

# Evaluation of Mode of Delivery in Women with Previous Caesarean Section

Dr. Bhoomika Chaudhari<sup>1</sup>, Dr. Shirish Toshniwal<sup>2</sup>

<sup>1</sup>Ex. Resident, Department of OBGY, B J Medical College, Ahmedabad, India

<sup>2</sup>Assistant Professor, Department of OBGY, B J Medical College, Ahmedabad, India

**Abstract:** ***Objectives:** To identify factors associated with successful Vaginal Birth after Caesarean Section (VBAC) and failed Trial of Labour after Previous Caesarean Section Delivery (TOLAC). To compare maternal & neonatal outcome in women undergoing TOLAC with women undergoing elective repeat caesarean section (ERCS). **Material & Methods:** **Study Design:** Prospective observational study. **Study population:** 200 consenting pregnant women with history of prior single caesarean section carried out at our institute from July 2013 to July 2015. **Result:** Primary outcome noted is the various factors responsible for successful and failed TOLAC. Secondary outcome noted is the comparison between TOLAC and ERCS group (control) in terms of maternal and neonatal morbidity and mortality. **Conclusion:** TOLAC is the preferred option for women presenting with previous single LSCS. Antenatal counseling and informed consent is crucial. It involves individualized assessment of risk and benefit of planned VBAC and ERCS. They should be informed that overall, the chances of successful VBAC are 72-76%. Successful VBAC has the fewest maternal and paternal adverse effect while the greatest risk of adverse outcome occurs with failed TOLAC. VBAC failure can be minimized with appropriate patient selection, good antenatal counseling, careful review of the case notes and adherence to written guidelines.*

**Keywords:** Trial of Labour after Caesarean Delivery (TOLAC), Vaginal Birth After Caesarean Section (VBAC), Elective Repeat Caesarean Section (ERCS), Failed TOLAC / Emergency LSCS (EMLSCS).

## 1. Introduction

Of the profound alterations in the practice of obstetrics over the past century, one of the most apparent has been the progressive increase in frequency of Caesarean delivery. The safety of lower uterine segment technique, evolution of anaesthetic proficiency, availability of blood products and antibiotics, broadening of indication for the operation and recognition of foetus as a patient, have all contributed to the rise in the incidence of Caesarean births over the past 50 years. Consequently, an increasing proportion of pregnant women attending for care have had a previous caesarean and face the question of mode of delivery. These women are at an increased risk of complication compared with other women.

The dictum of “Once a Caesarean, Always a Caesarean” largely applied in the United States until the 1980’s. However, a series of studies in the 1980’s reported the relative safety of attempting vaginal birth following the Caesarean delivery (VBAC). The new dictum should be “Once a Caesarean, Always a Hospital Delivery and Trial of Vaginal Delivery for non-recurrent indication of Caesarean section”.

The new dictum results in increased rate of VBAC. But then the incidence of uterine rupture also increases resulting in declining trend of TOLAC and increasing trend towards Elective Repeat Caesarean Section (ERCS). However, the choice between ERCS and VBAC involves a balance of risks and benefits, and the balance differs according to the mothers characteristics.

Women with previous caesarean section should be offered both Elective Repeat Caesarean Section and Vaginal Birth

after Caesarean Section as options for delivery after thorough clinical assessment and antenatal counseling; and the decision to attempt a trial of labour is made by the informed woman in conjunction with her health-care provider.

Women have largely been encouraged to attempt vaginal birth. However, maternal and neonatal morbidity is increased among women who attempt VBAC and fail. The major obstetric drawback of ERCS is risk of rare, but severe, adverse outcomes in future pregnancies. The two major clinical factors determining the choice for VBAC are, therefore, the likelihood of a successful attempt and the mother’s plan for future pregnancies.

## 2. Aims and Objective of Study

- 1) To identify factors associated with increased likelihood of Vaginal Birth after Caesarean Section (VBAC) and those associated with failed trial of labour in women with previous caesarean section (failed TOLAC).
- 2) To compare maternal & neonatal outcome in women undergoing TOLAC with women undergoing elective repeat caesarean section (ERCS).

## 3. Materials and Methods

The prospective observational study of 200 consenting pregnant women with history of prior caesarean section was carried out at our institute in the department of Obstetrics and Gynaecology from July 2013 to July 2015. These women were grouped as those who can be allowed trial of labour and those requiring elective repeat caesarean section.

**Inclusion Criteria for TOLAC group** is patients with history of previous single lower segment transverse

Volume 6 Issue 10, October 2017

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caesarean section for non-recurrent indication currently presenting with term singleton, live pregnancy with vertex presentation with spontaneous onset of labour and without any contraindication for vaginal delivery and without any obstetric complications or other medical complications.

**Exclusion criteria for TOLAC group** are patients with previous classical caesarean or hysterotomy scar, previous two or more LSCS, presenting with other obstetric complications such as malpresentation, placenta previa, or other medical complications, currently presenting with signs and symptom of scar dehiscence or rupture uterus and those with absolute contraindication for vaginal delivery.

**Inclusion criteria for ERCS group** are patients with previous LSCS for recurrent indication, previous LSCS with obstetrics complication such as malpresentation, placenta previa, or other medical complication and those with absolute contraindication to vaginal delivery.

In our study, we have taken scar dehiscence and uterine rupture as a single maternal outcome. Primary outcome noted is the factors associated with successful TOLAC and failed TOLAC. Secondary outcome noted is the comparison between TOLAC and ERCS group in terms of maternal and neonatal morbidity and mortality.

The cases were studied and observed according to the performa. Informed consent was taken for VBAC after explaining the benefits and inherent risks. Cross match was sent, compatible blood was reserved, IV line was kept patent and the patient was kept NBM in readiness for an emergency LSCS. These patients were carefully monitored for:

- Temperature, pulse and blood pressure monitored every 30 minutes.
- Scar tenderness assessment every half hourly
- Fetal distress (tachycardia, bradycardia, meconium) by continuous electronic fetal heart rate monitoring.
- Satisfactory progress of labour monitored by per abdominal and per vaginal examination.
- Hematuria

No obstetric analgesia was given to any of these patients. The patients who successfully delivered vaginally were then studied for the various factors responsible for it and the patients who had failed trial of labour were studied for the factors responsible for it. Chi square test was used for statistical evaluation of factors contributing to successful VBAC.

The patients were watched closely for any immediate postpartum complications. Maternal morbidity after delivery was assessed using the criteria of excessive blood loss, puerperal sepsis, pyrexia, PPH, urinary retention and the need for obstetric hysterectomy. Fetal wellbeing was also assessed.

Maternal and fetal outcomes were compared between the group of patients who underwent trial of labour after caesarean section (TOLAC) and those which underwent elective repeat caesarean section (ERCS). (TOLAC VS ERCS)

Maternal and fetal outcomes were also compared between the patients with successful trial of labour after caesarean section (VBAC) with those who had failed trial of labour after caesarean section (EMLSCS); and with those which underwent elective repeat caesarean section (ERCS). (VBAC Vs EMLSCS and VBAC Vs ERCS).

The patients were counseled for sterilization or advised acceptable contraception.

#### 4. Observation and Discussion

This study comprises of study of outcome of pregnancy in 200 cases of previous one lower segment caesarean section admitted at Obstetrics & Gynaecology department, B J Medical College, Civil Hospital, Ahmedabad, during the period of 2 years from July 2013 to July 2015. Our observations are as follows:

**Table 1:** Brief overview of mode of Delivery in our study

(A)		
Total No. of Patients	TOLAC	ERCS
200	150	50

In our study, 150 women with history of single previous lower segment caesarean section underwent trial of labour in this pregnancy.

(B)		
TOLAC	VBAC	Failed TOLAC (EMLSCS)
150	110	40

Out of 150 patients, 110 patients (73.3%) delivered vaginally while in 40 patients (26.6%) trial had to be terminated and caesarean section had to be done.

**NICHD study** reported 73% (70-75%) successful VBAC rate in women with previous one lower segment caesarean section who attempted trial of labour [1].

Similar observation is found in our study, where VBAC success rate is 73.3%.

**Table 2:** Age Distribution

Age (years)	VBAC	Failed TOLAC (EMLSCS)	Success Rate of TOLAC
<20 yrs.	-	1	-
21-25 yrs.	48	13	79%
26-30 yrs.	56	15	79%
>30yrs	5	12	29%

$\chi^2$  16.9 df 2 p value 0.0002 (p<0.05)

In the present study, women with greater than 30 years of age showed reduced likelihood of successful VBAC. **Bujold et al** reported from their 14 year study covering 2493 woman that maternal age at the time of TOL  $\geq$ 30 yrs was associated with a lower rate of successful vaginal delivery (OR: 0.73;95% CI: 0.56-0.94) [2].

**Table 3:** Antenatal Care

	VBAC	EMLSCS
Booked	93(76%)	28 (23%)
Emergency	17 (58%)	12 (41%)

$X^2$  3.97 df 1 p value 0.04 ( $p < 0.05$ )

VBAC rate was also significantly high among patients who had availed regular antenatal care compared to emergency cases. This was highlighted by The **TOLAC guidelines formulated by AAFP** [3] which clearly stated that proper counselling and evaluation of women with previous caesarean section is essential to ensure successful VBAC as well as to reduce the rate of complications like uterine rupture.

**Table 4:** Interval between Previous CS & Index Pregnancy

Interval between Previous CS & Index Pregnancy	VBAC	EMLSCS	Success Rate of TOLAC
≤ 2 yr.	-	5	-
2-4 yr.	74	27	73%
≥ 5 yr.	36	8	81%

$X^2$  2.29 df 1 p value 0.13 ( $p > 0.05$ )

VBAC was associated with significantly higher success rate in women whose interconception period exceeded 2 years. **Shipp and colleagues** reported threefold increase risk of rupture in women with an Interdelivery interval ≤ 18 months [4].

**Table 5:** Indication of Previous CS & Result of Trial of Labour

Indication of Previous CS	No of Pts. Given Trial	VBAC	%	EMLSCS	%
Fetal Distress	40	28	70%	12	30%
NPOL	29	21	72%	8	28%
Malpresentation	48	40	83%	8	17%
Post Date	1	-	-	1	100%
Hypertensive Disorder	13	8	61%	5	39%
Oligohydroamnios	14	10	71%	4	29%
Cord Around Neck	4	3	75%	1	25%
Placenta Previa	1	-	-	1	100%
Total	150	110	-	40	-

Above table shows that patients with prior LSCS for Malpresentation had the highest rate of successful VBAC, followed by those, for NPOL and fetal distress. **Coughlan et al and colleagues** describe prior caesarean delivery for a breech (malpresentation) presentation is associated with highest reported success rate [5]. In a prospective study carried out on 263 women by **Shakti et al** [6], significantly higher success rates were observed for VBAC in women with prior caesarean for non-recurrent indications- 91 % for Breech, 88% for fetal distress, 70% for dystocia.

**Table 6:** Indication of CS in this Pregnancy

**(A) Failed TOLAC**

Sr. no	Indication of CS	No. of Patients (n= 40)	Percentage
1.	Scar Tenderness	9	22.5%
2.	Ruptured uterus	3	7.5%
3.	Fetal Distress	19	47.5%
4.	NPOL	5	12.5%
5.	PROM	4	10%

Out of 150 TOLAC pts., 40 had CS due to failed trial. Fetal distress was the commonest cause of failed trial (48%) followed by scar tenderness (22.5%) and prolonged labour

(12.5%). **Dr. A. N. Gupta et al** [7] PGI Chandigarh, 1986 stated that the major indication of repeat caesarean section in cases in which trial was not successful was the fetal distress even when it was ruled out before trial was started.

**(B) ERCS**

Sr. no	Indication	No of Patients (n= 50)	Percentage
1.	Post Date	13	26%
2.	CPD	7	14%
3.	Previous CS	8	16%
4.	Oligohydroamnios	9	18%
5.	PROM	7	14%
6.	Breech	2	4%
7.	Placenta Previa	1	2%
8.	Uteroplacental Insufficiency	1	2%
9.	Pre eclampsia	2	4%

**Table 7:** Prior Vaginal Delivery

H/O prior vaginal delivery	Total (n= 150)	VBAC (n= 110)	EMLSCS (n= 40)	Success Rate of TOLAC
Yes	46	38	8	83%
No	104	72	32	69%

$X^2$  2.9 df 1 p value 0.043 ( $p < 0.05$ )

In a study of 318 women by **Iyer** [8] it is stated that there are more chances of VBAC (84.8%) in women with history of previous vaginal delivery compared to ones without (62.7%).

Similar observation found in present study where 83% of the patients delivered vaginally had h/o previous vaginal delivery compared to 69 % of patients without prior h/o vaginal delivery.

**Table 8:** Gestational Age according to EDD

GA according to EDD	TOLAC (n=150)	VBAC (n= 110)	Failed TOLAC (EM LSCS) (n= 40)	Success Rate of TOLAC (%)
34-36 wks.	38	30	8	79%
37-39 wks.	58	41	17	71%
≥40 wks.	13	4	9	31%

$X^2$  10.6 df 2 p value 0.004 ( $p < 0.05$ )

\*\* 51 Patients were unaware of their LMP, out of which 34 had successful VBAC, 7 had Emergency LSCS due to failed Trial and 10 had Elective LSCS.

Above table demonstrated decrease VBAC rate in women who undertake TOLAC beyond 40 weeks of gestation.

**Table 9:** Relationship between Cervical Dilatation on Admission & Success rate of TOLAC

Cervical Dilatation on Admission	VBAC (n= 110)	EMLSCS (n= 40)	Success Rate of TOLAC	P value
1 F	5	5	50 %	0.75
2 FL- 3 cm	35	28	55.5%	0.75
3-5 cm	32	7	82%	0.006
> 5 cm	38	-	100%	0.006

$X^2$  25.1 df 2 p value <0.000 ( $p < 0.05$ )

Success rate of VBAC in TOLAC patients increases with ≥3 cm cervical dilatation at the time of admission. For patients



presenting with cervical dilatation >3 cm, more number of patients delivered vaginally successfully and this difference is also statistically significant. While those presenting with cervical dilatation <3 cm, number of patients delivered vaginally is more in absolute number terms but this difference was not found to be statistically significant. **Flamm and colleagues** reported an 86% success rate in women presenting with cervical dilatation greater than 4 cm [9].

**Table 10: Relationship between Neonatal Birth Weight & Likelihood for Successful TOLAC**

Birth weight	TOLAC (n= 150)	VBAC (n= 110)	EMLSCS (n= 40)	Success Rate of TOLAC
2.0-2.4 kg	23	20	3	87%
2.5-2.9 kg	95	75	20	79%
≥3 kg	32	15	17	47%

$X^2$  15.17 df 4 p value 0.004 (p<0.05)

Women with neonatal birth weight exceeding 3 kg in our study had less chances of successful VBAC compared to those women having neonatal birth weight less than or equal to 3 kg.

**Table 11: Maternal outcome**

**(A): TOLAC Vs ERCS**

	TOLAC (n= 150)	ERCS (n= 50)
Cervical Tear	4 (2.6%)	-
Para urethral Tear	1 (0.6%)	-
Prolonged catheterisation	3 (2%)	2 (4%)
Wound Infection	3 (2%)	-
Blood Transfusion	15 (10%)	6 (12%)
PPH	8 (5.3%)	-
Laparotomy	1 (0.6%)	-
Uterine rupture	9 (6%)	2 (4%)
Obstetric Hysterectomy	1 (0.6%)	-
MMR	1 (0.6%)	-
Total	46 (31%)	10 (20%)

$X^2$  1.24 df 1 p value 0.132 (p>0.05)

Increased risk of maternal morbidity defined in terms of cervical tear, para-urethral tear, prolonged catheterization, need for blood transfusion, etc. was observed in those who underwent trial of labour in present pregnancy. There was only 1 mortality in our study which happened in TOLAC group. However, this difference in maternal morbidity and mortality between TOLAC and ERCS group when subjected to statistical analysis was not found to be statistically significant. The most feared complication of uterine rupture was seen in 9/150 patients who underwent TOLAC while this (scar dehiscence) was seen in 2/50 patients who underwent ERCS. The most common complication in both the group was need for blood transfusion which was slightly more in ERCS group.

The **NICHD study [10]** showed that planned VBAC, compared with ERCS, had a higher risk of uterine rupture (0.7% vs 0%).

**(B): VBAC Vs EMLSCS**

	VBAC (n= 110)	EMLSCS (n= 40)
Cervical Tear	4 (3.6%)	-
Para urethral Tear	1 (0.9%)	-
Prolonged catheterisation	-	3 (7.5%)
Wound Infection	-	3 (7.5%)
Blood Transfusion	2 (1.8%)	13 (32.5%)
PPH	3 (2.7%)	5 (12.5%)
Laparotomy	1 (0.9%)	-
Uterine Rupture	1 (0.9%)	8 (20%)
Obstetric Hysterectomy	-	1 (2.5%)
MMR	-	1 (2.5%)
Total	12 (11%)	34 (85%)

$X^2$  33.44 df 1 p value 0.0001 (p<0.05)

On subgroup analysis of TOLAC patient, comparing VBAC and EMLSCS group, complications were significantly more in the EMLSCS group.

Maternal mortality which occurred in TOLAC group happened in patient with failed TOLAC. Except cervical tear, the remaining complications identified are found to be more frequent in EMLSCS group.

The above table shows difference in maternal morbidity and mortality between VBAC and EMLSCS group when subjected to statistical analysis was found to be statistically significant.

The **NICHD study [10]** showed unsuccessful (EMLSCS) compared with successful VBAC increased the risk of uterine rupture (2.3% versus 0.1%), hysterectomy (0.5% vs 0.1%), and transfusion (3.2% vs 1.2%).

**(C): VBAC Vs ERCS**

	VBAC (n= 110)	ERCS (n= 50)
Cervical Tear	4 (3.6%)	-
Para urethral Tear	1 (0.9%)	-
Prolonged catheterisation	-	2 (4%)
Wound Infection	-	-
Blood Transfusion	2 (1.8%)	6 (12%)
PPH	3 (2.7%)	-
Laparotomy	1 (0.9%)	-
Uterine Rupture	1 (0.9%)	2 (4%)
Obstetric Hysterectomy	-	-
MMR	-	-
Total	12 (11%)	10 (20%)

$X^2$  1.76 df 1 p value 0.092 (p>0.05)

On comparing VBAC and ERCS group, there was no clinically significant difference in complication rate between both the groups. There was no maternal mortality in neither VBAC nor ERCS group. These findings are consistent with the various other studies which suggested that the complication rate is similar and there is no difference between complication rate in VBAC (successful TOLAC) and ERCS group.

From the above three tables, it can be concluded that in our study VBAC (successful TOLAC) had the lowest complication rate and the greatest adverse outcome occurred in patient who had failed TOLAC and had to underwent an EMLSCS.

**Table 12:** Perinatal Outcome

**(A): TOLAC Vs ERCS**

	TOLAC (n= 150)	ERCS (n= 50)
NICU Admission	10 (6.6%)	2 (4%)
Need for respiratory support	4 (2.6%)	1 (2%)
Need for ventilator support	2 (1.3%)	-
Stillbirth	3 (2%)	-
Neonatal Death	3 (2%)	-
Total	22 (14.6%)	3 (6%)

$X^2$  2.08 df 1 p value 0.074 (p>0.05)

On comparing perinatal outcomes in TOLAC with ERCS group, it is found that there is an increased incidence of NICU admission (6.6% vs 4%) and an increased risk of still birth and neonatal death in those who had trial of labour. However when this findings were subjected to statistical analysis, the difference in neonatal complication in absolute number between TOLAC and ERCS group was not found to be statistically significant.

All the still birth in our study, were in patient who had developed uterine rupture during trial of labour, while the neonatal death was again observed in TOLAC group and was due to meconium aspiration syndrome.

The **NICHD observational study [10]** showed that there was around a threefold increase for one or more composite adverse perinatal outcomes (perinatal mortality, NICU admission, neonatal acidosis) for planned VBAC with ERCS.

**(B): VBAC Vs EMLSCS**

	VBAC (n= 110)	EMLSCS (n= 40)
NICU Admission	4 (3.6%)	6 (15%)
Need for respiratory support	1 (0.9%)	3 (7.5%)
Need for ventilator support	-	2 (5%)
Stillbirth	-	3 (7.5%)
Neonatal Death	-	3 (7.5%)
Total	5 (4.5%)	17(42.5%)

$X^2$  22.18 df 1 p value 0.0001 (p<0.05)

The perinatal mortality which occurred in TOLAC group was entirely found in those with failed TOLAC and this difference among EMLSCS and VBAC group was found to be statistically significant.

**(C) VBAC Vs ERCS**

	VBAC (n= 110)	ERCS (n= 50)
NICU Admission	4 (3.6%)	2 (4%)
Need for respiratory support	1 (0.9%)	1 (2%)
Need for ventilator support	-	-
Stillbirth	-	-
Neonatal Death	-	-
Total	5 (4.5%)	3 (6%)

$X^2$  0.13 df 1 p value 0.35 (p>0.05)

Neonatal complication rate are similar in VBAC and ERCS group with no mortality observed in either VBAC or ERCS group.

**5. Summary**

In our study, 200 women with previous one LSCS were studied, of which 150 women underwent TOLAC. Of these,

110 had successful VBAC yielding a success rate of 73.3%, while the remaining 40 had a failed TOLAC and underwent EMLSCS (26.6%).

Factors which increases the likelihood of VBAC are prior history of vaginal delivery (83%), younger maternal age (21-30yrs), regular antenatal visits, interconception period of >2 years and cervical dilatation  $\geq 3$  cm at the time of admission. Among indications of previous CS: increased likelihood of successful VBAC is with previous caesarean section for malpresentation (83%), followed by non-progress of Labour (72%) and fetal distress (69%).

Factors associated with decreased likelihood of VBAC were gestational age  $\geq 40$  weeks and neonatal birth weight  $\geq 3.0$  kg.

Indication of CS in failed TOLAC was found to be mainly due to fetal distress (48%), scar tenderness (22.5%) and prolonged labour (12.5%)

When comparing TOLAC and ERCS group the maternal and neonatal morbidity and mortality was found to be similar. Maternal and neonatal mortality was mainly found in failed TOLAC group, while patients in VBAC and ERCS group found no difference in either maternal or neonatal morbidity.

**6. Conclusion**

Rates of primary caesarean sections have increased dramatically since the 1980's. Consequently, an increasing proportion of pregnant women attending for care have had a previous caesarean and face the question of mode of delivery. These women are at increased risk of complication compared with other women. The primary choice for women in this situation is whether to have a repeat caesarean section or to attempt vaginal birth. Both repeat CS and VBAC have inherent risks for the mother and the baby.

Antenatal counselling and informed consent is crucial. Counselling should incorporate an individualized assessment of the risks and benefits of ERCS and planned VBAC modes of delivery. Women considering their options for birth after a single previous cesarean should be informed that, overall, the chances of successful planned VBAC are 72-76%.

Trial of labour after previous caesarean delivery (TOLAC) provides women who desired a vaginal delivery with the possibility of achieving that goal and it is also associated with decreased maternal morbidity and decreased risk for future pregnancy. At a population level, VBAC is associated with decrease in overall caesarean rate.

VBAC should not be undertaken without thorough discussion of the risks during labour with the pregnant women. It should not be undertaken in units where full obstetric facilities such as emergency transfer to theatre, blood transfusion and continuous fetal monitoring are not available.

Planned VBAC should be offered to the vast majority of women with a singleton pregnancy of cephalic presentation at term with a single previous single lower segment

caesarean delivery. From a maternal point of view, the safest outcome is spontaneous labour and spontaneous vaginal delivery while the outcome associated with the greatest morbidity is a failed VBAC resulting in caesarean section.

In women with single previous lower segment caesarean section, who opted for ERCS, the major obstetric drawback is the risk of rare, but severe, adverse outcomes in future pregnancies.

The two major clinical factors determining the choice for VBAC are, therefore, the likelihood of a successful attempt and the mother's plan for future pregnancies. Successful VBAC is a desirable outcome for mother and newborn. VBAC failure, resulting in emergency caesarean section and, rarely, in uterine rupture, can be minimized with appropriate patient selection, good antenatal counseling, careful review of the case notes and adherence to written guidelines. Even in the rare case of uterine rupture, catastrophic maternal and fetal consequences can be minimized by prompt diagnosis and rapid resort to emergency caesarean section.

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