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The failure rate and related factors of vaginal delivery after caesarean section

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ABSTRACT

Objective. In women with a previous caesarean section, whichever choice of mode of delivery - Elective Repeat Caesarean Section (ERCS) or Trial of Labour After Caesarean (TOLAC) - there is not an option free from risks for both the woman and the foetus. The main focus of this study was the successful rate of VBAC.

Patients and Methods. We conducted a retrospective cohort study of pregnant women from 2015 to 2019 who had a previous caesarean delivery. In the selected time-frame, 199 women with a previous caesarean gave birth. The criteria of inclusion were to have had only one previous caesarean section and no previous vaginal deliveries. The subjects were initially divided into TOLAC or ERCS. Then, the patients from the first group were further divided into successful group and failure group.

Results. Comparing the outcomes of women admitted to trial of labour and those of women who planned a repeat caesarean, we found that maternal age over 35 years was the most important factor influencing the choice of not admitting a woman to trial of labour (OR = 0.38; CI 95%: 0.21-0.69). Moreover, 81.5% of women giving birth at term had a TOLAC vs the 18.5% of women in the elective repeat caesarean section group (OR = 4.83; CI 95%: 2.36-9.84).

Conclusions. There were no significant differences between the successful VBAC group and the failure group (who underwent a caesarean section during trial of labour) in regard to nationality, marital status, level of education, maternal age, gestational age at delivery and birth weight.

INTRODUCTION

Trial of labour in a woman who had a previous caesarean section is an option available to most patients. The three most common mistakes obstetricians make in the management of a woman with a previous caesarean section are: underestimate the viability of a vaginal delivery, overestimate foetal

risks, and underestimate the risks linked to a repeat caesarean section. The medical advice of the consultant obstetrician is very relevant: the more they consider vaginal birth as the main objective to pursue, the more they will be invested in facilitating and advising a trial of labour to the woman [1]. Whichever choice of mode of delivery - Elective Repeat Caesarean Section (ERCS) or Trial of Labour

After Caesarean (TOLAC) - there is not an option free from risks for the woman and the foetus. 80% of women with one previous caesarean section and no previous vaginal delivery can go through labour; 75% of them (60% of the total) will achieve a vaginal birth after caesarean section (VBAC). 85-90% of all women with a previous caesarean section and at least one previous vaginal delivery will achieve a successful VBAC [2].

The ability to identify women who have greater chances to achieve a vaginal birth after caesarean section could potentially reduce maternal and foetal morbidity, which is higher in the group of women who undergo an unplanned caesarean during trial of labour. For this very reason some studies have proposed scores based on indicators of success, but their clinical usefulness is not satisfactory [3]. A review of vaginal birth after caesarean section [4] highlighted as prognostic factors for a greater chance of achieving VBAC: at least one previous vaginal birth, spontaneous onset of labour and breech presentation as the indication of the previous caesarean section. In contrast, advanced age, high body mass index (BMI) and birth weight above 4000 gr are associated with greater rates of failed trial of labour and increased risk of adverse events. However, these studies consider the newborn's birth weight rather than estimated foetal weight before birth, therefore limiting the clinical usefulness of this data item. In fact, Chauhan reported that only 62% of the ultrasonographic estimates were within 10% of the actual birth weight [5]. Although some studies highlighted a lower chance of successful VBAC if the pregnancy goes beyond 40 weeks, this factor alone shouldn't prevent a TOLAC [6]. Finally, an important role in the likelihood of successful VBAC is the woman's motivation. There is evidence that prediction tools and decision aids may decrease anxiety and reduce uncertainty in decision making among patients [7]. Beside the motivation, a woman should be given the chance to know the statistical data from the hospital in which she has chosen to give birth. In Italy there are great disparities among regions: the rate of successful VBAC goes from 39.4% in the Provincia Autonoma di Bolzano to 2.3% in Basilicata [8]. The wide difference among regions in the rate of repeat caesarean in women with a previous caesarean section confirms the need for significant organizational and clinical improvements within the different hospitals.

The aim of our study is to analyse the failure rate (and related factors) of vaginal delivery after caesarean section among women who delivered in our hospital over the past five years.

MATERIALS AND METHODS

We conducted this retrospective cohort study of pregnant women from 2015 to 2019 who had a prior caesarean delivery. All of these women gave birth at the Sacra Famiglia FBF Hospital in Erba, a small urban non-teaching hospital in North Italy. The data has been collected analysing the birth register certificates from the relevant years. In the timeframe 2015-2019, 199 women with a previous caesarean section gave birth. These women's obstetric history included only one previous caesarean section and no previous vaginal delivery. In order to be admitted to TOLAC, when considered eligible, all women had to sign a consent form. The confidentiality of all participants was maintained during the data collection. In the timeframe 2015-2019 at the Sacra Famiglia FBF Hospital there have been 3424 births and the prevalence of women with previous caesarean section and no previous vaginal birth has been 5.8% (199/3424). The data have been recorded by midwives immediately after delivery; then, the required data were gathered and entered a checklist with three different sections, including demographic characteristics, past and current obstetric history, mode of delivery and neonatal outcome.

By high level of education, we mean high school diploma or degree, by low level of education we mean middle or primary school completion or no level of education at all.

The focus of this study was the rate of successful VBAC. Therefore, the patients were divided into two groups: trial of labour (TOLAC) or planned repeat caesarean. Then, the patients from the first group were divided into successful group (if they achieved a spontaneous or instrumental vaginal delivery) and failure group (if they did not achieve a vaginal delivery and had to undergo an emergency caesarean section during trial of labour).

Statistical analysis

Chi-square test was used to compare the two groups regarding the rate of elective repeat caesarean section *vs* trial of labour, and the successful vaginal birth after caesarean section rate *vs* unplanned

repeat caesarean section rate. A P-value of less than 0.05 was considered significant in all analyses.

RESULTS

Out of the 199 women with one previous caesarean section and no previous vaginal delivery, 88 (44.2%) had a spontaneous or instrumental vaginal birth, 29 (14.6%) had an unplanned caesarean section during trial of labour, and 82 (41.2%) chose an elective repeat caesarean section. Out of the 117 women admitted to trial of labour, 75.2% achieved a vaginal birth.

Figure 1 shows the percentage of women with a previous caesarean section and those admitted to trial of labour over the five years. There are no significant changes over the years. The average of women with a previous caesarean section, over the five years, is 5.8% (+ 0.34%, - 0.46%). The average of women admitted to trial of labour is 3.4% (+ 0.32%, - 0.38%).

Breech presentation was the indication for elective caesarean section in 6 women, equal to 3% of the women with one previous caesarean section. 6% of the patients (12/199) received an induction of labour. In 2017, a woman admitted to TOLAC had one uterine rupture (0.5%), which didn't require a hysterectomy. The newborn baby was flat and acidotic at birth (pH 6.95), but he subsequently had a normal postnatal period. The same patient gave birth again via elective caesarean section at 37+ weeks in 2020. Five newborns required resuscitation at birth, all of them have had normal follow-ups so far.

Table 1 shows the outcomes of women admitted to trial of labour (TOLAC) and of women who planned a repeat caesarean section in the study cases. Chi-

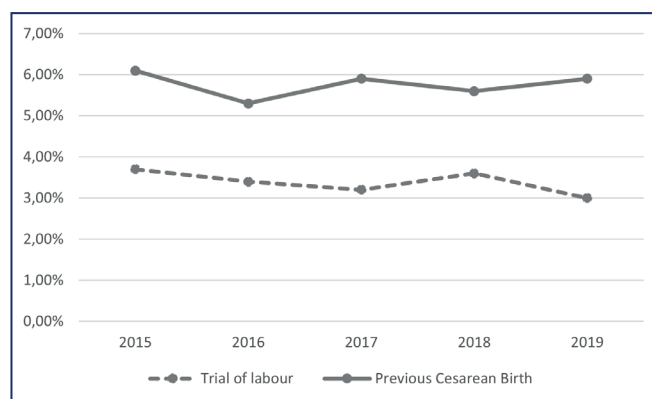


Figure 1. Rate of women with one prior caesarean and women with trial of labour.

square test showed that maternal age over 35 years was the most important factor influencing the choice of not admitting a woman to trial of labour (OR = 0.38; CI 95%: 0.21-0.69). Moreover, 81.5% of the women giving birth at term (≥ 40 week) had a TOLAC, compared to 18.5% of women in the repeat elective caesarean section group (OR = 4.83; CI 95%: 2.36-9.84).

Table 2 shows the outcomes of successful VBAC and the rate of caesarean section during trial of labour. There were no significant differences regarding nationality ($p = 0.277$), marital status ($p = 0.193$), level of education ($p = 0.478$), maternal age ($p = 0.777$), gestational age at delivery ($p = 0.358$) and birth weight ($p = 0.752$).

DISCUSSION

The prevalence of women with one previous caesarean section and no previous vaginal delivery in our hospital is low in comparison with the 12.7%

Table 1. Characteristics of women with trial of labor after cesarean by successful vaginal birth after cesarean.

	VBAC	Unplanned Repeat Cesarean	TOT	P-value*	OR (CI 95% OR)
Italian born	64 (78.0%)	18 (22.0%)	82 (100%)		
Foreign born	24 (31.4%)	11 (31.4%)	35 (100%)	0.277	1.63 (0.67-3.94)
Married	62 (72.1%)	24 (27.9%)	86 (100%)		
Unmarried	26 (83.9%)	5 (16.1%)	31 (100%)	0.193	0.49 (0.17-1.44)
High school grade		17 (22.7%)	75 (100%)		
Lower school grade	30 (71.4%)	12 (28.6%)	42 (100%)	0.478	1.36 (0.57-3.22)
Maternal age < 35 y	52 (74.3%)	18 (25.7%)	70 (100%)		
Maternal age ≥ 35 y	36 (76.6%)	11 (23.4%)	47 (100%)	0.777	0.88 (0.37-2.09)
Gestational age at delivery < 40 w	46 (71.9%)	18 (28.1%)	64 (100%)		
Gestational age at delivery ≥ 40 w	42 (79.2%)	11 (20.8%)	53 (100%)	0.358	0.66 (0.28-1.58)
Birth weight < 3500 g	61 (74.4%)	21 (25.6%)	82 (100%)		
Birth weight ≥ 3500 g	27 (77.1%)	8 (22.9%)	35 (100%)	0.752	0.86 (0.33-2.18)

CI: Confidence interval; OR: Odds Ratio; VBAC: vaginal birth after caesarean section; *based Chi-square test.

prevalence of Robson's group V across Regione Lombardia in 2017 [9]. This is due to the meticulous care given to physiological labour in Robson's groups I and III at our hospital [10]. In fact, over the timeframe 2010-2019, the prevalence of caesarean section in Robson's groups I and III has been respectively 4.3% and 1.8% [11]. Breech presentation was the indication for a repeat caesarean section in 3% of the cases. From the analysis of the birth register certificates of our hospital, the overall prevalence of breech presentation at term is 3.2%. This shows that an external cephalic version in breech presentation at 37 weeks is practiced as well on women with a previous caesarean section. In fact, an external cephalic version trial can be attempted on women who wish to trial vaginal birth after previous caesarean section as highlighted by a recent review [12]. Induction of labour for nulliparous women at our hospital in the timeframe 2015-2019 has been 9.8%, a greater prevalence than the one in the population of women with a previous caesarean section (6%). This demonstrates a poor attitude towards using this procedure for women with a previous caesarean section. Although induction and augmentation of labour are not contraindicated in women with a previous caesarean section, there remains considerable disagreement among clinicians on their use. Induction of labour (particularly in women with an unfavourable cervix or by prostaglandins) and augmentation of TOLAC are associated with a 2 to 3-fold increased risk of uterine rupture and around 1.5-fold increased risk of emergency caesarean section, when compared to spontaneous TOLAC [2]. Considering women aged 35 and above, we noted a higher rate of elective caesarean section before labour (OR = 0.38; CI 95%: 0.21-0.69) (Table 1). Even Laura B.

Attanasio and Mary T. Paterno [13] proved that women aged over 34 face an elective repeat caesarean section in 77.8% of cases, vs 22.2% of women admitted to trial of labour. In fact, maternal age of 40 years or above is an independent risk factor for stillbirth and unsuccessful VBAC. Published evidence suggests consideration of delivery of women aged 40 years or more by 39-40 weeks of gestation to reduce the risk of adverse perinatal outcome (particularly stillbirth) [2]. In our study, on the one hand we admitted to trial of labour a greater number of women aged 35 or above compared to the study by Laura B. Attanasio and Mary T. Paterno (47.5% vs 22.2%), but on the other hand in many cases we performed an elective repeat caesarean section much earlier than what recommended: 56% below 39 weeks. The Royal College of Obstetricians and Gynaecologists recommends that an elective repeat caesarean section is performed at 39 weeks of gestation, since there is a small increase in neonatal respiratory morbidity if done earlier [2]. Table 2 shows no differences for the variables considered in terms of vaginal birth or caesarean section during trial of labour. This could be due to the small number of women included in our study or to a population mainly without other risk factors (obesity, pregnancy related hypertensive disorders, diabetes, induction of labour). In fact, reviews and meta-analysis with over 200,000 cases reach different conclusions [13, 14]. Our protocol establishes that in women with a previous caesarean section (and no vaginal delivery) the second period will not last more than 2 hours. After 1 hour of expulsive period the woman is visited by a trained obstetrician who will evaluate maternal and foetal well-being and the possibility to start with oxytocine perfusion. Gitas *et al.* [15] do not use an absolute maximum length of time

Table 2. Characteristics of women with one prior cesarean by trial of labor after cesarean or planned repeat cesarean.

	ERCS	TOLAC	TOT	P-value*	OR (CI 95% OR)
Italian born	63 (43.4%)	82 (56.6%)	145 (100%)		
Foreign born	19 (35.2%)	35 (64.8%)	54 (100%)	0.292	1.41 (0.74-2.70)
Married	64 (42.7%)	86 (57.3%)	150 (100%)		
Unmarried	18 (36.7%)	31 (63.3%)	49 (100%)	0.464	1.28 (0.65-2.49)
High school grade	58 (43.6%)	75 (56.4%)	133 (100%)		
Lower school grade	24 (36.4%)	42 (63.6%)	66 (100%)	0.320	1.35 (0.73-2.48)
Maternal age < 35 y	30 (30%)	70 (70%)	100 (100%)		
Maternal age ≥ 35 y	52 (52.5%)	47 (47.5%)	99 (100%)	0.001	0.38 (0.21-0.69)
Gestational age at delivery < 40 w	70 (52.2%)	64 (47.8%)	134 (100%)		
Gestational age at delivery ≥ 40 w	12 (18.5%)	53 (81.5%)	65 (100%)	< 0.001	4.83 (2.36-9.84)
Birth weight < 3500 g	57 (41%)	82 (59%)	139 (100%)		
Birth weight ≥ 3500 g	25 (41.7%)	35 (58.3%)	60 (100%)	0.93	0.97 (0.52-1.79)

CI: Confidence interval; OR: Odds Ratio; ERCS: elective repeat cesarean section; TOLAC: trial of labor after cesarean; *based Chi-square test.

for the second stage of labour, and they reported a median expulsive period of 79.3 minutes (± 61.9) and VBAC's success rate of 55.6% in contrast to 75.2% of our study. Above all, Gitas *et al.* defined the expulsive period as the period from complete dilatation of the cervix to the delivery of the infant. In our study we defined it as the time the woman feels pushing.

Keeping in mind the standard of our hospital, apart from merely statistic considerations, the conclusions we can draw from our study are: first of all, our reality is shared by the majority of Italian hospitals (63.1% of birth centres counts less than 1000 births per year) [8]. Secondly, the importance of counselling during pregnancy, and of assessing the previous personal experience and the indication for the previous caesarean section; the importance of discussing benefits and risks of planned repeat caesarean section *vs* trial of labour, also based on the statistics of one's own hospital and considering the availability of analgesia in labour. A final decision for mode of delivery should be clearly documented in the notes. Thirdly, the focus to understand that planned trial of labour is a clinically safe choice for the majority of women with a single previous lower segment caesarean delivery. Such strategy is also supported by health economic modelling and would at least limit any escalation of caesarean sections rate and maternal morbidity associated with multiple caesarean deliveries [2]. Although it is hard to prove a causal link, the risk of morbidity generally increases with the number of caesarean deliveries. The greatest risk following repeated caesarean sections is that of placenta accrete spectrum and the complications linked to it, especially major post-partum haemorrhage. Other morbidities associated with repeated caesarean sections are foetal growth restriction, preterm birth and possibly stillbirth. Chronic maternal morbidities associated with multiple caesarean deliveries include pelvic pain, adhesions, decreased fertility, increased risk of spontaneous abortion and ectopic pregnancy [16]. It is well reported that, even after two caesarean sections, VBAC does not increase maternal or neonatal morbidity [17]. However, in Italy just few centres perform TOLAC after two caesarean sections, and most of them are Academic Hospital. Finally, our aim is to put in place strategies to reduce the primary caesarean sections rate, especially in the primiparous woman at term with a singleton foetus in cephalic presentation. This can

be achieved by preserving the physiology of childbirth, using 6 cm as the cut off for active labour, allowing adequate time for second stage of labour and encouraging operative vaginal delivery [18].

CONCLUSIONS

TOLAC is an appropriate option that should be offered to all precesarized pregnant women with single pregnancy, cephalic fetus and previous caesarean section with transverse incision at the level of the lower uterine segment, with or without a history of previous vaginal delivery, provided that there are no specific contraindications.

COMPLIANCE WITH ETHICAL STANDARDS

Authors contribution

Each author gave a substantial contribution or the preparation of the manuscript.

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Study registration

This study was not registered in an international database repository.

Disclosure of interests

The authors declare that they have no conflict of interests.

Ethical approval

Ethical approval was not required since the study was classified as a hospital audit of current clinical practice. The confidentiality of all participants was maintained during the data collection.

Informed consent

All women signed a consent form.

Data sharing

N/A.

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