

Original Research Article

Factors associated with successful vaginal birth after cesarean section and its outcome in Asella Referral and Teaching Hospital, Ethiopia

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ABSTRACT

Background: Planned vaginal birth after cesarean section is appropriate for and offered to the majority of women with a singleton pregnancy of cephalic presentation at 37 weeks or beyond. The main purpose of the study was to assess factors associated with successful vaginal birth after cesarean section and its outcome in Asella Referral and Teaching Hospital.

Methods: An institutional based case-control study conducted to identify factors associated with successful vaginal birth after cesarean section and its outcome in a two years period. The data was collected from patients' charts after tracing a patient's number, a double proportion sampling technique was used to determine sample size using EPI info version 7.1.4.0, and multivariate regression analysis of independent variables associated with successful vaginal birth after cesarean section was performed with unmatched case control.

Results: Two hundred eighty-eight (288) mothers with history of one previous cesarean delivery attempted vaginal birth after cesarean section. This study found significant successful vaginal birth after cesarean section in mothers with previous vaginal birth, prior successful vaginal delivery after cesarean section, presented with cervical dilatation more than or equal to 4 cm and intact membrane at admission. Meconium > grade I and duration of labour > 481 minute negatively affected the success rate but weight did not affect vaginal birth after cesarean outcome.

Conclusions: Careful selection of mother is the corner stone of successful vaginal birth after cesarean section with special consideration of gestational age, condition of membrane, and develops national evidence-based clinical practice guidelines for potential implication.

Keywords: Cesarean section, Labour, Membrane rupture, Vaginal birth, Ethiopia

INTRODUCTION

Vaginal birth after caesarean (VBAC) is usually safer for the mother than a repeat caesarean specially, if the wish for an additional pregnancy is estimated to be high that it does carry a very small risk of uterine rupture and the current guidelines state that this risk should neither dissuade women from choosing VBAC nor prevent service providers from offering a trial of labour to women who choose this option.¹ VBAC is associated with less blood loss during delivery, shorter duration of hospitalization and decreased rate of blood transfusion,

intra partum and postpartum infection and thromboembolic events and increase rate of VBAC would decrease economic burden of nations and individuals.²

Extensive research done to identify the factors influencing the success of VBAC, its morbidities and risks of uterine rupture. Of these factors strongly influencing are prior VBAC, prior caesarean section for non-recurrent indication, Bishop Score of more than 4 and spontaneous onset of labour. While factors against the success are induction/augmentation, previous

caesarean for recurrent cause (CPD, dystocia), non-reassuring foetal heart at the time of admission.³ In May 1985, the National consensus conference on aspects of Cesarean birth in Canada recommended that a trial of labour be offered to women with “one previous low transverse CS, a singleton vertex presentation, and no absolute indication for CS (such as placenta previa). Among women who attempted a trial of labour after a previous low transverse cesarean section, 60 to 80% had vaginal deliveries, and morbidity is lower among women who have had a vaginal delivery after a previous CS than among women who elected to undergo a second CS.⁴

In the United States, for most of the 20th century, the saying “once a cesarean, always a cesarean” was a rule. Today, the National institutes of health (NIH) opposes the dictum and urges women to consider trial of labour after caesarean(TOLAC).⁵ Ghaffari et al observed that the rate of vaginal delivery was higher in patients with previous caesarean section than in patients with prior vaginal delivery.¹ However, the factors that lead to a successful outcome remain unclear, as research continues to be conducted in hopes of creating a predictive model for VBAC success.⁶

Caesarean rate is increasing in Ethiopia because of the flourishing private hospitals in major towns. Even though teaching hospitals offer trial of labour for mothers with one scar, there is limited study done which shows the rate of VBAC acceptance and success in Ethiopian hospitals.

METHODS

Study design and period

The study was conducted in Asella Referral and teaching Hospital, labour ward from March 1 to 30, 2018. A retrospective institution-based case-control study conducted to identify factors associated with successful VBAC among mothers with one previous CS and offered trial of labour. Cases were all deliveries with only one previous scar, allowed VBAC according to the hospitals protocol, started labour spontaneously or by induction and delivered by vaginal route. Controls were those who delivered by Caesarean section after-a-trial of labour.

Source population and study subjects

The source population were all women who were on VBAC and deliver the baby was cases and all women who had trial of labour after CS and deliver with CS was controls group at Asella Referral and Teaching Hospital during the period.

Inclusion criteria

All registered women who had delivered babies through induction of labour or spontaneous labour after one CS at maternity wards at Asella Referral and Teaching hospital from January 1, 2016 to December 30, 2017, Previous

one lower segment cesarean section, no contraindication to trial of labour, Pregnant mother who came with spontaneous labour.

Exclusion criteria

Women who had not previous CS and without full document and high-risk pregnancy.

Sample size and sampling technique

A double proportion sampling technique was used to determine sample size using EPI Info version 7.1.4.0. (30). Sample size was determined using unmatched case control. To determine the exact sample size a 95% confidence level, power of 80%, case to control ratio of 1:1 and odd ratio of 2 with percent of control exposed was taken from previous study from Addis Ababa teaching Hospitals in 2013, 43.7% was taken from this study.⁷ The calculated value of case 144 and control 144 with a total sampling size of 288 was determined. The primary sources of the data were the admission log books at outpatient department (OPD) where the card numbers of patients admitted with previous caesarean scar was traced. Then those offered VBAC was identified from delivery logbooks and ward discharge summaries. Cases and controls were selected from the available charts in the study period until the maximum sample size fulfilled.

Study variables

Dependent variable

Vaginal birth after cesarean section

Independent variable

Maternal age, marital status, parity, gestational age and address.

Past obstetric variables

Indication for the primary C/S, inter delivery interval, Prior successful VBAC and Spontaneous vaginal delivery (SVD), history of stillbirth.

Current obstetric and foetal factors

Status of membrane at admission and duration of rupture, presence of meconium, cervical dilatation at admission and position of the presenting part, duration of labour and birth weight.

Data collection procedures

The data was collected from patients’ charts after tracing a patient’s number. Professional health workers collected data after training on the data collection tools and procedures. The information was collected using a checklist adapted from.^{8,9} The checklist includes maternal

socio demographic, past obstetric and current obstetric and foetal factors.

Data quality control

Pre-test was done in Adama Referral hospital before conducting actual data collection on 5% (15 records) of the sample and corrective measures done before the actual one.

Data analysis and data entry

Collected data were coded and entered into EPI Info version 7.1.4.0 and exported into Statistical Package for Social Science (SPSS) version 21.0 software for analysis. The proportion were computed by running descriptive statistics, followed by bivariate and multivariable logistic regression to determine statistical association between independent and dependent variables. Factors that had <0.5 significance level in the bivariate logistic regression analysis were considered in the multivariable logistic regression analysis. Presence and degree of association between outcome and independent variables was computed through odds ratio with 95% confidence interval (CI) and p value<0.05 considered as a statistically significant.

RESULTS

Sociodemographic factors of mothers who had trial of labour after cesarean section

Maximum patients belonged to age group 25- 35 years of age in the both groups (60.1%), the oldest group>35 (23.3%) and the younger group<25 (16.7) was statistically significant. The majority of the study units was associated with effective VBAC, they were from outside the Asella town 98 (68%) and controls group were from Asella town 46 (63.2%).The majority of mothers in both groups belonged to gestational age between 37-40 completed weeks 95 (66%) in case and 101 (70.1) in control groups, less than 37 weeks 48 (33.3%) in case and 38 (26.4%) in control groups and gestational age>40 weeks (0.7% in case and 3.5% in control) was statistically significant. Majority of mother's parity II-III was controls group 85 (59%) and IV-VI in cases were 73 (50.7%) and mother's parity greater than VII were 15 (10.4%) in cases and 9 (6.3%) in controls group (Table 1).

Past obstetric factors among mothers who had trial of labour after cesarean section

In present study, the most common cause of failed trial of labour was unknown indication of previous CS i.e. 45.2% (Table 2). Chance of successful VBAC was more if primary cesarean section was done for foetal macrocosmic 43 (24.3%), foetal distress 23 (16%) and antepartum haemorrhage (21%). Majority of mother's primary cesarean section indication were unknown in

control group 65 (45.2%). Short delivery interval had significant impact on the success of VBAC. Patients who failed to wait at least 18-months inter-delivery, the VBAC success rate dropped to 55 (38.2%) compared to 84 (58.3%) for those patients who waited 18 months or more. Mothers who had not experienced successful VBAC after the past caesarean section were a higher chance of failed trial of labour 143 (99.3%) and previous spontaneous vaginal delivery was find significant relationship from successful VBAC. History of stillbirth in the past was not related with both groups.

Table 1: Socio-demographic factors of mothers who had trial of labour after cesarean section in Asella Referral and Teaching hospital, 2018.

Socio-demographic factors	Frequency		Percentage	
	Case	Control	Case	Control
Address				
Rural	98	53	68	36.8
Urban	46	91	32	63.2
Total	144	144	100	100
Maternal age in years				
<25	25	23	17.4	16
25-35	87	86	60.4	59.7
>35	32	35	22.2	24.3
Total	144	144	100	100
Gestational age in weeks				
<37	48	38	33.3	26.4
37-40	95	101	66	70.1
>40	1	5	0.7	3.5
Total	144	144	100	100
Parity				
II-III	56	85	38.9	59
IV-VI	73	50	50.7	34.7
>VII	15	9	10.4	6.3
Total	144	144	100	100

Current obstetric and foetal factors in mother who had attending trial of labour

Having occipitoanterior position 121 (84%) in case group were having a higher chance of vaginal delivery which was found to be strongly statistically significant and labour stay more than 720 minutes after admission were associated with higher failure rate of VBAC (Table 3). The initial pelvic examination at the time of admission was recorded for each woman attempting VBAC. Women who start labour with cervical dilatation of equal to or more than 4 cm had higher success rate, 70 (48.6%) compared to 12 (8.3%) who had closed cervical dilatation.

Duration of rupture membrane in minute

Regarding the current delivery, those mothers who were admitted with intact membrane 80 (55.6%) and Presence

of meconium stained liquor grade I was less likely effective in case group. In our study neonatal birth weight

2500-4000g (80.6%) and <2500 g (19.4%) chance of successful VBAC increased in case group (Figure 1).

Table 2: Past obstetric factors among mothers who had trial of labour after cesarean section in Asella Referral and Teaching hospital, 2018.

Past obstetric factors	Frequency		Percentage	
	Case	Control	Case	Control
Indication of previous CS				
Fetal distress	23	13	16	9
APH	21	7	14.6	4.9
Failure of labor progress	5	20	3.5	13.9
Malpresentation	5	3	3.5	2.1
Failed induction	12	16	8.3	11
Macrocosmic	43	20	29.8	13.9
Unknown	35	65	24.3	45.2
Total	144	144	100	100
Delivery interval in months				
<24	55	51	38.2	35.4
25-60	84	85	58.3	59.1
>61	5	8	3.5	5.5
Total	144	144	100	100
Prior successful VBAC				
Yes	19	1	13.2	0.7
No	125	143	86.8	99.3
Total	144	144	100	100
Previous SVD				
Yes	67	19	46.5	13.2
No	77	125	53.5	86.8
Total	144	144	100	100
History of still birth				
Yes	-	-	-	-
No	144	144	100	100
Total	144	144	100	100

Table 3: Current obstetric and foetal factors in mother who had attending trial of labour in Asella Referral and Teaching Hospital, 2018.

Current obstetric and foetal factors	Frequency		Percentage	
	Case	Control	Case	Control
Status of membrane at admission				
Rupture	64	33	44.4	22.9
Intact	80	111	55.6	77.1
Total	144	144	100	100
Duration of membrane rupture in minute				
30-240 min	45	19	70.3	57.6
241-480 min	15	11	23.4	33.3
481-720 min	3	3	4.7	9.1
>720 min	1	-	1.6	0
Total	64	33	100	100
Presence of meconium				
Yes	17	6	26.6	18.2
No	47	27	73.4	81.8
Total	64	33	100	100

Continued.

Current obstetric and foetal factors	Frequency		Percentage	
	Case	Control	Case	Control
If present meconium				
Grade I	15	1	88	16.7
Grade II	2	2	12	33.3
Grade III	0	2	0	33.3
Grade IV	0	1	0	16.7
Total	17	6	100	100
Cervical dilatation at admission				
Closed	12	11	8.3	7.6
2-4 cm	62	66	43.1	45.8
>4 cm	70	67	48.6	46.6
Total	144	144	100	100
Position of presenting part				
Occipitoanterior	121	114	84	79.2
Other position	23	30	16	20.8
Total	144	144	100	100
Duration of labor in minute				
30-240 min	39	5	27	3.5
241-480 min	54	65	37.6	45.1
481-720 min	37	51	25.7	35.4
>720 min	14	23	9.7	16
Total	144	144	100	100
Birth weight				
<2500 g	28	23	19.4	16
2500-4000 g	116	121	80.6	84
Total	144	144	100	100

Table 4: Multivariate logistic regression analysis of independent variables associated with successful VBAC in mother who had attending trial of labour in Asella Referral and Teaching Hospital, 2018.

Variable	Case	Control	COR (95% CI)	AOR (95%CI)
Address				
Rural	98 (68%)	53(36.8%)	0.541	2.419
Urban	46 (32%)	91(63.2%)	3.658 (2.247-5.954)***	(1.356-4.316)**
Prior successful VBAC				
Yes	19(13.2%)	1(0.7%)	0.053	15.471
No	125(86.8%)	143(99.3%)	21.736 (2.869-164.691)***	(1.878-127.444)*
Previous spontaneous vaginal delivery				
Yes	67(46.5%)	19(13.2%)	0.284	3.723
No	77(53.5%)	125(86.8%)	5.725(3.195-10.257)***	(1.911-7.254)***
Status of membrane at admission				
Rupture	64 (44.4%)	33 (22.9%)	0.516**	2.349
Intact	80 (55.6%)	111 (77.1%)	2.691 (1.618-4.477)***	(1.287-4.287)**
Duration of labour				
30-240 min	39 (27%)	5 (3.5%)	0.128	10.700 (3.083-37.138)***
241-480 min	54 (37.6%)	65 (45.1%)	9.389 (3.459-25.484)***	1.951 (0.804-4.734)*
481-720 min	37 (25.7%)	51 (35.4%)	10.751 (3.866-29.897)***	1.243 (0.492-3.143)*
>720 min	14 (9.7%)	23 (16%)	12.814 (4.083-40.218)***	1

*Stands for P<0.05, ** P<0.01 and *** P<0.001, COR: Crude odds ratio, AOR: Adjusted odds ratio

Factors associated with successful VBAC and its outcome

Generally, the independent factors found to be associated with successful VBAC by the multivariate analysis with logistic regression were address, prior successful VBAC, previous spontaneous vaginal delivery, status of membrane at admission and duration of labour (Table 4).

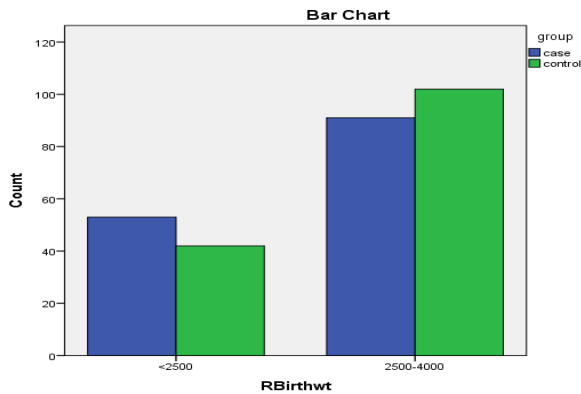


Figure 1: Graphical presentation of neonatal birth weight who delivered from mothers attending trial of labour in Asella Referral and Teaching Hospital, from 01 January 2016 to 30 December 2017.

DISCUSSION

Present study reported that success rate of VBAC in age group of <25 years is small. This result is consistent with studies by Malede Birara and Yirgu Gebrehiwot that they concluded women <25 years of age were more likely to experience unsuccessful trial of labour.⁷ In the current study mothers who lived outside the Asella town (AOR=2.419, 95%CI (1.356-4.316)) was associated with successful VBAC. A history of any prior vaginal delivery (AOR= 3.723, 95%CI 1.911, 7.254), particularly VBAC, is much more highly associated with successful VBAC than maternal age and the same finding to the study by Robinson, Grobman.¹⁰ In this study having occipito-anterior position (84%) were having a higher chance of vaginal delivery that was found to be strongly statistically significant and in line with Birara Gebrehiwot.⁷ Mothers with no previous vaginal birth (86.8%) are more likely to experience outcomes related to failure of labour progress, as compared to Scott JR study and require careful monitoring.¹¹ The study did not find significant relationship between success and history of stillbirth, but Ghafarzadeh study found to be related with failed VBAC this might be due to sample size and study period.¹ Status of membrane at admission (AOR=2.349, 95%CI (1.287-4.287)) was found to be important factor in predicting success of VBAC that mothers admitted with rupture of membrane had a higher likelihood of success which is concurrent with the study in Addis Ababa.⁷ Meconium stained liquor GII, GIII and GIV and labour stayed more than 720 minute after admission were associated with higher failure rate of VBAC and this result is consistent

with studies by Ghafarzadeh.¹ This study demonstrated that mothers who had experienced successful VBAC after the past caesarean section (99.3%) (AOR=15.471, 95%CI (1.878-127.444)) had a higher chance of success with significant statistical association and the study in Addis Ababa showed successful VBAC after the past caesarean section had a higher chance of success with significant statistical association.⁷ Mothers who had unknown indications for past caesarean section have been found strongly associated with high failure but in this study it didn't.² Stronger factor determining success in this study was cervical dilatation at admission indicating that those who were admitted with cervical dilatation greater than 4 cm had a strong likelihood of vaginal delivery than those admitted at cervical dilatation of less than or equal to 4cm which is agreeing with the study conducted in Addis Ababa.⁷ This study identified that women beyond 40 weeks of gestation could attempt VBAC, although there was an increasing risk of VBAC failure as compared to the study by Bahrain Med Bull 2017.¹² Generally, mothers who had between 37 weeks and 40 weeks gestational age in the successful group was found great association which is in-line with the study in Bahrain and study findings revealed that there was no association between birth weight of baby and success of VBAC inconsistent with the study done by Maurya et al.^{2,12}

This study may be considered the first to assess factors associated with successful VBAC and its outcome in Asella Referral and Teaching Hospital and adequate sample size was applied according to single population proportion formula that multiple logistic regressions was used to control associated factors in order to assess independent variables. The study was limited by the retrospective use of a database, allowing only the available variables to be used. In this particular hospital, for example, information on general medical and past obstetric history was not routinely and clearly recorded. Comparison and discussion were difficult due to shortage of similar studies carried out in Ethiopia and the study was not supported by qualitative methods.

In consideration of identified factors, patients should be counselled for or against trial of labour, responsible, and sufficient staff; use of partogram and presence of all emergency services should be available in the centre where trial of previous CS is opted.

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