Risks associated with subsequent pregnancy after one caesarean section: A prospective cohort study in a Nigerian obstetric population

CA Iyoke, GO Ugwu, FO Ezugwu[1], OL Lawani[2], HE Onah

Departments of Obstetrics and Gynaecology, University of Nigeria Teaching Hospital, Ituku-Ozalla, [1]Enugu State University Teaching Hospital, Enugu, Enugu State, [2]Federal Teaching Hospital, Abakaliki, Ebonyi State, Nigeria

Abstract

Context: Aversion for cesarean delivery is common in our practice and risks associated with caesarean section may contribute to this phenomenon.

Objective: The objective of this study was to estimate the risks associated with subsequent pregnancies in women with one previous cesarean section in a low resource setting.

Setting and Design: A prospective cohort study carried out at two major tertiary maternity centers in Enugu.

Materials and Methods: Maternal and perinatal outcomes were compared between women with one previous caesarean and women who had only previous vaginal deliveries.

Statistical Analysis Used: Analysis was performed with SPSS statistical software version 17.0 for windows (IBM Incorporated, Armonk, NY, USA) using descriptive and inferential statistics at 95% of the confidence level confidence.

Results: A total of 870 women were studied. These were divided into 435 cases and 435 controls. The absolute risk of cesarean section in a subsequent pregnancy in women with one previous cesarean was 75.8% (95% confidence interval [CI]: 72.0, 80.0). Cesarean section was significantly commoner in women with one previous cesarean compared with those who had previous vaginal delivery (Relative risk [RR] =3.78; 95% CI: 1.8, 6.2). Placenta praevia (RR = 5.0; 95% CI: 2.6, 7.2.), labor dystocia (RR = 6.4, 95% CI: 3.2, 11.2) intrapartum hemorrhage (RR = 5.0, 95% CI: 2.1, 9.3) primary postpartum hemorrhage (RR = 5.0, 95% CI: 1.5, 4.3.), blood transfusion (RR = 6.0, 95% CI: 3.4, 10.6) and Newborn special care admission (RR = 2.5; 95% CI: 1.1, 4.9) were significantly more common in women with one previous cesarean compared with those with previous vaginal deliveries. The absolute risk of failed trial of vaginal birth after a cesarean was 45% (95% CI: 38.5, 51.5).

Conclusion: Women who have one previous C-section face a markedly increased risk of repeat caesarean sections and feto-maternal complications in subsequent pregnancies. There is a need for doctors in Nigeria to be mindful of these risks while offering primary cesarean section in this low resource setting.

Key words: Absolute risks, pregnancy after caesarean, primary cesarean section

Date of Acceptance: 05-Nov-2013

Introduction

The advantages of vaginal delivery over cesarean section are well-documented in the literature.[1-3] However, there has been an increasing rate of cesarean operation world-wide. In order to stem this tide, practice protocols are now encouraging efforts to reduce the rate of caesarean deliveries.[4-6] These efforts have been given a boost by a recent meta-analysis, which showed a success rate of more than 70% for vaginal birth after two previous cesarean sections.[7]

Address for correspondence:
Dr. Chukwuemeka A Iyoke,
Department of Obstetrics and Gynaecology,
University of Nigeria Teaching, Hospital,
Ituku-Ozalla, Enugu State, Nigeria.
E-mail: caiyoke@yahoo.co.uk

Access this article online	
Quick Response Code:	**Website**: www.njcponline.com
	DOI: 10.4103/1119-3077.134035
	PMID: 24909467

In Nigeria, the case against caesarean delivery is made worse by a combination of the cultural perception that caesarean delivery represents reproductive failure and its high cost relative to vaginal delivery.[8,9] These two factors are largely responsible for the aversion for cesarean section, which has been well-documented in our setting.[8-13] Despite this, it appears that obstetricians in our area may not be giving sufficient chances for vaginal delivery to women with previous caesarean section because of limited resources for feto-maternal monitoring during any attempt at vaginal birth after a caesarean (VBAC). Consequently about a quarter or more of all deliveries in our center are currently by cesarean section and the leading indication is previous caesarean delivery co-existing with any more obstetric complication.[14]

Although there have been several published studies on VBAC section in Nigeria,[9,11] none has estimated the risks associated with subsequent pregnancy following a caesarean section. Given that even having formal education does not seem to improve acceptance of caesarean section in our area,[8] there is a need to take a closer look at the impact of a caesarean section on the obstetric future of women in this setting. In order to estimate the risks associated with subsequent pregnancies in women who had one previous caesarean, we conducted a prospective cohort study to compare outcomes of pregnancy following one previous caesarean with outcomes following previous vaginal delivery.

Materials and Methods

The study was carried out in the obstetric units of the University of Nigeria Teaching Hospital Ituku-Ozalla, Enugu, and Enugu State University Teaching Hospital, Park Lane, Enugu, Southeast Nigeria. The two centers are referral centers for high risk obstetric cases in South Eastern part of the country and beyond. They operate identical protocols for the conduct of antenatal care and delivery. They have a combined annual delivery rate of about 3200 (Hospital Delivery databases).

This was a prospective cohort study which took place from January 1, 2010 to December 31, 2012. The study population included all pregnant women who registered for antenatal care in the study centers during the study period. These are usually educated urban dwellers seeking care from specialists and coming to these hospitals by self-referral and also women referred from peripheral hospitals because of complicated pregnancies.

The sampling technique was purposive and patients were enrolled consecutively in the booking clinic. There was individual counseling of each woman recruited for the study, after which her written consent was obtained. Cases were defined as pregnant women who had one previous caesarean section. Controls were defined as pregnant women who had only previous vaginal birth and were matched for age and parity with the cases. For every booking woman with one previous caesarean delivery, a woman with only previous vaginal delivery matched with the woman with a previous caesarean in age and parity was selected as control. Each study participant was given a number (or tag) to enable specific follow-up. Both cases and controls were followed-up from booking until delivery and subsequent discharge. Women who had two or more cesarean sections, myomectomy or uterine rupture as well as unbooked (unregistered) women who present in labor were excluded from the study.

Following booking in the antenatal clinic, women who had no complications were seen subsequently every 4 weeks until 28 weeks, fortnightly until 36 weeks and weekly until the onset of labor or elective delivery. Women with complications were usually seen more frequently depending on their conditions; alternatively they could be admitted into the antenatal ward for in-patient care. For every woman, a birth plan was formulated at booking and this could be modified as events unfolded during the prenatal period. At every antenatal visit a short history of events since their last visit was taken by the midwife, urine dipstick test for protein, sugar and ketones were done and measurement of weight and blood pressure were taken. Results of previous investigations were retrieved. All these were documented before the woman sees the doctor who reviews the data and conducts a physical examination on the patient. The symphysio-fundal height, fetal lie, position, presentation and fetal heart tones were documented. Further steps in the woman's management were then outlined. Ultrasound scan was done as indicated. The woman was then given another appointment. In order to improve access to blood if needed in the course of antenatal care or during delivery, a policy of antenatal blood donation was operative in both study centers. Every booking woman was asked to provide a donor of 1 unit of blood, which could be used for her in case it was needed: A woman who has donated blood antenatally was entitled to any number of units she required during delivery. Women were counseled that those who did not need the blood for their delivery forfeited donated blood voluntarily. For women with one previous caesarean section, three of the authors (ICA, EFO and UGO) took decisions independently in their respective consultant-led units on whether to offer each woman a trial of vaginal birth or elective repeat caesarean section. It was agreed prior to the commencement of the study that women who had the following criteria should be delivered by elective repeat caesarean section: A recurrent indication for the primary C-section, valid contra-indication for vaginal delivery, need for induction of labor and patients' wish.

Women were admitted into the labor ward upon presentation with regular uterine contractions and the finding of at least 3 cm cervical dilatation. All events of labor were charted on

a partograph for all women in labor. Blood was grouped and saved for women with high risk labors. Monitoring in the first stage of labor involved half-hourly check of maternal BP, pulse rate, temperature and dipstick examination of urine as voided. Fetal heart rate was monitored with a Pinard's stethoscope ¼ hourly for women with high risk labors, otherwise half hourly. Vaginal examination was performed 2 h after admission and then 4 hourly until the onset of 2nd stage of labor. Third stage of labor was managed actively for every woman using early cord clamping, continuous cord traction and administration of oxytocics with the delivery of the baby. The duty senior registrar was in charge of supervising every labor in collaboration with the most senior midwife on duty. Complications were promptly reported to the on-call consultant who could intervene if there was a need. The mother and the new-born were observed for at least 24 h after vaginal delivery while those delivered by caesarean section were discharged on the 5th to 7th day if they had no complication. Three of the authors (ICA, UGO and EFO) were informed whenever any of the enrolled patients presented for delivery.

Trial of VBAC was done for women with only one previous caesarean section, vertex presentation, estimated fetal weight <4 kg, clinically adjudged adequate pelvis and no other contra-indication for vaginal delivery. Only surgical induction of labour by amniotomy was done when induction was indicated in women with one previous caesarean. Oxytocic drugs (syntocinon or prostaglandins) were not used for induction or augmentation. In addition to the routine monitoring described above, all women undergoing trial of VBAC were specifically observed for vaginal bleeding, scar tenderness and colour of liquor every 30 min. When fetal heart beats was difficult to hear by Pinard's stethoscope, a portable Doppler (Sonicaid) was used. Alternatively, ultrasound examination was conducted in the labor ward. There was no cardiotocograph. The trial of VBAC was terminated if cervical dilatation graph showed any deviation to the action line or there was scar tenderness, unexplained maternal high pulse rate and fresh vaginal bleeding. Another reason for terminating trial of VBAC was fetal distress decided by the presence of fresh thick meconium stained liquor, irregular fetal heart beats and/or heart beats of <120 or more than 160/min in the absence of any obvious cause.

Data collection was by the use of a pro forma designed for the study. Antenatal data collection for patients enrolled into the study was done 2 weekly with the assistance of resident doctors in the two participating consultant-led units. Data obtained included social-demographic characteristics, past obstetric history including details of the previous caesarean section where applicable, complications of antenatal, delivery and post-delivery periods as well mode of delivery and neonatal complications. Information was sought directly from the women and recorded in a proforma.

All data collected were keyed into Statistical Package for Social Science (SPSS) computer software version 17.0 (IBM corporation, Armonk, NY, USA) for analysis by descriptive and inferential statistics at 95% confidence level. The main outcome measures were the absolute and relative risks of cesarean delivery in the index pregnancy. Secondary outcome measures included the relative risks of prenatal complications, postpartum complications as well as fetal outcomes. The frequencies of prenatal, delivery, postpartum and neonatal outcomes were compared between cases and controls. Tests of significant difference were done with Chi-square test or Fishers exact test where applicable. Means of variables were compared with the Student *t*-test. Absolute risks of significant prenatal, delivery and postnatal complications in the index pregnancy were calculated. In addition, the relative risks of these outcomes compared with controls were calculated. Nearly, 95% confidence intervals were estimated. $P \leq 0.05$ were considered to be significant. The study was approved by the Research Ethics Committees of the study hospitals.

Results

A total of 1000 women made up of 500 women with one previous caesarean and 500 matched women with previous vaginal deliveries were enrolled for the study. Of the 500 women with one previous caesarean, 44 women were lost to follow-up. A further 21 women were excluded from the analysis due to the loss of their matched controls to follow-up. A total of 870 women were therefore studied; these were made up of 435 women with one previous cesarean section (cases) and 435 women with previous vaginal deliveries (controls). The mean age of women with one previous caesarean was 32 ± 4.7 years and women with previous vaginal deliveries 32.6 ± 4.5 years. Table 1 shows a comparison of the socio-demographic characteristics of respondents. Women with one previous caesarean section and those with previous vaginal deliveries did not differ in most socio-demographic characteristics.

Among women with one previous cesarean section, the commonest indications for primary caesarean section were poor progress of labor and/or prolonged labor 53% (231/435), suspicious fetal status/intrapartum fetal distress 15.6% (68/435), abnormal lie/malpresentation 8% (35/435), Pre-eclampsia/eclampsia 7.1% (31/435), placenta praevia 2.3% (10/435), abruptio placentae 1.2% (5/435), intrauterine growth restriction 1.2% (5/435), severe cephalopelvic disproportion 1.2% (5/435), macrosomia 1.2% (5/435): Other indications accounted for 9.25 (40/435).

Table 2 shows a comparison of the most common prenatal complications. More women who had one previous caesarean section than those who had only vaginal deliveries had prenatal complications in the index pregnancy. The most common antenatal complication in both groups was malaria in pregnancy. Women who had previous cesarean

Table 1: Comparison of socio-demographic characteristics of the women

Characteristics	Cases *n*=435	Controls *n*=435	*P* value
Age (years)			
<20	-	-	0.60
20-30	190	186	
31-40	220	224	
>40	25	20	
Marital status			
Married	420	359	<0.001*
Single/separated	15	76	
Religion			
Christianity	419	422	0.57
Others	16	13	
Ethnic group			
Igbo	427	430	0.40
Others	8	5	
Previous deliveries			
1 (primiparous)	150	148	0.80
2-4	255	252	
>4	30	35	
Level of education			
Primary	35	58	0.21
Secondary	65	87	
Tertiary	255	290	

*Significant

Table 2: Comparison of pregnancy complications

Complication	Cases *n*=435 (%)	Controls *n*=435 (%)	*P* value
Prenatal (*n*=435)			
Malaria in pregnancy	25 (5.75)	18 (4.14)	0.27
Abruptio placentae	4 (0.92)	0 (0.00)	0.12
Placenta praevia	15 (3.45)	3 (0.69)	<0.01*
Pre-eclampsia/eclampsia	13 (2.99)	2 (0.46)	<0.01*
Premature rupture of membranes	4 (0.92)	5 (1.15)	0.74
Postdatism	4 (0.92)	8 (1.84)	0.24
Gestational diabetes	4 (0.92)	4 (0.92)	1.00
Intra-uterine fetal death	1 (0.23)	0 (0.00)	0.32

*Significant

deliveries did not differ significantly from those who had previous vaginal deliveries with respect to antenatal complications except placenta praevia.

Table 3 shows a comparison of mode of delivery between women with one previous caesarean section and those with only previous vaginal deliveries. Both emergency cesarean section (125/435 vs. 58/435) and elective cesarean section (204/435 vs. 29/435) were more common in women who had one previous cesarean section.

Table 4 shows the indications for caesarean section in the index pregnancy. The most common indication for

Table 3: Comparison of mode of delivery in the index pregnancy

Outcome	Cases *n*=435 (%)	Controls *n*=435	*P* value
Vaginal delivery	106 (24.37)	348 (80.00)	<0.01*
Spontaneous	104 (23.91)	299 (68.70)	<0.01*
Induced	2 (0.46)	49 (11.30)	<0.01*
Caesarean section	329 (75.63)	87 (20.00)	<0.01*
Emergency section	125 (28.72)	58 (13.30)	<0.01*
Failed VBAC	104 (23.91)	-	-
Other obstetric indications	21 (4.81)	58	0.01*
Elective section	204 (46.90)	29 (6.70)	<0.01*
Recurrent indication	6 (1.38)	-	-
Non-recurrent indication	198 (45.52)	29	<0.01*

*Significant, VBAC=Vaginal birth after a caesarean

Table 4: Major indications for caesarean section for singleton deliveries in the index pregnancy

Indication	Cases *n*=329 (%)	Controls *n*=87 (%)	*P* value
Emergency caesarean section	125 (38.0)	58 (66.67)	-
Placenta praevia	5 (1.52)	2 (2.30)	0.61
Abruptio placenta	4 (1.22)	0 (0)	0.30
Poor progress of labour	84 (25.53)	23 (26.44)	0.86
Fetal distress	18 (5.47)	13 (14.94)	<0.01*
Severe pre-eclampsia/eclampsia	11 (3.34)	2 (2.30)	0.62
Failed induction of labour (*n*=2 for cases, and 49 for controls)	2 (100.00)	24 (48.98)	0.16
Elective section	204 (62.01)	29 (33.33)	-
Previous c-s plus other complications[a]	109 (33.13)	-	-
Placenta praevia	10 (3.04)	1 (1.15)	0.33
Contracted pelvis	5 (1.52)	0	0.24
Abnormal fetal lie	25 (7.60)	10 (11.49)	0.24
Large for date	20 (6.08)	8 (9.20)	0.30
Malpresentation	35 (10.64)	9 (10.35)	0.92

[a]Includes complications such as postdatism, premature rupture of membranes, breech presentation, mild pre-eclampsia etc., *significant

emergency caesarean section in women with a previous cesarean section as well as in those who had previous vaginal deliveries was poor progress of labor (labor dystocia). For elective caesarean section, the most common indication for women with a previous cesarean was the presence of an additional complication, which would otherwise have necessitated induction of labor or which could necessitate manipulation of the uterus or instrumental vaginal delivery.

Approximately, 24.4% (106/435) of cases compared with about 80% (348/435) of controls had vaginal deliveries. A total of 231 (53.2%) women with one previous cesarean section were allowed trial of VBAC out of which 106 had successful vaginal delivery giving a success rate of 45.9%. Among women who had failed VBAC, the reasons for failed VBAC were poor progress of labor 67.2% (84/125), fetal distress in labor 24.0% (30/125) and intra-partum hemorrhage 8.8% (11/125).

Table 5 shows a comparison of the complications of delivery among cases and controls. Fetal distress, poor progress of labor, intrapartum hemorrhage, primary postpartum hemorrhage and blood transfusion occurred significantly more in women with one previous cesarean delivery than in women with only previous vaginal deliveries.

A comparison of fetal outcomes showed that a greater proportion of babies born to women with a previous caesarean section were admitted into the New born Special Care Unit compared with babies born to mothers with only previous vaginal deliveries ($P = 0.01$). Although stillbirth and low birth weight were more common in women with a previous cesarean, the difference did not reach statistical significance. Similarly, the proportion of babies born to women with a previous cesarean who had 5th min Apgar score ≤6 did not differ significantly from the proportion of babies born to women with previous vaginal deliveries for all modes of delivery ($P > 0.05$). The mean 5th min Apgar score following failed trial of VBAC was 7.8 ± 2.2.

Table 5: Comparison of complications of delivery

Complications	Cases (%)	Controls (%)	*P* value
Intrapartum			
Fetal distress (*n*=435)	30 (6.90)	10 (2.30)	<0.01*
Poor progress of labour (*n*=231 for cases; 406 for controls)	84 (36.36)	23 (5.67)	<0.01*
Uterine rupture (*n*=231 for cases)	1 (0.43)	0 (0.00)	0.16
Fresh still birth (*n*=435)	2 (0.46)	0 (0.00)	0.15
Blood transfusion (*n*=435)	2 (0.46)	0 (0.00)	0.15
Hysterectomy (*n*=435)	1 (0.23)	0 (0.00)	0.16
Manual removal of placenta (*n*=435)	4 (0.92)	1 (0.23)	0.11
Placenta acreta/increta/percreta (*n*=435)	1 (0.43)	0 (0.00)	0.16
Intrapartum haemorrhage (*n*=435)	11 (8.8)	2 (0.46)	0.01*
Postpartum (*n*=435)			
Primary PPH	11 (2.5)	1 (0.23)	<0.01*
Secondary PPH	6 (1.38)	2 (0.46)	0.15
Puerperal sepsis/endometritis	2 (0.46)	3 (0.69)	0.65
Blood transfusion	12 (2.76)	2 (0.46)	<0.01*
Maternal death	0 (0.00)	0 (0.00)	-

*Significant, PPH=Postpartum hemorrhage

Table 6 summarizes the risks associated with subsequent pregnancy in women who had one previous cesarean section. Placenta praevia was 5 times more likely to occur in women with a previous cesarean than in those with previous vaginal deliveries. Similarly, preeclampsia/eclampsia was 6½ times and cesarean delivery about 4 times more likely to occur in women with a previous cesarean compared with those with previous vaginal deliveries.

Discussion

This is the first study from our center that has estimated the risks associated with subsequent pregnancies in women who had one previous caesarean section. These estimates could be useful for precise counseling of patients and for clinical decision making prior to recommending primary C-section.

The study shows a significantly more women who underwent one previous cesarean section had placenta praevia and preeclampsia compared with women who had no previous cesarean. Prenatal diagnosis of placenta praevia was 5 times more likely to occur in women with one previous caesarean compared with those without a previous caesarean. This finding agrees with previous studies.[15,16] Although it has been known that caesarean section was a risk factor for placenta praevia, the finding that placenta praevia occurred 5 times as common in women with one previous cesarean had not been documented before in our environment.

Similarly, the study also showed that preeclampsia/eclampsia was 6½ times more likely to occur in women with a previous caesarean than in those with previous normal deliveries. This finding has not been documented before. Since only 7% of the primary caesarean section in the cohort were due

Table 6: Absolute and RR for selected maternal and perinatal outcomes[a]

Variable	Number	AR in women with one previous caesarean (95% CI)	AR in women with no previous caesarean (95% CI)	RR (95% CI)
Placenta praevia	435	3.45 (1.8, 5.2)	0.69 (−0.02, 1.5)	5 (2.6, 7.2)
Pre-eclampsia/eclampsia	435	2.99 (1.4, 4.6)	0.46 (−0.07, 1.1)	6.5 (2.1, 9.3)
Caesarean section	435	75.63 (72.0, 80.0)	20.0 (16.2, 23.8)	3.78 (1.8, 6.2)
Elective caesarean	435	46.90 (43.0, 52.0)	6.7 (4.3, 9.1)	7.0 (2.7, 11.4)
Emergency caesarean	435	28.72 (25.3, 33.7)	13.3 (9.9, 16.1)	2.16 (1.8, 5.9)
Poor progress of labor	*n*=231 for cases and 406 for controls	36.36 (30.3, 42.3)	5.67 (3.4, 7.9)	6.4 (3.2, 11.2)
Intrapartum hemorrhage	435	8.8 (4.3, 15.6)	0.46 (−0.07, 1.1)	19 (13.8, 26.4)
Failed VBAC (*n*=231)	231	45.0 (38.5, 51.5)	-	-
Primary PPH	435	1.15 (0.1, 1.9)	0.23 (−0.83, 0.63)	5 (1.5, 4.3)
Newborn special care admission	435	5.75 (3.4, 7.8)	2.30 (−0.93, 2.63)	2.5 (1.1, 4.9)
Blood transfusion	435	2.76 (2.0, 3.6)	0.46 (−0.75, 1.2)	6 (3.4, 10.6)

[a]Selected outcomes were variables for which cases and controls differed significantly on bivariate analysis. AR=Absolute risk, RR=Relative risk, CI=Confidence interval, VBAC=Vaginal birth after a caesarean, PPH=Postpartum hemorrhage

to Preeclampsia/eclampsia, it was unlikely that those who had one previous caesarean could have had substantial involvement of women with hypertensive diseases.

On its part, despite overwhelming recommendations in favor of vaginal birth after a previous caesarean, concern for safety and medico legal considerations could have diminished the enthusiasm of obstetricians in allowing more vaginal birth after caesarean section in our setting. This may explain the high absolute risk for repeat cesarean and the nearly four-fold higher relative risk for cesarean section in women with one previous cesarean found in this study. The fact that elective cesarean section occurred in much higher proportion compared with emergency section underlies the possibility of an undue concern for safety. This further buttressed by the fact that only 53% of women with the previous section were allowed trial of vaginal delivery (although only about 1% had a recurrent indication). It is possible that women are not being allowed sufficient chance to try labor after vaginal delivery. Low rate of resort to VBAC after one previous caesarean had been previously documented in our environment.[9,17]

The rate of Failed VBAC in this study was high. The successful VBAC rate of 46% successful vaginal delivery rate was lower than 73% by Davies *et al.*,[18] 79.9% by Turner and Casey.[19] Again, this may be explained by a combination of early resort to emergency C-section during trial of vaginal delivery due to lack of facilities for adequate feto-maternal monitoring during attempts at VBAC.

It is striking to find that blood transfusion was 6 times more likely to occur in women with a previous caesarean section than in those who had vaginal deliveries. The finding of higher rate of blood transfusion in subsequent pregnancies in women with one previous caesarean has not been documented before in our environment. The finding may be explained by the five-fold increases in placenta praevia and in primary postpartum hemorrhage. Although there was no maternal death in the cohorts used for this study, the association of hemorrhage with previous C-section could be significant for maternal mortality where facilities may not be available to combat it. Besides, increased blood transfusion in our area with high prevalence of human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome constitutes a veritable risk for spreading HIV infection.

Conclusion

In conclusion, a previous C-section is associated with an increase in the risk of placenta praevia, preeclampsia/eclampsia, repeat cesarean section, poor progress of labor, blood transfusion, 5th min APGAR score <6 and newborn special care admission: The estimated risks are at least 2-7 times higher than in women with no previous cesarean matched for age and parity. It remains a challenge to strike a balance between concern for safety and the need to decrease cesarean section rates. Findings from this work indicate that in the absence of optimal facilities, most obstetrician are guided by concern for safety, hence the much higher risk of caesarean among women with a previous caesarean compared with those with previous vaginal deliveries despite the prevalent cultural aversion for caesarean delivery. These risks should serve as a major deterrent in liberal application of primary C-section even in the face of recorded safety and success of even vaginal birth after two caesarean sections.

References

1. Ainbinder SW. Operative delivery. In: De Cherny AH, Nathan L, editors. Current Obstetrics and Gynecologic Diagnosis and Treatment. 9th ed. New York: McGraw Hill; 2003. p. 499-530.
2. American College of Obstetricians and Gynecologists (ACOG). ACOG Practice bulletin no. 115: Vaginal birth after previous cesarean delivery. American College of Obstetricians and Gynecologists, 2004. Available at: www.ncbi.nlm.nih.gov/PubMed/20664418. [Last accessed on 2013 Aug 31].
3. MacDorman M, Declercq E, Menacker F. Recent trends and patterns in cesarean and vaginal birth after cesarean (VBAC) deliveries in the United States. Clin Perinatol 2011;38:179-92.
4. American College of Obstetricians and Gynecologists. ACOG Practice bulletin no. 115: Vaginal birth after previous cesarean delivery. Obstet Gynaecol 2010; 116:450-63.
5. Royal College of Obstetricians and Gynaecologists (RCOG). Birth After Previous Caesarean Birth, Green Top Guidelines No. 45, RCOG, 2007. Available at: http://www.rcog.org.uk/files/rcog-corp/GTG451022011.pdf. [Last accessed on 2013 Aug 31].
6. Society of Obstetricians and Gynaecologists of Canada (SOGC). Guidelines for vaginal birth after previous caesarean birth. Clinical Practice Guidelines Number 155 (Replaces guideline Number 147), February 2005., Available at: www.ncbi.nlm.nih.gov/pubmed/16001462. [Last accessed on 2013 Aug 31].
7. Tahseen S, Griffiths M. Vaginal birth after two caesarean sections (VBAC-2)-a systematic review with meta-analysis of success rate and adverse outcomes of VBAC-2 versus VBAC-1 and repeat (third) caesarean sections. BJOG 2010;117:5-19.
8. Onah HE. Formal education does not improve the acceptance of caesarean section among pregnant Nigerian women. Int J Gynaecol Obstet 2002;76:321-3.
9. Egwuatu VE, Ezeh IO. Vaginal delivery in Nigerian women after a previous cesarean section. Int J Gynaecol Obstet 1990; 32:1-6.
10. Awoyinka BS, Ayinde OA, Omigbodun AO. Acceptability of caesarean delivery to antenatal patients in a tertiary health facility in south-west Nigeria. J Obstet Gynaecol 2006; 26:208-10.
11. Ezechi OC, Fasuba OB, Kalu BE, Nwankwo CA, Obiesie LO. Caesarean delivery: Why the aversion? Trop J Obstet Gynaecol 2004;21, 164-167.
12. Ezechi OC, Fasuba OB, Dare FO. Socioeconomic barriers to safe motherhood among booked patients in rural Nigerian communities. J Obstet Gynaecol 2000; 20:32-4.
13. Enabudoso EJ, Ezeanochie MC, Olagbuji BN. Perception and attitude of women with previous caesarean section towards repeat caesarean delivery. J Maternal Fetal Neonatal Med 2011;24:1212-4.
14. Nkwo PO, Onah HE. Feasibility of reducing the caesarean section rate at the University of Nigeria Teaching Hospital, Enugu Nigeria Teaching Hospital, Enugu Nigeria. Trop J Obstet Gynaecol 2002;19:86-9.
15. Hemminki E, Meriläinen J. Long-term effects of cesarean sections: Ectopic pregnancies and placental problems. Am J Obstet Gynaecol 1996;174:1569-74.
16. Nahar K , Akhter L, Chowdhury SB. Outcome of pregnancy with history of previous caesarean section. Orion Med J 2008;31:588-90.
17. Ikechebelu JI, Mbamara SU, Afuba AN. Vaginal birth after one caesarean

section: A review of the practice at Nnewi, Southeast Nigeria. J Med Med Sci 2010;1:309-13.
18. Davies JA, Lee A, Spencer JA. Delivery following previous caesarean section. J Obstet Gynaecol 2003;1:27-33.
19. Turner MJ, Casey C. Delivery after caesarean section. A proposed analysis J Obstet Gynaecol 2003;18:513-4.

How to cite this article: Iyoke CA, Ugwu GO, Ezugwu FO, Lawani OL, Onah HE. Risks associated with subsequent pregnancy after one caesarean section: A prospective cohort study in a Nigerian obstetric population. Niger J Clin Pract 2014;17:442-8.
Source of Support: Nil, **Conflict of Interest:** None declared.