Vaginal Birth after One Caesarean Section in Women who had Spontaneous Labour: Review of Practice and Evaluation of Predictive Scores in a Resource Constrained Setting in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author OPA conceptualized and designed the study and also wrote the final draft of the manuscript. Author ODO did literature searches and wrote the first draft of the manuscript and author TA analysed the data and read the final draft of the manuscript. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Aims: To evaluate and determine the practice, outcome, success rate, complications and predictive factors of vaginal birth after one Caesarean section (VABC) in spontaneous labour.
Study Design: A retrospective study.
Place and Duration of Study: Department of Obstetrics and Gynaecology of Ekiti State University Teaching Hospital, Ado-Ekiti, between January 2010 and December 2014.
Methodology: The case files of women who had one previous lower segment Caesarean section and were managed in spontaneous active phase of labour between the gestational age of 28 and 41 weeks were retrieved from the medical records department for analysis. Specific

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sociodemographic variables, intrapartum complications, route of delivery and other materno–fetal outcome variables (to identify predictors of a successful VBAC) were extracted from the case notes. Analysis was done using Chi square or the Fisher's exact test and t test while logistic regression was done to determine the predictors of successful VBAC using odd ratios and 95% confidence interval.

Results: Out of 727 women selected for VBAC, 388 (53.4%) had successful vaginal delivery. Previous vaginal delivery, previous successful vaginal birth after Caesarean section, and cervical dilatation of more than 7cm when the previous Caesarean section was done were the significant predictive factors associated with successful vaginal birth after one Caesarean section, $P = 0.01$ while the age of the women and weight of the babies at birth, $P = 0.43$ & 0.82, were not significantly associated with successful vaginal birth after Caesarean section. There were no cases of uterine rupture, perinatal and maternal mortality recorded in women who had VBAC during the period of the review.

Conclusion: This study has demonstrated that when patients are carefully selected using the positive predictive factors, trial of VBAC is a possibility in low resource settings with minimal facilities for monitoring.

1. INTRODUCTION

Caesarean section (CS) is an important surgical procedure that is commonly performed in modern obstetrics [1]. The rate of Caesarean section over the years has consistently been on the increase worldwide. Repeat Caesarean sections account for about 50% of this increase; while fetal distress, dystocia, breech presentation and other causes account for the remaining (50%) [2]. Vaginal birth after Caesarean section (VBAC) is an option of delivery that allows women who had undergone Caesarean section have vaginal delivery and is considered safe in selected cases [3].

The practice of vaginal birth after Caesarean section is very important and relevant in developing countries and more especially in Nigeria because of the high cultural aversion to Caesarean section [4,5]. It is a known fact that Nigerian women have strong aversion for Caesarean section not because of the associated fetal and maternal risks but because of the general belief that abdominal delivery is a mark of reproductive failure [6]. Women with Caesarean delivery are considered by others to be infidel, "not woman enough", and are usually objects of social ridicule. This makes any attempt at reducing the incidence of Caesarean section a key factor in the reduction of maternal and perinatal mortality [1]. It is therefore pertinent to achieve a successful VBAC in this setting to reduce the number of unnecessary abdominal births after a previous CS. In selected cases of VBAC, the success rate ranges between 50%-

80% from previous studies [7-9]. A successful VBAC has distinct advantage over repeat Caesarean section by decreasing the operative morbidity and mortality as well as bringing down the length of hospital stay and expenses [9,10].

Many studies have identified factors that are predictive of a successful VBAC and these include a previous vaginal delivery, prior VBAC, non-recurrent indication for the Caesarean delivery, birth weight, inter-delivery interval and cervical dilatation at the time of CS [11-14]. However, only a previous history of vaginal delivery was the most common predictor of a successful VBAC, with success rate of 86-89% [15] while the role of cervical dilatation at the time of CS has shown conflicting results [3]. The factors against success of VBAC are induction/augmentation of labour, previous Caesarean section for recurrent cause (CPD, dystocia) and non- reassuring fetal heart at the time of admission [14].

Most studies on factors affecting outcome of vaginal birth after one Caesarean section were done in developed countries with few in sub-Saharan Africa and Nigeria in particular. The few studies from Nigeria are not from south-western Nigeria where this hospital is located and the study has not been carried out here previously. Therefore, this study was carried out to evaluate the outcome, success rate, complications and predictors of success in our practice of vaginal birth after one Caesarean section at Ekiti State University Teaching Hospital, Ado-Ekiti.

2. MATERIALS AND METHODS

This was a retrospective study of cases of vaginal birth after one Caesarean section (VBAC) managed at Ekiti State University Teaching Hospital (EKSUTH), Ado-Ekiti between 1st January 2010 and 31st December, 2014. The inclusion criteria were women who had Caesarean section in their previous delivery for non-recurrent indications whose surgeries healed well without complications and had no contra-indications to vaginal delivery in their present pregnancy. This study excluded women who had Caesarean delivery for a recurrent indication, had complications that could affect wound strength and healing and had contra-indications to vaginal deliveries in the index pregnancy. The case notes were retrieved from the medical records department for analysis.

The information retrieved from the case notes were in two sections. The first section was on the sociodemographic data of the women like age, parity, education, occupation, religion, tribe, previous vaginal delivery, previous vaginal birth after Caesarean section, cervical dilation before the previous Caesarean section and indications for the previous Caesarean section. The second section elicited information about gestational age at delivery, labour, maternal and neonatal outcomes such as the birth weight of the babies, the Apgar score at 1 and 5 minutes and admission into neonatal intensive care unit (NICU).

The primary outcome measure was the rate of successful vaginal delivery. Other outcome measures were Apgar scores (at 1 and 5minutes), maternal morbidities such as uterine rupture/dehiscence, postpartum haemorrhage and maternal or perinatal mortality.

The indications for the one previous Caesarean section were categorised into recurrent indications (cephalopelvic disproportion or obstructed labour resulting from fetal macrosomia or malpositioning) and non-recurrent indications (such as malpresentation, abnormal lie and fetal distress).

The departmental protocol for VBAC is to allow women with one previous Caesarean section who have been selected in the antenatal clinic to undergo vaginal delivery when they present in spontaneous labour between 28 and 41 weeks. The progress of labour in the active phase is monitored with a partograph and the fetal heart rate is monitored by intermittent auscultation with sonicaid. Oxytocin augmentation of uterine contractions is not practiced. The process of labour in women undergoing VBAC is abandoned for obstetric indications like fetal distress and poor progress in labour.

The data generated were analysed using SPSS statistical software, version 17 (SPSS, Chicago, IL, USA). Categorical variables were analysed using the Chi square or the Fisher's exact test, where appropriate and continuous variables with student t-test. Logistic regression was done to identify significant predictors of vaginal delivery. Odds ratio and 95% CI were computed and the level of significance was set as $p < 0.05$.

3. RESULTS

A total of 6897 deliveries were conducted over the study period and 1145 women (16.6%) had previous delivery by Caesarean section. Of the 1145 women who had previous delivery by Caesarean section, 727 (63.5%) women were evaluated and prepared for vaginal birth after one Caesarean section and 388 of them had successful vaginal delivery accounting for a success rate of 53.4%.

Table 1 shows that there was no significant difference among the women who had successful VBAC and those women who did not in their mean age, parity, gestational age at delivery, birth weight and Apgar scores at 1 and 5 minutes respectively, $p > 0.05$. The other sociodemographic characteristics of the women also did not show any significant difference, $p > 0.05$.

Table 2 shows that previous vaginal delivery, previous successful vaginal birth after Caesarean section, and cervical dilatation of more than 7cm when the previous Caesarean section was carried out were significantly associated with successful vaginal birth after Caesarean section, $p = 0.01$ while the age of the women and weight of the babies at birth were not significantly associated with successful vaginal birth after Caesarean section, $p = 0.06$ and 0.07 respectively.

Table 3 shows that on logistic regression, birth weight of baby of more than 4kg was not associated with successful vaginal birth after Caesarean section, $p > 0.05$.

About 2.1% and 2.7% of babies were admitted to neonatal intensive care unit (NICU) for women who had successful VBAC and failed VBAC respectively, p > 0.05. There were no reported cases of perinatal and maternal mortality, uterine rupture or dehiscence or hysterectomy in the study group.

Table 1. Sociodemographic characteristics of women who underwent VBAC

Variables	Outcome of VBAC		P value
	Successful	**Failed**	
Age of woman	31.58±3.81	31.50±4.23	0.43
Parity	1.57±0.78	1.52±0.61	0.09
Gestational age at delivery	39.00±1.49	39.00±1.73	0.07
Birth weight	3.30±0.51	3.33±0.59	0.42
Apgar score			
1 minute	7.54±1.66	7.44±1.84	0.07
5 minute	9.57±1.69	9.45±1.79	0.09
Tribe			
Yoruba	370 (54.2%)	313 (45.8%)	0.11
Igbo	18 (40.9%)	26 (59.1%)	
Education (woman)			
Secondary and below	43 (43.0%)	57 (57.0%)	0.23
Post-secondary	345 (55.0%)	282 (45.0%)	
Occupation (woman)			
Unemployed	77 (65.3%)	41 (34.7%)	0.33
Self-employed	80 (47.6%)	88 (52.4%)	
Privately employed	10 (62.5%)	6 (37.5%)	
Civil servant	221 (52.0%)	204 (48.0%)	
Religion			
Christianity	355 (52.9%)	315 (47.1%)	0.58
Muslim	33 (57.9%)	24 (42.1%)	

Table 2. Factors predicting outcome of VBAC

Variables	Outcome of VBAC		P value
	Successful	**Failed**	
Age of women (years)			
20 – 34	288 (55.6%)	230 (44.4%)	0.06
≥ 35	100 (47.8%)	109 (52.2%)	
Parity of woman			
1	158 (37.9%)	258 (62.1%)	0.01*
≥ 2	230 (73.9%)	81 (26.1%)	
Birth weight (kg)			
< 2.5	22 (27.2%)	59 (72.8%)	0.07
2.5 – 4.0	349 (51.2%)	333 (48.8%)	
> 4.0	17 (28.3%)	43 (71.7%)	
Previous vaginal delivery			
Yes	266 (69.6%)	116 (31.4%)	0.01*
No	122 (35.4%)	223 (64.6%)	
Previous VBAC			
Yes	275 (86.7%)	42 (13.3%)	0.01*
No	113 (27.6%)	297 (72.4%)	
Cervical dilation before CS			
< 7 cm	291 (65.7%)	152 (34.33%)	0.01*
≥ 7 cm	197 (51.3%)	187 (48.7%)	

Statistically significant

Table 3. Logistic regression of factors predicting outcome of VBAC

Variables	AOR (95% CI for AOR)	P value
Previous vaginal delivery		
Yes	1	
No	0.266 (0.183 – 0.387)	0.01*
Previous VBAC		
Yes	1	
No	0.384 (0.264 - 0.557)	0.01*
Cervical dilatation before previous CS		
< 7 cm	1	
≥ 7 cm	0.391 (0.270 - 0.556)	0.01*
Birth weight (kg)		
< 2.5	0.391 (0.148 - 0.687)	0.43
2.5 - 4.0	1	
> 4.0	0.903 (0.372 - 2.194)	0.82

Statistically significant; CI- Confidence interval; AOR- Adjusted odd ratio

4. DISCUSSION

The VBAC success rate recorded in this study was 53.4% and this is comparable to similar findings reported from Benin and Ibadan [16,17] but higher than that reported from Nnewi [1]. This success rate is consistent with VBAC success rates of 50-80% that have been reported in well selected cases from previous studies [18,19]. This is because all the women involved in these studies were properly evaluated and selected for trial of VBAC during their antenatal care unlike the study from Nnewi by Ikechebelu et al. [1] that reported a lower success rate due to too many bad and poorly selected cases that were already in labour and referred there from peripheral hospitals and health centres. In addition, it was also stated in the study that poor antenatal compliance by the women and easy recourse to repeat Caesarean section by the doctors especially in emergency situations contribute to the lower rate. However, this success rate is lower than findings of Guise et al and Chauhan et al. [7,8] and this may be due to the fact the VBAC success rates vary based on the patient's obstetric history, indication for the previous CS and facilities available for intrapartum fetal monitoring and diagnosis of fetal distress such as cardiotocography machine and fetal blood gases [3].

Women with previous vaginal delivery and previous vaginal birth after Caesarean section had more successful trial of labour outcome in this study. This finding was consistent with reports from previous studies [3,7,12,14,18]. Studies by Hendler et al. [12] and Peaceman et al. [19] reported that previous vaginal delivery is considered as the single best predictor of

successful VBAC and has been found to be protective against uterine rupture [14]. Also, Obeidat et al. [3] reported a high success rate in women with previous VBAC while Elkousy et al. [13] added that the safety in attempting VBAC is greatest in women who had a previous successful VBAC and lowest in those who had never had a successful vaginal birth. The previous vaginal delivery of average sized fetuses and previous VBAC suggested that the birth passages in these women were of adequate capacity which is usually considered before allowing a trial of VBAC in women with one previous CS while women with contracted pelvis would have been excluded. Women selected for these studies [12-14,19] fit in into these two criteria and this explains the similarity in their results. However, this was in contrast to findings by Ikechebelu et al. [1] who reported no significant association between previous vaginal delivery and success of VBAC. They opined that the lack of association could be because most of the patients were admitted as emergency cases after having tried VBAC in peripheral centres where the patient selection would have been poor and their labour would have been either unsupervised or supervised by unskilled and untrained personnel who would only refer them out when the situation is bad [1].

In this study, the success rate of VBAC in women who achieved a cervical dilatation of ≥ 7 cm before the previous CS was about 75% which is slightly lower than 80-85% reported in the literature [3,12]. Previous studies reported that a cervical dilatation of ≥7 cm in labour before the CS in the previous pregnancy is associated with successful VBAC and progress in labour before the previous CS has been shown as one of the

strongest positive predictors of VBAC success [3,12]. In the study by Hendler et al. [12], it was reported that the effect of previous advanced labour might be as good as that of a previous vaginal delivery in predicting the outcome of labour in VBAC. Therefore, one may speculate that patients with advanced cervical dilation during the previous course of labour may have an advantage with respect to progress and outcome of labour and delivery in subsequent pregnancies.

There was no statistical significance regarding fetal birth weight and VBAC success and this was similarly reported by Ikechebelu et al. [1]. There has been no consensus over whether women with an estimated fetal weight of ≥ 4,000 g should undergo a trial of labour or not. Although previous studies revealed that women with macrosomic infants (> 4,000 g) can have a successful VBAC especially if they have had a successful vaginal delivery before, there are no large studies on the effect of birth weight on success rates of VBAC [1,3]. However, ACOG guidelines [20] states that the risk of uterine rupture is increased when the fetal weight is more than 4 kg. Hence, with proper pelvic assessment and good monitoring of progress of labor, average sized babies can also be delivered vaginally.

Babies born to women who had successful VBAC in this study had higher Apgar scores at 1 minute and 5 minutes though not statistically significant. Obeidat et al. [3] similarly reported lower Apgar scores in babies born to women with failed VBAC. About 2.1% and 2.7% of the babies born to women who had successful VBAC and failed VBAC respectively were admitted to neonatal intensive care unit (NICU) on account of severe birth asphyxia and there was no perinatal mortality among the study groups. Thus, the good perinatal outcome and absence of scar dehiscence or uterine rupture and maternal mortality in this study is worthy of note since all the labour cases were monitored clinically with no advanced fetal monitoring facility like cardiotocography machine during the period this review was carried out. The progress of labour was monitored closely using partograph while sonicaid was used in monitoring the fetal heart rate. There were quick interventions and management of labour cases deviating from the normal progress and these may have accounted for absence of complications like scar dehiscence or uterine rupture in these women.

This was similarly reported in a study by Obeidat et al. [3].

5. CONCLUSION

In conclusion, the VBAC success rate recorded in this review is within the previous documented ranges and showed that women with one previous CS could be selected for VBAC if they meet the criteria for VBAC and there are no contraindications to this. Also, the review revealed that previous vaginal delivery, previous successful vaginal birth after Caesarean section, non-recurrent indications for the previous Caesarean section and advanced cervical dilation in labour prior to the Caesarean section were associated with successful trial of VBAC. This has further demonstrated that when patients are carefully selected using these positive predictor factors in poor resource settings, VBAC will be more successful.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethical and Research Committee of Ekiti State University Teaching Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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