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MATERNAL AND FETAL OUTCOMES IN VAGINAL BIRTH AFTER CESAREAN: A PROSPECTIVE OBSERVATIONAL STUDY

Obstetrics & Gynaecology

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ABSTRACT

BACKGROUND : The steady global increase in primary cesarean delivery rates has led to a significant number of pregnant female patient with a uterine scar. Determining the safest mode of delivery in subsequent pregnencies -choosing between an Elective Repeat Cesarean Section (ERCS) or a Trial of Labor After Cesarean (TOLAC) resulting in Vaginal Birth After Cesarean (VBAC)—remains a core priority in modern obstetrics to minimize maternal and neonatal complications. **AIM & OBJECTIVES :** To evaluate the success rate of a Trial of Labor After Cesarean (TOLAC) and thoroughly analyze the maternal and fetal outcomes associated with successful VBAC versus emergency repeat cesarean section following failed Trial of Labor After Cesarean TOLAC at a tertiary care public teaching hospital in G.G.Government Hospital, Jamnagar. METHODOLOGY : A prospective observational study was conducted over a 5 month period in the Department of Obstetrics and Gynecology at Shree M. P. Shah Government Medical College and Guru Gobind Singh Hospital, Jamnagar, Gujarat. The study cohort comprised 262 pregnant women with a history of one previous lower segment cesarean section (LSCS) who voluntarily underwent a trial of labor. Continuous clinical monitoring, partographic assessment, and immediate postpartum and neonatal evaluations were performed to document maternal morbidities and fetal outcomes. RESULTS : Out of 262 participants who attempted TOLAC, 51 achieved a successful vaginal delivery, yielding a VBAC success rate of 19.46%. The remaining 211 cases (80.54%) required an emergency repeat cesarean section due to non-progress of labor, scar tenderness, or fetal distress. Uterine rupture occurred in 1 case (0.67%) within the failed TOLAC group. Maternal morbidity, including postpartum hemorrhage (PPH) and puerperal pyrexia, was significantly lower in the successful VBAC group than in the failed trial group ($p < 0.05$). Fetal outcomes revealed that 12 neonates from the failed TOLAC group required Neonatal Intensive Care Unit (NICU) admission, compared to only 6 neonates from the successful VBAC group. **CONCLUSION :** A trial of labor after a previous cesarean section exhibits a high success rate under careful clinical surveillance in a tertiary setup. Successful VBAC offers superior maternal and fetal outcomes compared to a failed trial of labor that results in an emergency surgery. This underlines the critical value of optimal patient selection, continuous intrapartum monitoring, and timely decision-making.

KEYWORDS

Trial Of Labor After Cesarean (tolac); Vaginal Birth After Cesarean (vbac); Elective Repeat Cesarean Section (ercs); Previous Cesarean Section; Emergency Repeat Cesarean Section; Uterine Scar; Maternal Outcome; Fetal Outcome; Maternal Morbidity; Fetal Distress; Uterine Rupture; Postpartum Hemorrhage; Nicu Admission; Intrapartum Monitoring; Obstetric Outcome

INTRODUCTION

Over the past few decades, the rising global rate of primary cesarean deliveries has emerged as a major focus for international public health initiatives. This upward trend is driven by an expanding array of medical indications, defensive clinical practices, evolving maternal preferences, and the relative safety of modern anesthesia and surgical techniques. However, this surge has left a substantial demographic of reproductive-aged women with a scarred uterus, which directly impacts subsequent pregnancies.

Historically, the management of pregnancies following a cesarean delivery was governed by Craigin's classic 1916 dictum: **"Once a cesarean, always a cesarean."** This perspective made routine elective repeat cesarean section (ERCS) the standard clinical response for decades. However, as the long-term surgical risks of multiple repeat cesarean deliveries became clearer-including severe adhesion formations, bladder injury, and life-threatening placental attachment disorders like placenta accreta spectrum (PAS)—the clinical consensus shifted. Modern obstetrics now strongly advocates for a Trial of Labor After Cesarean (TOLAC) in carefully selected candidates.

When a trial of labor is successful, it culminates in a Vaginal Birth After Cesarean (VBAC). Successful VBAC avoids major abdominal surgery, which correlates with shortened hospital stays, faster physical recovery, lower healthcare costs, and decreased baseline risks of deep vein thrombosis and postpartum infection. Conversely, TOLAC carries inherent risks. The most critical complication is a symptomatic uterine rupture, which can lead to severe maternal hemorrhage, hysterectomy, fetal hypoxia, neurological damage or perinatal death. In low-resource or high-volume public tertiary healthcare settings across India, balancing these risks presents a significant challenge. Public health institutions like Shree M. P. Shah Government Medical College and Guru Gobind Singh Hospital in Jamnagar, Gujarat, serve a diverse, high-volume patient demographic. Many of these patients present with poor antenatal documentation, variable nutritional statuses, and limited access to regular healthcare. Investigating the clinical factors that influence TOLAC success, alongside evaluating its maternal and neonatal safety profiles in this specific population is essential. This data is critical for refining localized clinical protocols, improving patient counseling, and optimizing resource allocation.

AIMS AND OBJECTIVES

- To determine the overall success rate of Vaginal Birth After Cesarean (VBAC) among eligible pregnant women undergoing a Trial of Labor After Cesarean (TOLAC).
- To evaluate the maternal outcomes and morbidity profiles, including postpartum hemorrhage, perineal tears, puerperal febrile morbidity, and uterine rupture, across successful and failed labor trials.
- To assess the immediate fetal and neonatal outcomes, focusing on Apgar scores at 1 and 5 minutes, birth weight, and the rate of Neonatal Intensive Care Unit (NICU) admissions.
- To identify the primary clinical indicators that lead to emergency surgical interventions during a failed trial of labor.

REVIEW OF LITERATURE

The safety and efficacy of a trial of labor following a prior cesarean birth have been extensively debated in international obstetric literature. Large-scale epidemiological reviews indicate that a successful VBAC carries the lowest overall risk of maternal morbidity compared to any other delivery option after a previous cesarean. However, a failed TOLAC that requires an emergency repeat cesarean section carries the highest risk of maternal and perinatal complications, exceeding those associated with an ERCS.

Predicting the likelihood of a successful TOLAC remains an active area of clinical research. Several maternal parameters have been linked to a higher probability of success, including a history of at least one previous successful vaginal delivery (either before or after the index cesarean), spontaneous onset of labor upon admission, and a non-recurring primary indication for the initial surgery (e.g., breech presentation or placenta previa). Conversely, factors such as maternal obesity, advanced maternal age, an inter-pregnancy interval of less than 18 months, and macrosomia consistently correlate with an increased risk of emergency surgical conversion.

The most critical challenge during TOLAC management is the prevention and early detection of uterine scar dehiscence or rupture. Clinical guidelines emphasize that while manual evaluation of scar thickness via transabdominal ultrasound can provide supportive data, it cannot replace continuous intrapartum clinical evaluation. Signs such as a non-reassuring fetal heart rate pattern (typically prolonged deceleration or bradycardia), acute localized abdominal pain that persists between contractions, maternal tachycardia, or a sudden regression of the presenting fetal part remain the classic indicators of an impending uterine rupture. Consequently, access to continuous fetal heart rate monitoring and rapid surgical intervention capabilities are mandatory prerequisites for offering TOLAC.

METHODOLOGY

Study Design and Setting

This prospective observational study was conducted over a continuous 5-month period in the Department of Obstetrics and Gynecology at Shree M. P. Shah Government Medical College and Guru Gobind Singh Hospital, Jamnagar, Gujarat, India.

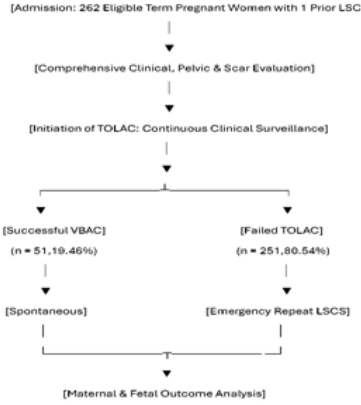
Ethical Considerations

The study protocol was formally approved by the Institutional Ethics Committee. All eligible participants were fully briefed on the potential benefits and inherent clinical risks associated with TOLAC, including the risk of emergency surgery and uterine rupture. Signed, informed voluntary consent was obtained from each patient before enrolment and strict data confidentiality was maintained.

Selection Criteria

Inclusion Criteria: Pregnant individuals with a history of exactly one prior primary lower segment cesarean section (LSCS) performed for a non-recurring indication, presenting with a singleton, term gestation (37 to 40 completed weeks), a vertex presentation, and a clinically adequate pelvis.

Exclusion Criteria: Patients with a documented history of a classical or inverted T- shaped uterine incision, prior extensive myomectomy entering the endometrial cavity, multiple prior cesarean sections, absolute cephalopelvic disproportion, placenta previa, malpresentation (e.g., transverse lie or breech), or a history of prior uterine rupture.



Technical Workflow and Patient Management

A total of 262 pregnant women matching the selection criteria were enrolled consecutively. Upon admission, a comprehensive clinical profile was documented, including the primary indication for the previous cesarean, inter-pregnancy intervals, and prior vaginal delivery history.

Labor was allowed to progress spontaneously in the majority of cases. Uterine activation via cautious oxytocin titration or artificial rupture of membranes (ARM) was restricted to selected cases exhibiting clear secondary hypotonic uterine inertia, managed under senior clinical supervision.

Intrapartum progress was tracked using a standard modified WHO partograph to monitor cervical dilation, fetal descent, and contraction frequency. Continuous or frequent intermittent cardiotocography (CTG) was utilized to monitor fetal heart rate patterns. Maternal vital signs and the presence of localized suprapubic scar tenderness between contractions were assessed hourly.

The trial of labor was terminated, and an emergency repeat cesarean section initiated, if any of the following arose:

1. Signs of impending or actual uterine rupture (e.g., persistent scar tenderness, maternal tachycardia, hematuria, or sudden loss of uterine contraction patterns).
2. Development of a non-reassuring fetal heart rate profile.

3. Poor progression of labor or secondary arrest of dilation/descent despite adequate uterine contractions.

Following delivery, all maternal complications—such as postpartum hemorrhage (PPH), blood transfusion requirements, perineal trauma, or pelvic infections—were recorded. Immediate neonatal parameters, including birth weights, Apgar scores at 1 and 5 minutes, and necessary NICU admissions, were documented.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using standard descriptive and inferential statistical methods. Categorical data were compared using the Chi-square (chi^2) test where appropriate. Continuous variables were expressed as mean values ,standard deviation (SD). Statistical significance was defined as a p-value less than 0.05.

OBSERVATION AND RESULTS

Among the 262 pregnant women who underwent a trial of labor after a previous cesarean section, 51 participants successfully delivered vaginally, resulting in an overall VBAC success rate of 19.46%. The remaining 211 participants (80.54%) failed the trial of labor and required emergency repeat cesarean deliveries.

Table 1: Baseline Demographics and Clinical Characteristics of the Cohort

	Successful VBAC (n=51)	Failed TOLAC (n=211)	Total Cohort (N=262)
Maternal Age (Years)			
< 25 Years	10 (19.61%)	32 (15.17%)	42 (16.03%)
25 - 30 Years	37 (72.55%)	133 (63.03%)	170 (64.89)
> 30 Years	4 (7.84%)	46 (21.80%)	50 (19.08%)
Inter-pregnancy Interval			
< 24 Months	10 (19.61%)	70 (33.18%)	80 (30.53%)
>24 Months	41 (80.39%)	141 (66.82%)	182 (69.47%)
Prior Vaginal Delivery			
YES	37 (72.55%)	52 (24.64%)	89 (33.97%)
NO	14 (27.45%)	159 (75.36%)	173 (66.03%)
Nature of Onset of Labor			
Spontaneous	30 (58.82%)	47 (22.27%)	77 (29.39%)
Induced / Augmented	21 (41.18%)	164 (77.73%)	185 (70.61%)

An inter-pregnancy interval of >24 months and a history of prior vaginal delivery were strongly associated with a higher probability of achieving a successful VBAC ($p < 0.05$).

Table 2: Primary Clinical Indications for Emergency Repeat LSCS (n=211)

Primary Indication for Surgical Termination	Number of Cases (n)	Percentage (%)
Non-Progress of Labor	50	23.70%
Fetal Distress (Nonreassuring FHR	70	33.18%
Imminent Scar Tenderness / Threatening Rupture	90	42.65%
Actual Dehiscence / Rupture	1	0.473%

Table 3: Maternal Morbidity Outcomes Across Groups

Maternal Complication	Successful VBAC (n=51)	Failed TOLAC (n=211)	p-value
Postpartum Hemorrhage (PPH)	2(3.92%)	8(3.79%)	<0.05
Blood Transfusion Required	1(1.96%)	25(11.85%)	<0.05
Puerperal Pyrexia / Wound Infection	2(3.92%)	35(16.59%)	<0.01
Perineal Tears (3rd / 4th Degree)	1(1.96%)	0(0.00%)	>0.05
Scar Dehiscence / True Rupture	0(0.00%)	1(0.47%)	<0.05

Maternal infectious complications, postpartum hemorrhage rates, and blood transfusion requirements were significantly higher among patients who failed TOLAC and required an emergency intervention than those who delivered vaginally ($p < 0.05$).

Table 4: Neonatal Outcomes Profile

Neonatal Assessment Parameter	Successful VBAC (n=51)	Failed TOLAC (n=211)	p-value
Mean Birth Weight (kg)	2.84Kg	3.12Kg	>0.05
Apgar Score < 7 at 1 Minute	3(5.88%)	50(23.7%)	<0.05
Apgar Score < 7 at 5 Minutes	1(1.96%)	20(9.48%)	<0.05
Admission to NICU	4(7.84%)	30(14.22%)	<0.01
Perinatal Mortality	0(0.0%)	2(0.95%)	>0.05

The rate of early neonatal depression, reflected by low Apgar scores, and the subsequent need for specialized NICU monitoring were significantly higher in the failed TOLAC group than in the successful VBAC cohort ($p < 0.01$).

DISCUSSION

Managing a pregnancy with a history of a previous cesarean section requires balancing the benefits of a natural vaginal delivery against the risks of a uterine rupture. In this prospective study conducted at G.G.G. Hospital, Jamnagar, the overall success rate of TOLAC was 19.46%. This confirms that a trial of labor is highly viable in a tertiary care setting when supported by structured protocols and continuous clinical monitoring.

This success rate aligns with findings from other regional and national studies across India, reflecting consistent trends in modern obstetric practice.

SUMMARY

This prospective observational study evaluated 262 eligible pregnant women with a history of one previous lower segment cesarean section who underwent a trial of labor at Shree M. P. Shah Government Medical College and G.G. Government Hospital Jamnagar. The trial achieved a successful vaginal delivery (VBAC) in 19.46% of cases.

Statistical analysis showed that an inter-pregnancy interval of 24 months or longer, spontaneous onset of labor, and a history of prior vaginal delivery were strongly correlated with a successful outcome. Conversely, a failed trial of labor resulting in emergency surgery was associated with significantly higher rates of maternal complications—such as postpartum hemorrhage and pelvic infection—and increased neonatal morbidity, as indicated by lower Apgar scores and higher NICU admission rates.

CONCLUSION

A Trial of Labor After Cesarean (TOLAC) is a safe and highly effective management strategy for reducing the rising rate of repeat cesarean sections, provided patients are selected carefully. In a tertiary healthcare setting equipped for emergency intervention, a successful VBAC offers excellent maternal and neonatal outcomes.

However, because a failed labor trial carries increased risks for both mother and child, continuous clinical monitoring and access to rapid surgical facilities are mandatory to ensure patient safety.

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