AFRICAN JOURNAL OF FETOMATERNAL MEDICINE

Original Article

Vaginal Birth After Caesarean Section– A 5 Year Review in A Tertiary Hospital in South-West Nigeria

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Abstract

Background: Vaginal birth after Caesarean section (VBAC) is a viable option for women who have had a Lower Segment Caesarean section (LSCS). However, global VBAC rates have declined significantly, from 40-50% in 1996 to 10% in 2005. ***Objectives***: This study aimed to determine the incidence, success rate, predictive factors, and outcome of VBAC at University College Hospital (UCH), Ibadan, Nigeria. **Methods**: A retrospective descriptive study was conducted, analyzing case records of women who underwent VBAC between 2016 and 2020. **Results**: A total of 9,559 deliveries were recorded, with 4,887 Caesarean deliveries, representing a Caesarean section rate (CSR) of 51.12%. Of these, 1,084 were first lower segment caesarean deliveries. A total of 162 women presented for VBAC, with 116 (71.6%) planned for VBAC. The VBAC rate was 5.9%, with a success rate of 50%. There were no maternal mortalities, and the perinatal mortality rate was 12.3 per 1000 births. The study identified several significant predictive factors for successful VBAC, including planning by an Obstetrician ($p=0.002$), previous vaginal delivery ($p<0.001$), previous VBAC ($p<0.001$), and a Bishop Score of ≥7 at admission ($p<0.001$). **Conclusion:** The VBAC rate and success rate in our center are relatively low and can be improved by focusing on positive predictive factors and increasing awareness about VBAC.Keywords**:** Vaginal Birth After Caesarean, Predictive Factors, Trial of Labour after Caesarean, One Prior Caesarean

Keywords: Vaginal Birth, Caesarean Section, Nigeria

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Introduction

Caesarean Section (CS) is the delivery of a fetus along with the placenta and membranes through surgical incisions made on the abdomen and the uterus after the age of fetal viability[1-3]. The surgical incisions on the uterus could be classical incision, transverse incision on the lower segment of the uterus (the most common and current standard), De Lee's incision or the J-incision[4].
There are several indications for CS which could be maternal related, fetal related or fetomaternal related[5] but over 85% of the indications for CS are due to a previous CS, breech presentation, labour dystocia and fetal distress[6, 7].

The incidence of CS has been on the rise[8] with a global Caesarean Section Rate (CSR) of 25% as at 1988 that rose from the less than 5% rate of the early 1970s[9, 10]. In the United States of America (USA), the CSR has risen from 4.5% in 1970 and by 2015 was 32%[11, 12]. Also noted is a rise from 9% in 1980 to 25% in 2007 in the United Kingdom and a rise from 10.6% in 1997 to 19.1% in 2006 in Saudi Arabia[13]. In China, the CSR increased from the 29% of 2008 to 35% in 2014[14] and getting above 50%[15]. The CSR in West Africa is being placed between 15% and 21% with Nigeria having a rate of 20% - 30% in most of her Tertiary Hospitals[16].

The increasing use of CS as a mode of delivery could be attributed to the achieved improvement in the safety of the Caesarean Section procedures due to the advances in anaesthetic procedures, antibiotics and blood availability, decline in operative vaginal delivery, decline in breech delivery, fear of litigation in obstetric practice and maternal request among other reasons[17]. Despite all

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these, the problems of safety and cost still pose some concern, particularly in resource-poor countries[18, 19].
There have been several debates on appropriate CSR for a population with consideration given to the Robson classification which allows for standardised comparison. [20-22].

Hence, a global move away from the popular dictum of Edwin B. Cragini (1916)[23] *"once a caesarean section, always a caesarean section"*. Vaginal birth after caesarean section (VBAC) is one of the important options to aid the reduction of CSR[24]. VBAC is an agreed standard obstetric practice by many health bodies, e.g. the National Institute of Health and Excellence (NICE), Royal College of Obstetricians and Gynaecologists (RCOG), American College of Obstetricians and Gynaecologists (ACOG) and the National Institute of Health (NIH) to have a Trial a Labour after caesarean section (TOLAC) for a women with a non-recurring indication for her primary lower segment caesarean section as there have been recorded successful VBAC[10, 25-27].

VBAC is an option of delivery that allows women who had undergone Lower Segment Caesarean Section (LSCS) have vaginal deliveries and is considered safe in selected cases[27]. However, it is observed that the rate of VBAC, as well as the rate of TOLAC, has decreased during the past 10 years, having a global rate of 10% as at 2005 compared to 40-50% rate of 1996[10]. Nevertheless, TOLAC, despite the known risks of 0.5-0.9% rate of uterine rupture[10], remains an attractive option for many patients and leads to a successful outcome in a high proportion of cases upon the achievement of the planned VBAC[28]. VBAC is preferred to Elective Repeat Caesarean Delivery (ERCD) especially in women with one previous caesarean section[6, 10, 25].

The VBAC rate (VBAC incidence rate), which is the number of vaginal deliveries occurring out of the denominator of parturient with one previous CS within a given period[10, 26, 29], should not be confused with VBAC success rates, which is the number of successful VBAC that occurred among parturient that were planned for VBAC and had the TOLAC[10, 25].

VBAC rate may be a better index for measuring performances in various centres but unfortunately many of the studies do not state their VBAC rates, though the rates could be derived in some studies which stated the number of first caesarean sections. The success of VBAC is dependent of some carefully considered factors that can be termed as VBAC predictive factor[4, 25, 27]. Some of these predictive factors of a successful VBAC include non-recurring indication of the previous CS, previous vaginal deliveries, previous VBAC, cervical dilatation as at presentation, birthweight, inter-delivery intervals etc[12, 30]. With careful patient selection and good management of labour, the success rate for a vaginal birth after caesarean section (VBAC) can be as high as 60%-80%[31]. For example, a study of 33,560 women, in USA, with one prior CS gave a success rate of 73% for VBAC while a study conducted in Saudi-Arabia had VBAC success rate of 61%[13].

A review of similar studies carried out in some tertiary health institutions in Nigeria revealed VBAC success rates of 53.4% for Ekiti State University Teaching Hospital (EKSUTH), Ado-Ekiti, Ekiti State, Nigeria[30]; 66.9% for Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria[24]; 33.8% for Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria[32] and VBAC success rate of 50% in Enugu, Enugu State, Nigeria[33].

A similar study carried out in the University College Hospital (UCH), Ibadan, Nigeria between 1988 and 1993 gave a VBAC success rate of 86.5%[34] and stated that there was no significant association between a successfully VBAC and birthweight, gestational age or initial indication for the primary caesarean section[34].

This current study conducted 27years after the previous similar study in the same setting, UCH, has updated information on the incidence rate and success rate of VBAC in UCH, the associated characteristics of the pregnant women with successful VBAC, the feotomaternal outcome and the predictive factors of successful VBAC in UCH, between 2016 and 2020.

Methodology

Study Design

The study was a 5 year retrospective descriptive study[35]. The study analysed primary data of all women who had vaginal birth after a lower segment caesarean section between 1st January, 2016 and 31st December, 2020 in the University College Hospital, Ibadan, Nigeria[36].

Setting

The study setting was the University College Hospital (UCH) [37], Ibadan, Oyo State, Nigeria.

Sample frame/sampling method

All the available case notes for VBAC during the 5-year period were retrieved in the University College Hospital. The population of the study were all women with Vaginal Birth After a single previous lower segment Caeserean Section. This population was derived from all women who had a Trial of Labour after a Caesarean Section (TOLAC).

Inclusion Criteria

The parturient included in the study were all women with one previous lower uterine caesarean section that met the criteria for a VBAC and who were either planned for or not for the VBAC. These were women with one previous lower uterine segment caesarean section scar, who presented at the University College Hospital (UCH), Ibadan, Nigeria, were seen at the antenatal care unit of the hospital and subsequently presented at the labour ward, with no contraindication for vaginal delivery, and allowed to have TOLAC by the managing doctors as

documented in the patients' medical records and such women achieved delivery between 1st January, 2016 and 31st December, 2020.

Exclusion criteria

All women with more than one CS; All women with one previous LSCS with contraindications to vaginal deliveries. All women with one previous CS that had classical uterine incision. All other forms of child deliveries aside VBAC. All VBAC that occurred outside the period of 1st January, 2016 and 31st December, 2020. All women in any of these categories stated above were excluded from the study.

Data Analysis

A quantitative data analysis making use of the Statistical Product and Service Solution (SPSS) version 25. The incidence rate of VBAC (i.e. VBAC rate) was derived from all the successful cases of VBAC divided by the total number cases of cases with the first CS[26, 38] in the 5-year study period while the proportion of successful VBAC (i.e. VBAC success rate) calculated based on the total number of women with 1 previous LSCS, planned for VBAC, underwent TOLAC and had a successful vaginal delivery[25, 38].

Descriptive statistics such as frequency tables and percentages, charts were used to describe the collected variables. Means and standard deviations were stated for continuous variables and compared across groups with the Independent Students' t-test while categorical variables were described with frequencies and percentages and compared across group with the Pearson's Chi-squared test or Fisher Exert Test as found applicable. A *p*-value of less than 0.05 was interpreted as a statically significant correlation.

All the statistically significant variables were incorporated into the binary logistic regression analyses to derive their respective odd ratios (OR) and confidence intervals (CI) to depict the association between successful VBAC and the variables from the pregnant women.

Ethical Considerations

The approval for the study was obtained from the Management of the University College Hospital (UCH), Ibadan, Nigeria. We ensured anonymity and confidentiality of records collected as the names were represented with alphabets and this was ensured before access to the data. The data collected was kept for the purpose of this study only and planned to be discarded after a minimum period of 5 years. The data has been stored in a password protected computer.

Results

In the University College Hospital (UCH), Ibadan, during the period from 1st January, 2016 till 31st December, 2020 there were a total of 9,559 deliveries, out of which 4,887 were CS, hence the CSR of 51.12%. There were 1,084 cases of first caesarean deliveries, equivalent to 11.34% of all the deliveries that occurred in the study period.

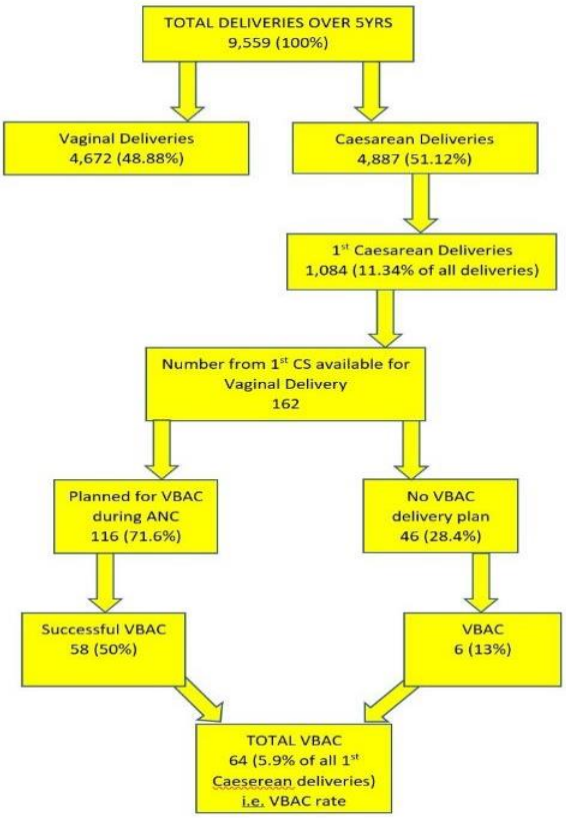

Fig 1: Participants' flowchart

The figure 1 below gives the flowchart of the participants in the study. There were 162 women with 1 previous Caesarean Section, 116 (71.6%) were planned during antenatal visits for VBAC while 46 (28.4%) had no documentation of a plan for VBAC. A total of 64 of the pregnant women with one previous CS had VBAC. This gave the VBAC incidence rate (VBAC rate) as 5.9% of the women with one previous CS. From the 64 VBAC cases, 58 were from the 116 cases that were planned for VBAC, hence 50% success rate of VBAC. There were 6 out of the 46women who had no documented plan for VBAC that had successful VBAC.

The outcomes of the deliveries of women with one prior CS were grouped into two. Group one had successful VBAC while group two had failed VBAC with an eventual repeat CS. Based on these groups, the statistical tables below were derived, and the results explained.

The table 1 showed the sociodemographic feature of the cases in the study with none of the variables being statistically significant for a successful VBAC.

Table 1: Sociodemographic Characteristics

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Age in years				
21 – 30	39 (69.4)	18 (31.6)	χ^2= 2.312	0.128
31 – 40	59 (56.2)	46 (43.8)		
Mean Age ± SD	31.80 ± 3.59	32.20 ± 3.34	t=0.736	0.463
Occupation				
None	10 (58.8)	7 (41.2)	χ^2= 1.423	0.700
Unskilled	26 (56.5)	20 (43.5)		
Skilled	6 (50.0)	6 (50.0)		
Professional	56 (64.4)	31 (35.6)		
Religion				
Christianity	79 (61.7)	49 (38.3)	χ^2= 0.383	0.536
Islamic	19 (55.9)	15 (44.1)		
Tribe				
Yoruba	82 (59.4)	56 (40.6)	Fisher's Exert Test = 0.865	0.790
Igbo	15 (65.2)	8 (34.8)		
Hausa	1 (100.0)	0 (0.0)		
Highest Education				
Non-formal	0 (0.0)	2 (100.0)	Fisher's Exert Test = 4.403	0.67
Secondary	9 (47.4)	10 (52.6)		
Tertiary	89 (63.1)	52 (36.9)		

χ^2 – Chi-square; SD – Standard Deviation

The table 2 explored the characteristics of the parturient. There were statistical significances for "history of previous vaginal delivery" (χ^2= 14.35, *p*-value <0.001), "number of previous vaginal birth" (χ^2= 2.312, *p*-value <0.001) and "previous VBAC" (χ^2= 2.312, *p*-value <0.001).

Fetal distress accounted for the commonest indication for the previous CS (38.9%). Only one of the parturient with a recurring indication (4.1%) had a successful VBAC while 40.6% of parturient with non-recurring indication had successful VBAC with Fishers exert test value of 1.947 and p-value 0.163 which was not statistically significant. The case of recurring indication that had VBAC was that of positional cephalopelvic disproportion.

Table 2: Obstetric Characteristics of the Pregnant women

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Previous Vaginal Delivery				
Yes	13 (34.2)	25 (65.8)	χ^2= 14.350	**<0.001***
No	85 (68.6)	39 (31.4)		
Number of Previous Vaginal Birth				
Nil	85 (68.6)	39 (31.4)	χ^2= 14.350	**<0.001***
One	13 (34.2)	25 (65.8)		
Previous VBAC				
No	92 (67.6)	44 (32.4)	χ^2= 18.143	**<0.001***
Yes	6 (23.1)	20 (76.9)		
Previous CS type				
Elective	15 (51.7)	14 (48.3)	χ^2= 1.137	0.268
Emergency	83 (62.4)	50 (37.6)		
Indication for the Previous CS			Fisher's Exert Test = 1.947	0.163
Recurring Indication	6 (85.7)	1 (4.13)		
Non-Recurring	92 (59.4)	63 (40.6)		
Pre-existing Medical Condition				
Hypertension	3 (75.0)	1 (25.0)	Fisher's Exert Test = 2.027	0.596
Peptic Ulcer Disease	4 (80.0)	1 (20.0)		
Asthma	2 (100.0)	0 (0.0)		
None	89 (58.9)	62 (41.1)		

*χ^2 – Pearson's Chi-square; * - Statistically significant value*

The table 2 also explored the presence of preexisting medical condition and found no statistically significance with successful VBAC.

The table 3 explored the antenatal characteristics of the parturient. There was no statistically significance relationship between the mean gestational age at booking and a successful VBAC (t = 0.981 and *p*-value of 0.328). This was same also for interpregnancy interval (Fishers Exert Test 0.739, *p*-value=0.390), likewise for the calculated Body Mass Indices (BMI) at booking (t=1.410, *p*-value=0.161). Some of the parturient had documented plan for a VBAC from the clinic and this showed a statistically significant relationship with successful VBAC (χ^2=28.4219, *p*-value <0.001). The presence of coexisting conditions during the pregnancy and complications during the antenatal period were both not statistically significant for a successful VBAC respective *p*-values of 0.121 and 0.442. The commonest antenatal complication in the studied population was degenerative uterine fibroids (3.7%).

The table 4 showed the intrapartum findings from the parturient. There was no statistically significant relationship of a successful VBAC with the mean gestational age of the parturient at admission into the labour ward (t=0.107, *p*-value 0.915). Same observed for the gestational age at delivery (t=0.973, *p*-value 0.332). However, a Bishop score of 7 and above was statistically significant (χ^2= 58.043, *p*-value <0.001). Absence of Intrapartum complication was statistically significant in having a successful VBAC (Fisher's Exert Test = 48.055, *p*-value <0.001). The table 5 showed the neonatal outcome in the study. There were 2 cases of perinatal mortality (1 early neonatal death (END) and 1 macerated still birth (MSB)) hence perinatal mortality rate of 1.23%. The END had foetal distress intrapartum of a mother with preeclampsia. For the MSB, the mother presented with reduced maternal perception of foetal movement during antenatal period. The only variable with observed statistical significance for VBAC was the birth weight of the baby (t=2.160, *p*-value 0.032).

Table 3: Antenatal Characteristics of Pregnant Women

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Gestational Age at Booking (days)				
Mean GA ± SD	139.27 ± 49.89	131.91 ± 44.49	t=0.981	0.328
Duration of Conception from last delivery			Fisher's Exert Test = 0.739	0.390
Less than 2yrs	8 (72.7)	3 (27.3)		
2yrs and above	90 (59.6)	61 (40.4)		
Booking Body Mass Index (Kg per Sqm)				
Mean BMI ± SD	28.15 ± 5.80	26.90 ± 5.43	t= 1.410	0.161
Planned mode of Delivery			χ^2= 28.4219	**<0.001***
Planned for VBAC	58 (50.0)	58 (50.0)		
Not planned/documented	40 (86.9)	6 (13.1)		
Co-existing Condition with Pregnancy			Fisher's Exert Test = 4.851	0.121
None	89 (58.6)	63 (41.4)		
Hypertension	2 (66.7)	1 (33.3)		
Peptic Ulcer Disease	1 (100.0)	0 (0.0)		
Uterine Fibroids	6 (100.0)	0 (0.0)		
Complications during Antenatal Period				
No	79 (58.1)	581 (41.9)	χ^2= 8.114	0.422
Yes	19 (73.1)	7 (26.9)		

*χ^2 – Pearson's Chi-square; SD – Standard Deviation; * - Statistically significant value*

Table 4: Intrapartum Characteristics of Pregnant women with VBAC

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Gestational Age at Admission into Labour ward (days)				
Mean GA ± SD	270.81 ± 18.01	270.50 ± 17.75	t=0.107	0.915
Bishop's Score at admission to Labour ward			χ^2= 58.043	**<0.001***
< 7	78 (86.7)	12 (13.3)		
≥ 7	20 (27.8)	52 (72.2)		
Complications during Labour			Fisher's Exert Test= 48.055	**<0.001***
Yes	53 (98.1)	1 (1.9)		
No	45 (41.7)	63 (58.3)		
Gestational Age at delivery (days)				
Mean GA ± SD	269.87 ± 15.19	271.98 ± 12.33	t=0.973	0.332

*χ^2 – Pearson's Chi-square; SD – Standard Deviation; * - Statistically significant value*

There was no record of maternal mortality in our study as depicted in table 6 below. The postpartum complications that were found in the population were post-partum preeclampsia and post-partum hemorrhage, hence maternal morbidity rate of 2.49%.

Table 7 focused on the predictive factors related to a successful VBAC. The predictive factors deduced from this study included "previous vaginal delivery" (OR=4.191), "Previous VBAC" (OR = 6.970)," being planned for VBAC" (OR = 6.667), "Bishop's score of 7 and above at presentation in the labour ward" (OR = 16.9) increased the likelihood of a successful VBAC in multiples of their respectively stated Odd ratios (OR) while for birth weight (OR=0.490) a decrease in values increased the chances of a successful VBAC. The presence of complication during TOLAC also markedly reduces the chances of a successful VBAC (OR=0.013).

Table 5: Neonatal Outcome of Pregnant women with VBAC

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Fetal Status				
Alive	98 (61.3)	62 (38.7)	Fisher's Exert Test = 2.933	0.158
ENND	0 (0.0)	1 (100.0)		
MSB	0 (0.0)	1 (100.0)		
Birth Weight (Kg)				
< 2.5	4 (50.0)	4 (50.0)	Fisher's Exert Test = 1.370 t= 2.160	0.504
2.5 – 3.99	93 (61.6)	58 (38.4)		
≥ 4.0	1 (33.3)	2 (66.7)		
Mean weight ± SD	3.23 ± 0.48	3.06 ± 0.50		**0.032***
Gender of Baby				
Male	55 (65.5)	29 (34.5)	χ^2= 1.812	0.178
Female	43 (55.1)	35 (44.9)		
APGAR score in 1min				
< 7	9 (75.0)	3 (25.0)	Fisher's Exert Test = 1.141	0.285
≥ 7	89 (59.3)	61 (40.7)		
APGAR score in 5min				
< 7	1 (33.3)	2 (66.7)	Fisher's Exert Test = 0.943	0.331
≥ 7	97 (61.0)	62 (39.0)		
NICU admission			Fisher's Exert Test = 0.388	0.533
No	94 (61.0)	60 (39.0)		
Yes	4 (50.0)	4 (50.0)		
Child status at discharge				
Alive	98 (61.3)	62 (38.7)	Fisher's Exert Test = 3.101	0.155
Dead	0 (0.0)	2 (100.0)		

*χ^2 – Pearson's Chi-square; SD – Standard Deviation; * - Statistically significant value*

Table 6: Maternal Outcome of Pregnant women

Variable	Successful VBAC		Test Statistics	p-value
	No n=98 n (%)	Yes n=64 n (%)		
Complications Post Partum			Fisher's Exert Test = 2.281	0.516
No	96 (60.8)	62 (39.2)		
Yes	2 (50.0)	2 (50.0)		

Table 7: Logistic Regression Analysis of Predictive Factors Related to VBAC

Parameter	OR	p-value	95% CI	
Previous Vaginal Delivery	4.191	< 0.001	1.941	9.052
Previous VBAC	6.970	< 0.001	2.615	18.580
Planned mode of delivery	6.667	0.002	2.624	16.934
Bishop's Score at admission to Labour Ward	16.9	< 0.001	7.616	37.502
Complication during Labour	0.013	< 0.001	0.002	0.101
Birth Weight (Kg)	0.490	0.035	0.253	0.950

CI = Confidence Interval; OR = Odd Ratio

DISCUSSION

From our study, the success rate of VBAC was 50%, which is equivalent to the success rate reported in the study at Enugu, Nigeria[33]. Other documented VBAC success rates in different study locations within Nigeria include 53.4% in Ekiti [30], 66.9% in Sokoto[24] and 33.8% in Anambra[32]. Some reported rates in neighbouring African countries include 61.2% (Ghana)[38], 57.6% Congo[39] and 64.5% Ethiopia[40]. These VBAC success rates are lower than the RCOG's recommended success rate of 72-75%[25]. The higher success rates are common in resource-rich environments e.g. USA - 73%[13], Turkey - 73.2%[41] and Abu-Dhabi - 83.5%[42] but there have also been cases of high VBAC success rates in some resource-poor environments like the 72.5% VBAC success rate of Ebonyi State Nigeria reported by Esike *et al,* 2016 and the 86.5% success rate that occurred in a similar study conducted at our centre, UCH about 27years ago. In like manner, some resource-rich environments have shown relatively lower VBAC success rates in comparison to the RCOG guidelines[43]. It may therefore be inferred that it may be inappropriate to use VBAC success rate as a comparative index as the variation in study methodology in the different locations may be an influencing factor[39]. Likewise, the various demography and clinical features of the parturient may account for these diverse rates[13, 44]. Of keen interest is the comparison of our UCH current VBAC success rate of 50% to the 86.5% success rate from the previous study conducted between 1988 and 1993. This reduced rate may be related to differences in the methodology of the two studies or factors that have been related to global increase in CSR[9, 45] and

consequently reduced VBAC incidence rates (i.e. VBAC rates)[28].

This VBAC rate (VBAC incidence rate), which is the number of vaginal deliveries occurring out of the denominator of parturient with one previous CS within a given period[10, 26, 29], should not be confused with the earlier discussed VBAC success rates[10, 25]. VBAC rate may be a better index for measuring performances in various centres but unfortunately many of the studies did not state their VBAC rates, though the rates could be calculated in some studies with the number of first caesarean sections. In our study, we have a VBAC rate of 5.9% which interprets as 59 cases of VBAC occurring out of every 1000 cases with only one prior caesarean section.

This VBAC rate is calculated from the 64 cases of VBAC that occurred out of the 1,804 cases of 1st CS. There were 9,559 total deliveries during our study period of which 4,887 (51.12%) were CS giving a CSR of 51.12% which is close to the 46.5% CSR stated by Bello and Agboola, 2022[45]. This infers that UCH has a markedly high CSR in comparison to 10-15% optimal CSR recommended by the World Health Organisation (WHO)[8, 15]. This buttressed the need to improve on the VBAC rate of 5.9% found in UCH.

The VBAC rate for the earlier study of about 27yrs ago[34] could not be ascertained as the number of 1st CS was not stated. Reviewing the similar studies that had VBAC success rates stated above, it was observed that the study in Sokoto[24] that had VBAC success rate of 66.9% had derived VBAC rate of 4.4%, the study in Ekiti[30] with the 53.4% VBAC success rate had VBAC rate of 33.9%, that done in Enugu[33] with the 50% VBAC success rate had 12.7% VBAC rate while the study in Anambra with the VBAC success rate of 33.8% did not state the number of 1st CS, hence the VBAC rate could not be derived. From the studies in neighboring nations, we noted the VBAC rate of 24.2% for the study at Korle Bu Teaching Hospital (KBTH), Ghana which had VBAC success rate of 61.2%. Though the VBAC rate from this Ghana study is much higher than ours, it was stated in the study that there has been a downward trend in the VBAC rate of the hospital and an increasing trend in the CSRs. As UCH is noted also with higher trend of CSR[45], then this may explain our low VBAC rate. This is also in congruence with the global trend of higher CSR and lower VBAC rates[27].

There are several influencing factors accounting for these increasing CSR and declining VBAC rates. These includes but not limited to the following discussed. Some observed complications during VBAC e.g. uterine rupture, resulting in the discouragement of both the Obstetricians and the pregnant women with a prior caesarean section willing to undergo TOLAC. The earlier stated guideline requesting multidisciplinary presence (obstetrician, anaesthetist, midwives etc.) for women undergoing VBAC which became challenging in Teaching Hospitals where there were inadequate numbers of these specialist doctors and they had to cover multiple hospitals simultaneously. These reasons as reported by Caughey, 2018[10] and corroborated by ACOG[26] resulted in the observed increased CSR over the years 1996 to 2004 from 21% to 29.2% and the VBAC rates' decline of 28% to 9% for the same period. It has therefore become pertinent to explore modalities through which VBAC rates can be increased.

Lundgren *et al*, 2016[43] in a qualitative study involving focused group discussions with clinicians on the important factors that can increase VBAC rates concluded on four broad factors that can aid an increase in VBAC rates especially in environments with low VBAC rate like our centre. The factors are: The level and type of care offered during pregnancy and childbirth; organizational factors; the decision-making process for VBAC; and the strategies to reduce fears in all parties involved. A careful consideration of the parameters for VBAC is important. This includes detailed obstetric history and a positive attitude from all clinical workers (doctors and nurses) that are involved in the care of women with a prior caesarean delivery, paying attention to early follow up of women after their first CS. This organizational support will help to increase VBAC rates and likewise, resources should be available for women undergoing VBAC as also encouraged by WHO in her non-clinical intervention recommendations that can reduce unnecessary CS[46]. This will also enable the availability of consistent and unbiased information to all potential candidates of VBAC and build their trust in the clinicians and the hospitals of concern. This will also help reduce the associated fear in both parties.

The fear of litigation on the part of the clinicians if CS is not done on time[18] and the risk aversion associated with TOLAC on the part of the patients. The International Federation Gynecology and Obstetrics (FIGO)'s guideline on decision making about vaginal and caesarean delivery[47] is an important professional instrument that should be given attention to reduce the fear factor related to VBAC. The decision on the mode of delivery for a pregnant woman with one prior lower segment caesarean section with a non-recurring indication for the CS remains a topic of continuous debate.

There are two main outcomes in cases of VBAC that have received in-depth research in literatures, and these are the success rate of VBAC and the occurrence of uterine rupture[25, 27, 38, 47]. The success rate of VBAC from our study was 50% and this has been discussed above. There was no case of uterine rupture during our study period. This was not unusual as the documented incidence of uterine rupture complicating VBAC is 0.5 – 0.9% and this rate is even lower for cases with prior lower segment uterine incisions[25, 26]. The absence of a case of uterine rupture in our study could therefore be explained as positive result from our practice and policy for VBAC in UCH. In UCH, we exclude any woman with prior caesarean section that is not a lower segment caesarean section.

RCOG in her guideline, states a contraindication to VBAC for cases with prior classical incisions but VBAC allowed for those with previous inverted T or J incisions of low vertical uterine incisions[25]. We allow VBAC for only prior lower segment caesarean section in our centre currently. In our study centre, unlike

some other centres[48], augmentation of labour is not allowed during TOLAC and augmentation or induction of labour is also a factor that increases the risk of uterine rupture by up to 1.5[25]. VBAC is only allowed in women with one prior LSCS in our study centre unlike some study centres that allow VBAC for cases of 2 prior LSCS (called VBAC2). However, some studies have shown that there have not been any significant association of 2 prior LSCS with the increased risk of uterine rupture[25, 27, 38]. These studies have shown similar outcomes for both VBAC and VBAC2[49]. Notwithstanding, some other studies have reported increased uterine rupture rates of 1.8-3.7% for TOLACs after 2 prior LSCS[10].

Shehu *et al*, 2016 stated that the main complication from a TOLAC is the failure to achieve a VBAC which results in an emergency repeat CS[47]. And whenever, there is failed VBAC, there may be resulting maternal and or fetal complications. From our study, the failed VBAC was 50%. This figure, though equivalent to that quoted by Ugwu et al, 2014 and lower than the 66.2% from Eleje *et al,* 2019[32] , is higher than the figures from Ekiti[30] (46.6%), Sokoto[24] (33.1%), Ghana[38] (39.8%), Congo (42.4%) and Ethiopia[40] (36.5%). The contributory factors to this high value of the failed VBAC in our study environment may not be unrelated our low threshold for CS and our use of electronic fetal monitoring device for women in labour as explained by Shehu *et al*, 2019[24]. This reason can be substantiated by our finding of fetal distress 18 (18.4%), fetal bradycardia 6 (6.1%) and fetal tachycardia 9 (9.2%) that gave a total of 33 (33.7%) as the commonest indication for the CS performed after failed VBAC in our study. These findings were detected promptly by the fetal monitory device (cardiotocogram) which we make use of in our centre.

From our result, there was a case of intrapartum complication that proceeded to have a successful VBAC. This case was fetal distress that occurred possibly at the 2nd stage of labour. Also contributing to this high figure in failed VBAC in our centre is one of the points explained above by Lundgren *et al*, 2016 which is related to fear and risk aversion[43, 50]. As we noted from our findings that maternal request 24 (24.5%) is the single most common indication for CS in the study population. Some of the women that were already planned for VBAC came into the labour ward and after few hours of being in labour, they requested for a repeat CS instead of following through with their clinician's management.

The perinatal mortality rate from our study was 12.3 per 1,000 births. This rate was lower than the 19.1/1000 recorded in Sokoto[24], the 19.7/1000 recorded in Anambra[32] and the 17.1/1000 recorded for our study centre about 27yrs ago. However, the perinatal mortality rate associated with TOLAC as stated guidelines from ACOG is 1.3/1000[26] and 0.4/1000[25] from RCOG. These are the perinatal rates that are equivalently found among nulliparous in labour based on finding from series of study. The reason for this high perinatal rate in this study in UCH and also in other tertiary health centres in Nigeria may be related to the economic challenges in our environment and the related delays in carrying out emergency CS when there are observed complications during TOLAC. These result in delayed operation time from the occasional non-readiness of the operating theatre stemming from the non-availability of blood or anaesthetic coverage or power supply or some other essential consumables for the emergency surgeries. There is therefore the need for us to improve in reducing our perinatal mortality during TOLAC to values as close to the international standard values as possible. It is acknowledged from our study result that the perinatal rate in our centre has improved from 17.1/1000 of 27years ago to the 12.3/1000 in this current study. However, we need to improve further.

There was no recorded case of maternal death during our study but there was a 2.49% maternal morbidity. The maternal complications found postpartum were two cases of postpartum pre-eclampsia (1.23%) and two cases of postpartum haemorrhage (1.23%) and these complications were not statistically associated with VBAC. The guideline from ACOG has shown that VBAC is associated with fewer complications, but failed TOLAC has relatively more complications[26] with uterine rupture being the commonest complication[49, 51]. In our study, we had zero case of uterine rupture. There were cases of uterine rupture in the similar studies conducted in Sokoto[24] and Anambra[32]. And both had 2.5% and 2.6% respective complications of postpartum haemorrhage[24, 32]. There was also a 2.6% incidence of uterine rupture in our centre from the study conducted about 27years ago but no case of maternal death[34]. The relatively lower complications and the zero maternal death associated with VBAC in our centre may be related to our careful selection criteria for cases of one prior LSCS that eventual have a TOLAC.

The predictive factors, associated with VBAC, from our study included "previous vaginal delivery (OR = 4.191, *p*-value <0.001)", "Previous VBAC (OR = 6.970, *p*-value <0.001)", "being planned for VBAC (OR = 6.667, *p*-value 0.002)", "Bishop's score ≥7 at admission into the labour ward (OR=16.9, *p*-value <0.001)". These four predictive factors increased the likelihood of a successful VBAC in multiples of the stated odd ratios (OR). We found a predictive factor, Birth Weight (OR = 0.490, *p*-value 0.035) that had inverse relationship with the occurrence of a successful VBAC. Also from our study, the occurrence of complication during TOLAC had markedly reduced chances of a successful VBAC (OR = 0.013, *p*-value <0.001). Comparing the predictive factors from our current study with the findings from Ilesanmi *et al*, 1997's study[34] which was also carried in the same centre as ours, there was no statistical significance for successful VBAC for "previous vaginal delivery" (*p*-value 0.585), none for "previous VBAC", "being planned for VBAC" was not specified, and likewise "Bishop score", and "presence of intrapartum complications" were not specified.

Birth weight (*p*-value 0.268) was noted not statistically significant for successful VBAC in this previous study at UCH. This difference may imply that there have been improvements in the level of Obstetrics services delivery in UCH over the 27-year period. In the study conducted in Sokoto there were only two predictive

factors found[24]. Birth weight (*p*-value 0.015) and "cervical dilatation of >4cm at presentation" (*p*-value 0.001) which are only two of the seven predictive factors that we found for our centre. From the study by Aduloju *et al*, 2016 in Ekiti, the predictive factors found were "Previous vaginal deliver"y (*p*-value 0.01), "Previous VBAC" (*p*-value 0.01) and "cervical dilatation of more than 7cm at the prior CS"(*p*-value 0.01)[30]. Eleje *et al*, 2019's study[32] done in Anambra had "Previous vaginal delivery" (*p*-value <0.001) and "Previous VBAC" (*p*-value <0.001) as the predictive values of VBAC.

Viewing the predictive factors for successful VBAC from the lenses of the guidelines from RCOG, ACOG and detailed population based studies, it can be found that our finding of "previous vaginal delivery" and "previous VBAC" are in keeping with the international standards and "previous vaginal delivery", especially "previous VBAC", are precision predictors of successful VBAC giving up to 85-90% success rate[25]. These two predictive factors are also associated with a reduced risk of uterine rupture[10]. The lower birth weight of neonates as we also found in our study is one of the predictive factors stated by guideline for VBAC as associated with increased success rate for VBAC[14].

A high Bishop score is corroborated by many studies as a valid predictive factor of successful VBAC[25, 39, 52]. However, there was no documentation or any direct finding on being planned for VBAC. Being planned for VBAC can be well understood and explained. It puts to consideration all the predictive factors and guidelines in selecting women that should have VBAC and this invariably will cause an increased success rate for VBACs. In some centre, VBAC prediction models[27, 38] are used, aiding improved success rates in such centres. We currently do not have an official prediction model in our study centre. We make use of information from VBAC guidelines in educating and selecting the cases to undergo TOLAC in our centre. Possibly, if we formulate and start using a prediction model, it will increase our 50% VBAC success rate to the RCOG recommended figure of 72-75%[25]. Some other predictive factors, noticed from guidelines and literatures, that increase success rate for VBAC but we did not find them during our study include "greater maternal height", "maternal age less than 40years", BMI of less than 30kg/m^2, "gestation age at admission in labour ward of less than 40weeks", "spontaneous onset of labour", "vertex presentation", "white ethnicity" etc.

The knowledge about all these predictive factors in essential to guide the selection of parturient with previous LSCS for TOLAC and to help in counselling women with first caesarean section on the mode of delivery in subsequent pregnancy.

Strength and Limitation of the Study

Our study is a retrospective descriptive study, quantitative study design. This constitute partly the strength of the study as the results from the study can be easily generalised[35]. Adding to the strength of this study is the strict inclusion and exclusion criteria we used during the data collection process[35]. However, this study has some limitations. The first is related to the retrospective nature of our study which restricted us only to the information found in the old casefiles and we had no direct contact with any parturient during the study hence we missed the opportunity to strengthen the study based on the information of care that could have been directly gathered from the study population.

The second limitation relates with the study size which is small and limits the strength of generalisation of the result of our study[35]. Also, in this study, we only looked mainly at the population that was planned for VBAC. A more detailed looked at all the incidences of one prior LSCS that register their subsequent pregnancy at our booking clinic and followed up throughout the antenatal period till delivery and postnatal clinic will give us a better detail about VBAC, elective repeat CS, failed VBAC and emergency repeat CS with their associated predictive factors.

We therefore suggest that a Prospective Cohort study should be carried out in UCH in future for a more detailed and improved knowledge of VBAC rate, success rate, outcome and predictive factors associated with a successful VBAC. A large population-based prospective cohort study involving multiple secondary and tertiary health centres across Nigeria should also be considered to facilitate the drafting of an appropriate policy and national guideline on VBAC in Nigeria, which can serve as a domesticated material for obstetric practice of VBAC at all health centres in the nation. This will invariably bring about reduction in the rate of unnecessary CS, improve VBAC rate and success rate and reduce associated perinatal and maternal morbidity and mortality in Nigeria.

Conclusion

This study our VBAC rate and VBAC success rates are relatively low and the predictive factors for a successful VBAC can be used in the careful selection of pregnant women with one previous CS to undergo TOLAC. VBAC is safe, less expensive and it is an encouraging obstetrics practice that will reduce unnecessary caesarean delivery and improve the quality of lives of every woman.

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