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Review of Outcome of Pregnancy with History of Previous Caesarean Section- Predictors of Safe Labour

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Abstract
Objectives*: To study the factors which affect outcome of trial of labor*
Materials and Methods*: All pregnant women admitted to Goa Medical College, from October 2013 to June 2015, fulfilling the inclusion criteria were enrolled in this study. Data was collected in a proforma, meeting the objectives of the study. Antenatal/ past obstetric predictive factors with respect to successful TOLAC were analysed.*
Results*: The study included 1,302 pregnant women with history of one or more previous cesarean deliveries, who fulfilled the inclusion criteria. 918 cases (70 %), including 236 subjects with previous 2 LSCS and 682 subjects with previous 1 LSCS; were taken for repeat LSCS (ERCD). Of the 384 cases (30 %) who underwent TOLAC; success rate was 80.5% (309/384).*
Younger women (<30 years) (OR=1.61,P= 0.0003),Women with BMI <25(P=0.03), IUGR babies(OR=1.38,P=0.63), Preterm gestation <37 weeks (P= 0.001), Low Birth weights (<3 Kg) (P=0.0045), a history of previous vaginal deliveries (P= 0.0014), Previous history of VBAC (P=0.018), Inter delivery interval >3 years of having a VBAC (OR=2,P=0.03), Bishops score at admission >/= 10 (P=0.000), Spontaneous onset of labour (P=0.034) were associated with significantly higher rate VBAC. Maternal diabetes (ODM/GDM) (OR=0.6,P=0.59), PROM (OR=0.39,P=0.013) previous LSCS was done for Cephalo-pelvic disproportion (OR=0.5) & Failure to progress (OR=0.29) reduces the chance of VBAC. Place of stay (P=0.75), Educational status (P=0.76), Pre-eclamsia (P=0.22) were not statistically significant factors affecting TOLAC. ***Conclusion****: Positive predictors for VBAC from our study were younger age group, lower maternal BMI, absence of maternal diabetes, lower gestational age and birth weight, higher Bishops score at admission, spontaneous onset of labour, vaginal delivery prior to or after caesarean section, malpresentation as indication for prior LSCS and longer inter-delivery interval (>3 years).*

Key words: *Trial oflabor after cesarean (TOLAC), Vaginal Birth After Cesarean (VBAC), Elective repeat cesarean delivery (ERCD)*

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I. Introduction

Cesarean section is the delivery of a fetus through an abdominal and uterine incision[1]. Since 1985, the obstetricians world-over have considered an ideal rate for caesarean sections to be around 10-15%[2]. Even so, since then, caesarean section rates have increased in both developing and developed countries[2]. Two new Human Reproduction Programme (HRP) studies show that when caesarean section rates are around 10%, neonatal and maternal deaths decrease. When the rate is above 10%, there is no improvement in maternal mortality[2]. In India, until 2005-2006, cesarean section rate was 10.5% of all deliveries, just below the recommended level of 15%; according to a NFHS-3 report[3]. But in the last decade, the numbers have escalated in many states—reaching as high as 41% of deliveries in Kerala, and 58% in Tamil Nadu; as reported by the ICMR School of Public Health[4]. Reports have shown to be amongst the states with high rates of cesareans, around 25% (NFHS-3 survey)[3]. Goa and Maharashtra have lower odds of having a private institutional caesarean delivery3.

There are implications of a previous cesarean with respect to maternal, fetal, and neonatal complications in subsequent pregnancies such as placenta accreta and uterine rupture[5]. The risk worsens in patients with multiple repeat cesareans[5]. And, although the absolute risk is small, cesarean section is associated with an increase in severe maternal morbidity; even mortality. Also, higher cesarean rates imply higher health care costs[5].

Trial oflabor after cesarean (TOLAC) and Vaginal Birth After Cesarean (VBAC) has had a measurable impact on decreasing total cesarean deliveries[5]. A trial of labor after cesarean (v/s. repeat cesarean) has been a polarizing and unresolved issue in obstetrics for over 30 years[6].There are no randomized controlled trials (RCT) comparing VBAC with repeat cesarean[6]. Hence, conflicting guidelines have surfaced, influenced by emotional, financial, and medico-legal considerations rather than high quality evidence6. Owing to safety concerns, VBAC rates have declined drastically leading to an increase in rates of cesarean deliveries[5]. Therefore, in an attempt to reduce cesarean section rates, efforts must be made to increase VBAC rate[5]. Therefore, present study was undertaken to review of pregnancy following previous Cesarean section to identify predictors of VBAC.

II. Materials and Methods

All pregnant women admitted to Goa Medical College, from October 2013 to June 2015, fulfilling the inclusion criteria were enrolled in this study. Data was collected in a proforma, meeting the objectives of the study.

Inclusioncriteria**:** Women with pregnancy above 28 weeks of gestation, with a live fetus, with a history of one or more previous cesarean deliveries.

Amongst all study subjects, one group underwent Elective repeat cesarean, without a trial of labor due to various indications. Subjects in 2nd group were allowed a trial of labor. Amongst the subjects who were allowed trial of labor, a subgroup who failed trial of labor were taken for emergency cesarean for various indications.

Thus, study subjects were classified as: A: women chosen for elective repeat cesarean without a Trial of laborB: women who were given a trial oflabor and delivered vaginally C: women who were given a trial of labor, but due to failed trial had to be taken for repeat cesarean

For each study subject, demographic details in the form of age, weight, BMI, residence (rural v/s urban) & socio-economic/ educational status were recorded.

Detailed history including menstrual history (to determine gestational age), past obstetric history was elicited from all subjects. Past obstetric particulars included gravidity, parity, and number of previous cesareans, number of previous vaginal deliveries (including prior VBACs) and timing & indications of last cesaraean delivery. Past history of intra/ post-operative complications was recorded. Birth weight & gestation at the time of last cesarean delivery were also recorded.

At admission, per abdomen and per vaginal examination (when indicated) was done to find out malpresentation and to note dilatation and effacement of cervix, station of vertex and adequacy of pelvis for vaginal delivery.

Patients without any contraindication for vaginal delivery were counselled with respect to risks and benefits of trial of labor. After obtaining informed consent subjects willing for VBAC were given trial of labor. During trial of labor, patients underwent careful monitoring for any sign of impending rupture uterus such as maternal tachycardia, FHR variability, scar tenderness etc.

Augmentation of labor was done with artificial rupture of membranes/ oxytocin infusion when indicated. Ventouse/forceps were used in second stage of labour if delay was anticipated.

Antenatal/ past obstetric predictive factors with respect to successful TOLAC were analyzed.

III. Results:

Younger age group women <30 years of age were found more likely to have successful TOLAC (OR=1.6) v/s women >/= 35 years of age (OR= 0.28). The difference was statistically significant (P=0.0003)

Table 1: Effect of Age on TOLAC subjects

Age group	TOLAC	VBAC	Failed TOLAC	OR
<30	190	160	30	1.61
31-34	145	120	25	1.40
≥35	49	29	20	0.28
Total	384	309	75	
P= 0.0003				

Table 2: Effect of Maternal BMI on TOLAC

BMI	TOLAC	VBAC	Failed TOLAC	OR
<25	176	150	26	1.77
25-29.9	124	99	25	0.94
≥30	84	60	24	0.51
TOTAL	384	309	75	
P= 0.0312				

Higher maternal BMI >/= 30 was associated with lower chances of VBAC (OR= 0.51). The difference was statistically significant (P= 0.03).

Table 3: Effect of Maternal Diabetes in TOLAC group

Diabetes	TOLAC	VBAC	Failed TOLAC	OR
Absent	359	293	66	2.5
Present	25	16	9	0.6
	384	309	75	
P = 0.059				

Presence of Maternal diabetes (ODM/GDM) reduced the chances of VBAC, although difference was not observed to be statistically significant (OR= 0.6, P= 0.059).

Table 4: Relation of IUGR in TOLAC group

IUGR	TOLAC	VBAC	Failed TOLAC	OR
Absent	345	276	69	0.73
Present	39	33	6	1.38
Total	384	309	75	
P=0.63				

IUGR babies were observed to have higher odds of VBAC (OR= 1.38) although difference was not statistically significant (P=0.63).

Subjects with PROM, were less likely to have VBAC; reaching statistical significance (OR=0.39, P=0.013).

Table No. 5 Relation of PROM in TOLAC group

PROM	TOLAC	VBAC	Failed TOLAC	OR
ABSENT	341	281	60	2.51
PRESENT	43	28	15	0.39
P= 0.0128				

Table 6: Effect of Gestational age on TOLAC

Gestational age	TOLAC	VBAC	Failed TOLAC	OR
<34Wks	42	42	0	1.84
34.1-37Wks	71	62	9	0.40
37.1-40Wks	250	190	60	0.59
>40wks	21	15	6	
P=0.0000				

Preterm gestation 34.1-37 weeks had significantly higher probability of a VBAC (OR= 1.84, P= 0.000). There was no failed TOL with gestation <34 weeks.

Table 7: Relationship of Birth weight on TOLAC

Birth weight	TOLAC	VBAC	Failed TOLAC	OR
<1500	22	22	0	-
1.5-2.499	85	70	15	1.17
2.5-2.99	211	172	39	1.15
3-3.49	54	39	15	0.57
>3.5	12	6	16	0.23
P=0.0045				

Infants with higher Birth weights (>/=3 Kg) had significantly lower odds of successful TOLAC compared to lower Birth weights (<3 Kg) [P=0.0045].

Table 8: Relation of Bishops score at admission in TOLAC group

Bishop score	TOLAC	VBAC	Failed TOLAC	OR
6-7	54	24	30	0.12
8-9	186	144	42	0.68
>10	144	141	3	20.14
P=0.000				

Higher Bishops score at admission >/= 10 was associated with a higher rate of TOLAC success (OR=20.14, P= 0.000)

Table 9: Effect of type of labor on TOLAC

Type of labour	TOLAC	VBAC	Failed TOLAC	OR
Spontaneous	329	271	58	2.09
Induced	55	38	17	0.48
P= 0.034				

Subjects who had spontaneous labor had significantly higher chances of a VBAC compared to subjects in whom labor was induced (P=0.034).

No statistically significant difference was found in success of TOLAC in urban v/s rural population (P= 0.75).Educational status had no statistically significant correlation with success of TOLAC (P=0.76), although; higher odds (OR=1.2) of VBAC were found in less educated (<X, OR=1.2) subjects.No statistically significant relation was found between presence of preeclamsia& success of TOLAC though OR=2.15 showed increased

chances of VBAC with absence of preeclampsia.Subjects with a history of previous vaginal deliveries had significantly higher odds of TOLAC being successful. Odds were higher for patients with multiple prior vaginal deliveries compared to one prior vaginal delivery (OR=3.76 v/s 2.57). Odds of having successful TOLAC in patients with no vaginal deliveries were low (OR=0.27, P= 0.0014).

IV. Discussion

In our study of 1,302 pregnant women with history of one or more previous cesarean deliveries, 918 cases (70 %) (including 236 subjects with previous 2 LSCS and 682 subjects with previous 1 LSCS) were taken for repeat LSCS (ERCD) without trial of labor.

The rate of TOLAC in our study was 30% (384 subjects), while Poddar[7] and Najma KP[8]found TOLAC rates of 22% and 20% respectively. Of the 384 cases underwent TOLAC; 309 achieved vaginal delivery. VBAC rate in our study was 80.5% (309/384). AHRQ review [9] found a comparable VBAC rate of 74% and 79.6%, respectively.

Higher VBAC rate was found in subjects <35 years age (84.2% in <30 years & 82.8% in 31-34 years) v/s >/= 35 years age (59.2 %), reaching statistical significance (P=0.0003).The results were comparable with results shown by Cameron et al[9]which showed decreasing odds of TOLAC success with increasing age (OR =0.4 for >40 yrs age). Bujold et al[10], (P= 0.005), Doshi[22] and Nighat Shaheen[11], (P<0.001) also found a statistically significant relation between increasing age and lower chances of VBAC.Educational status was found to have significant effect on outcome of TOLAC (P= 0.76); while King et al[12] in a study of 3,068 subjects found higher odds of VBAC with increase in years of education. Higher maternal BMI >/= 30 was associated with lower chances of VBAC (OR= 0.52, P= 0.03); our results correlated with findings of study by Landon[13], (OR= 0.55) for BMI > 30 and Juhasz[14], (OR= 0.53, P<0.001) for BMI >29. Though in a study by Grobman[15] odds ratio was 0.94 in patients with BMI >30, there were less chances of VBAC with higher BMI. Presence of maternal diabetes (ODM/GDM) reduced the chances of VBAC (OR= 0.6). The results of the present study are in agreement with the findings of Srinivas[16], 2007 (OR=0.68) showing lower odds for VBAC in patients with diabetes. Gymafi[17] presented still lower odds of VBAC (OR=0.42), in patients with diabetes. Conversely, Dharan et al[18] presented higher odds of VBAC in non- diabetic mothers (OR=1.61, P<0.001).In our study, no statistically significant relation was found between presence of preeclamsia& success of TOLAC, though; OR=2.15 showed increased chances of VBAC with absence of preeclampsia. Relative risk (RR) for failure of TOLAC in subjects with preeclampsia in our study was 1.2. This finding is in accordance to finding by Srinivas et al[16](2006) which stated that subjects with preeclampsia were more likely to fail VBAC (relative risk [RR], 1.56; 95% CI, 1.22 to 2.00).In our study, preterm gestation <37 weeks had significantly higher probability of a VBAC (P= 0.0000) whereas gestation beyond 37 weeks had lower odds of VBAC (OR=0.4 & 0.56 for gestation 37.1-40 weeks &>40 weeks respectively). Gestation <34 weeks had 100% success rate for TOLAC. This finding was in agreement with findings by Landon[13], Smith[19], Quiñones[20] and Srinivas[16]which demonstrate lower odds ratio for VBAC with increasing gestational age. Dhillon[21], also found lower percentage of VBAC with higher gestational age (P=0.0003)**.**Infants with higher Birth weights (>3 Kg) had lower odds of VBAC (OR= 0.57 & 0.23 for birth weight 3-3.5 Kg &> 3.5 Kg, respectively) compared to lower Birth weights. This result was comparable to findings from study by Cameron[9], Landon[13], Doshi[22],Smriti Gupta[23], Dhillon[21]&Nighat Shaheen[11].In our study, higher Bishops score at admission was associated with a significantly higher rate of TOLAC success (P= 0.000). This is in accordance with findings by Bujolds[10]2004 (OR for Bishop's >5= 2.07) and Smriti Gupta[23]2014 (OR for Bishop's >5= 16). Both studies found Bishops score to be a statistically significant predictor for VBAC. Subjects who had spontaneous labor had higher chances of a VBAC compared to subjects in whom labor was induced (P=0.034). This result was substantiated by results from Smriti[23]Gonen[24] and Landon[13]published results with similar odds of VBAC in cases of induced labor.In our study, subjects with a history of previous vaginal deliveries had significantly higher odds of TOLAC being successful. The odds of VBAC increased with no. of prior vaginal deliveries (P=0.0014). This finding were comparable to Cameron[9], Bujold[10], Gyamfi[17], Grobman[15], Srinivas[16],Mercer[25] and Bangal[26] which demonstrate a high chance of VBAC in subjects with a history of prior vaginal delivery.Patients with a history of vaginal delivery have less chances of inadequate pelvis. This explains the higher success rate of VBAC.

In our study, subjects with a history of previous VBAC had significantly higher odds of TOLAC being successful (OR= 3.8 for VBAC success with one prior VBAC v/s no prior VBAC). There was no failed TOLAC in subjects with 2/> prior VBACs (P=0.0181).

Our results correlate with results by Flamm[27], Bujold[10], Gyamfi[17], Landon[13], Grobman[15]and Doshi.

Maconesz[28]2001 also demonstrated lower TOLAC failure in subjects with history of prior VBAC (adjusted odds ratio, 0.13; 95% confidence interval, 0.05-0.31). The odds ratio for VBAC failure in our study was 0.21, for patients with history of prior VBAC.Our study found that, Inter delivery interval >3 years had higher odds of having a VBAC (OR=2.0). The relationship was statistically significant (P= 0.03).Doshi[22](2010),

found VBAC was associated with significantly higher success rates in women whose inter-conceptional period exceeded two years (P<0.01).

Huang et al.[29]2002, studied inter-delivery interval <19 month, and found no relationship in less spacing of deliveries compared to larger inter-delivery spacing for patients who had spontaneous onset of labor (P=0.98). However, for induced labor; <19 months interdelivery interval was associated with lower VBAC rate in these studies (P<0.01).

V. Conclusion:

Positive predictors for VBAC from our study were younger age group, lower maternal BMI, absence of maternal diabetes, lower gestational age and birth weight, higher Bishops score at admission, spontaneous onset of labour, vaginal delivery prior to or after caesarean section, malpresentation as indication for prior LSCS and longer inter-delivery interval (>3 years).

Ethics: Institutional ethical committee approval was taken prior to present study.

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