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The Effect of Primary Cesarean Section on Subsequent Delivery

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Abstract

Objective: To evaluate the effect of the first cesarean section (CS) on the subsequent delivery.

Methods: This prospective cohort study was carried out in two major hospitals of Yaoundé, Cameroon, from November 1st, 2013 to April 30th, 2014. Maternity records at second delivery of parturient whose first delivery was done by CS (primary CS) or vaginally was compared. The main variables recorded included maternal age, intergenesic period, gestational age at delivery, mode of delivery, birth weight, uterine rupture and post-partum haemorrhage. Data were analyzed using Epi info 3.5.4. Fisher exact test and t-test were used for comparison. P<0.05 was considered statistically significant.

Results: There was no statistically significant difference between means concerning maternal ages, intergenesic periods, gestational ages at delivery and birth weights. Women with primary CS had an increased risk of uterine rupture (one case versus none), repeat CS (RR 5.1, 95%CI 2.5-10.4, P<0.0001) and post partum bleeding ≥500ml (RR 6.3, 95%CI 2.0-20.0, P<0.0002).

Conclusion: Primary cesarean delivery was associated with a higher risk of repeat CS. Given that repeat CS is associated with subsequent elective CS, efforts should concentrate mainly on the reduction of primary CS rate to reverse the rising CS rate.

Keywords: Primary cesarean section; Subsequent delivery; Cameroon

Introduction

Cesarean section (CS) rate has increased in many developed countries [1], the reasons being the high rate of CS in nulliparous women and the frequently repeat CS in women with scarred uterus [2,3]. Indeed, 27% to 76.5 % of CS is being performed among nulliparous women [2,4]. Labour among these women is frequently associated with longer first and especially second stages [5], leading to increased risks of instrumental deliveries and emergency CSs [5]. Among nulliparous women, many of these CSs are performed in the second stage [6].

Studies showed that a first successful vaginal delivery, even if instrumental, increases the chances of vaginal delivery in the subsequent pregnancy [7], while a first delivery by CS has been associated with an increased risk of repeat CS in the subsequent deliveries [8]. Reducing CS rate in nulliparous women might contribute to reverse of the rising CS rate. Due to the fear of uterine rupture during trial of scar, repeat CS is being performed by many obstetricians, sometimes without clear indications [3]. Repeat CS contributes to the increasing CS rate because future vaginal deliveries among these women will almost be impossible. This is why some authors have advised obstetricians to be patient during the second stage of labour in nulliparous women [1] and the indication of the primary (first) cesarean section should be absolute.

Complications of scarred uterus include an increased risk of uterine rupture, repeat CS, placenta accreta or increta and post-partum haemorrhage [9,10]. Given that more CSs are increasingly being performed in our environment, especially among nulliparous women, we expect high repeat CS rate among women who had primary CS delivery. This study, therefore, aimed at evaluating the influence of first delivery by CS on the subsequent delivery.

Material and Methods

Participant recruitment

This prospective cohort study was carried out in the maternities of the University Teaching Hospital and the Central Maternity of Yaoundé, Cameroon, from November 1st, 2013 to April 30th, 2014. Our participants were recruited at the antenatal consultation units where all women were regularly followed up. At 36 weeks gestation, women whose first delivery was carried out by CS, with an adequate pelvis (radiologically or clinically if assessed by the obstetrician) were recruited (scarred uterus group). Women with contracted pelvis or with previous classical CS were excluded from this study. For each woman with a scarred uterus, a woman whose first delivery was done vaginally and who was received at the antenatal consultation unit just after the woman with scarred uterus was recruited (unscarred uterus group). All women were followed up from 36 weeks till delivery. An informed consent was obtained from each woman. This study was approved by the two institutional ethics committees. Variables recorded anonymously on a pre-established and pretested questionnaire by the principal investigator included maternal age, the intergenesic period, the gestational age (confirmed by a standard ultrasound scan performed before 20 weeks gestation), the duration of active phase of labor (from cervical dilatation 4 cm to full dilatation), the duration of the second stage (from full dilatation to delivery of the fetus), the mode of delivery, labor augmentation (with oxytocin), the birth weight, the Apgar score and maternal complications such as uterine rupture, genital lacerations or postpartum haemorrhage (PPH). These variables

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were chosen because we hypothesized that young maternal age, shorter intergenesic period, advanced gestational age and excessive fetal weight might increase the risk of repeat CS. Furthermore, we hypothesized that women with scarred uterus might have an increased risk of prolonged labor, repeat CS, poor Apgar score (<7) and obstetrical complications such as PPH.

Statistical analysis

Sample size was calculated using the following formula [11]: $N = 2 \times(1/1-f)\times(Z\alpha+Z\beta / P_0-P_1)^2 \times P\times(1-P)$ where f was the assumed percentage of women that might be lost during follow-up (0%), Zα =1.96 corresponding to a type I error of 2.5%, Zβ =1.96 corresponding to a type II error of 2.5% or a power of 97.5%, P_0 the assumed prevalence of cesarean section in women with scarred uterus (50%), P_1 the assumed prevalence of cesarean section in women without scarred uterus (10%) and P is $(P_0+P_1)/2$. According to this formula, at least 41 women were needed in each group. Data were analyzed using Epi info 3.5.4. The data of women of the scarred uterus group were compared to those of the unscarred uterus group. Fisher's exact test was used to compare categorical variables and t-test to compare continuous variables. We used relative risks with their 95% confidence intervals (CIs) to present the comparison between the two groups. P<0.05 was considered statistically significant.

Results

Socio-demographic and obstetrical variables of the study participants

A total of 50 women were recruited in each group. Some socio-demographic and obstetrical variables are presented in Table 1.

The indications for primary CS in the scarred uterus group were cephalopelvic disproportion (CPD) (20 cases or 40%), acute fetal distress (AFD) (10 cases or 20%), severe pre-eclampsia or eclampsia (PE-E) (eight cases or 16%), nulliparous breech presentation (five cases or 10%), cord prolapse (four cases or 8%) and placenta praevia (three cases or 6%). Second stage lasting more than 30 min was observed in 4/13 cases in the scarred uterus group as against 9/43 cases in the unscarred uterus group (RR 1.4, 95%CI 0.5-4.0, P=0.70).

Delivery of study participants

Successful vaginal delivery occurred in 13 cases (26%) in the scarred uterus group as against 43 (86%) in the unscarred uterus group (Table 2). Instrumental vaginal delivery was carried out only in one case in the scarred uterus group and the indication was acute fetal distress.

Of the 36 cases of CS performed in the scarred uterus group, 15 were carried out electively. These included suspected macrosomic babies (clinically or ultrasonographically estimated birth weight ≥4000 g) (13 cases) and severe pre-eclampsia (2 cases). Seven other CS was carried out as soon as women reached the labor room without trying the scar (without observing if under normal uterine contractions, a successful vaginal delivery could be achieved). It included premature rupture of membranes with a poor Bishop score (<6/13) (5 cases) and fetal distress (2 cases). The remaining 14 cases of CS were all failed trial of scar (six cases of CPD, six cases of AFD, and two cases of uterine pre-rupture syndrome).

The main indications for CS during the second delivery in the scarred uterus group were suspected macrosomic babies and AFD, while, in the group with unscarred uterus the main indication was AFD

Variables	Scarred uterus group (range)	Unscarred uterus group (range)	RR	95%CI	P value
Number of women	50	50			
Maternal age (year)	26.2 ± 4.2 (20-36)	26.7 ± 4.7 (16-37)			0.57
Gestational age (week)	39.1 ± 2.1 (33-43)	38.9 ± 1.7 (35-43)			0.60
Intergenesic period (month)	33.8 ± 22.8 (14-108)	36.1 ± 24.2 (12-113)			0.62
Labour augmentation	9/50 (18%)	13/50 (26%)	0.7	0.3-1.4	0.46
Second stage of labor duration (min)	29.2 ± 16.3 (15-70) n= 13	25.0 ± 14.7 (5-60) n=43			0.38
CS	36/50 or 72%	7/50 or 14%	5.1	2.5-10.4	<0.0001
Birth weight (g)	3343.9 ± 445 (2090-4340)	3385 ± 531 (2000-4550)			0.67
Mediolateral episiotomy	1/18 (5.5%)	2/43 (4.6%)	1.2	0.1-12.3	1
Perineal tears (1st & 2nd degrees)	2/13 (15.4%)	4/43 (9.3%)	1.3	0.3-6.0	1
5 min Apgar score	8.5 ± 2.3 (0-10)	8.9 ± 1.9 (0-10)			0.34

CS: Cesarean section, RR: Relative risk.

Table 1: Distribution of socio-demographic and obstetrical variables in both groups.

Mode of delivery		Scarred uterus group N (%)	Unscarred uterus group N (%)
VD	Spontaneous	12 (24)	43 (86)
	Instrumental	1 (2)	0 (0)
CS	Elective CS	15 (30)	0 (0)
	Emergency CS indicated at arrival	7 (14)	3 (6)
	Failed vaginal delivery trial	-	4 (8)
	Failed trial of scar	14 (28)	-
Emergency laparotomy for uterine rupture		1 (2)	0 (0)
Total		**50 (100)**	**50 (100)**

VD: Vaginal delivery, CS: Caesarean section

Table 2: Distribution of mode of delivery in both groups.

Indications for cesarean section	Scarred uterus group (50 cases) N (%)	Unscarred uterus group (50 cases) N (%)
Suspected macrosomia (estimated fetal weight ≥4000 g)	13 (26)	-
Fetal distress	8 (16)	3 (6)
Cephalopelvic disproportion	6 (12)	1(2)
Premature rupture of membranes and poor Bishop score	5 (10)	-
Uterine pre-rupture syndrome	2 (4)	-
Severe pre-eclampsia	2 (4)	-
Placenta praevia	-	2 (4)
Cord prolapse	-	1 (2)
Total	**36/50 (72)**	**7/50 (14)**

Table 3: Indications for caesarean section in both groups.

(Table 3). Three CSs were carried out in the unscarred uterus group as soon as the women were received in the labor room (two cases of placenta praevia and one case of cord prolapse).

In the scarred uterus group, subsequent CS delivery (after trial of scar or not) occurred in 80% when the indication for the first CS was CPD (16/20), AFD (8/10), primiparous breech (4/5) and 75% when it was PE-E (6/8). Unsuccessful trial of scar occurred in 6/10 cases (60%) of CPD, 5/7 cases (71.4%) of AFD and 2/4 cases of pre-elampsia (50%).

The indication for episiotomy in the scarred uterus group was instrumental delivery (one case), while in the unscarred uterus group the indications for episiotomy were imminent perineal tears (two cases).

In the scarred uterus group, the mean birth weight of babies delivered vaginally (n=13) was lower than that of babies delivered by CS (n=36) (3137 ± 495 g vs 3465.0 ± 361 g respectively, P=0.014), and the mean birth weight of babies delivered vaginally in the scarred uterus group (n=13) was lower than that of babies delivered vaginally in the unscarred uterus group (n=43) (3137± 495 vs 3461± 515 g respectively, P= 0.050).

The mean birth weight of babies delivered by CS in the scarred uterus group (n=36) was similar to that of babies delivered vaginally (n=43) in the unscarred uterus group (3465 ± 361 vs 3461± 515 g respectively, P=0.96).

Complications at delivery

There was one case of uterine rupture in the scarred uterus group and none in the unscarred uterus group.

Postpartum bleeding of ≥500ml after vaginal or cesarean delivery was observed in 19 cases in the scarred uterus group and in only three cases in the unscarred uterus group (RR 6.3, 95%CI 2.0-20.0, P<0.0002).

Five minute poor Apgar score (<7) was observed in three cases in the scarred uterus group and in two cases in the unscarred uterus group (RR 1.5, 95%CI 0.2-8.5, P=1). No maternal death occurred during the study period.

Discussion

Our results showed no statistically significant differences in mean maternal age, intergenesic period, gestational age at delivery, duration of the active phase and duration of the second stage of labor between the two groups. This means that when socio-demographic characteristics are similar and when all conditions for trial of scar are met, progress of labor in women with scarred uterus is similar to those of women without a scarred uterus.

As concerns the mode of delivery, we observed that women who had the first delivery by CS had an increased risk of CS in the second delivery (RR 5.1). This is due to the fact that when some relative indications for CS like suspected macrosomic babies and premature rupture of membranes with poor Bishop Score occurred in a woman with a scarred uterus, elective or emergency CSs were rapidly performed. Meanwhile, when they occurred in a woman with an unscarred uterus, a trial of labor was carried out.

In our setting, due to the fear of uterine rupture, some obstetricians opt for a repeat CS, even when the indication for the second CS is not clear, instead of carrying out a trial of scar. For instance, when there is a suspected macrosomic baby in a woman with previous CS, although macrosomia is neither predictable clinically nor ultrasonographically [12], many obstetricians perform a CS. In our series, of the 13 CS carried out for clinically or ultrasonographically suspected macrosomic babies, only eight (61.5%) were actually macrosomic babies. If these women had unscarred uterus, all of them might have gone through normal labor and some might have delivered vaginally. Moreover, if a breech presentation occurred in a woman with a scarred uterus, a CS would have been done independently of the fetal weight. These facts illustrate that a first cesarean delivery exposes the woman to repeat CS in the next delivery.

Our rate of successful trial of scar in women whose first delivery was by CS was 46.4% (13/28). This low rate can be explained by the fact that no woman had a vaginal delivery prior to CS. A vaginal delivery prior to a CS increases the success rate of trial of scar up to 85% [13].

In our series, vaginal delivery during the second labor occurred among 13/50 women (26%) whose first delivery was carried out through a CS. This rate is similar to that of 26.1% observed elsewhere among women who had their first delivery by CS [14]. This reveals that a first delivery by CS in our series was associated with a 74% risk of repeat CS. These women with repeat CS will deliver only by an elective CS during the next deliveries given that they have a double scarred uterus. This repeat CS also contributes to the rising CS rate.

CPD and AFD as indications for the primary CS were associated with a higher failure rate (80%) of vaginal delivery after CS in our series. Women whose indications for the primary CS were CPD and AFD should therefore be monitored very closely for early diagnosis of a failed trial of scar.

After vaginal delivery, mean birth weight in the scarred uterus group was usually lower than that for controls. This means that unscarred uterus is more capable of delivering heavier babies than scarred uterus.

Rupture of scarred uterus occurred in one case (2%) in our series and was associated with the death of the fetus. This rate is close to that found by other researchers [15,16]. Consequently, we are reminded

that labor in women with scarred uterus should be well monitored and conditions for a rapid emergency CS should be met.

Our study revealed that women in the scarred uterus group had an increased risk of losing ≥500 ml of blood postpartum (RR 6.3). Similar results have been noticed elsewhere [9]. This shows that blood should always be cross-matched and kept for women with scarred uterus in labor. The mean 5 minute Apgar score was slightly lower in the scarred uterus group, due to uterine rupture, meaning that before conducting trial of scar, conditions for neonatal resuscitation should be made available.

Conclusion

First delivery by CS was associated with an increased risk of repeat CS, uterine rupture and post-partum hemorrhage in the subsequent delivery. Hence, nulliparous women should be offered better chances for a vaginal delivery. Women with repeat CS will almost always deliver by (elective) CS. Therefore, to reverse the rising CS rate, efforts should also be concentrated on the reduction of primary CS rate. For instance, given that CPD was the main indication for primary CS in nulliparous women in our series, measures should be taken to avoid excessive fetal weight gain (reduction of hyper caloric diet for instance) during antenatal care. Moreover, more patience should be observed during second stage of labor, and the indication for CS in nulliparous women should be absolute.

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