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Original Research Article

The art of vaginal birth after caesarean section: a retrospective observational study

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ABSTRACT

Background: There is an alarming rise in caesarean section rate worldwide. Our study aims to highlight the factors contributing to successful vaginal birth after caesarean section (VBAC) in our institution over a period of 4 years.

Methods: Our study is a retrospective observational study. 149 patients who underwent successful VBAC during the period of November 2022 to October 2024 were included in the study and their demographic characteristics, labor progress, maternal and neonatal outcomes studied.

Results: Out of the total 149 patients, 91% of patients were admitted with spontaneous onset of labor pains. Admission Bishop's score was >3 for 87% of patients. Majority of patients (95%) progressed in labour with low dose oxytocin. 7% of patients had gestation diabetes mellitus (GDM), 3% had gestational hypertension highlighting the fact that these are not contraindications for trial of labour after caesarean (TOLAC). There was no maternal and neonatal morbidity or mortality.

Conclusions: With proper case selection, antenatal counselling and adequate pain relief - TOLAC can result in successful VBAC. VBAC is a safe alternative to elective repeat caesarean section in patients with one previous caesarean section. Increasing VBAC deliveries can reduce the overall caesarean section rate and reduce the morbidities associated with repeated caesarean sections.

Keywords: Trial of labour after caesarean, Vaginal birth after caesarean section, Caesarean delivery

INTRODUCTION

Caesarean section (CS) rate has been rising throughout the world, especially in developed countries. As per the National Family Health Survey 2015-16 (NFHS-4), the caesarean rates at population level in India was 17.2%. The CS rate increased from 17.2% to 21.5% (2021) in the five years. In the private sector, these numbers stand at 43.1% (2016) and 49.7% (2021), meaning that nearly one in two deliveries in the private sector is a CS.¹⁻³

“Once a CS always a CS” - dictum of Cragin was appropriate for the era of classical CS.⁴ In this latest era of lower segment CS, two-layer uterine closure has resulted in improved scar thickness and paved the way for trial of labour after caesarean (TOLAC). In the present era, once a CS always an institutional delivery is the dictum to be

followed. CS rates can be brought down by encouraging patients and obstetricians that vaginal birth after caesarean section (VBAC) is a safe delivery option in an institution where intrapartum monitoring and facilities for emergency CS are available round the clock.

The increasing CS can be attributed to both patient factors and obstetrician factors. Patient factors include increasing rate of high-risk pregnancies (advanced maternal age, high body mass index (BMI), gestational diabetes mellitus (GDM), hypertension in pregnancy, and *in vitro* fertilization (IVF) conception), fear of pain and need for scheduled delivery time. Obstetrician factors include fear of complications like uterine rupture and birth asphyxia. But the rate of uterine rupture is only 0.5%, which can be avoided if there is stringent maternal and fetal monitoring.⁵

TOLAC should be encouraged because there are major benefits associated with vaginal birth, such as faster recoveries, potentially fewer hazards in future pregnancies, and less likelihood of childhood diseases, including asthma, obesity, and allergies.⁶⁻¹⁰ Guidelines of American College of Obstetricians and Gynecologists (ACOG) advise that TOLAC is most safely undertaken in hospitals where staff can immediately perform emergency caesarean delivery.¹¹ Certain institutional factors, such as hospital layout and the availability of supporting teams in the delivery room, are also important.¹² Our study aims to highlight the favourable factors that resulted in successful VBAC in our patients.

METHODS

This is a retrospective observational study of VBAC deliveries in a single institution over a period of 4 years (November 2020 to October 2024). All successful TOLAC cases who underwent VBAC were included in the study and their key characteristics like age, BMI, admission Bishop score, choice of pain relief, and delivery outcome were analysed.

Our institution is a 125 bedded hospital with a SICU and MICU next to the operation theatre complex. All TOLAC patients were admitted in MICU with 24-hours operation theatre availability in case of need for emergency CS. All patients were given detailed antenatal counselling regarding TOLAC, chance of emergency CS in case of scar dehiscence. Antenatal exercises for vaginal birth were taught. Previous CS patients were encouraged to talk to patients who had a successful VBAC. The availability of pain relief methods was also highlighted during routine antenatal check-ups. These antenatal counselling sessions had a positive impact on outcome for these patients as it increased their confidence level.

Inclusion criteria

Cases with previous one lower segment CS, last child birth more than 18 months, previous LSCS for a non-recurrent indication, and scar thickness >2.5 mm were included.

Exclusion criteria

Cases with previous more than one lower segment CS, previous classical CS, last child birth less than 18 months, previous LSCS for recurrent indication, and scar thickness <2.5 mm were excluded.

All previous CS patients planned for TOLAC were advised to await spontaneous onset of labour.

RESULTS

Table 1 summarizes the demographic and obstetric information of the study population. The mean age of the study population was 28.4 ± 4.3 , with most aged between 20-25 years (37.6%), 2.7% were ≥ 36 years. The mean BMI

was 24.5 ± 3.7 . The average scar thickness was 3.5 mm (SD=1.0), and the mean inter-pregnancy interval was 4.2 ± 1.9 years. The most common indications for previous CS were failed induction (24.8%), fetal distress (20.8%), and failure to progress due to arrest of dilatation (16.8%). Vaginal deliveries before the current pregnancy were reported by 3.4% of patients. Admission complaints were primarily labor pain (91.3%), followed by premature rupture of membranes (PROM) (7.4%).

Table 1: Demographic information of the study population.

Variables	Mean \pm SD or N (%)
Age (years)	28.4\pm4.3
≤ 19	1 (0.7)
20-25	56 (37.6)
26-30	52 (34.9)
31-35	36 (24.2)
≥ 36	4 (2.7)
BMI	24.5\pm3.7
Obstetric score	
G2P1	145 (97.3)
G3P2	3 (2.0)
G5P4	1 (0.7)
Scar thickness	3.5 \pm 1.0
Inter-pregnancy interval	4.2 \pm 1.9
Indication for previous CS	
Fetal distress	31 (20.8)
Breech	24 (16.1)
Transverse lie	2 (1.3)
Failed induction	37 (24.8)
Failure to progress arrest of dilatation	25 (16.8)
Failure to progress - arrest of descent	4 (2.7)
Preeclampsia/eclampsia	6 (4.0)
Placenta praevia	6 (4.0)
Oligoamnios/abnormal Doppler	7 (4.7)
Cord prolapses	2 (1.3)
Cord around neck	1 (0.7)
Caesarean delivery on maternal request	4 (2.7)
Previous VD	
Nil	143 (96.0)
1 vaginal	5 (3.4)
2 vaginal	1 (0.7)
Admission complaints	
Labour pain	136 (91.3)
PROM	11 (7.4)
Reduced fetal movement	1 (0.7)
Elective induction	1 (0.7)

Table 2 outlines the progress of labour. The mean Bishop's score was 4.8 ± 1.5 , with the majority (52.3%) scoring between 3-6, 34.9% scoring >6 , and 12.8% scoring <3 . For induction or acceleration of labor, 95.3% of patients received low dose oxytocin, while 4.7% underwent Foley catheter induction. The mean duration of the latent phase

was 7.3 ± 3.6 . The active phase duration had a mean of 3.1 ± 0.9).

Table 2: Progress of labor.

Variables	Mean \pm SD or N (%)
Bishops score	4.8\pm1.5
<3	19 (12.8)
3-6	78 (52.3)
>6	52 (34.9)
IOL/acceleration of labor	
Foley EAS	7 (4.7)
Low dose oxytocin	142 (95.3)
Latent phase duration (hours)	7.3\pm3.6
<10	113 (75.8)
10-20	34 (22.8)
>20	2 (1.4)
Active phase duration (hours)	3.1\pm0.9
<4	97 (65.1)
4-8	52 (34.9)

Table 3 summarizes the obstetric outcome. Labor analgesia was evenly distributed, with 49.7% receiving epidural and 50.3% receiving IV sedation. Most patients (89.3%) had a normal VBAC, while 10.7% required an assisted delivery using forceps or ventouse. The mean birth weight was $3.0 \text{ kg} \pm 0.4$, with 59.1% of neonates weighing between 3.1-3.5 kg, 30.9% weighing 2.5-3.0 kg, 6.0% exceeding 3.6 kg, and 4.0% weighing less than 2.5 kg. APGAR scores were predominantly favourable, with 97.3% of newborns scoring 9/10, while 1.3% had a score of 8/10, and 1.3% were intrauterine deaths (IUD). These results highlight positive outcomes for the majority of the patients and their newborns.

Table 3: Obstetric outcome.

Variables	Mean \pm SD or N (%)
Labor analgesia	
Epidural	74 (49.7)
IV sedation	75 (50.3)
Type of delivery	
Normal delivery VBAC	133 (89.3)
Forceps delivery ventouse	16 (10.7)
Birth weight (kg)	3.0\pm0.4
<2.5	6 (4.0)
2.5-3.0	46 (30.9)
3.1-3.5	88 (59.1)
>3.6	9 (6.0)
APGAR	
8/10	2 (1.3)
9/10	145 (97.3)
IUD	2 (1.3)

Table 4 provides information on the maternal and neonatal outcome.

Table 4: Maternal and neonatal outcome.

Variables	N (%)
NICU admission	
Yes	2 (1.4)
1 IDM /PTB	1 (0.7)
1 PT/LBW	1 (0.7)
No	147 (98.3)
Blood transfusion	
Nil	141 (94.6)
1	4 (2.7)
2	3 (2.0)
3	1 (0.7)
Complications	
Nil	144 (96.6)
Atonic PPH	5 (3.4)
Associated comorbidities	
Nil	125 (83.9)
Anemia	6 (4.0)
GDM	11 (7.4)
HTN	5 (3.3)
IHCP	1 (0.7)
MNG	1 (0.7)
Discharge condition of mother	
Healthy	149 (100.0)
Discharge condition of baby	
Healthy	146 (98.0)
IUD	2 (1.4)
NICU admission for 10 days (LBW)	1 (0.7)

DISCUSSION

TOLAC refers to a planned attempt to deliver vaginally by a woman who has had a previous caesarean delivery, regardless of the outcome. This method provides women who desire a vaginal delivery the possibility of achieving that goal-VBAC. In addition to fulfilling a patient's preference for vaginal delivery, at an individual level, VBAC is associated with decreased maternal morbidity and a decreased risk of complications in future pregnancies as well as a decrease in the overall caesarean delivery rate at the population level. However, although TOLAC is appropriate for many women, several factors increase the likelihood of a failed trial of labor, which in turn is associated with increased maternal and perinatal morbidity when compared with a successful trial of labor (i.e., VBAC) and elective repeat caesarean delivery. Therefore, assessing the likelihood of VBAC as well as the individual risks is important when determining who is an appropriate candidate for TOLAC.

Our antenatal TOLAC counselling sessions included detailed history taking regarding the previous CS. Indication for the previous caesarean was documented. Patients with recurrent indications like contracted pelvis, short statured with cephalopelvic disproportion and inter-pregnancy interval less than 18 months were counselled for repeat CS. Previous operative notes and discharge

summary were noted, if there was any mention of incision extension, the patient was counselled for elective repeat CS. Patients with previous CS being done for non-recurrent indications like fetal distress, breech presentation were encouraged for TOLAC. The cervical dilatation and the duration of labor pains before the previous CS were also noted. Patients who were in labor before the previous CS had a favourable bishop score on admission in this pregnancy.

During routine antenatal check-ups patients were encouraged to do antenatal exercises favouring vaginal birth like pelvic tilt (10 counts morning and evening), butterfly exercise (10 minutes morning and evening) from 24 weeks. At 34 weeks of gestation cephalic presentation was confirmed and patients were encouraged to do squats (5 to 10 counts in the morning and evening) and duck walk (3 metres morning and evening). Perineal massage taught at 36 weeks. Breathing exercises like slow inhale and slow exhale, inhaling through nose and exhaling through mouth were taught, patients were encouraged to do these breathing exercises during labor contractions which helped them to cope better with labour pains. These antenatal exercises had a positive impact on the labour progress and better postpartum recovery as observed by Wadhwa et al.¹³

The mean age of participants was 28.4 ± 4.3 , similar to the study by Metz et al.¹⁴ The mean BMI was 24.5 ± 3.7 . Scar thickness was noted by transvaginal ultrasound at 36 weeks. Mean scar thickness was 3.5 mm, which has high predictability of VBAC according to RCOG guidelines.⁵ The mean inter-pregnancy interval was 4.2 years.

All patients counselled for TOLAC were given the opportunity to talk to patients who had successful VBAC to share their labor and delivery experience. In our study 4 patients had undergone their first CS due to pain intolerance - cesarean delivery on maternal request (CDMR). In the present pregnancy, after having spoken to patients who had VBAC with epidural analgesia, they decided for a TOLAC and had a successful VBAC delivery experience with labor epidural.

25% of the previous CS indication in our study was due to Failed induction, this highlights the importance of restricting induction of labour to absolute obstetric indications. This in turn will reduce the overall CS rate.^{15,16}

91% of the patients were admitted with labor pains, 7% of patients were admitted with PROM. Spontaneous onset of labor pains is the single most important factor favouring successful VBAC according to our study. 87% of the patients had a BISHOP score >3 at the time of admission. The mean Bishop's score at admission was 4.8, which is similar to that observed by Bhardwaj et al.¹⁷

The success rate of VBAC is significantly higher in patients with admission Bishop score more than 3. Similar

results were reported by Landon et al, Demainczuk et al and Pickardt et al.¹⁸⁻²⁰

7 patients were induced by Foley EAS - 16 French Foley catheter was inserted intra cervically, Foley balloon was inflated with 60 ml distilled water and 100 ml normal saline was instilled as extra amniotic saline. Low dose oxytocin infusion was started after expulsion of Foley catheter.^{5,21}

All patients were monitored in MICU with continuous intrapartum fetal monitoring and continuous vitals monitoring of mother. Any change in fetal heart rate - fetal tachycardia, fetal decelerations were noted and decided for emergency CS. Any red flags in maternal monitoring like scar pain, scar tenderness, maternal tachycardia were immediately addressed and decided for emergency CS.

The mean latent phase of labor was 7 hours and active phase of labour was 3 hours. All patients were offered pain relief in the form of epidural analgesia (50%) or IV sedation (50%). Injection tramadol 25 mg with phenergan 25 mg as slow iv was given at the time of 3-4 cm cervical dilatation. Epidural analgesia was given as a low dose local anaesthetic and opioid mixture, 10 ml of 0.0625% bupivacaine with 2 mcg/ml fentanyl given at 30 minutes interval.²²

Labor progress was assessed with 4th hourly per vaginal examinations, contractions were monitored hourly. In case of inadequate contractions low dose oxytocin was given as infusion. Low dose oxytocin - 5 units of oxytocin was added to 500 ml normal saline, 0.5 mU per minute was started and titrated at 1 mU per minute every 30 minutes up to 20 mU per minute.^{5,23}

89% of patients delivered as labor natural with episiotomy, 11% of patients delivered by outlet forceps or ventouse. Active management of the third stage of labour was done for all patients. Atonic PPH was noted in 3% of patients managed with uterotonics and blood transfusion (5%). The incidence of atonic PPH in our study population is similar to the low risk primigravida population.²⁴ These results are similar to that observed by Rozen et al.²⁵

Post VBAC delivery, transabdominal ultrasound was done to confirm the lower segment scar integrity.

7% of the study population had associated GDM, 3% of them had gestational hypertension. Multinodular goitre and intrahepatic cholestasis were noted in one patient each. Hence GDM/GHTN are not absolute contraindications for TOLAC.

97% of the newborn babies cried immediately after birth with APGAR $>8/10$ and given to mother immediately after birth, similar results were published by Atia et al and Shatz et al.^{26,27} The mean birthweight in our study was 3.0 kg, 6% of babies were >3.6 kg at birth. Hence birthweight had no influence on the outcome of TOLAC in our study and

this is consistent with the observations of Atia et al and Patel et al.^{26,28}

Two patients were admitted with Intrauterine demise, successfully delivered vaginally. Two babies were admitted in NICU - one was a preterm infant of diabetic mother for GRBS monitoring. One newborn was preterm, low birth weight admitted for 10 days in NICU, discharged in healthy condition.

There was no maternal morbidity or mortality in our study. All mothers were discharged after 48 hours in healthy condition as opposed to increased duration of hospital stay and more pain that would have resulted with an elective repeat CS.^{29,30}

CONCLUSION

TOLAC can be offered to all patients with one previous CS with a non-recurrent indication. Proper case selection, detailed antenatal counselling, antenatal exercises, emotional support and adequate pain relief during labour are the key pointers to master the art of VBAC according to our study. Spontaneous onset of labour was the single most important predictor of success which should be explained to patients during antenatal counselling. VBAC is a safe option for previous one CS patients, reducing the morbidity associated with repeated CS like placenta praevia, placenta accreta spectrum (PAS), bladder, bowel injury, intra-abdominal adhesions and thromboembolism, thus increasing overall quality of life of women.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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