The Journal of Maternal-Fetal & Neonatal Medicine

ISSN: 1476-7058 (Print) 1476-4954 (Online) Journal homepage: http://www.tandfonline.com/loi/ijmf20

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To cite this article: Roberto Vigorito, Rodolfo Montemagno, Gabriele Saccone & Renato De Stefano (2016) Obstetric outcome associated with trial of labor in women with three prior cesarean delivery and at least one prior vaginal birth in an area with a particularly high rate of cesarean delivery, The Journal of Maternal-Fetal & Neonatal Medicine, 29:22, 3741-3743, DOI: 10.3109/14767058.2016.1142968

To link to this article: http://dx.doi.org/10.3109/14767058.2016.1142968

Accepted author version posted online: 18 Jan 2016.
Published online: 26 Feb 2016.

THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE

http://informahealthcare.com/jmf
ISSN: 1476-7058 (print), 1476-4954 (electronic)

J Matern Fetal Neonatal Med, 2016; 29(22): 3741–3743
 DOI: 10.3109/14767058.2016.1142968

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ORIGINAL ARTICLE

Obstetric outcome associated with trial of labor in women with three prior cesarean delivery and at least one prior vaginal birth in an area with a particularly high rate of cesarean delivery

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Abstract

Objective: The objective of this study is to evaluate maternal and neonatal outcomes associated with trial of labor after cesarean (TOLAC) in women with three prior cesarean delivery (CD) and at least one prior vaginal delivery.
Methods: This is a retrospective study using data collected from clinical records of women three prior CD and at least one prior vaginal delivery who were referred to our unit. Maternal and perinatal outcomes were compared between women with three prior CD who underwent TOLAC and those who underwent planned repeated CD (i.e. control group). The primary outcome was a composite of maternal complications including at least one of the followings: need for blood transfusion, uterine rupture, hysterectomy, and admission to intensive care unit.
Results: Fifty singleton gestations with three prior CD at with at least one prior vaginal birth were analyzed. Of them, 10 accepted to undergo TOLAC. Of the 10 women who underwent TOLAC, nine had vaginal birth and one had CD for non-reassuring pattern. We found no significant differences in the primary outcome, in need for blood transfusion, in the incidence of uterine rupture, hysterectomy, and admission to intensive care unit comparing TOLAC group with controls.
Conclusion: TOLAC in women with three prior CD and at least one prior vaginal delivery is a viable option and is not associated with higher risk of adverse maternal or fetal outcomes.

Keywords

Cesarean, induction, labor, neonatal outcome, vaginal birth

History

Received 18 November 2015
Revised 11 January 2016
Accepted 13 January 2016
Published online 15 February 2016

Introduction

There is a significantly increased risk of maternal morbidity and mortality associated with each additional cesarean delivery (CD) including operative injury, blood transfusion, hysterectomy as well as admission to intensive care unit (ICU) [1]. The alternative to having a CD in women with prior CD is a trial of labor after cesarean (TOLAC). Although vaginal birth after CD (VBAC) is associated with a low risk of uterine rupture [2], its management is controversial.

Due to the overall rise in cesarean frequency in many countries including Italy, an increasing number of women have had multiple CD [3]. In our region, the incidence of CD is more than 40% [3]. Although, American College of Obstetricians and Gynecologists (ACOG) considers reasonable to perform TOLAC in women with history of two prior CD, data regarding TOLAC in women with three prior CD is still a subject of debate [2]. The aim of this study was to evaluate the maternal and neonatal risks associated with TOLAC in women with three prior CD and at least one prior vaginal delivery.

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Materials and methods

This is a retrospective observational study using data collected from clinical records of women with three prior CD and with at least one prior vaginal birth who were referred to the Department of Obstetrics and Gynecology, Ospedale Buon Consiglio Fatebenefratelli, Naples, Italy, from January 2011 to January 2015. The study was approved by the local IRB. Starting on January 2010, TOLAC was offered to all women with three prior CD at with at least one prior vaginal delivery. Due to the increased risk of uterine rupture, we did not offer neither induction of labor nor oxytocin in women with prior CD undergoing TOLAC [4].

The aim of this study was to compare maternal and perinatal outcomes between women with three prior CD who underwent TOLAC and those who underwent planned repeated CD (i.e. control group). The controls group included women who refused TOLAC. Women who underwent CD for medical reason (e.g. placenta previa, non-reassuring patterns in the intrapartum or antepartum fetal heart monitoring, medical condition precluding a TOLAC) were excluded.

Only women with vertex singleton gestation at term and with at least one prior vaginal delivery were included.

The primary outcome was designed *a priori* and was a composite of maternal complications including at least one of the following: need for blood transfusion, uterine rupture, hysterectomy, and admission to ICU. Uterine rupture was defined as a disruption of the uterine muscle and visceral peritoneum or a uterine muscle separation with extension to the bladder or broad ligament during the CD or laparotomy following TOLAC. Secondary outcomes were birth weight and admission to neonatal ICU (NICU).

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS, SPSS Inc., Chicago, IL) v. 19.0 (IBM Inc., Armonk, NY). Data were shown as means ± standard deviation or as number (percentage). Categorical variables were compared using the Chi-square or Fischer exact test. Within-group comparison was undertaken using Wilcoxon and Mann–Whitney tests. p values $<(0).05$ were considered statistically significant. Results of the variables statistically significant were presented as odds ratio (OR) with 95% of confidence interval (CI). The study was performed following the STROBE guidelines [5].

Results

From January 2011 to January 2015, 150 women with three prior CD were referred to our Division. Hundred women were excluded: 95 were excluded since they did not have any prior vaginal birth and five were excluded for missing data.

Fifty vertex singleton gestations with three prior CD and with at least one prior vaginal delivery were analyzed. Of them, 10 accepted to undergo TOLAC. The two groups were similar in terms of maternal demographics; all the included women were Caucasian and the mean age at the enrolling was 31.5 in the TOLAC group and 30.9 in the control group (Table 1). Table 2 shows labor events of the 10 laboring women who underwent TOLAC.

Of the 10 women who underwent TOLAC, nine had vaginal birth while only one had CD for non-reassuring pattern. Comparing the TOLAC group with controls, no differences were found in the primary outcome (i.e. maternal composite outcome) ($p = 0.85$), in need for blood transfusion, in the incidence of uterine rupture, hysterectomy, and admission to ICU. We also found no difference in the birth weight and in the incidence of admission to NICU comparing fetuses of women who underwent TOLAC with fetuses of those who did not (Table 3).

Table 1. Maternal demographic characteristics.

	TOLAC 10 (20%)	Control 40 (80%)	p values
Age			
Mean ± SD	31.5 ± 5.8	30.9 ± 6.0	0.590
BMI			
Mean ± SD	28.6 ± 7.7	26.1 ± 4.7	0.510
>30 *n* (%)	34 (21.7%)	31 (21.1%)	0.975
Smoking *n* (%)	4 (40%)	10 (25%)	0.088
Race			
Caucasian *n* (%)	10 (100%)	40 (100%)	1.00
Gravidity			
Mean ± SD	2.4 ± 0.3	2.3 ± 0.4	0.894
Family history of hypertension			
n (%)	57 (36.3)	55 (37.7%)	0.688
Prior vaginal birth	10 (100%)	40 (100%)	0.999
Mean ± SD	1.2 ± 0.7	1.1 ± 0.8	0.748

Data are presented as number (percentage) or as mean with standard deviation. SD: standard deviation.

Discussion

This retrospective single center 5-year study evaluating maternal and neonatal outcomes between women with three prior CD and at least one prior delivery who underwent TOLAC with those who preferred undergoing planned CD showed that TOLAC in women with three prior CD is not associated with higher risk of maternal or neonatal complications.

The CD rate in the US as well as in Italy has risen in the last decade also due to the decline in VBAC from 31% in the 1998 to 9.2% in the 2004 [1,2]. ACOG has recommended that for women with two prior CD only those with a prior vaginal delivery should be considered candidates for TOLAC [4]. There are few large-scale studies addressing safety and efficacy of TOLAC after multiple prior CD [6–9], and there is very limited data on outcomes among women with more than two prior cesareans [9]. Prior studies have often combined all women with more than one prior cesarean into a single group, despite the fact that current recommendations for women with two prior and those with more than two prior CD are clinically distinct [5]. Additional sample size limitations have impacted the interpretation of prior studies [6–8]. Our data concur with the prior studies founding that women

Table 2. Labor events in the ten women who underwent TOLAC.

	TOLAC 10
Length of labor Mean ± SD (h)	4.59 ± 0.77
Prolonged second stage** *n* (%)	1 (10.0%)
Induction of labor *n* (%)	0 (0%)
Shoulder dystocia *n* (%)	0 (0%)
Rupture of membranes *n* (%)	8 (80.0%)
OVD *n* (%)	2 (20.0%)
3rd/4th degree perineal laceration *n* (%)	2 (20.0%)
Episiotomy *n* (%)	2 (20.0%)
Patient satisfaction* *n* (%)	8 (80.0%)

SD, standard deviation; TOLAC, trial of labor after cesarean; OVD, operative vaginal delivery (either forceps or vacuum).

*Number of women who were satisfied by TOLAC.

**> 2 hours.

Table 3. Primary and secondary outcomes.

	TOLAC 10 (20%)	Control 40 (80%)	p values
Maternal composite outcome*, *n* (%)	0	2 (5%)	0.85
Need for blood transfusion, *n* (%)	0	2 (5%)	0.85
Uterine rupture, *n* (%)	0	0	N/A
Hysterectomy, *n* (%)	0	0	N/A
Admission to ICU, *n* (%)	0	0	N/A
Birth weight (g) Mean ± SD	3160 ± 512	2805 ± 502	0.05
Admission to neonatal ICU, *n* (%)	0	1 (2.5%)	0.77
GA at delivery	39.7 ± 2.2	39.4 ± 2.7	0.61

Data are presented as number (percentage) or as mean with standard deviation. SD: standard deviation; ICU: intensive care unit; N/A: not applicable; GA: gestational age.

*At least one of the followings: need for blood transfusion, uterine rupture, hysterectomy, and admission to intensive care unit.

with three prior CD did not experience a difference in morbidity based on whether they attempted TOLAC or planned for a repeat cesarean [9].

The most important limitation of our study is that this is a retrospective, non-randomized comparison. *A priori* power analysis could not be assessed due to its retrospective nature [10,11]. We do acknowledge that our study is underpowered; however, this is indeed an uncommon cohort of women who were followed in at least five pregnancies (at least one prior vaginal birth, three prior CD and the index pregnancy), consecutive in most of the subjects, to determine feasibility of including them in our study. The management in the index pregnancy (TOLAC versus planned CD) was at the women's discretion.

In summary, TOLAC in women with three prior CD and with at least one prior vaginal birth is a viable option and is not associated with higher risk of adverse maternal or fetal outcomes. However, we think that patient preference for the type of delivery should drive the decision-making. Women should be given the choice between a TOLAC and a planned CD in case of prior multiple cesarean deliveries and should also be informed realistic and accurate risk of the procedures.

Declaration of interest

The authors report that they have no conflicts of interest.

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