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Navigating Trial of Labor after Cesarean Section: Insight into Unfavorable Results

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ABSTRACT

Objective: To measure the frequency of unfavorable maternal and fetal outcomes in patients who have failed trial of labor after cesarean section (TOLAC) and to compare them to demographic factors and clinical parameters to establish significance.
Study Design: Quasi-experimental study.
Place and Duration of Study: Department of Gynecology and Obstetrics, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Feb to Dec 2024.
Methodology: After ethical approval, we presented our experience regarding unfavorable outcomes of trial of labor after cesarean section (TOLAC) with demographic characteristics and clinical parameters in Pakistani population. The aim of the study was to help obstetricians to identify the negative indicators of TOLAC to minimize maternal morbidity and improve the success rate.
Results: The frequency of unfavorable maternal and fetal outcomes was higher in Group B patients. The frequency of peri-partum Hemorrhage was 7(14.3%) in Group A patients and 8(38.1%) in Group B patients, frequency of chorioamnionitis was 2(4.1%) in Group A patients versus 5(23.8%) in Group B patients and the frequency of uterine rupture was 1(4.8%) in Group B patients and none in Group A patient.
Conclusion: We concluded that unfavorable maternal and fetal outcomes of trial of labor after cesarean section are linked to maternal demographics (weight, patient enthusiasm, booking status) and clinical parameters (Bishop score, cervical dilatation, and effacement) at time of admission and they were found more frequently in patients with failed TOLAC.

Keywords: Bishop Score, Cesarean Section, Hemorrhage, Laparotomy, Trial of Labor After Cesarean Section (TOLAC), Uterine Rupture.

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INTRODUCTION

Recurrent cesarean deliveries are linked to higher risk of complications like ruptured uterus, wound dehiscence and placenta accreta spectrum disorders.[1] Growing trend of elective cesarean deliveries has also been associated to higher cumulative hysterectomy rates.[2] Despite having a smaller pool, women with singleton cephalic pregnancies with a history of cesarean section (CS) are biggest contributors to the overall cesarean rate.[3] The provision of labor trial to women who have had one prior cesarean section is one of the ways to reduce the rate of cesarean sections.[4] The main aim of trial of labor after cesarean (TOLAC) is to reduce maternal morbidity in terms of reduction of blood transfusion, patients comfort, prevention of another scar and adverse neonatal outcomes.[5] Uterine rupture, postpartum hemorrhage, and significant neonatal and fetal morbidities are associated with unsuccessful efforts at TOLAC.[6] The percentage of successful TOLAC efforts that result in a vaginal birth after cesarean section(VBAC)is almost seventy percent. A successful VBAC is linked to a prior vaginal birth, especially a previous VBAC.[7] Scored models are available for predicting successful TOLAC, but none are able to accurately determine the likelihood of an unsuccessful TOALC. Presence of dystocia, induced labors and no prior vaginal births are factors which are linked to unsuccessful TOLAC.[8]

Term vaginal delivery in the first pregnancy is the definitive evidence of adequate pelvic dimensions and increases the likelihood of subsequent vaginal deliveries.[9] Few studies have been done only on women who had their second child after the first cesarean section; most of the research looked at TOLAC regardless of parity. Research from Pakistan showed that the failure rates of TOLAC ranged from 24% to 35%, regardless of parity or birth order.[10] Like other low-income nations, Pakistan's tertiary care public sector hospitals deal with the problem of un-booked pregnant women appearing in labor and late antenatal attendees. The selection of appropriate candidates for TOLAC requires decision-making in the

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absence of a comprehensive prenatal medical record and sparse information.

Our study intends to measure the frequency of successful and unsuccessful trials in patients for second-time deliveries having previous one cesarean section. A greater ability to plan the mode of delivery and provide counseling regarding the likelihood of success or failure when attempting the trial of scar would result from an understanding of specific variables associated with women who have had a failed effort at their first attempt at vaginal birth. Therefore, we will compare the adverse outcomes, both maternal and neonatal in patients with successful and unsuccessful trials.

METHODOLOGY

After getting permission from the Hospital Ethical Committee A/28/ERC/39/24 we performed our quasi-experimental study at Pak emirates military hospital (PEMH), Rawalpindi Pakistan. We calculated sample size with the help of sample size calculator (WHO) by keeping level of significance 5%, power of test 80%, the anticipated frequency of success of TOLAC (anticipated population proportion P1) to be 72%[11] and the anticipated frequency of nonsuccess of TOLAC (anticipated population proportion P2) to be 26%,[11] the minimum sample was calculated to be 23. We collected a sample of 70 patients to make up for any dropouts.

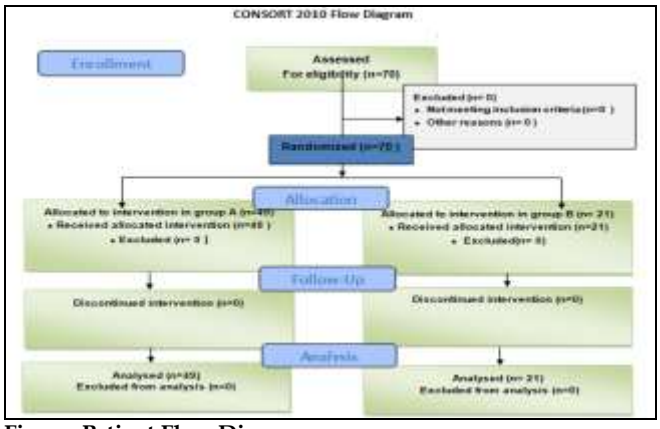

Figure: Patient Flow Diagram

Inclusion Criteria: Gravid ladies at term (38 to 42 weeks of pregnancy) who had history of one previous cesarean delivery due to breech presentation, dystocia, uncontrolled hypertension, or diabetes, intra-uterine growth retardation or cephalo-pelvic disproportion who presented to gynecology & obstetrics OPD or emergency with spontaneous labor and were willing for trial of labor. Both booked and un-booked patients were included and all patients had greater than 18 months inter-pregnancy interval, previous Pfannenstiel incision, no history of myoma, estimated fetal weight less than 3.5kg, adequate pelvis, no fetal distress or maternal comorbid, and no Intra uterine Growth Restriction(IUGR).[12,13]

Exclusion Criteria: Patients with gestational or insulin dependent diabetes, hypertension, pre-eclampsia, eclampsia, placenta previa, women with previous upper segment cesarean section, intra-uterine growth retardation (IUGR), twin pregnancy, epilepsy, fibroid or post-dates pregnancy (greater than 42 weeks) were excluded.

The patients were included in the study after written informed consent and after carefully explaining the purpose of study and their willingness to have a trial of labor. The patients who were willing to participate were included after application of criterias furnished. Patient's demographics were recorded including age, weight, height, Basal metabolic index (BMI), Ethnicity, education, and socioeconomic status. The pregnancy related factors which were taking into consideration were: booking status (booked or un-booked), inter-pregnancy interval and gestational age. The features of labor recorded were Presence of premature rupture of membranes (PROM), Bishop Score at admission, need for augmentation of labor and patients' enthusiasm. The frequency of successful and un-successful trials was recorded, and patients were randomized into two Groups: Group A and Group B based on success of trial. The patients with successful trial were Grouped together as Group A and patients with unsuccessful trial were Grouped together as Group B. The randomization process is shown in (Figure). The fetal outcomes including APGAR score at 5 minute and admission in NICU for >24 hours were recorded. Both Group A and B patients were given augmentation of labor according to their clinical parameters, stage of labor and presentation at time of admission. The primary outcome was comparison of frequency of unfavorable maternal and fetal outcomes in both Groups including presence or absence of chorioamnionitis, antepartum and post-partum hemorrhage, uterine rupture, cesarean hysterectomy, laparotomy, admission of neonate for greater than 24 hours in NICU and low APGAR score at five minutes. The record of demographic characteristics and clinical parameters was also made. TOLAC was defined as

attempt at vaginal delivery in women who have had a previous caesarean section. When a woman undergoing trial of labor after cesarean section gives birth on her own it is considered a successful TOLAC. Failure to accomplish a vaginal birth following a cesarean section in women undergoing a TOLAC, with the delivery concluding in an emergency cesarean is referred to as an unsuccessful TOLAC.[14]

The data was analyzed through Statistical Package for Social Sciences-26 software. The quantitative variables were analyzed after calculating mean and standard deviation and qualitative variables were analyzed after calculating frequency and percentage. Chi-square and independent samples t-test were applied were applicable.

RESULTS

There was total 70 patients who were given trial of labor after cesarean section during the study period. There were 49(70.0%) patients who had successful TOLAC and had spontaneous vaginal delivery therefore they were Grouped as Group A and there were 21(30.0%) patients who did not deliver vaginally and ended it up in cesarean section and they were labeled as Group B. The mean age of Group A patients was 26.12±3.29 years and mean age of Group B patients was 24.71±2.8 years. There was no significant age difference between the study Groups (p value of 0.431). There were 41(83.7%) patients in Group A which had mean basal metabolic rate (BMI) between 19-25 and 8(16.3%) patients whose BMI was higher (>25). While in Group B 15(71.4%) patients had BMI greater than 25 which shows a significant difference (*p*-value<0.05). The patient's ethnicity, educational status, socio-economic status and inter-pregnancy interval did not have significant difference with *p*-value of 0.348, 0.036, 0.337 and 0.113. However TOLAC was found un-successful in 9(42.9%) booked and 12(57.1%) un-booked patients with *p*-value <0.05. Patient enthusiasm has had significant impact on success of TOLAC as patients who were enthusiastic had greater success of TOLAC versus non-enthusiastic patients. Forty-two (85.70%) patients who showed enthusiasm were delivered vaginally in Group A while 15(71.4%) patients who didn't show enthusiasm had cesarean section in Group B with *p*-value>0.001. The maximum number of normal deliveries was seen in Group A patients who had gestational age of 40+1 weeks while eight 8(38.1%) patients in same age Group had cesarean delivery in this age Group. Four (19.0%) patients in Group B had age of 41 weeks who did not deliver vaginally. The gestational age showed a significant correlation with the success of TOLAC with *p*-value of <0.01. The augmentation of labor and presence of premature rupture of membranes (PROM) did not show significant association with the un-successful TOLAC. There were 14(66.7%) patients with bishop score of 0-3 who had un-successful TOLAC in Group B while 31(63.3%) patients with good bishop score (>7) had successful TOLAC. There were 14(66.7%) patients in Group B who had cervical dilatation less than three centimeters and 13(61.9%) patients who had <50% effacement on presentation, all of these had un-successful TOLAC with *p*-value <0.001 (Table-I)

The frequency of unfavorable maternal and fetal outcomes was mostly seen in Group B patients. The frequency of peri-partum hemorrhage was 7(14.3%) in Group A patients and 8(38.1%) in Group B patients, frequency of chorioamnionitis was 2(4.1%) in Group A patients versus 5(23.8%) in Group B patients and the frequency of uterine rupture was 1(4.8%) in Group B patients while none of Group A patients had uterine rupture. Scar tenderness was present in 6(28.6%) Group B patients while none of the Group A patients developed scar tenderness. One patient (2.0%) underwent laparotomy in Group A and one patient underwent laparotomy in Group B as well. The frequency of unfavorable maternal outcomes was more in Group B versus Group A with a p value of less than 0.001. Three babies (6.1%) in Group A had low APGAR (<7) and 8(38.1%) patients in Group B had low APGAR and they required admission in neonatal intensive care unit for greater than 24 hours (*p*-value <0.001) (Table-II).

DISCUSSION

The unfavorable outcomes both maternal and fetal were more frequent in patients with un-successful TOLAC and these ranged from scar tenderness to laparotomy. However, hysterectomy was not done in any of the patients in both Groups despite the fact that one patient in both Groups underwent laparotomy. Our Group's failure rates are comparable to those of research from King Abdul Aziz Hospital in Saudi Arabia,[14] which found that twenty four percent of women delivered vaginally after one scar however the patients in their study also included patients who previously had given birth vaginally. We only included those patients who were strictly previous one scar and had only one cesarean in the past and they never had vaginal delivery.

Table-I: The Comparison of Demographics Characteristics and Clinical Parameters of Patients between the Study Groups (n=70)

Parameters		Group A n=49 Successful TOLAC	Group B n=21 Un-successful TOLAC	*p*-value
Demographics				
Age (years)		26.12±3.29	24.71±2.8	0.431
Weight (Kg)		69.53±4.56	68.71±3.50	0.963
Height (cm)		162.85±7.20	154.95±6.03	0.010
		Frequency (%)	**Frequency (%)**	
Body Mass Index	19-25	41(83.7%)	6(28.6%)	<0.001
	>25	8(16.3%)	15(71.4%)	
Ethnicity	Punjabi	18(36.7%)	9(49.2%)	0.348
	Siraiki	2(4.1%)	2(9.5%)	
	Pathan	16(32. %7)	4(19.0%)	
	Sindhi	3(6.1%)	4(19.0%)	
	Kashmiri	9(18.4%)	2(9.5%)	
	Urdu speaking	1(2.0%)	0(0%)	
Educational status	Nil to 4 grade	3(6.1%)	3(14.3%)	0.036
	5th -9th grade	11(22.4%)	8(38.1%)	
	Matric	17(34.7%)	4(19.0%)	
	Inter	15(30.60%	5(23.8%)	
	Bachelor or more	3(6.1)	1(4.8%)	
Socio-economic status	PKR 31000-40000	9(18.4%)	9(42.9%)	0.337
	PKR41000-69000	29(59.2%)	11(52.4%)	
	PKR >70000	11(22.4%)	1(4.8%)	
Booking status	Booked	33(67.3%)	9(42.9)	0.05
	Un-Booked	16(32.7%)	12(57.1%)	
Inter-pregnancy interval	> 2 years	33(67.3%)	16(76.2%)	0.113
	> 3years	5(10.2%)	4(19.0%)	
	> 4 years	11(22.4%)	1(4.8%)	
Patient enthusiasm	yes	42(85.70%)	6(28.6%)	< 0.001
	no	7(14.3%)	15(71.4%)	
Patients' clinical parameters				
Gestational age (weeks)	39-40 weeks	8(16.3%)	0(0%)	0.01
	40+1 weeks	24(49.0%)	8(38.1%)	
	41 weeks	6(12.2%)	4(19.0%)	
	41+1-42 weeks	11(22.4)		
Labor Augmentation	Yes	46(93.9%)	21(100%)	0.337
	No	3(6.1%)	0(0%)	
Premature Rupture of Membranes	Yes	15(30.6%)	6(28.6%)	0.551
	No	34(69.4%)	15(71.4%)	
Bishop Score	0-3	0(0%)	14(66.7%)	0.001
	4-7	18(36.7%)	6(28.6%)	
	>7	31(63.3%)	1(4.8%)	
Cervical dilatation (cm)	≤3 cm	6(12.2%)	14(66.7%)	0.001
	>3 cm	43(87.8%)	7(33.3%)	
Cervical Effacement	≤50%	5(10.2%)	13(61.9%)	0.001
	>50%	44(89.8%)	8(38.1%)	

**TOLAC: Trial of Labor after Cesarean Section*

According to multicenter retrospective analysis[15] it was demonstrated that success rate of TOLAC procedures was comparatively high (86.3%) among women who had twin gestations but outcomes for mothers and newborns were worse with the success of TOLAC. They highlighted significant contributors of failed TOLAC to be cervical dilation at labor admission, absence of oxytocin treatment for labor augmentation, earlier gestational age at delivery, and absence of epidural analgesia. In our patient's poor bishop, decreased cervical dilatation was also related to fail TOLAC. We did not give epidural to any of the patients as it is not very common and we did not include twin pregnancies.

Table-II: The Comparison of Frequency of Unfavorable Maternal and Fetal Outcomes in Patients with Successful (Group A) and Un-Successful TOLAC (Group B) (n=70)

	Group A n=49 n(%)	Group B n=21 n(%)	*p*-value
Unfavorable Maternal outcomes			
Peri-partum Hemorrhage	7(14.3)	8(38.1)	<0.001
Chorioamnionitis	2(4.1)	5(23.8)	
Laparotomy	1(2.0)	1(4.8)	
Uterine Rupture	0(0%)	1(4.8)	
Scar Tenderness	0(0%)	6(28.6)	
Unfavorable Fetal Outcomes			
Low APGAR Score (<7)	3(6.1)	8(38.1)	0.002
NICU admission >24 hour	3(6.1)	8(38.1)	0.002

**TOLAC: Trial of Labor after Cesarean Section, APGAR Score: Appearance, Pulse, Grimace, Activity, Respirations*

According to one study[16] there are eleven variables which are linked to TOLAC failure out of which the most important were fundal height, prior vaginal birth, and cervical dilation at admission, membrane status, and progress in dilatation three hours after admission. Their main objective was to determine the clinical and demographic factors that, at the time of admission for spontaneous labor and up to three hours later, were linked to a failed TOLAC. However, we followed all patients till delivery, and we included neonatal outcomes as well. According to our study, overweight patients (BMI>25), un-booked patients, post-dates and those who are not very enthusiastic had un-successful TOLAC. The clinical parameters which added to the failure were poor bishop & lack of cervical dilatation and cervical effacement. The presence of PROM, greater inter-pregnancy interval and augmentation of labor did not offer much advantage.

According to one study 69.04% of mothers have a BMI of >24, which is regarded as a fair causal factor in the failure of VBAC. They proposed that maternal BMI is not the only factor that contributes to the failure of VBAC but a low Bishop score at the time of admission was also associated with it as the women in their study had a Bishop score of less than 5.[17] They found that women with age greater than 30, history of unsuccessful vaginal births following cesarean sections, pregnancy intervals less than two years, high body mass index, low Bishop's score, and infant

weight greater than three kg were the main causes of repeat cesarean sections. Their study was retrospective and descriptive, but we performed a quasi-experimental study. Forty-two patients out of seventy patients were booked and had inter-pregnancy intervals greater than 2 years. We did not include patients with inter-pregnancy intervals of less than 2 years as it's a known predictor of failed TOLAC.

One of the important aspects that was highlighted was the patient's enthusiasm which was positively associated with the success of TOLAC. The decision of TOLAC is also linked to patient's willingness which is an important predictor. The women who voluntarily choose to undergo TOLAC would have an impact on the success rate in contrast to women who require appropriate counseling and support. Therefore, it's critical to support women who are reluctant to undergo TOLAC or to help those who are willing make decisions because doing so has an impact on the success percentage.[18]

The findings of our study have highlighted that women who wish to undergo TOLAC should focus on weight reduction, positive motivation, birth spacing, control of medical conditions and regular antenatal checkups and should also wait for spontaneous onset of labor to achieve success. The obstetrician's ability to identify the negative indicators of TOLAC can minimize maternal morbidity and improve the success rate.

CONCLUSION

We concluded that unfavorable maternal and fetal outcomes of trial of labor after cesarean are linked to maternal demographics (weight, patient enthusiasm, booking status) and clinical parameters (Bishop score, cervical dilatation and effacement) at time of admission and they were found more frequently in patients with failed TOLAC.

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Authors' Contribution

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

UY & AI: 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.

QAA & MT: 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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