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Original Article

Predictors of Successful Vaginal Deliveries after Previous one Caesarean

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ABSTRACT

Objective: to compare the outcomes in patients undergoing TOLAC after one LSCS and find out successful predictors for vaginal delivery in those who have delivered vaginally in comparison to those who end up in repeat C-section.
Study Design: Prospective comparative study.
Place and Duration of Study: Department of Gynecology and Obstetrics, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Dec 2023 to June 2024.
Methodology: Three hundred women of reproductive age group with previous single caesarean deliveries were included in the study. The demographics, obstetric history, index pregnancies, and medical details of each case were examined. Induction of labour, BISHOP score upon admission, BMI, gestational age at delivery, estimated foetal weight, intrapartum features, mode of delivery, previous vaginal delivery and intraoperative observations were all noted.
Results: A total three hundred (n=300) patients were included 150(50.0%) of the cases resulted in a successful vaginal delivery, whereas 150(50.0%) underwent repeat caesarean delivery. The overall success rate of VBAC after exclusion of caesarean cases due to maternal requests was 73.0%. Methods of labour inductions were as follows: balloon (n=20), oxytocin (n=64), balloon followed by oxytocin (n=18), vaginal PGE2 (n=2), balloon followed by vaginal PGE2 (n=4), c-section followed by relaparotomy due to intrapelvic hematoma (n=1), dehiscence (n=7). Multiple regression analysis showed BISHOP score at admission were statistically significant difference (p-value=0.001; 95% CI= 0.023 – 0.095). Women with a BMI of less than 28 had a two times greater chance of giving vaginal birth after a caesarean (OR: 2.06, 95% CI: 1.36-3.89, p<0.001).
Conclusion: The BISHOP score upon admission, TOLAC score, body mass index, number of prior vaginal deliveries, and birth weight are important factors in determining the success of a VBAC.
Keywords: BISHOP Score, Placenta Previa, Trial of Labor After a Caesarean (TOLAC), Vaginal Birth After a Caesarean (VBAC).

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INTRODUCTION

Trial of Labor after a Caesarean (TOLAC) is a medical approach that allows women with a prior cesarean section to attempt a vaginal delivery with their subsequent pregnancies.[1] The aim is to achieve a Successful Vaginal Birth after a Caesarean (VBAC). This process involves careful monitoring of maternal and fetal health during labor, assessing the feasibility of a safe vaginal delivery. VBAC offers a woman the opportunity for a more natural birthing experience, avoiding the risks associated with repeat cesarean surgeries.[2] However, TOLAC requires close medical supervision to ensure the well-being of both mother and baby, balancing the desire for a vaginal birth with safety considerations.[3]

A planned caesarean section can be scheduled for the index pregnancy, or a woman who has already had a caesarean delivery can try labour after a caesarean (TOLAC).[4] A planned TOLAC might lead to either a vaginal birth after caesarean section (VBAC) or an unanticipated intrapartum caesarean section. One should take into account the patient's wishes, obstetric history, and information regarding the pros and downsides of TOLAC compared to scheduled recurrent caesarean deliveries when making this decision.[5] The rates of maternal harm and the likelihood of successful VBAC are two major considerations in selecting this choice. There was a lack of information on maternal and baby clinical outcomes in a prior systematic review that included two small randomized studies with a collective of 320 women. The rates of maternal injury were found to be low in both VBAC and elective repeat caesarean deliveries, according to this review.[6,7]

The maternal death rate was higher for elective recurrent caesarean deliveries (0.013%) than for TOLAC trials (0.004%), despite the fact that both types of deliveries are rare.[8] No significant differences were seen in the rates of maternal hysterectomy, bleeding, or transfusions between the two groups. When comparing TOLAC to elective repeat caesarean birth, the risk of uterine rupture was much higher (0.47% vs. 0.03%).[9] Furthermore, TOLAC was associated with a

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higher rate of perinatal mortality (0.13% vs. 0.05%). According to the research, most women should consider VBAC as an option. Both TOLAC and elective recurrent caesarean deliveries had very low rates of negative outcomes.[10]

For a better outcome, TOLAC should be offered for selected cases. In order to guarantee a high success rate, prediction models have been created to forecast successful VBAC. In this study, we set out to identify key markers for a successful vaginal birth after a caesarean section and to report our cases of the trial of labour after caesarean delivery based on the TOLAC score.

METHODOLOGY

The comparative cross sectional study was conducted at the Department of Gynaecology and Obstetrics, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Dec 2023 to June 2024, after approval from Ethical Review Committee. Sample size was calculated using WHO sample size calculator taking mean score BISHOP scores of VBAC Group as 74.2±11.05 and in Repeat Cesarean Group as 67.3±10.3.[11]

Inclusion Criteria: Pregnant women with the history of caesarean delivery and a low transverse incision, 37 weeks of gestation, and a normal-sized pelvis were included.

Exclusion Criteria: Pregnancies without prenatal care, pregnancies with multiple gestations, foetal malformation, foetal weight >4,000 gm, and prenatal intervals shorter than 12 months were excluded.

A total of 300 women of reproductive age group with previous single caesarean deliveries were included in the study. The demographics, obstetric history, index pregnancies, and medical details of each case were all examined. Time since the last delivery, BISHOP score at admission, BMI, previous delivery, gestational age at delivery, estimated foetal weight, intrapartum features, mode of delivery, and intraoperative observations were all noted for each current pregnancy.

An extra amniotic balloon was chosen over oxytocin for labour induction for pregnant women who experienced more than two contractions during 10-minute tocodynamics monitoring. In cases where there were less than three contractions within ten minutes, the use of oxytocin for the purpose of augmentation of labour was suggested. During labour induction, patients were given five units of oxytocin mixed with one litre of normal saline. After starting at 2.5 mU/minute, the dose was subsequently raised in 2.5 mU/minute increments until obtaining the required contractions' intensity and amplitude. The amniotic membrane was broken either spontaneously or artificially after obtaining the target contraction frequency with cervical dilatation >6 cm (Figure-1).

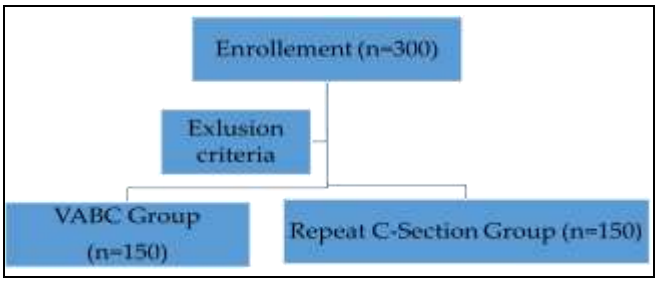

Figure-1: Flow Diagram (n=300)

After participants gave their informed consent. The approach of non-probability consecutive sampling was used. The analysis of the data was carried out using Statistical Package for Social Sciences version 23.0. The mean±standard deviation was used to summarise the quantitative data, while frequency and percentages were used to summarise the qualitative variables. To investigate the inferential statistics, we used a chi-square test and an independent sample t-test. ROC analysis was used to predictive values of TOLAC score, Duration since previous CD (months), BMI, birth weight and the BISHOP score at admission. Significance was determined by a *p*-value that was less than or equal to 0.05.

RESULTS

A total three hundred (n=300) patients were included 150(50.0%) of the cases resulted in a successful vaginal delivery, whereas 150(50.0%) underwent repeat caesarean delivery. Ninety women gave up trial of vaginal delivery during labor. The overall success rate of VBAC after exclusion of caesarean cases due to maternal requests was 73.0%. Of 300 patients, 219(73.0%) had a previous caesarean delivery and no vaginal delivery, 61(20.3%) had a vaginal delivery before the caesarean delivery, and 20(6.7%) had a prior VBAC. Methods of labour inductions were as follows: balloon (n=20), oxytocin (n=64), balloon followed by oxytocin (n=18), vaginal PGE2 (n=2), balloon followed by vaginal PGE2 (n=4), c-section followed by relaparotomy due to intrapelvic hematoma (n=1), dehiscence (n=7), deep vaginal laceration (n=1), bladder injury (n=1), postpartum haemorrhage (n=2) and uterine rupture (n=1). Table-I

showed the comparison of demographic characteristics with respect to VBAC and repeat cesarean group. There was statistically significant difference seen Maternal Age (p=0.002), BMI (p<0.001), Gravidity (p-value =0.001), parity (p value=0.046) and Alive (p-value <0.001). There was statistically significant was found in term of TOLAC score (p-value <0.001), Duration since previous CD (p-value =0.005), Birth Weight (p-value =0.049) and Bishop score at admission (p-value <0.001) and non- statistically significant difference was seen in GA of index pregnancy (p-value =0.382) Shown in Table-II. ROC curve analysis showed that, BISHOP score (AUC=0.778, p-value <0.001), Duration since previous CD (months) (AUC=0.627, p-value <0.001), BMI (AUC=0.372, p-value <0.001), Birth weight (AUC 0.398, p-value =0.002) and Bishop score at admission (AUC=0.723, p-value <0.001) shown in Table-III.

Table-I: Comparison of Demographic characteristics with respect to Vaginal birth after a caesarean (VBAC) and Repeat Cesarean Group (n=300)

Variables	Vaginal birth after a Caesarean (n=150)	Repeat Cesarean Group (n=150)	*p*-value
Maternal Age (years)	28.39±3.36	29.69±3.86	0.002
Body Mass Index (kg/m²)	27.09±4.10	29.24±3.60	<0.001
Gravidity	2.33±0.96	2.72±1.03	0.001
Parity	1.04±0.72	1.87±0.77	0.046
Alive	2.03±0.91	2.44±1.05	<0.001

Table-II: Comparisons of the Duration since previous Cesarean delivery, Gestational Age of index pregnancy, Birth Weight (gr) and Bishop score at admission delivery between groups (n=300)

Variables	Vaginal birth after a Caesarean (n=150)	Repeat Cesarean Group (n=150)	*p*-value
Duration since previous Cesarean delivery (months)	54.53±3.16	53.44±3.47	0.005
Gestational Age of index pregnancy (months)	38.19±1.38	38.04±1.39	0.382
Birth Weight (gr)	3342.85±70.76	3381.19±150.54	0.049
Bishop score at admission	4.83±1.42	2.98±1.03	<0.001

Table-III: ROC analysis showed significant predictive values of TOLAC score, Duration since previous CD (months), BMI, birth weight and the BISHOP score at admission (n=300)

Variables	Area		SE	*p*-value	95 % CI
Duration since previous Cesarean delivery (months)	0.627		0.032	<0.001	0.564–0.690
Body Mass Index (kg/m²)	0.372		0.032	<0.001	0.661–0.786
Birth Weight (gr)	0.398		0.034	0.002	0.331–0.464
Bishop score at admission	0.723		0.032	<0.001	0.661–0.786

Multiple regression analysis showed Bishop score at admission statistically significant difference (p-value=0.001; 95 Cl= 0.023 – 0.095). Women with a BMI of less than 28 had a two times greater chance of giving vaginal birth after a caesarean (OR: 2.06, 95% CI: 1.36-3.89, p<0.001) (Figure-2).

DISCUSSION

Trial of Labor after a Caesarean (TOLAC) is a medical approach that allows women who have previously undergone a cesarean section to attempt a vaginal delivery with subsequent pregnancies. TOLAC involves carefully monitoring the mother and fetus during labor to assess the feasibility of a successful vaginal delivery.[10] The decision to pursue VBAC is influenced by factors such as the reason for the previous cesarean, the type of uterine incision, and the overall health of the mother. Medical professionals closely observe the progress of labor and intervene if necessary to ensure the safety of both the mother and the baby.[11]

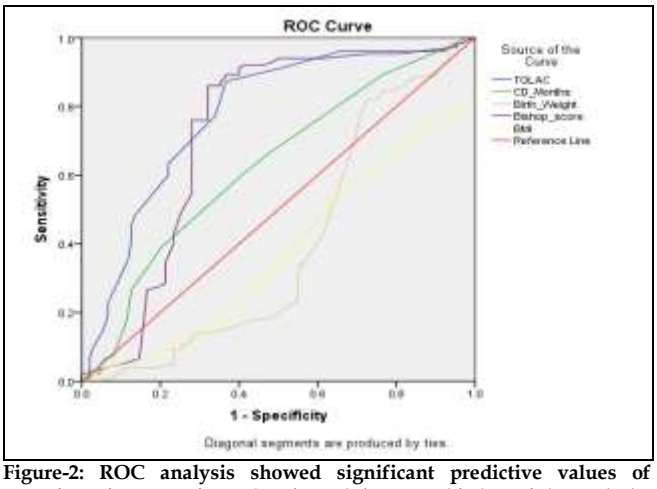

Figure-2: ROC analysis showed significant predictive values of Duration since previous CD (months), BMI, birth weight and the Bishop score at admission (n=300)

The current study set out to identify relevant predictors for VBAC cases and describe our experience with trial of labour after caesarean delivery based on the TOLAC score. Based on our data, we can say that the following factors significantly predicted whether or not a woman who underwent TOLAC would have a successful vaginal delivery: admission BISHOP score, body mass index (BMI), number of prior vaginal deliveries, and birth weight. The most powerful predictor for successful vaginal birth, according to our analysis, was the BISHOP score upon admission (p<0.001) and was the second most powerful predictor. For TOLAC as a whole, our study found a 45.6% success rate. The success percentage of vaginal birth after a caesarean was 73.2% after cases that were excluded due to maternal requests for repeat caesarean operations. Our research shows that being overweight increases the likelihood of VBAC not working. Compared to obese women, women with a body mass index (BMI) below 29 were twice as likely

to give birth vaginally (p<0.001). Similarly, compared to underweight individuals, obese patients had about half the chance of a successful VBAC, according to one study.[12] Our results are consistent with those of another study, which found that maternal BMI was an independent variable linked to a reduced rate of vaginal birth after a caesarean delivery. A major predictor for successful vaginal delivery in this study was the number of previous deliveries (p<0.001).[13] Previous research has shown that a decreased risk of failed TOLAC is connected with a history of vaginal birth. Patients who had never given birth vaginally before had a lower success rate than those who had a previous VBAC. Our investigation found that two of the cases with uterine rupture had never given birth vaginally before.[14] One study found that women who had a vaginal birth before had a higher chance of a successful VBAC. Furthermore, the likelihood of uterine rupture and total maternal morbidities were both reduced in women who had previously given birth vaginally. Consequently, TOLAC is a viable option for women who have already given birth vaginally.[15] One more thing that helps with a vaginal delivery going well is the baby's birth weight. During the patient's hospital stay, an ultrasonographic measurement can be taken to determine the estimated birth weight. The number of unsuccessful attempts at labour was found to be directly associated to birth weight in one study.[16] Vaginal delivery was more likely to be successful when the baby weighed less than 3,500 g, as opposed to when the baby was macrosomic. The potential dangers of attempting a vaginal delivery in cases when the estimated foetal weight is more than 4,000 g should be communicated to the patient. According to the previous researchers, certain ideal circumstances are necessary for a successful vaginal birth after a caesarean section. The primary risk factors for uterine rupture were labour inducement with oxytocin and prostaglandins, while protective ones were a previous vaginal birth and labour that began spontaneously.[14] Our study had a uterine rupture rate of 0.42. There were two cases of uterine ruptures; in one, labour induction was accomplished by the use of a balloon, and in the other, oxytocin was utilised to speed up the labour process. Ten cases of labour induction with vaginal PGE2; none of these cases experienced uterine ruptures or dehiscence. Furthermore, our results showed that the rate of successful VBAC was higher with labour induction with oxytocin and prostaglandin E2. The pros and cons of inducing labour vs planning a repeat caesarean section have not been compared in a randomised trial.[16] However, TOLAC induction was compared to expectant management in two retrospective cohort studies. Although the risks of uterine rupture were increased with labour induction, the two studies demonstrated that it decreased the likelihood of a caesarean delivery at term.[17,18] Our results consistently demonstrated that the likelihood of VBAC was 2.5 times higher in cases with labour induction. Vaginal birth rates ranged from 53.8% to 81% in studies that examined the effects of prostaglandin inducement of labour following surgical delivery. When prostaglandin was used to induce labour, the risk of uterine rupture varied from 0 to 1.8% in these investigations. There were no cases of uterine ruptures and a high rate of vaginal delivery when prostaglandin E2 was used in our study.

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CONCLUSION

The BISHOP score upon admission, body mass index, quantity of prior vaginal deliveries, and birth weight are important factors in determining the success of a VBAC. Having a body mass index (BMI) below 29, having given birth vaginally before, and having an estimated foetal weight all reduce the likelihood of labour failing. When suggesting a vaginal delivery to patients after a caesarean, all of these variables should be taken into account.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SA & SC: Data acquisition, data analysis, critical review, approval of the final version to be published.

VA & AS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MT & RA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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