

CLINICAL ARTICLE

Obstetrics

Trial of labor after cesarean in twin gestation with no prior vaginal delivery – evidence from largest cohort reported

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Abstract

Objective: To investigate trial of labor after cesarean (TOLAC) success rates in twin gestations with no prior vaginal delivery.

Methods: A retrospective study of women with twin gestations who underwent a TOLAC and had no prior vaginal delivery during 2011–2020. TOLAC success and failure groups were compared.

Results: Of 675 twin gestations with a history of cesarean delivery and no prior vaginal delivery, 83 (12.3%) elected to undergo a TOLAC and 26 (31.3%) succeeded. Two (7.7%) women delivered by cesarean for the second twin after vaginal delivery of the first twin. Epidural analgesia was positively associated with TOLAC success (odds ratio [OR] 4.31, 95% confidence interval [CI] 1.56–11.94, $P = 0.004$). Uterine rupture occurred in two patients (3.5%) of the TOLAC failure group. The proportion of cases with low Apgar score (<7) at 5 min was higher in the TOLAC success group (4 [15.4%] versus 1 [1.8%]; OR 10.1, 95% CI 1.07–96.22, $P = 0.032$) and the neonatal composite adverse outcome rate was lower in this group (OR 0.22, 95% CI 0.07–0.69, $P = 0.009$).

Conclusion: TOLAC in women with twins with no prior vaginal delivery is associated with a low success rate. No independent predictors of successful TOLAC were identified.

KEYWORDS

cesarean delivery, neonatal outcomes, trial of labor after cesarean, twins, vaginal birth after cesarean

1 | INTRODUCTION

Increased cesarean delivery (CD) rates, reaching as high as 31.9%,¹ carry maternal morbidities and may result in future obstetrical complications.^{2,3} Therefore, it is of paramount importance to minimize the rate of elective repeat CD.^{4,5} Trial of labor after cesarean

(TOLAC) resulting in successful vaginal birth after cesarean (VBAC) is associated with lower rates of maternal and perinatal adverse outcomes.^{6–10}

The majority of women carrying a twin gestation with a history of a previous CD will choose an elective repeat CD.¹¹ However, as twin gestation rates are rising—nearing 3.3% in the USA in 2018,¹²

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possibly as a result of increased use of assisted reproduction—it is likely that a growing number of women carrying twins will face the dilemma of TOLAC or elective repeat CD.

Counseling women regarding their TOLAC success is important, but is a complex task.^{4,13} When women with twin gestations face this dilemma, this task is even more complex, as it relies on scarce data based on small series (ranging from 21 to 92) and heterogeneous populations gathered from administrative data sets.^{11,14} Moreover, previous vaginal delivery is known to be a key determinant of TOLAC success rate. However, previous reports and systematic reviews on TOLAC in twin pregnancies failed to acknowledge this factor, concluding that TOLAC success rates among twins do not differ from those of singleton gestations, while relying for their conclusions mostly on parous women.^{11,14} Little is known regarding TOLAC in twin gestations among women with no prior vaginal delivery. As counseling these women accurately based on their obstetrical history is essential for shared decision making, we aimed to investigate TOLAC success rates among twin gestations of women with no prior vaginal delivery.

2 | MATERIALS AND METHODS

2.1 | Women

This is a retrospective cohort study conducted at the Hadassah Medical Center, the Chaim Sheba Medical Center, and the Lis Maternity Hospital, three tertiary medical centers in three of the most populated cities in Israel. These hospitals serve large, heterogeneous populations, with over 10 000 deliveries per year in each center. The study cohort comprised all women with twin gestations who underwent TOLAC and had never delivered before during 2011–2020.

Inclusion criteria included women with twin gestations, cephalic presentation of the first twin, previous CD with a low transverse incision who underwent TOLAC. Women with previous vaginal deliveries, more than one previous CD, intrauterine fetal demise before TOLAC admission, or major fetal anomalies were excluded.

2.2 | Data collection

As part of the routine clinical care, the medical team collects granulated clinical data in the electronic health records of all women delivering at the medical centers. To identify women who have undergone a trial of labor we abstracted all vaginal deliveries and unplanned CDs of women with twins and one prior CD. We then reviewed the electronic health record of each case individually in order to include only cases with a trial of labor.

For this study, we reviewed the electronic health records from the three medical centers, and abstracted maternal hospital admission records, delivery charts, surgical reports, and discharge letters. We extracted the following data: maternal characteristics including age, ethnic origin, height, body mass index (calculated as weight in kilograms divided by the square of height in meters), weight gain during pregnancy, gravidity; CD characteristics including the presence of

twins, gestational age at delivery, elective versus unplanned CD, CD indication, presence of dystocia, cervical dilatation at delivery; current pregnancy and TOLAC characteristics including chorionicity, diabetic disorders, gestational hypertensive disorders, inter-delivery interval, mode of start of delivery, epidural analgesia, oxytocin administration, presence of meconium, and intrapartum fever; TOLAC outcomes including mode of delivery, indication for CD, and cervical dilatation at CD, uterine rupture, postpartum hemorrhage, and maternal composite adverse outcome. (Maternal composite adverse outcome was defined as the presence of uterine rupture and/or postpartum hemorrhage.) Neonatal characteristics including birth weight, birth weight differences between deliveries, and the proportion of women with a higher birth weight in the current delivery compared with the index delivery, Apgar scores, length of admission, neonatal intensive care unit admission (NICU) and neonatal composite adverse outcome (neonatal composite adverse outcome was defined as the presence of any of the following: Apgar at 1 min <5, Apgar at 5 min <7, and NICU admission).

Labor dystocia was defined as any of the following: arrest of descent, arrest of dilatation, or failed induction of labor. Successful TOLAC was defined as vaginal delivery of the first twin. A further analysis was performed for the second twin's mode of delivery. Postpartum hemorrhage was defined in accordance with published guidelines.¹⁵ Uterine rupture was defined using strictly defined diagnostic criteria as previously published.^{16,17}

2.3 | Statistical analysis

Maternal, neonatal, and delivery characteristics of the women who had a successful TOLAC were compared with those with failed TOLAC. Univariate analysis was performed to identify factors associated with TOLAC outcome. Multivariable regression analysis, with a stepwise regression, was used to adjust for potential confounding factors in order to identify factors independently associated with TOLAC success. The regression model included the following factors: use of epidural, weight gain during pregnancy, interpregnancy interval, induction of labor, maternal age, maternal height, and gestational age.

Characteristics of women are described as proportions for categorical variables and as median (interquartile range [IQR]) and mean for continuous variables. Significance was assessed by the χ^2 test or Fisher's exact test for categorical variables. Student's *t*-test was used for analysis of continuous variables with normal distribution and the Mann–Whitney *U*-test was used for analysis of continuous variables with skewed distribution. Study results are presented as odds ratios (OR) and 95% confidence intervals (CI). A two-sided *P* value less than 0.05 indicated statistical significance.

The data were analyzed using SPSS version 22 (IBM Corp).

2.4 | Ethical approval

The study protocol was approved by the institutional review boards of the three medical centers: Ichilov Sourasky medical center

0282-08-TLV 08/2020, Hadassah medical center 0632-15-HMO 01/2016, and Chaim Sheba medical center 7145-20-SMC 06/2020.

3 | RESULTS

Of the 10 094 twin deliveries during the study period, 1036 (10.3%) were in women with a history of CD. Of these, 675 (65.1%) were women with no prior vaginal delivery. Of those, 83 (12.3%) elected to undergo a TOLAC and met the inclusion criteria (Figure 1). The median interpregnancy interval for the whole cohort was 43 months (IQR 24–28 months). The median gestational age at delivery was 35^{0/7} weeks (IQR 34^{0/7}–37^{0/7} weeks). Seventy-three of the pregnancies (87.9%) involved dichorionic twins.

Table 1 presents the demographic and clinical characteristics of women who had a successful or failed TOLAC. Of the 83 women who underwent TOLAC in the subsequent pregnancy, 26 (31.3%) successfully delivered vaginally. The rate of dystocia as the indication for CD at the previous CD did not differ between the groups (2 [7.7%] versus 12 [21.0%], $P = 0.148$). Other maternal and previous CD characteristics did not differ between groups.

Table 2 presents the delivery characteristics of women with successful and failed TOLAC. Epidural analgesia was positively associated with TOLAC success (19 [73.1%] versus 22 [38.6%]; OR 4.31, 95% CI 1.56–11.94, $P = 0.004$). The rates of pregnancy complication as well as the onset of labor (induction versus spontaneous delivery) did not differ between the two groups. Of the women with successful TOLAC, 21 (80.8%) delivered without assistance and 5 (19.2%) delivered by operative vacuum delivery. There were no forceps deliveries. Two (7.7%) women delivered by CD for the second twin. The remaining 57 (68.7%) women experienced a failed TOLAC attempt and delivered by CD because of dystocia ($n = 26$, 45.6%), non-reassuring fetal status ($n = 26$, 45.6%), and other causes ($n = 5$, 8.8%). There were two cases (3.5%) of uterine rupture in the TOLAC failure group and no uterine ruptures occurred in the TOLAC success group ($P = 0.578$). Higher birth weight in TOLAC was positively associated with TOLAC success (6 [23.1%] versus 3 [5.3%]; OR 5.40, 95% CI 1.23–23.67, $P = 0.024$). The rate of the maternal composite adverse outcome was higher in the successful TOLAC group (OR 6.54, 95% CI 1.17–36.39, $P = 0.031$) because of the increased rate of postpartum hemorrhage among these women.

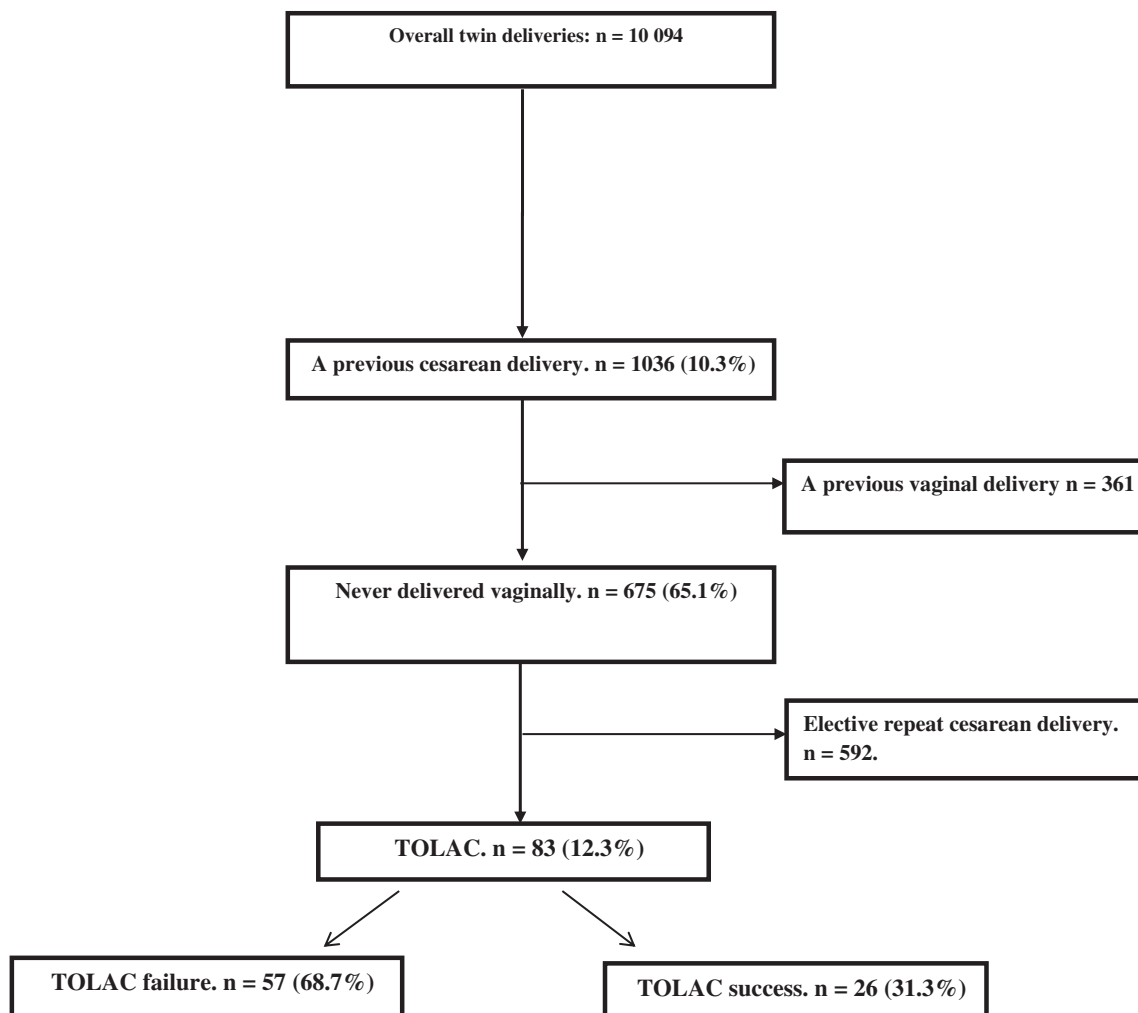


FIGURE 1 Selection of the study group.

TABLE 1 Women and previous cesarean delivery characteristics of women who had a successful or failed TOLAC

Characteristics	Successful TOLAC (n = 26)	Failed TOLAC (n = 57)	OR (95% CI)	P value
Women demographics				
Age, years	32 [28–34] (30)	31 [29–33] (31)	1.02 (0.91–1.14)	0.671
Ethnicity				
European	8 (30.8%)	28 (49.1%)	0.46 (0.17–1.22)	0.121
Middle eastern	18 (69.2%)	29 (50.9%)	2.17 (0.81–5.79)	0.121
Women anthropometrics				
Height, cm	164 [158–167] (163)	160 [158–167] (161)	1.03 (0.93–1.15)	0.544
Pre-pregnancy body mass index, kg/m ²	22.2 [20.3–26.7] (22.9)	21.7 [18.3–24.0] (22.2)	1.04 (0.83–1.29)	0.723
Pre-delivery body mass index, kg/m ²	27.4 [25.6–30.0] (27.6)	26.5 [24.6–30.7] (27.5)	1.01 (0.82–1.24)	0.910
Weight gain, kg	13 [9–16] (13)	15 [10–21] (15)	0.93 (0.77–1.11)	0.448
Women obstetrical history				
Gravidity	2 [2–3] (3)	2 [2–3] (2)	1.08 (0.69–1.70)	0.724
Previous twin cesarean delivery	4 (15.4%)	11 (19.3%)	0.76 (0.21–2.65)	0.668
Index cesarean delivery				
Gestational age at delivery, weeks	38 ^{0/7} [36 ^{0/7} –38 ^{0/7}] (37 ^{1/7})	40 ^{0/7} [35 ^{6/7} –41 ^{0/7}] (38 ^{1/7})	0.86 (0.63–1.18)	0.382
Birth weight, g	2952 [2487–3270] (2952)	3100 [2550–3575] (2984)	1.0 (0.99–1.001)	0.888
<2500	7 (26.9%)	12 (21.0%)	1.38 (0.47–4.04)	0.555
Mode of cesarean delivery				
Pre-labor cesarean	16 (61.5%)	32 (56.1%)	1.25 (0.48–3.22)	0.811
Intrapartum cesarean	10 (38.5%)	25 (43.9%)	0.80 (0.31–2.06)	
Indication for cesarean delivery				
Dystocia of labor	2 (7.7%)	12 (21.0%)	0.31 (0.06–1.51)	0.148
Cervical dilatation at delivery, cm	5 [1–9] (5)	6 [5–10] (7)		0.456

Abbreviations: CI, confidence interval; OR, odds ratio; TOLAC, trial of labor after cesarean.

^a All continuous variables are expressed as median [interquartile range] (mean). Categorical variables are presented as numbers (percentages).

Table 3 presents the neonatal outcomes of the two groups. The proportion of cases with low Apgar score (<7) at 5 min was higher in the TOLAC success group (4 [15.4%] versus 1 [1.8%]; OR 10.1, 95% CI 1.07–96.22, $P = 0.032$). The neonatal composite adverse outcome rate was lower in this group compared with the TOLAC failure group (OR 0.22, 95% CI 0.07–0.69, $P = 0.009$).

In a multivariable regression analysis, no factor was found to be independently associated with TOLAC success. During the study period, TOLAC success rate in twin gestations with a prior vaginal delivery was 87.3%.

4 | DISCUSSION

To date, there are no data regarding TOLAC among women carrying twin gestations with no prior vaginal delivery. Therefore, any evidence that might improve our estimation of successful TOLAC in these women is of paramount importance.

In this study, we demonstrated a notably low TOLAC success rate of 31.3% among twin gestations with no prior vaginal delivery. Epidural analgesia was positively associated with TOLAC success.

However, no independent predictors of successful TOLAC were identified. Importantly, the TOLAC success rate in twin gestations with a prior vaginal delivery during the study period was 87.3%.

Counseling women and shared decision making regarding TOLAC is a complex task, as the likelihood of achieving VBAC is individual, based upon numerous demographical, anthropometrical, obstetrical, and fetal characteristics. Furthermore, women's attitudes towards a TOLAC attempt may vary greatly.^{4,18} This is even more pronounced in twin gestations, because data are less clear in comparison to singleton pregnancies. Although these women are considered candidates for TOLAC and it is stated that women with twin gestations have a similar likelihood of achieving VBAC to women with singleton gestations,^{4,19} delivery may be complicated by the need for internal fetal manipulation or emergent CD because of prolapse of the umbilical cord.

Since the seminal report by Brady et al.²⁰ in the *New England Journal of Medicine* nearly 3 decades ago, reporting four successful VBAC in women delivering twins, there have been few other retrospective studies on TOLAC in twins, which have been summarized in two recent systematic reviews on TOLAC in twins.^{11,14} A meta-analysis focusing on maternal morbidities following TOLAC in

TABLE 2 Delivery characteristics and outcomes of women who had a successful or failed TOLAC^a

Characteristics	Successful TOLAC (n = 26)	Failed TOLAC (n = 57)	OR (95% CI)	P value
TOLAC delivery				
Inter-delivery interval, mo	36 [24–54] (46)	36 [24–48] (40)	1.01 (0.98–1.03)	0.503
Diabetic disorder	1 (3.8%)	3 (5.3%)	0.72 (0.07–7.27)	1.0
Gestational hypertensive disorder	0 (0%)	0 (0%)		1.0
Dichorionic twins	21 (80.1%)	52 (91.2%)	0.40 (0.10–1.54)	0.184
Epidural analgesia	19 (73.1%)	22 (38.6%)	4.31 (1.56–11.94)	0.004
Induction of labor	4 (15.4%)	2 (3.5%)	5.00 (0.85–29.29)	0.074
Oxytocin administration	3 (11.5%)	6 (10.5%)	1.10 (0.25–4.82)	0.890
Meconium-stained amniotic fluid	2 (7.7%)	8 (14.0%)	0.51 (0.10–2.59)	0.417
Intrapartum temperature $\geq 38.0^{\circ}\text{C}$	5 (19.2%)	17 (29.8%)	0.56 (1.18–1.73)	0.314
Gestational age at delivery, weeks	36 ^{0/7} [34 ^{0/7} –37 ^{1/7}] (33 ^{6/7})	36 ^{0/7} [34 ^{3/7} –37 ^{2/7}] (35 ^{3/7})	0.92 (0.83–1.02)	0.225
TOLAC outcome				
Mode of delivery				
Spontaneous vaginal	21 (80.8%)			
Operative vaginal delivery	5 (19.2%)			
Cesarean for second twin	2 (7.7%)			
Indication for cesarean delivery				
Non-reassuring fetal heart rate		26 (45.6%)		
Dystocia		26 (45.6%)		
Other ^b		5 (8.8%)		
Cervical dilatation at cesarean delivery	–	7[3–9] (7)		
Birth weight, g (Twin A)	2407 [1995–2681] (2194)	2310 [1925–2667] (2273)	1.00 (0.99–1.001)	0.617
Birth weight, g (Twin B)	2314 [1828–2540] (2202)	2221 [1899–2720] (2078)	1.00 (0.99–1.001)	0.824
≤ 1500 g ^c	3 (11.5%)	5 (8.8%)	1.36 (0.29–6.16)	0.692
1500–2000 g ^c	3 (11.5%)	11 (19.3%)	0.54 (0.13–2.14)	0.386
2001–2500 g ^c	9 (34.6%)	18 (31.6%)	1.14 (0.42–3.06)	0.784
>2501 g ^c	11 (42.3%)	23 (40.4%)	1.08 (0.42–2.77)	1.00
Birth weight difference between deliveries, g	–606 [–936 to +72] (–659)	–688 [–1097 to 187] (–718)	1.00 (0.99–1.001)	0.823
Higher birth weight in TOLAC	6 (23.1%)	3 (5.3%)	5.40 (1.23–23.67)	0.024
Maternal outcome				
Uterine rupture	0 (0%)	2 (3.5%)	0.41 (0.01–9.03)	0.578
Postpartum hemorrhage	5 (19.2%)	2 (3.5%)	6.54 (1.17–36.39)	0.031
Composite maternal outcome ^d	5 (19.2%)	2 (3.5%)	6.54 (1.17–36.39)	0.031

Abbreviations: CI, confidence interval; OR, odds ratio; TOLAC, trial of labor after cesarean.

^aAll continuous variables are expressed as median [interquartile range] (mean). Categorical variables are presented as numbers (percentages).

^bOther: three cases of maternal request during labor; two cases of cord prolapse.

^cCategorical analysis of birth weight is presented for Twin A only.

^dComposite maternal outcome was defined as the occurrence of uterine rupture and/or postpartum hemorrhage.

twins,¹⁴ summed four studies ($n = 21$, $n = 16$, $n = 134$, and $n = 120$) discussing success rates.^{21–24} When comparing TOLAC success rate in singletons compared with twins, the study concludes that women with twin gestations have rates of successful vaginal delivery similar

to those of women with singleton gestations and stated that this information should be provided during prenatal counseling. However, this meta-analysis did not account for parity or women with no prior vaginal delivery. A recent meta-analysis, which focused on TOLAC

TABLE 3 Neonatal outcomes of pregnancies with successful or failed TOLAC^a

Characteristics	Successful TOLAC (n = 26)	Failed TOLAC (n = 57)	OR (95% CI)	P value
Neonatal outcome				
Apgar, 1 min	9 [9–9] (8)	9 [9–9] (8)	0.82 (0.66–1.03)	0.175
Apgar, 5 min	10 [10–10] (8)	10 [9–10] (10)	0.79 (0.62–1.006)	0.123
Apgar, 1 min <7	4 (15.4%)	5 (8.8%)	1.89 (0.46–7.71)	0.452
Apgar, 5 min <7	4 (15.4%)	1 (1.8%)	10.1 (1.07–96.22)	0.032
Neonatal intensive care unit admission	5 (19.2%)	29 (50.9%)	0.22 (0.07–0.69)	0.009
Hospital stay, dAYS	5 [3–9] (7)	8 [5–25] (13)	0.92 (0.82–1.03)	0.162
Composite neonatal outcome ^b	5 (19.2%)	29 (50.9%)	0.22 (0.07–0.69)	0.009

Abbreviations: CI, confidence interval; OR, odds ratio; TOLAC, trial of labor after cesarean.

^aAll continuous variables are expressed as median [interquartile range] (mean). Categorical variables are presented as numbers (percentages).

^bComposite neonatal outcome was defined as the occurrence of any of the following: Apgar 1 min <5, Apgar 5 min <7, neonatal intensive care unit admission

success rate,¹¹ summed 10 studies reporting success rate and concluded that the successful TOLAC rate was 72.2% (95% CI 59.7%–83.2%). The same limitation regarding parity was present in this recent meta-analysis.

It is clear from the present study results that counseling women with no prior vaginal delivery based on these reports might overestimate the predicted TOLAC success rate. Moreover, the general CD rate in our country nears 15%,²⁵ which further reinforces the present study's results of low success rate of TOLAC among the subset of women examined. We have recently published TOLAC success rates in our centers of practice among women with no prior vaginal delivery, ranging from 62.3% in elderly women (age 40 and above)²⁶ to 82.9% in younger women.²⁷ Therefore, the low TOLAC success rate in twin gestations among women with no prior vaginal delivery found in our study should be underlined. We believe this should provide some novel updated evidence to aid in counseling these specific women. Importantly, the vaginal delivery rate in our centers among twin gestations with no prior vaginal delivery who undergo a trial of labor matched to the gestational age in our study cohort is 73.6% for the first twin and 71.8% for the second twin (unpublished data). Therefore, our findings cannot be accounted for by a general low local rate of successful vaginal birth in twins.

Our reported CD rate for the second twin only, after vaginal delivery of the first twin (7.7%), is in line with a recent meta-analysis reporting a rate of 9.2% (95% CI 5.1%–14.4%), implying significant chance of TOLAC failure, even after successful TOLAC of the first twin.¹¹ This information should be shared with women being counseled regarding TOLAC in twins.

In the current study, dystocia at previous CD did not differ between TOLAC success and failure groups. This could be a result of a rather small sample size. It is possible that a larger cohort would show a trend of negative association with successful TOLAC as the established notion that dystocia at previous CD significantly lowers the TOLAC success rate.^{28,29} However, again, it is possible that we did not reach statistical significance because of the small sample size.

Epidural analgesia is encouraged by society guidelines in multiple gestation deliveries for the purpose of manipulation of the second twin or emergent CD.¹⁹ In our study, epidural analgesia was associated with a higher TOLAC success rate. It is possible that this is the result of women failing TOLAC early in the course of delivery, before epidural analgesia request or administration, rather than as an independent determinant affecting the TOLAC success rate—as our regression analysis failed to underline epidural as an independent determinant of TOLAC success. However, this point deserves further study. Of note, we do not suggest that if an epidural was given at some earlier point, the success rate would have been different. However, there are studies that suggest that use of an epidural is associated with an increased TOLAC success in the general population.^{28,30}

In our study, a higher birth weight in the TOLAC compared with the index CD, was positively associated with TOLAC success. It is possible that this is the result of lower weight fetuses, presenting with less reassuring characteristics of fetal heart rate,³¹ or that providers were less tolerant for a vaginal delivery process in women carrying smaller fetuses. Another explanation could be that this is a result of a small sample size with no clinical implication. Nevertheless, we do not advocate that some lower birth-weights cut-offs should be used to avoid TOLAC in this setting.

Together with the remarkably low success rates, we observed a higher rate of postpartum hemorrhage in the TOLAC success group. However, uterine rupture rate did not differ, reaching 3.5% in TOLAC failure group and 2.4% in the whole cohort, which is relatively high compared with previous reports on uterine rupture rates in TOLAC.¹² In a recent meta-analysis, the pooled event rate for uterine rupture during twin TOLAC was 0.87% (95% CI 0.51%–1.3%),¹¹ including only 18 uterine ruptures. We believe that drawing conclusions from these small numbers, regarding a rare diagnosis such as uterine rupture, should be done carefully. It is possible that uterine rupture rate among twin pregnancies with no prior vaginal delivery is higher than in parous women undergoing twin TOLAC. However, this is yet to be determined.

Notably, in terms of neonatal outcomes, Apgar scores in neonates delivered vaginally following TOLAC were lower than in those with failed TOLAC. However, the neonatal composite adverse outcome, predominantly governed by NICU admissions, was higher in the failed TOLAC group. This should be interpreted cautiously, because some NICU admissions are based on birth weight or other parameters and might represent pediatric practice rather than adverse obstetrical outcome.

The retrospective design of this study carries inherent biases such as selection and information bias. Second, as twin TOLAC among women with no prior vaginal delivery is uncommon, a notable limitation of our study is its limited sample size. Nevertheless, to the best of our knowledge, this is the only evidence available to date regarding this study question. Considering the relatively modest sample size, some of the non-statistically significant findings may be due to lack of statistical power, and rare adverse outcomes (e.g. uterine rupture) could not be assessed in the proper sample size. We have included only limited maternal outcomes and did not include postpartum endometritis. However, these outcomes are those that could be objectively accounted for, as postpartum endometritis is difficult to study in a retrospective study. Furthermore, we did not evaluate the different indications for NICU admission. Moreover, we have not analyzed the birth weight centile of newborns nor was there any relation to small-for-gestational-age newborns. Finally, another limitation is that we have analyzed outcomes of the first twin only. However, the second twin's presentation varies, affecting its mode of delivery (cephalic vaginal delivery or breech extraction) and this might introduce major bias in neonatal outcome evaluation. Therefore, a proper and clinically relevant analysis of the second twin's outcome could not be performed in our sample size.

In summary, we have found that twin TOLAC in women with no prior vaginal delivery is associated with a notably low success rate. Although substantial efforts are being undertaken to lower the CD rate worldwide, with increasing TOLAC rates and broader definitions of normal labor patterns, it is possible that in this particular subset of women with no prior vaginal delivery, keen to deliver twins in TOLAC, a more prudent approach should be practiced. These data should be acknowledged by providers and obstetricians and should be used while counseling and sharing decision making with women contemplating TOLAC in this scenario. Prospective studies could help to confirm our findings and better delineate the optimal mode of delivery and pregnancy outcomes for this subset of women.

CONFLICT OF INTERESTS

None.

AUTHOR CONTRIBUTIONS

All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission. RM, GL, and JR wrote the manuscript. SY, AS, AM, and YY curated the data and analysis.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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