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Original Research Article

EVALUATION OF THE PREDICTORS OF SUCCESSFUL VAGINAL DELIVERY IN WOMEN AFTER PREVIOUS CAESAREAN SECTION, A PROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL

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Abstract: *A study was conducted to determine the factors that contribute to a successful vaginal delivery in women who have previously undergone one lower-segment caesarean section. This study was conducted over six months, with the approval of the Institutional Research Committee. During the third trimester of their pregnancy, women carrying a single fetus with the cephalic presentation, who had previously undergone a lower uterine segment caesarean section, were given comprehensive information about the Trial of Labour After Caesarean (TOLAC) and Vaginal Birth After Caesarean (VBAC) during their prenatal visits. Upon arrival at the labour ward for induction of labour or during the early stages of labour, the women were asked for their consent to participate in the study. The relevant data was recorded on a pre-established, organised Performa. The study included 152 pregnant women, out of which 65 (42.8%) had a successful VBAC, while 87 (57.2%) failed to have a successful VBAC. The predictors of successful VBAC were identified as a history of previous VBAC or vaginal delivery and cervical dilation of more than 3cm upon admission. From this study, it can be concluded that in carefully selected cases, a trial of labour can be given to women with a history of prior CS in a tertiary care hospital where facilities for rigorous maternal and fetal monitoring are available.*

Keywords: Caesarean Section, TOLAC, VBAC, Predictors of Vaginal Delivery

Introduction

The rate of Caesarean Section procedures has been steadily increasing in both industrialised and developing nations over the past few decades, emerging as a significant public health issue worldwide (Gedefaw et al., 2020; Gregory et al., 2012). Indeed, women who undergo a caesarean section experience higher rates of morbidity and death compared to those who have a vaginal birth. These include severe postpartum bleeding, the requirement for blood transfusion, difficulties linked with anaesthesia, surgical risks, and complications related to future pregnancies. Studies indicate that a significant contributor to the overall rise in Corporate Social Responsibility (CSR) is the recurrence of Caesarean Sections (CS) in women who have previously undergone this surgical procedure (Thapsamuthdechakorn et al., 2018). To address the significant rise in caesarean deliveries globally, obstetricians have undertaken various efforts to decrease this rate, such as implementing a trial of labour after caesarean delivery (TOLAC) (ACOG, 2019). A trail of labour following a caesarean (TOLAC) delivery is when a woman who has previously had a caesarean section plans to attempt a vaginal delivery, regardless of the outcome. If the procedure is successful, it will lead to a vaginal birth after a caesarean section (VBAC), and if it is unsuccessful, it will result in a repeat caesarean delivery (Cahill et al., 2005; Dodd et al., 2013). Both options possess inherent advantages and risks. In general, for the majority of women who have undergone a caesarean section, vaginal birth after caesarean (VBAC) is a viable and secure choice. Both the American College of Obstetricians and Gynecologists (ACOG) and the Royal College of Obstetricians and Gynecologists (RCOG) concur that women who have had one previous low transverse caesarean section, possess a clinically adequate pelvis, and have no previous classical uterine scar or rupture are suitable candidates for attempting a vaginal birth after caesarean delivery (VBAC) (Obstetricians and Gynecologists, 2010; Obstetricians and Gynaecologists, 2015). For women who have previously undergone a caesarean delivery, attempting a trial of labour is frequently their final chance to have a vaginal birth. Nevertheless, an unsuccessful vaginal birth after caesarean (VBAC) carries a higher likelihood of maternal and neonatal problems compared to a planned repeat caesarean section (CS) (Studsgaard et al., 2013). Therefore, the likelihood of a successful vaginal birth is a highly significant aspect in making choices while providing antenatal counselling to these women (Sindiani et al., 2020).

Several researchers have attempted to determine the factors that are linked to a successful Vaginal Birth after Caesarean (VBAC). These factors include: having had a previous vaginal birth before a caesarean section (CS), having had a previous successful VBAC, having a normal body mass index before pregnancy, having a higher bishop score and a favourable cervical status upon admission, being of a younger maternal age, and having a non-recurring indication for a previous CS such as fetal malpresentation and a non-reassuring fetal heart pattern (34-38) (Eloranta et al., 2023; Girma et al., 2021; Li et al., 2019; Tesfahun et al., 2023).

Presently, apprehensions regarding the potential hazards of TOLAC have resulted in only a handful of obstetricians and expectant mothers who are prepared to undergo TOLAC voluntarily. Several researchers have created predictive models to increase the success rate of TOLAC (Trial of Labour after Caesarean) and VBAC (Vaginal Birth after Caesarean). These models aim to predict the likelihood of a successful VBAC. However, in our institute, senior obstetricians manage such women individually, according

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to their personal experience and no local protocol/ predictive models for successful VBAC exist. The study results will help make local protocols for the careful selection and counselling of women for successful VBAC in our set-up.

OBJECTIVE: The current study is designed to find the success rate of VBAC in women with a history of previous LSCS and to evaluate the predictors/factors for successful VBAC in our population.

Methodology

This study was a prospective, cross-sectional study for six months, from 1 November 2022 to 30 April 2023, after receiving approval from the Institutional Research Committee (Ref: No.542/LRH/MTI). During their prenatal appointments in the third trimester, women who had previously undergone a caesarean section (for non-recurring indication) with singleton pregnancy were given detailed information about the trial of labour after caesarean (TOLAC) and vaginal birth after caesarean (VBAC). Women admitted to the labour ward for induction of labour (IOL) or in early labour were asked for their informed consent to participate in the research study.

The enrollment criteria included women of reproductive age group with parity ≤ 6, had previously undergone a lower uterine segment caesarean section, and had a pregnancy that lasted between 37 and 40+ weeks, with a single fetus in cephalic presentation. Additionally, their pelvis needed to be clinically adequate. The exclusion criteria encompassed women with a history of uterine rupture, uterine myomectomy, or hysterotomy. In addition, women who had a period between deliveries of less than 18 months and an estimated weight of the fetus over 4 kg were not included.

Upon being admitted to the labour ward for the aim of inducing labour or for monitoring during the early stages of labour, we gathered demographic data, a detailed medical and obstetric history, and information regarding prior caesarean sections. An extensive assessment was performed to determine the clinical adequacy of the maternal pelvis by consultant 0ncall.

The procedure for inducing labour in women followed the local protocol of the facility, which involved inserting an 18-size Foley catheter into the cervix and inflating it with 60cc of normal saline. At the same time, a half-dose (1.25 ml or 1 mg) of Prostaglandin E2 was inserted into the posterior vaginal fornix. The Bishop score was reassessed 8 hours after the initial treatment. If there was no improvement, the remaining half of the gel was given intravaginally. Labour start and progression were followed under close monitoring of maternal vital signs and fetal heart rates for 24 hours. If unsuccessful, the option of a repeat caesarean section was taken into consideration.

To ensure maternal and fetal well-being, rigorous monitoring of the labour progression and maternal and fetal well-being was maintained by senior postgraduate trainees in the labour ward. In case of suspicion, the consultant on call was called to assess the labour events. The measures for emergency CS were in place all the time. Successful Vaginal Birth After caesarean (VBAC) was an option for vaginal deliveries. However, if there was insufficient progress in labour or if presumed fetal distress was diagnosed, an emergency caesarean birth was performed after consulting the consultant on call.

The duration of time from the initiation of labour induction or the onset of spontaneous labour to the time of birth was recorded for both vaginal and caesarean deliveries. The third stage of labour was managed according to the established protocol. Thorough data documentation took place using a pre-determined Performa.

The sample size was calculated using openness, taking a previous proportion of failed progression of labour as an indicator of previous caesarean section in patients with successful VBAC of 11.1%, the margin of error of 5% and confidence interval of 95%, the calculated sample size was 152 patients inducted in the study using non-probability consecutive sampling.

The process of examining data was carried out with SPSS version 20. The obstetric qualities and circumstances that contribute to a successful vaginal birth after caesarean (VBAC) were displayed in tables and charts, showing their frequency and percentages.

Results

One hundred and fifty-two patients were included in this study. The mean age recorded was 25.16±4.94 years. The mean gestational age was 39.66±1.44 weeks. The mean BMI recorded was 27.73±2.14 kg/m^2—the mean time since the last caesarean section was 3.28±0.44 years. Parity-wise distribution revealed that 30 (19.7%) patients had a parity of 1 to 3, while 122 (80.3%) patients had a parity > 3. Fifty-one (33.6%) patients had a previous history of VBAC, while 70 (46.1%) patients had a previous history of normal vaginal delivery. Regarding the previous indication of caesareans, section 71 (46.7%) patients had fetal distress, thirty-four (22.4%) patients had failed labor progression, ten (6.6%) had failed labour induction, and 37 (24.3%) had fetal Malpresentation. The onset of labour was spontaneous in 130 (85.5%) patients, while induced labour was given to 22 (14.5%) patients. The mean birth weight was 3.61±1.88 years. VBAC was successful in 65 (42.8%) patients, while in 87 (57.2%) patients, it was unsuccessful.

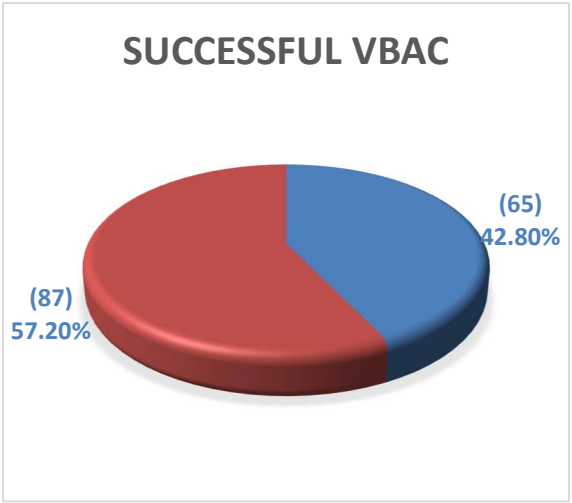

Figure 1 Successful VBAC

Our subgroup analysis between successful and unsuccessful VBAC is presented in Tables 1 and 2. Our subgroup analysis showed that parity > 3 was notably higher in the successful VBAC group, 89% vs 73.6% in the unsuccessful

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group. Previous VBAC was a strong predictor of successful VBAC, as 46.2% of patients with successful VBAC had a previous history of VBAC compared to 24.1% of patients in the unsuccessful group. Similarly, previous NVD was a positive predictor for successful VBAC (55.4% vs 39.1%). Indications of previous caesarean section show that fetal distress and fetal Malpresentation were strong predictors for successful VBAC. Cervical dilation > 3 cm was seen in 72.3% of patients in the successful VBAC group versus 44.8% in the unsuccessful VBAC group. Table 2 presents the subgroup analysis of numerical predictors of successful VBAC.

Table 1: Subgroup analysis of categorical predictors using the Chi-Square test

Predictors of VBAC (categorical)		Successful VBAC				
		Yes		No		P value
		N	%	N	%	
Parity	1 to 3	7	10.8%	23	26.4%	0.01
	> 3	58	89.2%	64	73.6%	
Previous VBAC	Yes	30	46.2%	21	24.1%	0.004
	No	35	53.8%	66	75.9%	
Previous NVD	Yes	36	55.4%	34	39.1%	0.04
	No	29	44.6%	53	60.9%	
Indication of the previous C-section	Fetal distress	36	55.4%	35	40.2%	0.04
	Failed labour progress	9	13.8%	25	28.7%	
	Failed induction of labour	2	3.1%	8	9.2%	
	Malpresentation	18	27.7%	19	21.8%	
Cervical dilation	< = 3 cm	18	27.7%	48	55.2%	0.001
	> 3 cm	47	72.3%	39	44.8%	

Table 2: Subgroup analysis of numerical predictors using T-test

Predictors of VBAC (numerical)	Successful VBAC	N	Mean	Std. Deviation	P value
BMI (Kg/m2)	Yes	65	27.1523	1.55428	0.003
	No	87	28.1775	2.42136	
Time since the last C-section (Years)	Yes	65	3.51	2.251	0.05
	No	87	2.91	1.522	
Birth weight (Kg)	Yes	65	3.1423	.35206	0.001
	No	87	3.3902	.48469	

Discussion

Due to the increasing occurrence of primary caesarean section (CS) resulting from different medical reasons, a significant number of pregnant women who come to healthcare institutions have previously undergone CS. Due to the intrinsic danger of scar rupture, these patients are more likely to have increased medical vulnerabilities. Obstetricians must demonstrate increased care and judgement when handling these instances. Therefore, each occurrence undergoes a personalised evaluation to determine the possibility of a successful VBAC (Atia et al., 2023; Sahin et al., 2022). The obstetrician's decision-making process regarding the most suitable approach for future labour is further complicated by the existence of a uterine scar. There are differing opinions within the medical community regarding the best course of action in these situations. Some specialists support elective repeat caesarean section, while others recommend attempting a VBAC. A third group suggests a more nuanced approach that considers the individual circumstances of each case. Among the numerous risk factors, maintaining the integrity of the uterine scar is of utmost importance, as the rupture of the scar can have significant consequences for both the pregnant woman and the unborn child. On the other hand, advocates of VBAC argue that the advantages of this method are more than the possible hazards involved in choosing to have another caesarean section after a previous one (Lipschuetz et al., 2020).

Our study included 152 patients with a previous Caesarean section aged between 18 and 35 years. We assessed the predictors of successful VBAC. VBAC was successful in 65 (42.8%) patients, while not in 87 (57.2%) patients. The proportion of successful VBAC in our study is similar to a study which reported 65 (45.5%) success of VBAC (Siraneh et al., 2018). Another study reported 216 (45.6%) success rate of VBAC, which also attests to the validation of our findings (Sahin et al., 2022).

We studied various predictors of successful VBAC in our study through subgroup analysis. Starting with the indication of previous caesarean section, which included presumed fetal distress and fetal malpresentation, were notably associated with successful VBAC. Similar findings have been reported by a study which demonstrated that women having prior CS for fetal distress and malpresentation had higher rates of successful VBAC (Atia et al., 2023).

Our subgroup analysis revealed that previous VBAC was notably higher in the successful VBAC group, which is similar to the findings of the study15 mentioned above; they reported that in their multivariate regression model, previous history of VBAC was a strong predictor of successful VBAC. Previous vaginal delivery turned out to be a positive predictor as well in our study, which is again

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in line with the findings of the study above (Atia et al., 2023). In another study, similar findings were reported regarding previous VBAC and previous vaginal delivery being strong predictors for successful VBAC (Sahin et al., 2022).

In our study, we observed that patients with cervical dilation of more than 3 cm were more likely to have successful VBAC as compared to patients having cervical dilation less than 3 cm; a meta-analysis also confirms our findings, which reported that various studies have shown that cervical dilation of more than 4 cm is a strong predictor of successful VBAC (Mekonnen and Asfaw, 2023).

Other parameters which our subgroup analysis identified as predictors for VBAC were the lower BMI in the successful VBAC group, birth weight and time interval since the last caesarean section; these parameters have been identified in various studies.(Atia et al., 2023; Mekonnen and Asfaw, 2023; Sahin et al., 2022).

Since our study was prospective cross-sectional with smaller sample size, we consider these reasons as possible limitations of this study; we recommend multicenter studies with larger sample sizes and dynamic study designs to explore predictors of successful VBAC.

Conclusion

The findings from our study lead to the conclusion that a previous history of VBAC, prior vaginal delivery, and cervical dilation exceeding 3 cm upon admission emerged as significant predictors associated with the successful outcome of VBAC. Moreover, our study has shown encouraging outcomes for successful VBAC in women having had prior CS for presumed fetal distress and fetal Malpresentation.

So, a trial of labour in women with prior CS can be given in carefully selected cases in a tertiary care hospital where facilities for rigorous maternal and fetal monitoring are available.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department Concerned (Ref: No.542/LRH/MTI).

Consent for publication

Approved

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Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

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Data acquisition, analysis.
Data entry and Data analysis, drafting article
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Data acquisition, analysis.
Coordination of collaborative efforts.
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Coordination of collaborative efforts.
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript

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