Trial of Labor After Cesarean Section Among Women with Unique Lower Segment Scarred Uterus and Fetal Weight >3500 g: Prognostic Factors for a Safe Vaginal Delivery

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Abstract

Objective To evaluate outcome of trial of labor after cesarean section (TOLAC) with fetal weight >3500 g.

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Materials and Methods This retrospective descriptive study was carried out between March 1, 2012, and February 28, 2015. Medical and obstetrical records of women with birth weight (BW) >3500 g admitted in the labor ward with advanced labor or admitted in early labor but with underestimated fetal weight >3500 g were analyzed. Main variables analyzed included maternal parity, vaginal delivery prior to TOLAC, the BW and the integrity of the uterine scar.

Results Mean BW was 3789.3 g. Out of 36 women, 75 % had a successful TOLAC. Women who delivered vaginally before TOLAC had a higher success rate than women who never delivered vaginally (94.1 vs. 63.1 %, $P < 0.044$).

Conclusion Successful TOLAC with birth weight >3500 g can be observed among women, especially among those admitted in advanced labor or with successful vaginal delivery prior to the current TOLAC.

Keywords Scarred uterus ·
Trial of labor after cesarean section ·
Birth weight >3500 g · Prognostic factors

Introduction

Cesarean section (CS) rate has risen in many parts of the world without having necessarily improved maternal or fetal well-being [1, 2]. This rise is due to medical causes as well as non-medical causes such as the fear by practitioners or by women themselves of possible maternal or fetal intrapartal complications [3, 4]. Because of this rising CS rate, some women in subsequent deliveries have to go through a trial of labor after cesarean section (TOLAC) (observation, under normal uterine contractions, of labor outcome in women with a lower segment scarred uterus and who fulfill certain criteria). For many authors, to be eligible for a TOLAC with a reduced risk of uterine rupture or dehiscence, women should fulfill some criteria such as a unique lower uterine segment transverse scar, a time interval between CS and next conception of ≥ 12 months, a vertex presentation, a radiologically adequate pelvis, a fetus weighing <3500 g and the absence of other medical or obstetrical complications [5, 6].

Although the main complication of TOLAC is uterine rupture or uterine dehiscence, a repeat CS means the realization of an elective CS in the subsequent deliveries since a trial of double uterine scar is not recommended, given that it is associated with an increased risk of uterine rupture or dehiscence. Therefore, to reduce the global CS rate, every effort should be made to reduce the rate of repeat CS.

In order to reduce CS rate, many authors successfully carried out TOLAC when the above-mentioned criteria were not all met. Successful TOLAC, defined as a successful vaginal delivery with intact uterine scar, has been carried out in breech presentation [7], on an unknown uterine scar [8] and even with fetal weight ≥ 3500 g. Indeed, according to the Canadian Society of Gynecologists and Obstetricians, macrosomia is not a contraindication to TOLAC [9].

CS is increasingly being carried out in our country with consequently increased rate of women with TOLAC. Since fetal weight estimation is not accurate, neither clinically nor ultrasonographically, there are some cases of TOLAC when the excessive fetal weight (≥ 3500 g) has been ignored. This study aimed at determining the success rate and the prognostic factors for a successful TOLAC in women with fetal weight >3500 g.

Methods

This retrospective descriptive study was carried out between March 1, 2012, and February 28, 2015 (3 years). Medical and obstetrical records of women in whom a TOLAC was carried out with birth weight >3500 g were analyzed. Files of women who had elective or emergency cesarean section for various indications without trying the scar, though with birth weight ≥ 3500 g, were excluded.

The policy in the service was to carry out a TOLAC in the following conditions: unique lower segment transverse scarred uterus, a radiologically adequate pelvis, a fetus in vertex presentation weighing <3500 g and a time interval between CS and next conception of ≥ 12 months without any other obstetrical or medical complications such as cardiac disease or preeclampsia. Vertex malpositions were also excluded. Labor was monitored using the partogram. All arrangements were made during labor for an emergency CS, if indicated. If after 3 h, there was no progress in either the cervical dilatation or the fetal descent, then an emergency CS was performed. When women were received in labor, after explaining to them the possible labor outcome, an informed consent was obtained from each of them.

Although our policy was to carry out elective CS when the estimated fetal weight was ≥ 3500 g, sometimes the excessive fetal weight was underestimated. Moreover, even when this was not the case, some women were received in advanced cervical dilatation (≥ 8 cm) or with fetal descent at 2/5 or below (station 0 to +2) in whom imminent vaginal delivery could be expected.

This study was approved by the ethics committee of the Yaoundé University Teaching Hospital. In our study, we wanted to know the characteristics of these women as well as the factors that led to a failed (inability to deliver vaginally with an intact uterine scar) or to a successful TOLAC. Variables collected on a pre-established questionnaire included maternal age, parity, the gestational age at delivery (validated by an ultrasound scan done before 20 weeks gestation), whether she had a successful vaginal delivery prior to CS, or a successful vaginal delivery after CS (previous successful TOLAC), the largest birth weight delivered vaginally if any, the time interval between CS and next conception, the length of the second stage of labor, the birth weight, the Apgar score and the integrity of the uterine scar obtained via systematic digital exploration of the uterine scar, as indicated by some authors when the risk of uterine dehiscence is high [10]. We hypothesized that women who had vaginal delivery, especially of a baby of >3500 g, prior to this current TOLAC might have increased chances of success.

The required sample size was calculated to be 35 using the formula for a cross-sectional descriptive study [11]. In this formula, $N = P(1 - P)Z_{\alpha}^2/D^2$, where $Z_{\alpha} = 1.96$ corresponds to a confidence level of 0.05 and $D = 0.1$ is the degree of precision, assuming that the prevalence of women with unique scarred uterus and fetal weight ≥ 3500 g (P) might be 10 % in our unit.

Data were analyzed using SPSS 20.0 (IBM, Armonk, NY, USA). Fisher's exact test was used to compare categorical variables and t test to compare continuous variables. $P < 0.05$ was considered statistically significant. The results are presented as mean $\pm$ standard deviation (SD) for quantitative data and frequencies for qualitative data.

Results

Of 4240 deliveries carried out during the study period, 582 women with unique scarred uterus (13.7 %) were found, including 444 cases (76.3 %) with BW < 3500 g and 138 cases (23.7 %) with BW ≥ 3500 g. Among the 444 women with BW < 3500 g, 325 (73.2 %) had a successful TOLAC, while 119 (26.8 %) had repeat CS (37 elective and 82 emergency).

Among the 138 women with BW ≥ 3500 g, TOLAC was carried out in 36 cases (26.1 %), while elective CS or emergency CS indicated at arrival in the delivery ward was performed in 102 cases (73.9 %), including 72 cases with BW ≥ 3500 g as the only indication and 30 cases with other added indications.

As concerns the 36 cases of TOLAC with BW ≥ 3500 g, 23 women (63.9 %) were received in advanced labor with 19 (82.6 %) having a successful TOLAC, while 13 (36.1 %) were received in early labor with eight (61.5 %) having a successful TOLAC. Mean maternal age when TOLAC was carried out was 30.16 ± 4.8 years (range 22–40), while mean parity was 2.08 ± 1.2 (range 1–5). Gestational ages ranged from 36 to 42 weeks (mean

39.4 ± 1.5). Mean time interval between CS and next conception was 28.5 ± 25.5 months (range 7–120).

Prior to the current TOLAC, 17 women (47.2 %) had vaginal delivery of neonates weighing between 2052 and 5000 g (mean 3437.8 ± 687.5 g). This included 10 women who had delivered vaginally before the CS, four who had delivered vaginally after the CS and three who had delivered vaginally both before and after CS. In fact, seven women/36 (19.4 %) had previous successful TOLAC.

As concerns the time interval between CS and next conception, five women conceived < 12 months (range 7–11 months) after the CS.

Concerning all 36 neonates, BW ranged between 3508 and 4520 g with a mean of 3789.3 ± 225.8 g. Mean 1-min Apgar score was 8.08 ± 0.9 (range 5–9), while mean 5-min Apgar score was 9.4 ± 0.7 (range 7–10). Neonates were females in 19 cases (52.8 %) and males in 17 cases (47.2 %).

A total of 27 women (75 %) had a successful TOLAC including one forceps delivery. The length of the second stage of labor in these women was 27.5 ± 17.7 min (range 5–58). Demographic and obstetrical variables distribution among women with successful or failed TOLAC is given in Table 1.

Nine women (25 %) had a cesarean delivery including one case of imminent uterine rupture that was discovered preoperatively as partial dehiscence (2.7 %). The indications for CS were cephalopelvic disproportion (CPD) in six cases and uterine pre-rupture syndrome (imminent uterine rupture) in three cases. The diagnosis of imminent uterine rupture was based either on the presence of Bandl's ring and maternal tachycardia or on the presence of abdominal pain at the level of the uterine scar between uterine contractions. The BW of neonates delivered by cesarean section ranged from 3575 to 4520 g (mean 3867 ± 307.6 g). Eight women out of nine (88.9 %) with failed TOLAC were primiparas and one was of parity two with a prior vaginal delivery (BW 5000 g). The only peculiarity observed in the case of partial uterine dehiscence was the BW of 4117 g.

Table 1 Demographic and obstetrical variables distribution among the women

Variables	Successful TOLAC ($n = 27$) mean $\pm$ SD (range)	Failed TOLAC ($n = 9$) mean $\pm$ SD (range)	p value
Maternal age (year)	30.7 ± 4.8 (22–40)	28.5 ± 4.2 (22–35)	0.22
Gestational age (week)	39.6 ± 1.4 (37–42)	38.7 ± 1.7 (36–41)	0.12
Parity	2.4 ± 1.2 (1–5)	1.1 ± 0.3 (1–2)	0.0031
Time interval between CS and next conception (month)	40.0 ± 27.0 (8–120)	28.7 ± 12.3 (7–42)	0.23
Prior vaginal delivery to CS	12/27 (44.4 %)	1/9 (11.1 %)	0.11
Vaginal delivery after CS	7/27 (25.9 %)	0/9 (0 %)	0.15
Birth weight (gm)	3773.4 ± 203.1 (3518–4229)	3836.9 ± 277.9 (3575–4520)	0.46

TOLAC trial of labor after cesarean section, CS cesarean section

Table 2 Parity distribution among women with successful or failed TOLAC

Parity	Successful TOLAC <i>N</i> (%)	Failed TOLAC <i>N</i> (%)
1	9 (33.3)	8 (88.9)
2	5 (18.5)	1 (11.1)
3	7 (25.9)	0 (0)
4	5 (18.5)	0 (0)
5	1 (3.7)	0 (0)
Total	27 (100)	9 (100)

TOLAC trial of labor after cesarean section

Table 3 Birth weight distribution among women with successful or failed TOLAC

Birth weight (g)	Successful TOLAC <i>N</i> (%)	Failed TOLAC <i>N</i> (%)
3500–3799	15 (55.5)	6 (66.7)
3800–3999	9 (33.3)	1 (11.1)
4000–4499	3 (11.1)	1 (11.1)
≥4500	0 (0)	1 (11.1)
Total	27 (100)	9 (100)

TOLAC trial of labor after cesarean section

Women of parity ≥ 2 (18/19 or 94.7 %) had higher success rate of TOLAC than women of parity 1 (9/17 or 52.9 %) ($P = 0.006$) (Table 2). Moreover, the three women who delivered vaginally both before and after CS had all successful TOLAC with BW of 3745, 3840 and 4300 g, respectively. The four women who delivered vaginally after the CS also had all successful TOLAC with BW of 3518, 3660, 3800 and 4229 g, respectively. Among the 10 women who delivered vaginally before the CS, nine (90 %) had a successful TOLAC with BW ranging between 3508 and 4080 g. The other woman in this subgroup had repeat CS for CPD.

The majority of BW (31/36 or 86.1 %) was between 3500 and 4000 g (Table 3). Nineteen women (52.8 %) had never delivered vaginally prior to the current TOLAC. Among them, 12 (63.1 %) had a successful TOLAC with BW varying between 3518 and 3950 g (mean 3702 ± 133.5 g). Therefore, women who delivered vaginally before TOLAC had a higher success rate than women who never delivered vaginally (16/17 or 94.1 % vs. 12/19 or 63.1 %, $P < 0.044$).

Among the five women with a time interval between CS and next conception <12 months, three had a successful TOLAC, while two had CS indicated for CPD.

Mean BW of babies delivered vaginally ($n = 27$) was similar to that of babies delivered by CS ($n = 9$) (3773.4 ± 203.1 g, range 3518–4229 vs. 3836.9 ± 277.9 g, range 3575–4508, $P = 0.46$) (Table 1).

BW among women who had uterine pre-rupture syndrome ($n = 3$) varied between 3600 and 4117 g with a mean of 3815.7 ± 219.6 g. When these babies were compared to those delivered by CS ($n = 9$) (mean 3836.9 ± 277.9 g), the difference was not statistically significant ($P = 0.90$).

Discussion

Our rate of successful TOLAC in women with a BW > 3500 g (75 %) is slightly lower than the rates of 79.6 and 85 % observed in India [12, 13]. This can be explained by the fact that TOLAC in our series concerned babies >3500 g, while in those studies it concerned babies <3500 g. Our rate seems higher than what could be expected. Indeed, if we had included the 72 other women with BW > 3500 g as the only indication for elective or emergency CS and who could have benefited also from TOLAC, our success rate would have been lower than what was observed. As found by other researchers in Canada, TOLAC can be carried out even when the estimated fetal weight is >4000 g if other criteria for TOLAC have been fulfilled [9].

A potential limitation of this study was the fact that TOLAC was not carried out for all women with fetal weight above 3500 g. In fact, the fetal weight >3500 g was underestimated among the 13 women received in early phase of labor. That is why TOLAC was carried out despite our initial policy of not doing it when fetal weight was ≥ 3500 g. Furthermore, although the pelvis was clinically adequate in all women, precise dimensions of the pelvis were not known given that pelvic scan was not done by all of them.

Maternal age >30 years was associated with an increased risk of failed TOL in Israel [14]. This was not observed in our series. Mean BW after successful TOLAC (3773.4 g) was higher than that of the previous vaginal delivery (3437.8 g) in our series. During delivery, there is stretch of maternal soft tissues that leads to a slight increase in the pelvic capacity that can be helpful for the subsequent delivery of larger babies. This is contrary to what was observed in Israel where a lower BW in the previous pregnancy was associated with a higher risk of failed TOLAC [14].

Women who had vaginal delivery prior to (or after) the first CS had better chances (94.1 %) of successful TOLAC in our series, as noticed in Sweden and India, respectively [5, 15]. This explains why women of parity ≥ 2 had better outcome of TOLAC than women of parity 1 in our series ($P = 0.006$).

Mean BW among women with successful or failed TOLAC was similar ($P = 0.46$), meaning that other

parameters such as the degree of maternal pelvic adequacy must play an important role in the success of a TOLAC. Further studies should be carried out in cases of successful TOLAC to establish the correlation between the different diameters of the pelvis and the delivery of a particular BW.

We had successful TOLAC with BW $\geq$ 4000 g (3/5 or 60 %) (Table 3). The fact that women who had vaginal delivery before or after CS had better chances of successful TOLAC (94.1 %) than women who never delivered vaginally before TOLAC (63.1 %) shows that women who had a prior vaginal delivery of a baby, especially a big baby (BW > 3500 g), had higher chances of delivering even a macrosomic baby after a TOLAC.

We had one case of partial uterine scar dehiscence (2.7 %) with an Apgar score of 7 and 8 at 1- and 5-min, respectively, and with a BW of 4117 g. This rate is higher than that of 0.8 % noticed in India [12]. This difference is probably due to our small sample or to the high BW in our series. This shows that TOLAC with an estimated fetal weight >4000 g is risky, as observed in Sweden [5], and all preparations should be made for rapid CS if signs of imminent uterine rupture are present.

Conclusion

Successful TOLAC with birth weight >3500 g can be observed, especially among women admitted in advanced labor or among those with successful vaginal delivery prior to the current TOLAC. To reduce the global CS rate, a TOLAC should be offered to well selected women with fetal weight >3500 g as long as the other criteria for TOLAC are fulfilled. Although fetal weight >4000 g was associated with an increased risk of uterine dehiscence, this study showed that TOLAC with fetal weight >3500 g is not an absolute contraindication as previously stated.

Compliance with Ethical Standards

Conflict of interest The authors have none to declare.

Ethical Standards This study entitled “Trial of labor after cesarean section among women with unique lower segment scarred uterus and fetal weight 3500 g: prognostic factors for a safe vaginal delivery” received approval from the institutional ethics.

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