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The Success Rate and Pregnancy Outcomes in Trial of Labor after One or Two Cesarean Section: A Cross-Sectional Study

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ABSTRACT

Background & aim: Trial of labor after cesarean (TOLAC) to achieve vaginal delivery is considered acceptable in women with one previous cesarean. This study was performed to compare the success rate and maternal and neonatal outcomes of TOLAC after one and two previous cesarean sections.

Methods: This cross-sectional study was conducted in September 2018 and March2020 by convenience sampling on 339 pregnant women with a history of one or two previous cesarean sections in Mashhad. TOLAC was performed for all eligible participants, if cesarean section performed due to any reason, it was considered a failed TOLAC. Maternal and neonatal outcomes by a check list were recorded during TOLAC and one week later. Data were analyzed by SPSS (version 24).

Results: TOLAC was successful in 301 cases (94.1%), but 19 (5.9%) underwent cesarean section. Maternal age, parity, and frequency of comorbidities were significantly higher in those with two previous cesarean sections compared to those with one previous cesarean section (P<0.05). Induction of labor was significantly higher in cesarean section compared to the TOLAC group (P=0.003). However, none of the pregnancy outcomes including induction of labor, postpartum hemorrhage, blood transfusion, birth weight, first -minute Apgar score, fifth minute Apgar score, NICU admission and breastfeeding in the first 48 hours were not significantly different between those with one or two cesarean sections (P>0.05).

Conclusion: Considering standard precautions in patient selection, TOLAC has a high enough success rate to justify recommending it to the selected women with one or two previous cesarean section.

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Introduction

The medical and obstetric benefits of successful TOLAC (trial of labor after cesarean) include the potential adverse outcomes of multiple repeat cesarean deliveries especially abnormal placental adhesions and adjacent organ injuries (1-3).

TOLAC is a safe option for women with a high likelihood of TOLAC (vaginal birth after

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cesarean) and low risk of intrapartum uterine rupture (2-3). The evidence has shown that a woman with only one previous cesarean delivery via a low transverse hysterotomy incision has the lowest risk of uterine scar separation during a subsequent trial of labor (1-2).

In such conditions, the success rate of TOLAC was reported as 60 to 80% (4), and uterine rupture was estimated as 0.4 to 0.7% (5).

ACOG (American College of Obstetrics and Gynecology) reported that women with two prior cesarean deliveries can be considered as candidates for TOLAC, with individualized counseling which accounts for other factors predicting the success rate (6). It seems that the success rate of TOLAC is similar for women with one versus two prior cesarean deliveries (65 to 85%) (7-8).

In the United States in 2013, the success rate was reported as 70.4% for women with TOLAC after one previous cesarean delivery and 51.4% for those with two or more prior cesarean deliveries (9). The factors such as antepartum, intrapartum, and nonmedical factors affect the success rate of TOLAC (10).

With regard to repeat cesarean section complications; especially in terms of morbid placental adhesions, the risk of peripartum hysterectomy, and increasing maternal requests for TOLAC, this study was conducted with the aim to compare the success rate and maternal and neonatal outcomes of TOLAC in women with one and two previous cesarean sections.

Materials and Methods

This cross-sectional study of pregnant women with one or two previous cesarean delivery was conducted between September 2018 and March 2021 in three academic hospitals of Mashhad University of Medical Sciences, Mashhad, Iran, to evaluate the TOLACTOLAC success rate and maternal and neonatal outcomes.

Inclusion criteria were pregnant women with one or two previous cesarean sections, no other myometrial incision, gestational age above 28 weeks with normal live fetus, indication of pregnancy termination (onset of labor, premature rupture of membranes (PROM), preeclampsia, no contraindication of vaginal delivery (placenta previa, breech presentation), and maternal request for TOLAC.

Exclusion criteria were: maternal request for cesarean delivery and need to labor induction due to low Bishop Score (<6).

TOLACAmong women who had the inclusion criteria which referred to the 3 academic hospitals, using a convenience sampling, a total number of 339 eligible women were included for TOLAC. About 19 cases were excluded due to maternal requests for cesarean delivery (due to not having informed consent for TOLAC). The written informed consent was obtained from all participants after comprehensive counseling about the benefits and also possible complications of TOLAC.

A checklist that was prepared by the researchers of this study contained 11 questions including maternal age, gestational age, parity, maternal weight, the number and cause of previous cesareans, time interval between the last cesarean until this admission, the number of previous vaginal delivery, past medical history, the cause of this admission and the need for labor augmentation with oxytocin infusion was completed by the researchers who were gynecology residents.

In the case of fetal distress, prolonged PROM, placenta abruption, or maternal request for cesarean section, the emergency cesarean delivery was planned and considered as a failed TOLACTOLAC (unsuccessful TOLACTOLAC). If labor augmentation by oxytocin infusion was needed, it was also recorded.

Maternal and neonatal outcomes including uterine or bladder rupture, postpartum hemorrhage, blood transfusion, successful breastfeeding, neonatal birth weight, first and fifth -minute Apgar score, and neonatal intensive care unit (NICU) admission were noted in the checklist.

The primary outcome was TOLAC success rate; the secondary outcomes included maternal complications consisting of uterine or bladder rupture, postpartum hemorrhage, blood transfusion as well as neonatal outcomes including first and fifth -minute Apgar score, birth weight, and NICU (neonatal intensive care unit) admission.

Patients were followed by phone calls up to one week after delivery for evaluation of any maternal or neonatal outcomes.

Kolmogrov-Smirnov test was used for assessment of data normality. Continuous variables were compared using Student t-test if normally distributed, and Mann-Whitney U test if non normally distributed; whereas discontinuous variables were compared using Chi-square or Fisher Exact tests. All statistical analysis was performed by using SPSS version 24. P≤0.05 was considered as a significant level.

Results

About 320 women with a history of one or two previous cesarean delivery were evaluated for TOLAC success. About 273 cases (85.3%) had one previous cesarean section and 47 cases (14.7%) had a history of two previous cesareans.

Baseline characteristics, the causes of previous cesareans, and the causes of recent admission in these women are shown in Table 1.

Table 1. Baseline characteristics of women with one or two previous cesarean delivery

Variable		One previous CS*** N=273	Two previous CS N=47	P-value
Maternal age (year)		30.79±5.31	33.31±4.62	0.003*
Gestational age (week)		38.46±1.36	38.60±1.15	0.543*
Parity		1.91±1.07	3.25±1.25	<0.001*
Maternal weight (kg)		70.28±11.58	67.02±15.07	0.104*
Number of previous normal vaginal delivery	N=0	77 (30.1)	12 (26.7)	0.709**
	N=1	101 (39.5)	16 (35.6)	
	N=2	52 (20.3)	10 (22.2)	
	N>2	26 (10.2)	7 (15.6)	
Number of previous abortion (before 20 weeks)	N=0	179 (69.9)	29 (64.4)	0.016**
	N=1	47 (20)	5 (12.5)	
	N=2	9 (3.8)	6 (12.5)	
	N=3	0	1 (2.5)	
Time interval between previous cesarean to this admission (month)		62.23±36.48	59.11±28.76	0.587*
Associated diseases				
Preeclampsia		5 (2%)	3 (6.7%)	0.017**
Gestational Diabetes		11(4.3%)	4 (8.9%)	
Chronic hypertension		2 (0.8%)	1 (2.2%)	
No proven disease		238 (93%)	37 (82.2%)	
Cause of referring				
Rupture of membrane		39 (15.2%)	8 (17.8%)	0.083**
Labor onset		203 (79.3%)	35 (77.8%)	
Vaginal bleeding		0 (0.0%)	1 (2.2%)	
Rupture of membrane and onset of labor		14 (5.5%)	1 (2.2%)	
The Cause of previous CS				
Breech presentation		54 (21.2%)	8 (17.8%)	0.502**
Arrest of labor		26 (10.2%)	5 (11.1%)	
Fetal distress		77 (30.2%)	19 (42.2%)	
Macrosomia		8 (3.1%)	0 (0.0%)	
Preeclampsia		6 (2.4%)	4 (8.9%)	
Meconium stained amniotic fluid		21 (8.2%)	2 (4.4%)	
placental abruption		9 (3.5%)	4 (8.9%)	
Twin pregnancy		3 (1.2%)	1 (2.2%)	
Prolonged rupture of membrane		11 (4.3%)	0 (0.0%)	
CPD		4 (1.6%)	1 (2.2%)	
Other		36(14.1%)	1 (2.2%)	

* Independent samples t-test was used to compare the two groups. ** Fisher exact test was used to compare the two groups
***CS: Cesarean section

Maternal age, parity, and medical illness were significantly higher in women with the history of two previous cesarean sections (P<0.05).

Among 320 eligible women for TOLAC, the total success rate was observed in 301 cases (94.1%); in 19 cases (5.9%) cesarean delivery was performed. About 256 cases in one previous cesarean section group and 45 cases in two previous cesarean section groups had successful TOLAC (93.77% vs. 95.74%, respectively). The causes of cesarean section are listed in Table 2.

Table 2. Frequency distribution of the causes of cesarean section in women with unsuccessful TOLAC

Causes	Frequency in total of mothers (N=320)
Prolonged rupture of membrane	4 (21.1%)
Arrest of labor	3 (15.8%)
Fetal distress	6 (31.6%)
Vaginal bleeding	2 (10.5%)
Meconium	4 (21.1%)

In terms of maternal and neonatal outcomes, the need for labor augmentation was significantly higher in unsuccessful TOLAC group (cesarean group) (P<0.001). There was no case of uterine rupture or bladder injury in any group. Other outcomes are shown in Table 3.

Maternal and neonatal outcomes between one and two previous cesarean section groups with successful TOLAC are shown in Table 4.

There was no significant difference between the two groups in terms of these outcomes.

Table 3. Comparison of maternal and neonatal outcomes between successful and unsuccessful TOLAC groups

Variable	TOLAC N=301	Cesarean Section N=19	P-Value
Labor induction	4 (1.3%)	4 (21.1 %)	<0.001*
Postpartum hemorrhage	7 (2.3%)	0 (0.0%)	0.649*
Receiving transfusion	4 (1.3%)	0 (0.0%)	0.782*
Breastfeeding within the first 48 hr	300 (99.7%)	19 (100%)	0.941**
Birth weight (gr)	3216.11±497.05	3232.78±297.57	0.824***
Score First-minute Apgar	8.94±0.29	8.89±0.31	0.486***
Fifth minute Apgar score	9.95±0.24	9.89±0.31	0.299***
NICU admission	10 (3.3%)	2 (10.5%)	0.154*

* Fisher exact test was used to compare the two groups. ** The Chi-square test was used to compare the two groups. *** Independent t-test was used to compare the two groups

Table 4. Frequency distribytion of Maternal and neonatal outcomes between one and two previous cesarean section groups with successful TOLAC

Variables	One previous CS N=256	Two previous CS N=45	P-Value
Receiving transfusion	3 (1.2%)	1 (2.2%)	0.479*
Postpartum hemorrhage	5 (2.0%)	2 (4.4%)	0.282*
Labor induction	8 (2.9%)	0 (0.0%)	0.608*
Satisfaction of TOLAC progress	250 (97.7%)	44 (97.8%)	0.718*
NICU admission	9 (3.5%)	1 (2.2%)	0.544*
Birth weight (gr)	3212.45±506.57	3236.95±443.61	0.761**
First minute Apgar	8.94±0.30	8.95±0.20	0.767**
Fifth minute Apgar	9.96±0.23	9.93±0.33	0.492**
Breastfeeding within the first 48 hr	255 (99.6%)	45 (100%)	0.850*

* Fisher exact test was used to compare the two groups.** Independent samples t-test was used to compare the two groups

Discussion

This study was performed with aim to compare the success rate and maternal and neonatal outcomes of TOLAC after one and two previous cesarean sections. The results of the current study showed that the TOLAC success rate and also the maternal and neonatal outcomes were comparable betweenwomen with the history of one or two previous cesarean sections who were admitted for TOLAC. The high success rate of TOLAC in this study may be due to the history of vaginal delivery and also suitable Bishop Score at the time of admission in the majority of participants in both groups.

We didn't find uterine rupture during trial of labor in any groups. However, postpartum hemorrhage and blood transfusion were more frequent in two previous cesarean section groups, but the differences were not significant (P=0.28 and P=0.47, respectively). These results were similar to the results of a previous study (11).

A meta-analysis that was performed to evaluate the obstetrical outcomes of TLAC between one and two previous cesarean section groups found different results. They found three times more uterine rupture in two previous cesarean section groups. Also, the overall TOLAC success rate was 71% which was lower than the current study (12). These differences may be due to higher sample size and also different inclusion criteria (like lower Bishop Score and more labor induction in their participants).

In terms of neonatal outcomes, first and fifth minutes Apgar score, NICU admission, and need for mechanical ventilation were comparable between the two groups (P>0.05). These outcomes were similar to the previous studies (11,13). However, increased neonatal adverse outcomes were reported in women with the trial of labor after two prior cesareans, compared with repeat elective cesarean section (14). These differences may be due to different maternal factors like the lower bishop score and lower gestational age at the time of admission in the TOLAC group.

Optimal neonatal outcomes in the current study showed the importance of restrictive criteria in choosing women for TOLAC; in fact, optimal maternal conditions including spontaneous labor onset, optimal Bishop score at the time of admission (≥6), precise fetal and maternal continuous monitoring during TOLAC and also the higher gestational age in this study were the main causes for the favorable TOLAC and neonatal outcomes.

One of the important findings in the current study was the higher number of previous normal vaginal delivery in the successful TOLAC group. This important factor also has been emphasized in other previous studies (15-16).

One of the strengths of the current study was evaluating TOLAC success rate in three academic hospitals which are the main referral centers in the east of Iran, so the results could have more generalizability. According to our knowledge, this is the first study which was conducted in the Iranian women population for assessment of TOLAC success rate after TOLAC2.

One of the limitations of the current study was the lower sample size in the TOLAC 2 group, so the occurrence of uterine rupture and major maternal morbidities were not seen. Regarding the optimal maternal and neonatal outcomes the importance of childbearing and decreasing the rate of hysterectomy due to repeat cesarean sections, future research could be focused on the strategies to decrease repeat cesarean section rate.

Conclusion

In an optimal situation, the trial of labor after one or two previous cesarean sections is a safe option for both mothers and neonates in selected cases. According to our findings, TOLAC has a high enough success rate to justify recommending it to the selected women with one or two previous cesarean sections.

Declarations

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Conflicts of interest

The authors declared no conflicts of interest.

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Ethical consideration

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (code: IR.MUMS.MED.REC.1397.673).

Authors' contribution

AP performed study conception and design, writing and editing the manuscript. AY and SA prepared the draft of the article. FAD collected the data of the study. MM and EH helped in data collection. HMM performed data analysis and interpretation. All authors approved the final manuscript.

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