Original Investigation

Outcome of trial of labour after one previous cesarean section at Federal Medical Centre, Bida, north central, Nigeria

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Abstract

Objective: To determine the success rate and feto-maternal outcomes following trial of labor among women with one previous cesarean section (C/S) seen at the Federal Medical Centre, Bida, Nigeria.

Material and Methods: This was a prospective cohort study among selected women with a previous C/S admitted for trial of labor after C/S over a 15 month period. Demographic and medical history data was collected by questionnaire. Women achieving vaginal birth after cesarean (VBAC) and those undergoing emergency repeat C/S (ERCS) were compared statistically for differences and associations based on a range of variables.

Results: A total of 150 women with one previous C/S were included. Out of 150 study participants, 105 (70.0%) achieved VBAC while 45 (30.0%) had ERCS. Women with previous vaginal delivery had higher odds of achieving VBAC. Poor progress of labor was the most common indication for ERCS (17/45; 37.8%). The most frequent maternal complication following abdominal delivery was post-partum hemorrhage (n=15; 33.3%) while perineal laceration (n=26;24.8%) was the commonest among women who achieved VBAC. The ERCS cohort suffered significantly more complications in comparison to those who had VBAC. Comparison of fetal outcomes by mode of delivery were comparable, except that neonates admitted into special care baby unit were more likely to have been born via ERCS (odds ratio 5.231; 95% confidence interval 1.247-21.950) compared to those born via VBAC. There was no perinatal or maternal mortality. However, one case of ruptured uterus was recorded.

Conclusion: These results demonstrated that good outcome following trial of labour is achievable among well selected women, even in low resource settings. [J Turk Ger Gynecol Assoc.]

Keywords: Cesarean delivery, TOLAC, fetal outcome, Nigeria

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Introduction

Cesarean section (C/S) is an important surgical procedure that is commonly performed in modern obstetrics. The World Health Organization advocated that operative delivery was important to reduce rates of death and permanent damage (1). It was estimated that assistance with delivery by C/S was necessary in at least 10% of pregnancies (1). The overall global C/S rate in 2018 was 21.1%, in Europe it was 25.7%, in Asia it was 23.1%, in Latin America and the Caribbean 42.8%, while it was 9.2% in Africa (1). In sub-Saharan Africa, the overall C/S rate is reported to be 5% (1-3) while it is 2.1% in Nigeria (4). Repeat C/S is a major contributor to this persistently increasing rate (1-6).

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To avoid many of the impediments associated with repeat C/S, trial of labor after C/S (TOLAC) is acknowledged as a safe alternative and which has contributed to a decrease in the overall C/S rate (6,7). Vaginal birth is associated with lesser complications, necessitates less anaesthesia, causes a lesser likelihood for postnatal morbidity. In addition, it is more affordable, enhances faster and improved bonding between mother and child, and entails a shorter hospital stay (1,6). These advantages are noteworthy, particularly in resource poor locales where socio-cultural aversion to cesarean birth is common (1,6-8).

To address the increasing cesarean birth rate, the American College of Gynecologists (ACOG) recommended that women with a previous lower segment C/S (LSCS) should be allowed TOL, after excluding contraindications (9). Analysis of the outcome of labor in these patients demonstrated vaginal delivery to be safe (6,7,9). A vaginal birth after cesarean success rate of 3.4%-85% was reported in a meta-analysis performed among countries in Sub-Saharan Africa (10), while in Nigeria this rate ranged between 24.3-72.5% (5,11-13). Nevertheless, wide disparities in TOLAC rates still persist between hospitals and practitioners.

Generally, one of the reasons why obstetricians hesitate to employ TOLAC is the risk of ruptured uterus and associated complications, such as the need for hysterectomy and poorer fetal outcome-but this can be circumvented by swift diagnosis and quick intervention (12-15). However, evidence showing the safety of TOLAC when used in consideration of appropriate guiding principles has been accessible since the early eighties (8,9). TOLAC offers clear-cut benefits over a repeat C/S since the operative morbidity, and mortality are totally eradicated, the duration of hospital admission is much shorter, and it is relatively cheaper (12,16,17). Apart from these benefits, TOLAC also provides an opportunity to reduce the rate of abdominal delivery. This can be addressed to some extent by eschewing primary C/S done without clear-cut indications, but more significantly by resorting to TOLAC.

Justification for the study

According to the recent Nigeria demography health survey, only 49.7% of pregnant women (including those with previous C/S) in north central Nigeria delivered within health facilities and one of the reasons for this include the fear of C/S. Women may resort to traditional birth attendants and this may be to their detriment. Hence the need to evaluate the efficacy and safety of TOLAC. In addition, this specific research topic has not been investigated in Nigeria previously. The outcomes of this study will help when counselling this cohort in the future.

Aim and objectives

Th aim of the present study was to determine the efficacy of TOLAC and to assess feto-maternal outcomes of TOLAC among patients with a previous C/S admitted for intrapartum care at the Federal Medical Centre, Bida (FMCB).

Specific objectives:

To determine the success rate of VBAC following TOL at FMCB.

To evaluate the various indications for repeat C/S following failed TOLAC at FMCB.

To determine the influence of history of previous vaginal delivery on the success rate of VBAC following TOL at FMCB.

To compare maternal complications between women who achieved VBAC and those who had emergency C/S following failed TOL in order to identify risk factors associated with failed TOL.

To compare fetal outcome among babies who were delivered vaginally and those via emergency repeat C/S (ERCS) with the intention of identifying factors associated with fetal morbidity associated with failed TOL.

Material and Methods

Study design

This was a prospective cohort study carried out amongst women with a history of previous C/S admitted for intrapartum care at FMCB, over a 15-month period in 2023-2024.

Setting

This study was carried out at the obstetrics and gynecology department among women with one previous LSCS scar who were admitted for TOLAC. FMCB is a federal tertiary institution located in the town of Bida, a semi-urban settlement in Niger state, north central Nigeria. Beside Minna, the state capital, Bida is the second largest city in the state, with a projected population of 266,008 by 2020 as reported in the 2006 National Census. Bida is located within the southern Guinea Savannah Zone of Nigeria. The majority of the populace are Muslim and the most common occupation is farming. This community is 240 km from Abuja and about 90 km from the state capital. FMCB receives referrals from primary and secondary health facilities in the state as well as from neighboring states. It has a capacity for 350 inpatients and the obstetrics and gynecology department provides emergency obstetrics care, postnatal care and general gynecological services.

Study population

The study population were pregnant women with one previous C/S at term, admitted in the active phase of labor at FMCB during the data collection period.

Sampling technique

A systematic sampling method was employed. A structured, piloted questionnaire was administered to consenting women from 1st October 2023 through 31st December 2024.

Sample size

A standard statistical formula [$n = (z)^2 p (1–p)/d^2$] was employed to calculate the sample size. The final sample size for the study was n=193.

Selection of participants

Around 30 patients with previous C/S scar were managed monthly in the labor ward in the year preceding the study. The study was planned to take 15 months. Thus, there was a combined total of 450 patients expected over the study period. Systematic sampling was used. Using this estimated population of 450, the sampling interval (K) employed was 450/193=2.331 ≈ 2. Every other patient was selected to make up to the required three patients per week.

The first woman was picked by simple random sampling. Thereafter, the remaining subjects were selected through systematic sampling, at a fixed interval of every other number. The participants were recruited for the study after signing or thumb printing a written consent.

Inclusion criteria

The inclusion criteria were: women in spontaneous onset of labour; with a prior C/S; adequate pelvis and average-sized singleton babies in vertex presentation (as determined by clinical and ultrasonic examination); who had no other uterine scars, medical conditions, obstetrics complications or any condition that contradicted vaginal delivery.

Exclusion criteria

All women with classical C/S, ≥2 previous LSCS, previous ruptured uterus, hysterotomy, myomectomy, intrauterine fetal death, or placental or fotal aberrations were excluded. Recruitment of patients for TOLAC was based on the 2019 ACOG recommendation (9).

Procedure

An in-depth sociodemographic characteristics and medical history that comprised age, educational status, occupation, parity, number and sequence of vaginal deliveries, reason(s) for previous LSCS, intra- and post-operative findings and impediments were documented. LMP was noted to determine the gestational age.

A detailed general physical examination, and systemic as well as obstetric examination was documented. Abdomen examination was carried out to confirm gestational age and identify fetal position, rule out any malpresentation and estimate fetal weight. Digital vaginal examination was also performed to determine cervical dilatation, effacement, position, consistency and fetal station in addition to the suitability of each pelvis for vaginal delivery.

Routine investigations were performed for all participants. Ultrasonography was performed to ascertain fetal maturity, size, lie and presentation, adequacy of liquor volume, localization of placenta and to exclude fetal abnormalities.

Having documented the findings from history and physical examination, patents were admitted for intrapartum care and consequently managed as high-risk pregnancies. An intravenous (IV) line was placed to obtain blood samples for full blood count, cross-matching and collection of two units of blood per patient and to test random blood sugar. Five percent dextrose saline infusion was given to supply energy and maintain IV access patency. The anesthetiologist and neonatologist were notified and the labor ward theatre was prepared for any emergency C/S. During intrapartum care, parturients were meticulously monitored for signs of threatening uterine rupture. Fetal surveillance was carried out using a Pinard stethoscope and cardiotocogrpahy was deployed when necessary. Progress of labor was carefully monitored by intermittent abdominal and vaginal examination as per departmental protocol. Ventouse was used when needed. Patients who had unsuccessful TOL, had repeat emergency C/S. Blood loss at C/S or vaginal birth was objectively assessed to quantify the amount of loss to identifyprimary postpartum hemorrhage (PPH). The cut-off point used was 1000 mL at C/S and 500 mL after vaginal birth.

Following delivery, newborn characteristics, including time of delivery, birth weight, Apgar scores at first and fifth minutes and special care baby unit (SCBU) admission as well as indication(s) for the admission were documented. All parturients were monitored through delivery and for at least seven days postpartum.

Statistical analysis

Study data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 23.0 (IBM Inc., Armonk, NY, USA). The major outcome measured was the delivery outcome in the index pregnancy. Descriptive statistical analysis was used; data was analyzed using percentage, mean, standard deviation, and bivariate analysis. A p value <0.05 was considered statistically significant.

Ethical aspects

The research protocol was submitted for review and this study was approved by the FMCB Health Research Ethics Committee (approval number: 2/7/25, date: 16.04.24). The patients were informed about the reason for the study; prospective

participants were informed of the voluntary nature of the study and the respondents were free to withdraw from participating at any time without giving any reason. The participants were assured that this action will not affect the services they were to receive.

Results

Two thousand four hundred and seventy seven patients delivered at FMCB over the study period. Of the 2,477 deliveries, 763 (30.8%) women had C/S for various indications while 1,714 (69.2%) women delivered vaginally, giving a C/S rate of 30.8%. Out of 193 women with one previous C/S who were recruited for TOLAC, only 150 (150/193=77.7%) questionnaires were correctly completed and were included in the final analysis. All the patients were married (100%).

Within the study cohort, 105 (70.0%) achieved vaginal delivery while 45 (30.0%) had ERCS. Out of the 105 patients who achieved VBAC, 79 (75.2%) had previous history of vaginal delivery, while 26 (24.8%) had no history of vaginal delivery. Of these 79, 44 (55.7%) were before C/S, while 35 (44.3%) were previous VBAC. In contrast, of the 45 patients that had ERCS, 11 (24.4%) had previous SVD before C/S, 5 (11.1%) had previous VBAC, while the remaining 29 (64.4%) had never delivered vaginally (Figure 1).

The mean age of the parturients was 30.4±4.91 years, ranging from 20-48 years. The parity of the patients ranged from 2-9, with a mean of 3.5±1.6. One hundred and twenty-one patients (80.7%) were Muslim, while 29 (19.3%) were Christian. Seventy (46.7%) were housewives, 30 (20.0%) were traders, while 25 (16.6%) were civil servants (Table 1).

Figure 2 shows the various indications for the ERCS. The leading indications for the ERCS were poor progress of labor in 17 women (37.8%), cephalopelvic disproportion (CPD) in 8 (17.8%), and fetal distress in 6 (13.3%). The eight cases of CPD were incidental findings in parturients with adjudged adequate pelvis; however, the clinical and ultrasound estimation of average sized fetuses turned out to be underestimation as the mean birth weight in this cohort was 3.85±0.04 kg, and this accounted for lack of descent of the babies through the birth canal.

Among the 95 women with a history of vaginal delivery (group I), 79 of them (83.2%) achieved successful VBAC while 16 (16.8%) had ERCS. The remaining 55 women with no history of vaginal delivery (group II), 26 of them had successful VBAC (47.3%), while 29 (52.7%) had ERCS. Logistic regression analysis identified that a history of previous vaginal delivery was an independent determinant of successful outcome of TOLAC. Furthermore, mothers with a history of previous vaginal delivery had nearly six times higher odds of having successful VBAC compared to mothers without history of vaginal delivery [odds ratio (OR) 5.507; 95% confidence interval (CI) 2.590-11.709] (Table 2).

The patients who had ERCS suffered more complications than those who achieved successful vaginal delivery. Whereas maternal complication rate was 73.2.1% in ERCS, it was 28.6% among those that had vaginal delivery. The commonest maternal complication following abdominal delivery was PPH

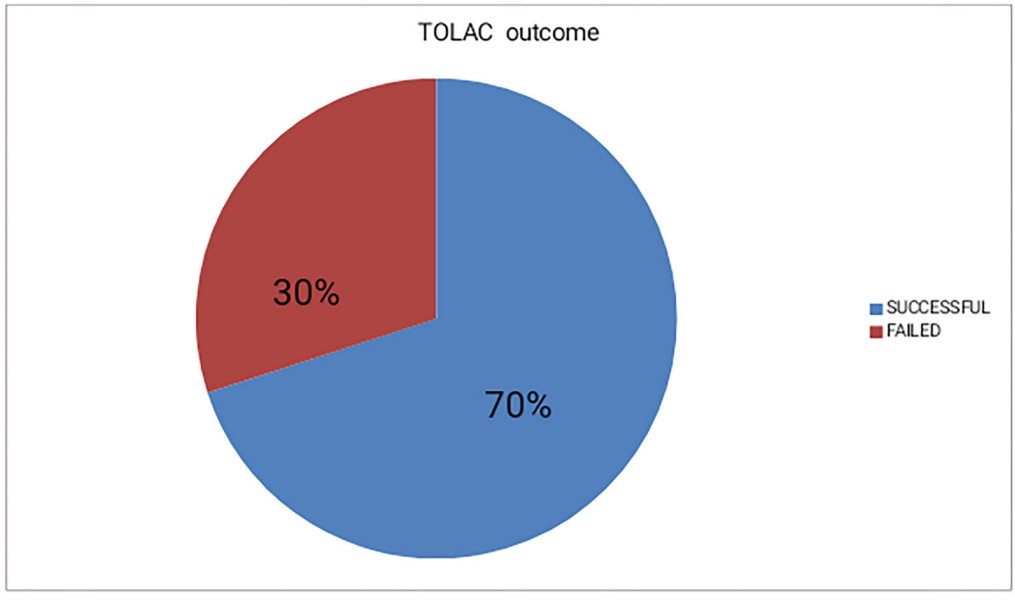

Figure 1. Outcome of TOLAC
TOLAC: Trial of labor after cesarean section

Table 1. Socio-demographic characteristics of women who underwent TOLAC

Variables	n (%)
Age group (years)	
20-24	16 (10.7)
25-29	51 (34.0)
30-34	53 (35.3)
35-39	25 (16.7)
≥40	5 (3.3)
Parity	
Para 2	56 (37.3)
Para 3-4	60 (40.0)
Para ≥5	34 (22.7)
Religion	
Islam	121 (80.7)
Christanity	29 (19.3)
Ethnicity	
Nupe	117 (78.0)
Yoruba	10 (6.7)
Igbo	14 (9.3)
Hausa	4 (2.7)
Others	5 (3.3)
Level of education	
Quarniic	27 (18.0)
Primary	21 (14.0)
Secondary	45 (30.0)
Tertiary	57 (38.0)
Occupation	
Housewife	70 (46.7)
Trader	30 (20.0)
Civil servant	25 (16.6)
Artisan	9 (6.0)
Schooling	13 (8.7)
Applicant	2 (1.3)
Others	1 (0.7)

TOLAC: Trial of labor after cesarean section

(n=15; 33.3%) while perineal laceration [first degree 19 (18.1%) and second degree 7 (6.7%)] was the commonest complication among women who achieved VBAC. Furthermore, women who underwent ERCS also exhibited other complications, including bladder injury, scar dehiscence, respiratory tract infection as a complication of general anaesthesia and abnormally adherent placenta. All the patients that suffered PPH following VBAC were managed conservatively, while 5 out of the 15 among the women who had ERCS, received blood transfusion. The difference in maternal complications attained statistical significance (Table 3).

Table 4 shows comparison of fetal outcome between participants who achieved vaginal delivery following TOLAC and those who required ERCS. The outcomes amongst infants of parturients who attained successful TOL and those who had repeat C/S were comparable except for the SCBU admission rate. Neonates admitted into SCBU were more than fivetimes more likely to have been born via ERCS after TOL (OR 5.231; 95% CI 1.247-21.950) compared to those born via VBAC.

The overall mean birth weight of infants in the present study was 3.1±0.4 kg. While the mean birth weight of neonates delivered vaginally was 3.18±0.42 kg, those delivered via ERCS was 3.21±0.29 kg. Though the babies in ERCS group tended to be bigger, the difference was not significant.

Discussion

The results of the present study demonstrated that TOLAC at FMCB had a success rate of 70.0%, while 30.0% had ERCS. Notably, the study identified a history of previous vaginal delivery as an independent determinant of successful vaginal birth following TOLAC. This study clearly demonstrated that TOLAC at FMCB has good outcome and is associated with minimal feto-maternal morbidity. However, ERCS arising from failed TOLAC was significantly associated with increased maternal complications and neonatal SCBU admission.

The VBAC success rate of 70.0% was consistent with results obtained in a study from Addis Ababa (18), but higher than reported figures from previous studies in Nigeria (11-13). The reason for the observed difference may be due to this being a prospective study in which patients were selected based on department protocol for TOLAC coupled with thorough intrapartum fetal monitoring. Generally, TOLAC success rates vary depending on the indications for the previous C/S, patient selection, and patient's obstetric history, as well as availability of facilities for intrapartum fetal monitoring that facilitate prompt diagnosis of fetal distress (2,8,13). Overall, our findings are in agreement with the generally reported VBAC range of 54-75%. (13,14).

As illustrated in the present study, a history of previous vaginal delivery was an independent determinant of successful outcome of TOL. Mothers with a history of previous vaginal delivery were more than five times more likely to have VBAC compared to mothers without a history of vaginal delivery. This finding is again in agreement with results reported from previous studies (7,19).

TOLAC failure rate of 30.0% recorded in this study is similar to the rate of 33.1% reported from Sokoto (13), but lower than reported figures from other previous studies in Nigeria (11,19). Nevertheless, the failure rate we found is in the middle of this rate reported previously of 20-40% of those that attempted TOLAC will fail (3,10,12,13,16).

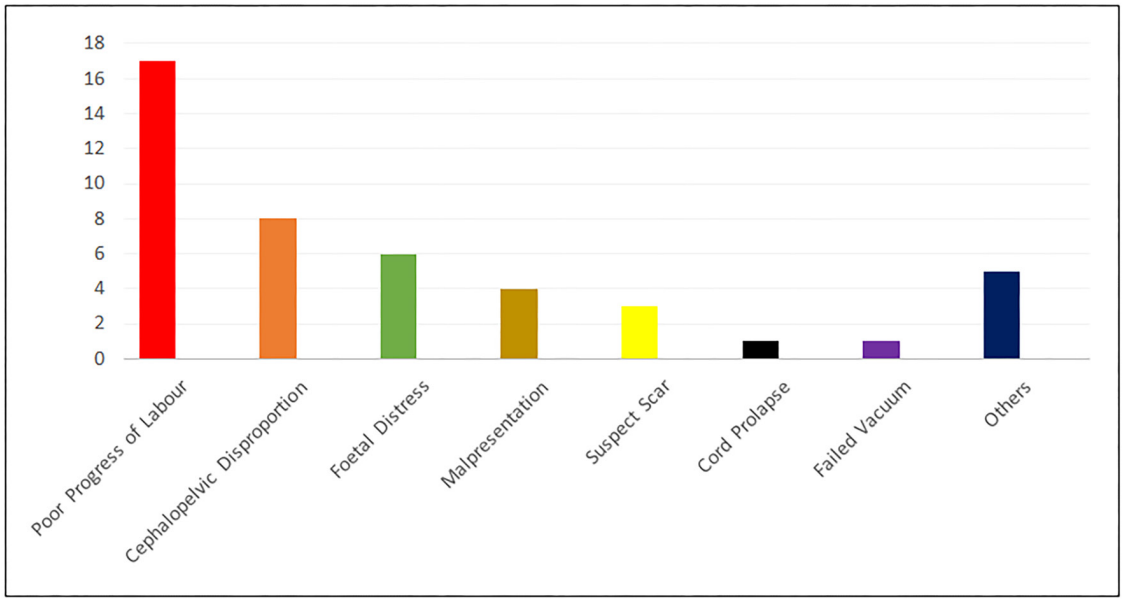

Figure 2. Indications for emergency repeat cesarean section
C/S: Cesarean section

Table 2. Bivariate logistic regression analysis of history of previous vaginal delivery among women who underwent TOLAC

Outcome of TOLAC	Group I (previous VD)		Group II (no previous VD)		OR (95% CI)	p-value
	95 (%)	95 (%)	55 (%)	55 (%)		
Successful VBAC	79	83.2	26	47.3	5.507 (2.590-11.709)	0.000
Failed TOL-LSCS	16	16.8	29	52.7	1	

VD: Vaginal delivery, **CI: Confidance interval, OR: Odds ratio, VBAC: Vaginal birth after cesarean, TOLAC: T**rial of labor after cesarean section, LSCS: Lower segment cesarean section

Table 3. Comparison of maternal complication between women who had VBAC and those who had emergency C/S (failed VBAC)

Complication	VBAC (n=105) n (%)	Emergency C/S (n=45) n (%)	p values
PPH	4 (3.8)	15 (33.3)	<0.001
Perineal laceration	26 (24.8)		<0.001
First degree	19 (18.1)	0 (0)	
Second degree	7 (6.7)	0 (0)	
Bladder injury	0 (0)	4 (8.9)	0.002
Abdominal wound sepsis	0 (0)	1 (2.2)	0.125
Scar dehiscence	0 (0)	4 (8.9)	0.002
Uterine rupture	0 (0)	1 (2.2)	0.125
Respiratory tract infection	0 (0)	4 (8.9)	0.002
Endometritis	0 (0)	1 (2.2)	0.125
Urinary tract infection	0 (0)	1 (2.2)	0.125
Abnormally adherent placenta	0 (0)	2 (4.4)	0.030

C/S: Cesarean section, VBAC: Vaginal birth after cesarean
PPH: Postpartum hemorrhage

Table 4. Bivariate logistic regression analysis of fetal characteristics among women who underwent TOLAC

Variable	Outcome of TOLAC		OR (95% CI)	p-values
	Successful 105 (%)	Failed 45 (%)		
Apgar scores at 1 minute				
0-3	2 (1.9)	1 (2.2)	1	
4-6	6 (5.7)	8 (17.8)	0.742 (0.065-8.438)	0.810
≥7	97 (92.4)	36(80.0)	2.667 (0.193-36.756)	0.464
Apgar at 5 minutes				
≤6	2 (1.9)	3 (6.7)	1	
≥7	103 (98.1)	42 (93.3)	0.272 (0.044-1.686)	0.612
SCBU admission**				
No	102 (97.1)	38 (84.4)	1	
Yes	3 (2.9)	7 (15.6)	5 231 (1.247-21.950)	0.024*
Birth weight (kg)				
≥4.0	1 (1.0)	0 (0)	1	
2.5-3.9	100 (95.2)	44 (87.8)	0.482 (0.100-2.318)	0.363
<2.5	4 (3.8)	1 (2.2)	0.289 (0.051-1.646)	0.162

*Statistically significant
**All were admitted on account of birth asphyxia save one in ERCS group that was admitted for observation
OR: Odds Ratio, CI: Confidance interval, TOLAC: Trial of labor after cesarean section

In a similar prospective study carried out in south-east Nigeria, the most common indication for ERCS after failed TOL was fetal distress, suspected macrosomia and malpresentation (19). In our study, poor progress of labor was the most common indication for ERCS, followed by CPD and fetal distress.

Patients who had ERCS in the present study had significantly more complications than women who achieved VBAC. The commonest complication following vaginal delivery was perineal laceration followed by PPH, while the commonest complication in ERCS group was PPH, followed by bladder injury and scar dehiscence. This result supports findings that failed TOLAC leading to repeat C/S is linked to higher maternal morbidity (1,3,9,20). A study from Port Harcourt, Nigeria reported that the most common complication was perineal laceration (21). However, the perineal laceration rate these authors reported of 31.4% was higher than 24.8% recorded in the present study. The scar dehiscence rate of 8.9% recorded in the present study was higher than the 4.6% reported from

Beirut, Lebanon (22). However, the uterine rupture rate of 0.67% was similar to the 0.6% reported from Sokoto, also in Nigeria (13).

Neonatal outcomes in the VBAC group and in the ERCS group were similar except for the rate of SCBU admission. Following TOL, neonates admitted to SCBU were more than five times more likely to have been born by ERCS. Nine babies (6.0%) suffered birth asphyxia in our study which was lower than the 8.55% reported in the Port Harcourt study (21). Unlike the study from Port Harcourt where there were varied indications for SCBU admission, birth asphyxia was almost the only indication for SCBU admission in our study.

Good feto-maternal outcomes were recorded following TOL among the participants of the present study, and there was no case of perinatal or maternal mortality. However, there was one case of ruptured uterus, similar to the reported outcomes in previous studies (5,8,11). Quick intervention and prompt management of labor cases deviating from normal progress greatly contributed to this. This suggests that in well selected cases, good outcome is a possibility for TOL even in low resource settings.

Studt limitations

The strength of this study lies in its prospective nature. The main limitations of our study was that it was underpowered and single center which will compromise the generalizability of the key findings.

Conclusion

This study demonstrated a high success rate of VBAC following TOL with good maternal and fetal outcomes. Of note, women with a personal history of previous vaginal delivery had significantly higher odds of achieving VBAC. However, a failed TOLAC leading to ERCS was significantly associated with SCBU admission. A second key finding of our study was that good outcome following TOL is achievable, even in low

resource settings. It is recommended that in low resource settings carefully selected women with a history of C/S may be encouraged to attempt TOLAC, especially those who had achieved a previous vaginal delivery. Though there appears to be a very low risk of uterine rupture, good case selection and prompt management of poorly progressing labor will help to minimize this risk. Larger, multicenter, population-based studies are necessary to alleviate the limitations of the present study and validate our findings.

Ethic

Ethics Committee Approval: *This study was approved by the Federal Medical Centre, Bida Health Research Ethics Committee (approval number: 2/7/25, date: 16.04.24).*

Informed Consent: *The patients were informed about the reason for the study; prospective participants were informed of the voluntary nature of the study and the respondents were free to withdraw from participating at any time without giving any reason.*

Footnotes

Author Contributions: *Surgical and Medical Practices: F.B.A., Concept: A.O.A., Design: F.B.A., Data Collection or Processing: A.S.A., Analysis or Interpretation: A.S.A., Literature Search: A.O.A., Writing: A.O.M.*

Conflict of Interest: *No conflict of interest is declared by the authors.*

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