the United Arab of Emirates private medical sector.

CONCLUSION

When conducted in carefully chosen situations in well-equipped facilities with medical professionals who have received training, VBAC is a safe operation. The patient must sign a consent form before to the trial commencing. The success of a VBAC trial is increased in cases of a single cephalic infant with just one previous cesarean delivery, mothers between the ages of 25 and 29, prior vaginal deliveries, fetal head zero station, and cervical dilatation of at least 4 cm at admission. Conversely, a higher head station -2, no previous vaginal delivery, a cervical dilatation of less than 4 cm at admission, and an older mother (35–40 years) all reduced the likelihood of a successful VBAC. A successful VBAC carries a significantly lower risk of problems for both the mother and the newborn than a failed trial. The following maternal problems were recorded: placental abruption, sphincter damage, postpartum bleeding, postpartum fever, and uterine rupture. Maternal deaths are not common fetal discomfort and newborn tachypnea are two of the documented neonatal problems. There are no reported newborn deaths.

COMPETING INTERESTS

The authors report there are no competing interests to declare.

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