

## Evaluating Prediction Score For Success of Trial of Labor After Cesarean (TOLAC)

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### ABSTRACT

**Objective:** To determine the success rate for trial of labor after cesarean section in women with good prediction score.

**Study Design:** Cross sectional (analytical) study.

**Place and Duration of Study:** Department of Obstetrics and Gynecology, PEMH Rawalpindi, from Dec 2017 to Jun 2018.

**Methodology:** A total of 141 women with previous delivery by caesarean section, planned for trial of labor with good prediction score of  $\geq 8$  were included in the study. All patients were then allowed to labor spontaneously. Data was collected for success rate after trial of labor

**Results:** Age range in this study was from 18-35 years with mean age of  $29.234 \pm 2.13$  years, mean gestational age  $38.531 \pm 0.99$  weeks, mean weight  $63.290 \pm 9.97$  Kg, mean height  $1.532 \pm 0.08$  meter and mean BMI was  $27.097 \pm 4.59$  Kg/m<sup>2</sup>. Success rate was seen in 86.5% patients.

**Conclusion:** In conclusion, a prediction model was proposed that can provide useful insights to envisage VBAC success rate for the pregnant women having history of caesarean delivery at the time of admission.

**Keywords:** Good prediction score, Intrauterine fetal demise, TOLAC, Success rate, VBAC (Trial of labor).

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### INTRODUCTION

A pregnant woman after her first caesarean section (CS first) can have two options, either she can choose an "Elective Repeat CS (ERCS)" or can opt for an intended "Vaginal Birth after Caesarean (VBAC)" i.e. a trial of labor. This may result in either successful (an actual) VBAC or lead towards an emergency CS i.e. unsuccessful VBAC. The most substantial part during the complete process is to discuss and counsel the patient about the risks of both options which are deliver mode, and the probability of VBAC.<sup>1</sup> According to the research, the success rates for VBAC varies from 60-80% across the world.<sup>2</sup> It is pertinent to mention that these figures may not be necessarily applicable for counselling, because many other factors may contribute towards the final outcome that includes demography, obstetric history, current pregnancy of the woman and other findings specific to that individual may vary.<sup>2</sup>

In recent past the American College of Obstetricians and Gynecologists (ACOG), in an effort to decrease the rate of cesarean delivery, has suggested that maximum number of pregnant women with a single previous low transverse cesarean delivery may be encouraged about VBAC through counselling and be offered a trial of labor.<sup>3</sup>

The counseling process involves two major key aspects, one is to provide the woman with her individual

chance of success and secondly, a conversation about the maternal and neonatal risks and benefits associated with TOLAC.<sup>4</sup> Another factor is to provide an accurate estimate of the individual chance of a successful TOLAC by using a predictive model.<sup>5</sup>

This predictive model, based on maternal factors and other existing facts and figures available at the first antepartum visit, and later on admission in labor room, allows an assessment of the probability of successful TOLAC. The overall potential for translation of knowledge into practice for the under-discussion model is high, as women could be counselled about, and make choices based on, their individual chance of successful TOLAC.<sup>6</sup> In a study by Maykin *et al* has found that frequency of success rate was 71% after TOLAC in women with good prediction score.<sup>7</sup> In another study by Yokoi *et al* has found that frequency of success rate was 98% after TOLAC in women with good prediction score.<sup>8</sup> Rationale: Subsequent studies have evaluated the external validity of prediction scores among various ethnic and geographic cohorts.<sup>1,5,8</sup> All of these studies have found the prediction scores to be most accurate at higher predicted success rates.

Unfortunately, no validation has been conducted in Pakistani population. Therefore, a study was planned to determine the frequency of success rate after TOLAC in women with good prediction score in our local population. Results of this study will help to formulate a prediction score for success of trial of labor after cesarean in our general population.

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## METHODOLOGY

A cross sectional study was carried out in Department of Obstetrics and Gynaecology of Pak Emirates Military Hospital Rawalpindi, from December 2017 to June 2018. A sample size of total 141 women was calculated by using 7.5% prevalence of Low Apgar score at 95% confidence interval using WHO formula for sample size calculation.<sup>11</sup>

### Inclusion Criteria

A non-probability consecutive sampling was adopted to select study population. Pregnant woman of 18-35 years of age having gestational age 37-41 weeks, singleton pregnancy on ultrasound with parity  $\geq 1$  and previous delivery by caesarean section on medical record, with good prediction score of  $\geq 8$  were included in study.

### Exclusion Criteria

Women having history of uterine rupture, malpresentation on ultrasound, h/o more than one caesarean section, Intrauterine fetal demise on ultrasound and placenta previa on ultrasound were excluded from the study.

After seeking prior permission from ethical committee and research department, the data related to the patients fulfilling the inclusion criteria from indoor department of Obstetrics and Gynecology of Pak Emirates Military Hospital Rawalpindi, was made part of the study. Moreover, informed consent for trial of labor was also taken from each patient at the time of admission in the labor room, ensuring confidentiality and fact that there was no risk involved to the patient while taking part in this study.

Complete obstetrical and medical history was taken, followed by detailed physical examination including general physical, abdominal and pelvic examination. All patients were then allowed to labor spontaneously. Continuous monitoring of all the patients was done in labor room as per protocol for high-risk pregnancy and scar tenderness. Moreover, cardiotocography (CTG) was also carried out continuously for all patients. Instrumental delivery was conducted as per protocol if indicated. In case there was no change in Bishop Score after being in labor for 4 hours, despite regular and painful uterine contraction, the patient was diagnosed as Failure to progress. Similarly, Fetal distress was labeled under following conditions:-

- Either grade 2 or more meconium was detected
- or there was 3 or more variable or type 2 decelerations present on 20 minutes CTG strip.

In case of failure to progress and fetal distress, immediate caesarean section was performed as per protocol.

Decision of emergency caesarean section was taken by consultant gynecologist of 3 years post fellowship experience. After delivery patient was kept in labor room for 24 hours. If remained stable, she was shifted to post-natal ward. Data was collected for success rate after trial of labour as according to the operational definition. Special proforma was designed to summarize the gathered data, which was then analyzed with statistical analysis program (SPSS version 22). The frequency and percentage was computed for qualitative variables like parity, prior vaginal delivery, previous indication of caesarean section and success rate. Similarly, for quantitative variables like age, gestational age, weight, height, BMI Mean  $\pm$  SD was presented. The effect modifiers e.g. parity, prior vaginal delivery was controlled by stratification. Lastly, post stratification chi square test was applied " $p \leq 0.05$ ", was considered statistically significant.

## RESULTS

The sample age range for the study was from 18-35 years with mean value of  $29.234 \pm 2.13$  years, mean gestational age  $38.531 \pm 0.99$  weeks, mean weight  $63.290 \pm 9.97$  Kg, mean height  $1.532 \pm 0.08$  meters and mean BMI was  $27.097 \pm 4.59$  Kg/m<sup>2</sup> as shown in Table-I. About 93.6% patients were of 1-3 parity group and 6.4% patients were of  $>3$  parity is presented in Table-II.

**Table-I: Mean  $\pm$  SD of patients according to age, gestational age, weight, height and BMI (n=141).**

Demographics	Mean $\pm$ SD
Age (years)	29.234 $\pm$ 2.13
Gestational age (weeks)	38.531 $\pm$ 0.99
Weight (Kg)	63.290 $\pm$ 9.97
Height (m)	1.532 $\pm$ 0.08
BMI (Kg/m <sup>2</sup> )	27.097 $\pm$ 4.59

**Table-II: Percentage and frequency of patients according to parity (n=141).**

Parity	No. of Patients	Percentage
1-3	132	93.6%
$>3$	9	6.4%

The percentage and frequency of patients according to Prior Vaginal Delivery and previous indication of caesarean section are tabulated in Table-III & IV respectively.

**Table-III: Percentage and frequency of patients according to prior vaginal delivery (n=141).**

Prior Vaginal Delivery	No of Patients	Percentage
Yes	49	34.8%
No	92	65.2%

Success rate was seen in 86.5% patients as shown in Table-V. Stratification of Success rate with respect to parity and prior vaginal delivery are shown in Table-VI and VII respectively.

**Table-IV: Percentage and frequency of patients according to previous H/o indication of caesarean section (n=141).**

Previous indication of caesarean section	No of Patients	Percentage
Failed Progress of labor	24	17%
Post date pregnancy	3	2.1%
Placenta Abruptio	6	4.3%
Breech Presentation	13	9.2%
Twin pregnancy	5	3.5%
IUGR	15	10.6%
Oligohydramnios	30	21.3%
Fetal Distress	45	31.9%

**Table-V: Percentage and frequency of patients according to success rate (n=141).**

Success Rate	No of Patients	Percentage
Yes	122	86.5%
No	19	13.5%

**Table-VI: Stratification of success rate with respect to parity.**

Parity	Success Rate		p-value
	Yes	No	
1-3	113 (85.6%)	19 (14.4%)	0.221
>3	9 (100%)	-	
Total	122 (86.5%)	19 (13.5%)	

**Table-VII: Stratification of success rate with respect to prior vaginal delivery.**

Prior Vaginal Delivery	Success Rate		p-value
	Yes	No	
Yes	49 (100%)	-	0.001
No	73 (79.3%)	19 (20.7%)	
Total	122 (86.5%)	19 (13.5%)	

## DISCUSSION

This study shows that the success rate VBAC was almost 86.5%. Mostly, these patients had spontaneous vaginal delivery. Although, the rate of success observed during this study seemed slightly higher than suggested statistics in other studies with the ranges between 60-80% success rate of VBAC.<sup>12,13</sup> This study also highlighted the fact that the women with prior vaginal delivery had higher chance for successful VBAC when compared to the success rate of women with no previous history of vaginal delivery. According to the available research and studies, cases with previous vaginal delivery was found out to be the strongest predictor for VBAC success,<sup>13,14</sup> which was complimenting the findings of this paper.

In addition, it was determined that success rate of VBAC was also associated with maternal age (i.e. low/high), and weight gain during pregnancy. Both these factors contribute towards the VBAC failure or success rate. Specifically, women with weight gain of over 20 kg has higher failure rate of VBAC. Moreover, it was also deduced during current study, in contrast to previous studies, the success rate of VBAC is not affected by gestational age.

During the studies six different variables were identified that were independently associated with success rate of VBAC, as per following:-

- **The age score (in years)** if >30=0; similarly, between 25-30=1; and for <25=2.
- **The gestational age measured in weeks (on LMP)** if <39=0; 1= 39-40=1; >40=2.
- **Indication of previous CS (on medical history):** Failed progress of labour (NPOL) =0; in case of twin pregnancy or with post-dates or intrauterine growth restriction (IUGR) or having placental abruptio or oligohydramnios=1; and lastly, breech presentation or foetal distress=2.
- **VBAC history:** The patients with no previous history i.e Nil=0; VBAC=1; vaginal delivery before caesarean and VBAC=2.
- **Bishop score** (on physical examination): 0-3=0; 4-5=1; 6-10=2.
- **BMI (kg/m<sup>2</sup>)** (weight (in kilogram) divided by height (in meters) squared): >30=0; 25-29.9=1; <25=2.

Based on current study, the findings suggest that proposed model generated a scoring system with ≥8 score, which can be effectively used for the prediction with the probabilities of successful VBAC with good appreciable accuracy. In conjunction with it, we further developed the score based on the relative weight of these variables and the success rate of these variables in prediction of VBAC success. Subsequently, a score was assigned to each (six) variable, and probability was deduced through level of score i.e. the highest score indicates the highest probability. Aforesaid, this can be inferred that more the total value of score, greater is the probability for having a VBAC success increase.

Various research studies were carried out to predict the success rate after TOLAC e.g. the research study by Maykin *et al* suggested that frequency of success rate was 71% after TOLAC in women with good prediction score.<sup>7</sup> In another study by Yokoi *et al* has found that frequency of success rate was 98% after TOLAC in women with good prediction score.<sup>8</sup>

Most of the prediction models, previously developed, reporting the success rate of VBAC,<sup>15,16</sup> usually do not consider (include) the variables that are available at the time of admission or are not established based on regression models. One of the similar studies has reported a scoring system which is based on five different factors that can be associated with success rate of VBAC. The factors included “previous VBAC, lower gestational age at the time of the first CS, abnormal presentation as indication for first CS, cervical dilatation, and gestational age ≤41 weeks”.<sup>17</sup>

One of the most recent nomograms, with application at admission time, included various other variables including demographics and ethnicity.<sup>18</sup> Additionally, the model suggested by Grobman *et al*, includes numerous other factors which makes it more complicated<sup>16</sup> difficult to analyze. The predictive nomogram model with multiple factors (variables) contributed towards the determination VBAC success for specific patient at the first prenatal visit. The stated model by Grobman *et al*<sup>16</sup> is built on a multivariable “logistic regression”. The list of variables that were made part of the model includes ethnicity, index of body mass, age factor (maternal), history of vaginal delivery (previous vaginal delivery), recurrent symptoms for the cesarean delivery, and VBAC.

The labor induction has negative effect on success of VBAC and it may decrease the chance of successful VBAC.<sup>19</sup> Here, It is pertinent to mention that the findings and results of this study are consistent with those of Grobman *et al*<sup>16</sup> and also support the argument that the data of patient admission have very important contribution towards the success of VBAC. Thus, eventually can increase the rate of effective prediction of VBAC.

The challenges associated with VBAC predictive model cannot be ruled out, despite all considerations, the model still faces major challenges in the clinical setting. The results based on individual women or with woman having specific findings cannot be set as a base for predicting success and subsequently will not help in decision making. The success estimation would be affected by the women willingly opt to undergo TOLAC vis-a-vis woman needing proper counselling and encouragement. Therefore, the importance of encouraging women who have less willingness to undergo TOLAC or facilitate the decision making for women who are willing to undergo TOLAC effect the success estimation.

The findings suggest that TOLAC must be offered to any woman who is already inclined and willing to undergo the process and same has been supported by the recommendations. The trials (based on prediction model and individual success rate) may not restrict options for women based on the low scores. Rather, a high success rate score should be actively used to promote TOLAC.

## CONCLUSION

In the end it is concluded that, the proposed model provides very effective and useful information, and can be very beneficial in predicting VBAC success rate. The proposed a model includes many associated variables including the data of patient (pregnant woman) at the time of admission who previously had a cesarean delivery act as the main contributory factor. In future, we intend to conduct the study with more larger and diverse datasets (more independent and dependent variables) that would help us to validate the suggested prediction model in clinical settings.

**Conflict of Interest:** None.

## Author Contribution

SB: Conception, design & analysis, interpretation of data, drafting of the article, critically revising article for important intellectual content, SA: Acquisition of data & drafting.

## REFERENCES

- Schoorel ENC, Melman S, van Kuijk SMJ. Predicting successful intended vaginal delivery after previous caesarean section: external validation of two predictive models in a Dutch nationwide registration-based cohort with a high intended vaginal delivery rate. *BJOG* 2014; 121: 840–7.
- Grobman WA. Rates and prediction of successful vaginal birth after cesarean. *Semin Perinatol* 2010; 34: 244–8.
- Birara M, Gebrehiwot Y. Factors associated with success of vaginal birth after one caesarean section at three teaching hospitals in Addis Ababa, Ethiopia: a case control study. *BMC Pregnancy Childbirth* 2013; 13: 31.
- Folsom S, Esplin MS, Edmunds S. Patient counseling and preferences for elective repeat cesarean delivery. *AJP Rep* 2016; 6(2): e226–e231.
- Chaillat N, Bujold E, Dubé E. Validation of a prediction model for vaginal birth after caesarean. *J Obstet Gynaecol Can* 2013; 35(02): 119–24.
- Lundgren I, van-Limbeek E, Vehviläinen-Julkunen K, Nilsson C. Clinicians' views of factors of importance for improving the rate of VBAC (vaginal birth after caesarean section): a qualitative study from countries with high VBAC rates. *BMC Pregnancy Childbirth* 2015; 15: 196.
- Maykin MM, Mularz AJ, Lee LK. Validation of a prediction model for vaginal birth after cesarean delivery reveals unexpected success in a diverse american population. *AJP Rep* 2017; 7(1): e31–e38.
- Yokoi A, Ishikawa K, Miyazaki K, Yoshida K, Furuhashi M, Tamakoshi K. Validation of the prediction model for success of vaginal birth after cesarean delivery in Japanese women. *Int J Med Sci* 2012; 9(6): 488–491.
- Crane JM, Butler B, Young DC. Misoprostol compared with prostaglandin E2 for labour induction in women at term with intact membranes and unfavourable cervix: a systematic review. *BJOG* 2006; 113(12): 1366–76.
- Irani RA, Foster S. Overview of the mechanisms of induction of labor. *Seminars in Perinatology* 2015; 39(6): 426–429.
- Tang J, Kapp N. WHO recommendations for misoprostol use for obstetric and gynecologic indications. *Int J Gynaecol Obstet* 2013; 121(2): 186–189.
- MacDorman M, Declercq E, Menacker F. Recent trends and patterns in cesarean and vaginal birth after cesarean (VBAC) deliveries in the United States. *Clin. Perinatol* 2011; 38: 179–192.
- Macones GA. Obstetric outcomes in women with two prior cesarean deliveries: is vaginal birth after cesarean delivery a viable option? *Am J Obstet Gynecol* 2005; 192: 1223–1228.
- Lydon-Rochelle MT, Cahill AG, Pong CY. Birth after previous cesarean delivery: short-term maternal outcomes. *Seminars in perinatology* (Elsevier; New York, NY, 2010).
- Weinstein D, Benschushan A, Tanos V. Predictive score for vaginal birth after cesarean section. *Am J Obstet Gynecol* 1996; 174: 192–198.
- Grobman WA. Development of a nomogram for prediction of vaginal birth after cesarean delivery. *Obstet Gynecol* 2007; 109: 806–812.
- Gonen R, Tamir A, Degani S, Ohel G. Variables associated with successful vaginal birth after one cesarean section: a proposed vaginal birth after cesarean section score. *Am J Perinatol* 2004; 21: 447–453.
- Grobman WA. Does information available at admission for delivery improve prediction of vaginal birth after cesarean? *Am J Perinatol* 2009; 26: 693–701.
- Grobman WA. Outcomes of induction of labor after one prior cesarean. *Obstet Gynecol* 2007; 109: 262–269.
- Läkemedelsverket CN. &Användning av misoprostol för förlossningsinduktion.pdf&gt;.
- Cogan R, Spinnato JA. Pain and discomfort thresholds in late pregnancy. *Pain* 1986; 27(1): 63–68.
- Dunbar AH, Price DD, Newton RA. An assessment of pain responses to thermal stimuli during stages of pregnancy. *Pain* 1988; 35(3): 265–269.
- Gintzler AR, Liu NJ. The maternal spinal cord: biochemical and physiological correlates of steroid-activated antinociceptive processes. *Progress Brain Res* 2001; 133: 83–97.
- Schulte HM, Weisner D, Allolio B. The corticotrophin releasing hormone test in late pregnancy: lack of adrenocorticotrophin and cortisol response. *Clin Endocrinol* 1990; 33(1): 99–106.