ORIGINAL ARTICLE

Prediction of successful trial of labour in patients with a previous caesarean section

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Abstract

Objective: To determine the prediction rate of success in trial of labour after one previous caesarean section.

Methods: The cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Cantonment General Hospital, Rawalpindi, from January 1, 2012 to January 31, 2013, and comprised women with one previous Caesarean section and with single alive foetus at 37-41 weeks of gestation. Women with more than one Caesarean section, unknown site of uterine scar, bony pelvic deformity, placenta previa, intra-uterine growth restriction, deep transverse arrest in previous labour and non-reassuring foetal status at the time of admission were excluded. Intrapartum risk assessment included Bishop score at admission, rate of cervical dilatation and scar tenderness. SPSS 21 was used for statistical analysis.

Results: Out of a total of 95 women, the trial was successful in 68 (71.6%). Estimated foetal weight and number of prior vaginal deliveries had a high predictive value for successful trial of labour after Caesarean section. Estimated foetal weight had an odds ratio of 0.46 ($p<0.001$), while number of prior vaginal deliveries had an odds ratio of 0.85 with ($p=0.010$). Other factors found to be predictive of successful trial included Bishop score at the time of admission ($p<0.037$) and rate of cervical dilatation in the first stage of labour ($p<0.021$).

Conclusion: History of prior vaginal deliveries, higher Bishop score at the time of admission, rapid rate of cervical dilatation and lower estimated foetal weight were predictive of a successful trial of labour after Caesarean section.

Keywords: VBAC, Predictive factors, Bishop score, Caesarean section. (JPMA 64: 542; 2014)

Introduction

The success rate of vaginal birth after Caesarean section (VBAC) varies from 53%-95%.[1,2] It is higher for patients who had previous Caesarean section (CS) due to non-recurring cause e.g. foetal distress or breech presentation.[1] VBAC is complicated by the inherent risk of scar rupture, which can be life-threatening for both the mother and the foetus.[3] Careful patient selection is an important initial step of a trial of labour after CS. Various prognostic models have been proposed to predict a successful trial of labour after CS. However, none is accurate.

Spontaneous onset of labour, history of previous vaginal delivery and favourable Bishop score at the time of admission before the labour suite have been reported as good prognostic factors in literature.[1]

VBAC is one of the target foci in our region. Because of the broad-based population pyramid, socio-cultural limitations to reduce fertility rates and scarcity of resources, it is of utmost importance to keep CS to a minimum. Various studies have reported encouraging results despite limited facilities to monitor high-risk labour.[1]

In this study, we carried out a two-step risk assessment of the candidates for trial of labour after CS and recorded a number of prredictive factors. These were then analysed for predictive value based on foeto-maternal outcome.

Subjects and Methods

The cross-sectional analytical study was conducted at the Cantonment General Hospital, Rawalpindi from January 1, 2012 to January 31, 2013. It comprised 95 patients who were selected by consecutive sampling technique. The sample size was calculated by the World Health Organization (WHO) sample size calculator. After institutional ethics committee approval, a detailed proforma was used as the study instrument. Data was collected by the authors.

All pregnant women who had one previous one lower segment transverse CS with a single alive foetus at 37-41 weeks of gestation and who were willing for a trial of labour were included in the study. Women with more than one CS, unknown site of uterine scar, history of uterine rupture, bony pelvic deformity, malpresentation, and diagnosed placenta previa, intra-uterine growth restiction, deep transverse arrest in previous labour or non-reassuring foetal status at the time of presentation in

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the labour room were excluded. All the selected women were assessed during their antenatal visit at 37-41 weeks. Written informed consent for participation in the study was obtained. Predictive factors related to past obstetric history were recorded, which included gravidity, parity, concurrent medical illness, indication of previous scar, prior history of vaginal delivery, history of VBAC and inter-pregnancy interval. Foetal weight was estimated and mode of delivery was discussed at this stage. Informed consent was obtained for trial of labour at the time of admission in the labour room. Intrapartum risk assessment included Bishop score at admission, monitoring for progress of labour and scar tenderness. Facilities for emergency lower segment CS were kept readily available. Partogram was maintained to reinforce monitoring. Induction or augmentation was not done in the subjects. All deliveries were conducted by an experienced senior registrar. Foetomaternal outcome was noted in terms of successful/failed trial of labour after CS (TOLAC).

Data was analysed using SPSS 21. Descriptive statistics were calculated, followed by the secondary analysis of the suspected maternal and obstetric factors of unsuccessful TOLAC. The comparison of mean age, VBAC, inter-delivery interval, Bishop score, and rate of cervical dilatation was done by significance testing using independent sample t test, taking significance level ≤0.05. Cross-tabulation was done for the proportions of unsuccessful and successful TOLAC. Binary logistic regression analysis was used to estimate the odds ratio (OR with P value and 95% confidence interval [CI]) as well as adjusted odds (AOR with 95% CI and P-value) for maternal factors, i.e., vaginal deliveries and inter-delivery interval. Similarly, OR with 95% CI and AOR with 95% CI and P-values were calculated for Bishop score at admission, rate of cervical dilatation and estimated foetal weight. P<0.05 was considered statistically significant.

Results

The trial was successful in 68 (71.6%) of the 95 women, while 27 (28.4%) women had to undergo emergency lower segment CS for various indications. Baseline characteristics of all the subjects were noted on the designated proforma (Table-1).

The two groups were comparable in terms of gravidity, parity, gestational age and the indications for previous CS (Table-2). Though age was not included in the predictive factors for successful trial of labour, a statistically significant difference was found between the two groups. Women who had a failed trial of labour belonged to a lesser age group with a mean of 27.1±3.16 years compared to 30.3±4.3 years for the others.

Table-1: Baseline Clinical Characteristics (n = 95).

Women's Characteristics		n (n %)
Age	<20	2(2.1%)
	20–30	66 (69.5%)
	>30	27 (28.4%)
Para	1	47 (49.5%)
	2	22 (23.2%)
	3	23 (24.2%)
	4	3 (3.2%)
Estimated Foetal Weight	2–2.5	6 (6.3%)
	2.6–3	72 (75.8%)
	3.1–3.5	17 (17.9%)
Bishop score on admission (cm)	<4cm	86 (90.5%)
	4-6cm	9 (9.5%)
Indication of previous scar	Foetal distress	35 (36.5%)
	Failed progress of labour	33 (34.7%)
	Breech	11 (11.6%)
	Failed Induction of Labour	4 (4.2%)
	PIH	3 (3.2%)
	Good Size Baby	9 (9.5%)

PIH: Pregnancy-induced hypertension.

Table-2: Comparison of means of maternal characteristics, labour and birth outcomes in women with successful and unsuccessful TOLAC (n = 95).

	Success TOLAC (n = 68)	Unsuccessful TOLAC (n = 27)	P-value
Age	30.3±4.3	27.1±3.16	*<0.001
Number of Prior Vaginal Deliveries	1.6±0.9	1.2±0.4	*0.043
Vaginal Birth After Caesarean	1±0.1	1±0.1	0.097
Rate of Cervical Dilatation	2.1±1	1.8±0.7	*0.038
Estimated Foetal Weight (kg)	3±0.4	3.3±0.3	0.212
Birth Weight (kg)	3±0.4	3.1±0.4	0.212
APGAR at 1 min	7.8±0.5	7.9±0.5	0.909

TOLAC: Trial of labour after Caesarean. APGAR: American Paediatric Gross Assessment Record.

When mean values were compared using independent t test, a statistically significant difference was found in the number of prior vaginal deliveries (p=0.043). Women with successful trial had a higher mean than those who failed to deliver (1.6±0.9 vs 1.2±0.4). There was no significant difference in the history of VBAC (p=0.097). There was a significant difference in the mean rate of cervical dilatation in the two groups (2.1±1 vs. 1.8±0.7, p=0.038). Mean estimated foetal weight , birth weight and APGAR (American Paediatric Cross Assessment Record) score at one minute was not found to be different in the two groups.

Logistic regression analysis for maternal and obstetric factors showed that estimated foetal weight and number

Table-3: Logistic Regression Analysis for maternal and obstetrics factors for successful TOLAC (n=95).

	Success TOLAC Mean ± S.D with 95% CI	Failure TOLAC Mean ± S.D with 95% C.I	OR (95% C.I)	P - value
Number of Prior Vaginal Deliveries	1.6±0.9 (1.3 - 1.9)	1.2±0.4 (0.9 - 1.5)	0.85 (0.6 - 2.1)	*0.010
Inter delivery Interval	3±1.0 (2.7 - 3.3)	2.6±0.7 (2.4 - 2.9)	0.46 (0.21 - 1.0)	0.050
Bishop Score	6±0.1 (6.0 - 6.1)	5.9±2.0 (5.1 - 6.7)	1.9 (1.0 - 3.5)	*0.037
Rate of Cervical Dilatation	2.1±1.0 (1.9 - 2.3)	1.8±0.7 1.5 - 2.0)	0.49 (0.16 - 1.08)	*0.021
Estimated Foetal Weight (kg)	3±0.4 (2.9 - 3.2)	3.3±0.3 (3.1 - 3.4)	0.46 (0.12 - 1.1)	*<0.001
Birth Weight (kg)	3±0.4 (2.9 - 3.1)	3.1±0.4 (3.0 - 3.1)	0.9 (0.31 - 1.86)	0.251
APGAR at five minute	9.8±0.7 (9.6 - 9.9)	9.7±0.8 (9.4 - 10.1)	0.34 (0.31 - 1.2)	*0.001

OR: Odds Ratio. CI: Confience Interval. SD: Standard Deviation. TOLAC: Trial of Labour After Caesarean. APGAR: American Paediatric Gross Assessment Record.

of prior vaginal deliveries had a high predictive value for successful TOLAC (Table-3). Estimated foetal weight had an OR of 0.46 (95% CI 0.12 - 1.1; and p<0.001), while number of prior vaginal deliveries had an OR of 0.85 (95% CI 0.6 - 2.1; p=0.010). Other factors found to be predictive of successful trial included Bishop score at the time of admission (OR 1.9, 95% CI 1.0 - 3.5; p=0.037) and rate of cervical dilatation in the first stage of labour (OR 0.49; 95% CI 0.16 - 1.08; P=0.021). Inter-delivery interval was not found to be predictive of successful TOLAC (OR 0.46; 95% CI 0.21 - 1.0; p=0.050).

Discussion

VBAC is one of the priority areas to reduce CS rate. However, it has a declining trend due to the increasing awareness of the risks associated with it. TOLAC is a focus of study both in local and international literature. However, there is a lack of randomised controlled trials addressing this issue. Various models have been proposed for the prediction of successful trial of labour although none has been validated.

In local literature, Mansoor M et al,[4,5] evaluated trial of labour in two separate studies. The reported success rate was similar to that of our study. Raja JF et al.[6] proposed a scoring system for induction of labour in VBAC. They have reported a similar success rate to ours.

Age was not included among the predictive factors for successful TOLAC in our study. However, a significant difference was noted. Women who failed to deliver belonged to a lesser age group. This may be because of the inclusion of teenaged pregnant women in our study. Some studies noted no effect of age on the success of TOLAC.[7] On the other hand, Raja JF et al[6] and Smith GC et al[8] showed that increasing maternal age directly correlated with the risk of emergency CS. Hamounte et al[9] also showed age to be an adverse factor for TOLAC.

Prior vaginal deliveries had a significant difference of mean values as well as a strong predictive value in binary logistic regression analysis. However, history of VBAC showed no such difference or predictive value. Some studies showed that vaginal birth either before or after CS was a favourable factor. These include reports by Gonen R et al[10] and Landon MB et al.[11] Others showed that only prior vaginal delivery is predictive, while VBAC is not.[6]

Bishop score at admission was found to have a good predictive value for successful TOLAC. Other studies done for the induction of labour also found that a Bishop score of >5 is associated with a higher likelihood of success.[6,12] Rate of cervical dilatation was also found to have a good predictive value. We could not find any other study in which this variable was assessed as such. However, it is known that non-progress of labour at the time of primary CS has a higher likelihood of failure in a subsequent trial.[13-15] Inter-delivery interval was not found to predict the success of TOLAC.

Although estimated foetal weight and birth weight did not have a significant difference of mean values in the two groups, estimated foetal weight was found to be strongly predictive of the success of TOLAC (p <0.001). Hamounte et al[9] also reported that birth weight of >4000gms is associated with a significant reduction in VBAC.

Conclusion

History of prior vaginal deliveries, higher Bishop score at the time of admission, higher rate of cervical dilatation and lower estimated foetal weight are predictive of a successful trial of labour after one previous CS. However, large-scale studies are needed to establish statistically significant association.

Acknowlegment

We are grateful to Dr. Raja Farhat Shoaib who reviewed the manuscript and made valuable amendments regarding statistical analysis.

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