



Original Article

Outcome and Mode of Delivery in Women with Prior Lower Segment Caesarean Section: A Prospective Observational Study

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ABSTRACT

Background: To study the outcomes and mode of delivery in women with a previous one lower segment caesarean section.

Methods: This hospital-based prospective observational study was conducted over a period of 1 year and 3 months in the Department of Obstetrics and Gynaecology at Sanjay Gandhi Memorial Hospital, Mangol Puri, New Delhi. The study included 250 patients with a previous lower segment caesarean section attending outpatient and emergency services who required admission and intervention. Based on inclusion and exclusion criteria, eligible patients were offered Trial of Labour After Caesarean (TOLAC), and their outcomes were documented.

Results: Out of 250 patients, 77 (30.8%) underwent direct repeat elective LSCS, while 173 (69.2%) were given a trial of labour. Among those who attempted TOLAC, 95 patients (54.91%) successfully delivered vaginally (VBAC), whereas 78 patients (45.09%) experienced failed trial of labour and delivered via emergency LSCS.

Conclusion: In properly selected patients, a trial of vaginal delivery after previous caesarean section is an effective obstetric management strategy. Vaginal delivery is associated with minimal postpartum morbidity, and reduced anesthetic and operative risks. With appropriate selection, timing, and close supervision by skilled staff, TOLAC can reduce the need for repeat caesarean sections, thereby improving maternal outcomes.

Keywords: Caesarean section, Trial of Labour (TOLAC), Vaginal Birth After Caesarean (VBAC).

INTRODUCTION

Pregnancy, delivery, and early parenthood are crucial life phases that have a significant positive impact on many families. Childbirth can occur either via the vaginal route or by caesarean section. In recent years, the rates of caesarean deliveries have been steadily increasing worldwide.¹

Caesarean delivery is defined as the birth of a fetus through surgical incisions in the abdominal wall followed by the uterine wall (hysterotomy). This definition does not apply in cases of abdominal pregnancy or ruptured uterus, where the fetus is delivered from the abdominal cavity.²

The introduction of caesarean section into clinical practice was initially a life-saving procedure for both mother and baby. Several studies have shown an inverse relationship between caesarean rates and maternal and infant mortality rates in developing countries, where large populations suffer from limited access to basic obstetric care.³

Caesarean section is the most common major surgery performed on healthy women. The incidence varies between institutions, ranging from 10% to 50% of all deliveries.⁴ It is often argued that caesarean rates above the recommended

levels offer no additional benefits for mothers or infants. Conversely, high caesarean rates may be associated with negative health outcomes for both mother and child.⁵

Repeated caesarean sections are linked to increased risks of placental complications such as placenta praevia, as well as intraoperative complications including adhesions involving the abdominal wall, bladder, and bowel, ureteric injury, hemorrhage, uterine rupture, and dehiscence. Postoperative complications may include surgical site infections, endometritis, urinary tract infections, fever, thromboembolism, and the need for blood transfusions.⁶

Caesarean sections are performed either electively or emergently, depending on the clinical indication. Each case is managed based on the urgency and specific circumstances. Elective caesarean is scheduled at a predetermined time, often leading to better outcomes in complicated obstetric cases.⁷ Elective repeat caesarean significantly contributes to the overall high caesarean rate.⁸

Emergency caesarean deliveries, especially during labor, are associated with higher risks of infection, blood transfusions, and deep venous thrombosis compared to both vaginal births and elective caesarean sections. Although the risks in elective caesareans are lower, emergency procedures may still be necessary for fetal or maternal salvage.⁹

Vaginal birth after caesarean (VBAC) offers numerous benefits, including the avoidance of abdominal surgery, rapid recovery, less blood loss, and reduced need for transfusions. Neonates are less likely to experience respiratory distress syndrome (RDS) or iatrogenic prematurity. Additionally, VBAC has psychosocial advantages, as many women feel more positive emotionally about vaginal delivery compared to cesarean. Therefore, VBAC is considered a valuable strategy for reducing the overall caesarean rate. Vaginal delivery is associated with fewer risks, no need for anesthesia, shorter hospital stays, lower costs, and promotes earlier bonding between mother and infant.¹⁴

However, a history of caesarean section can influence future pregnancies. The traditional dictum of "once a caesarean, always a caesarean" has been modified by Pauerstein to "once a caesarean, always a trial of labour," emphasizing that vaginal birth after caesarean (VBAC) is often feasible and safe when appropriately managed.¹⁷

With rising caesarean rates, promoting safe VBAC can reduce maternal morbidity, healthcare costs, and unnecessary repeat surgeries. This study aims to provide data on TOLAC success and safety to guide clinical practice.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology at Sanjay Gandhi Memorial Hospital, Mangol Puri, New Delhi. The study period spanned from April 1, 2019, to June 30, 2020. Data were collected from a total of 250 women with a history of previous one LSCS who were admitted for delivery. Participants were selected purposively based on predefined inclusion and exclusion criteria.

Women eligible for trial of labor (TOL) included those with a previous LSCS, cephalic presentation, singleton pregnancy, clinically adequate pelvis, gestational age over 37 weeks, and an inter-delivery interval of more than 18 months. Additionally, informed consent was obtained from each participant. Women who refused to give consent, had more than one previous LSCS, recurrent indications for cesarean, multiple pregnancies, or medical and obstetric complications during pregnancy were excluded from TOL. Other exclusion criteria included moderate to severe cephalopelvic disproportion (CPD), fetal weight ≥ 3.5 kg, malpresentation, intrauterine growth restriction (IUGR), oligohydramnios, and high floating head at term.

The sample size was calculated using Epi Info™ version 7.2.2.2, a statistical tool provided by the Centers for Disease Control and Prevention (CDC). Based on prior research by Balachandran et al., which reported a 66.2% success rate of vaginal delivery among women with previous LSCS, the required sample size was determined to be 204 women for 90% power, using the formula ($n = 4pq/L^2$), where $p = 0.662$ and $q = 1 - p$.

All eligible women, both booked and unbooked pregnancies beyond 37 weeks, were enrolled after obtaining informed consent. Data collection involved interviews and filling out prestructured proformas. Ethical clearance was obtained from the institutional ethics committee prior to study commencement. Participants were followed through to delivery, with detailed records of demographic data such as age, gravida, and parity, as well as obstetric history and examination findings. Routine antenatal investigations, along with assessments for high-risk factors, were performed. Fetal well-being was evaluated via ultrasonography and non-stress tests (NST), while pelvic examinations were carried out during early labor.

Women who did not meet the criteria for TOL or who had placental abnormalities such as placenta previa, or other contraindications like CPD, non-vertex presentation, postpartum sepsis, or medical disorders, were planned for elective repeat cesarean section. Induction of labor was performed using oxytocin in women with a Bishop's score greater than 6, following standard protocols. If the Bishop's score remained below 6 after 12 hours of induction,

labor was considered failed, and emergency cesarean section was performed. The study recorded maternal and neonatal outcomes and complications systematically.

OBSERVATION AND RESULTS

In this study, total 250 patients, both Booked and Un-booked; with the history of prior one LSCS were studied, irrespective of their gravida, parity and time interval between the previous LSCS and current pregnancy.

Table 1: Outcome of trial of labour

Outcome of Trial of Labour	Frequency	%
Successful VBAC	95	54.91%
Failed TOLAC/Emergency LSCS	78	45.08%
Total	173	100.0%

Out of 250 patients, 77 patients (30.8%) had undergone direct repeat elective LSCS and 173 patients (69.2%) were given trial of labour. Among 173 patients, 95 patients (54.91%) succeeded in having vaginal birth after cesarean (VBAC) and rest 78 patients (45.086%) had failed trial of labour and delivered by emergency LSCS.

Table 2: Co-relation between age and mode of delivery

Age Groups	Total	Groups			P value
		Elective LSCS	Emergency LSCS	VBAC	
		Frequency (%)	Frequency (%)	Frequency (%)	
<30 yrs	170	35 (20.6%)	60 (35.3%)	75 (44.1%)	<0.001
≥30 yrs	80	42 (52.5%)	18 (22.5%)	20 (25.0%)	
Total	250	77 (30.8%)	78 (31.2%)	95 (38.0%)	

In our study 170 patients were in the age group of <30 years and rest 80 patients were in the age group of 30 years. As the age increases the chances of VBAC decreases ($p < 0.001$ significant), Patients whom successful vaginal birth after cesarean (VBAC) occurred, 75 were in age group of 30 years and 20 patients were in age group of >30 years.

Table 3: Co-relation between gravid of mother and mode of delivery

Gravida of Mother	Total	Groups			P value
		Elective LSCS	Emergency LSCS	VBAC	
		Frequency (%)	Frequency (%)	Frequency (%)	
2	117	42 (35.9%)	50 (42.7%)	25 (21.4%)	<0.001
3	68	20 (29.4.0%)	18 (26.5%)	30 (44.1%)	
>3	65	15 (23.1%)	10 (15.4%)	40 (61.5%)	
Total	250	77 (30.8%)	78 (31.2%)	95 (38.0%)	

In our study 117 patients were gravida 2 followed by 68 patients were gravida 3 and 65 patients were multigravida with >3 previous pregnancy. Vaginal birth after cesarean (VBAC) success rate in gravida 2 patients were 21.4%, in gravida 3 patients were 44% and in multigravida (gravida >3) patients were 61.5%. As the gravidity increases chances of VBAC increases ($p < 0.001$ significant).

Table 4: Co-relation between gestational age and mode of delivery

Gestational Age	Total	Groups			P value
		Elective LSCS	Emergency LSCS	VBAC	

		Frequency (%)	Frequency (%)	Frequency (%)	
37-37+6	123	42 (34.1%)	37 (30.1%)	44 (35.8%)	0.065
38-38+6	80	28 (35.0%)	20 (25.0%)	32 (40.0%)	
39-39+6	47	7 (14.9%)	21 (44.7%)	19 (40.4%)	
Total	250	77 (30.8%)	78 (31.2%)	95 (38.0%)	

Majority of patients 123 were in between the gestational age of 37-37+6 weeks ,while 80 cases were in between the gestational age of 38-38+6 weeks and 47 cases were in between the gestational age 39-39+6 weeks. There was no significant statistical difference between gestational age and mode of delivery (p=0.065).

Table 5:Co-relation between birth interval from last LSCS and mode of delivery

Birth interval from Last LSCS	Emergency LSCS(78)		VBAC(95)		p value
	Frequency	%	Frequency	%	
18 month - 2 yrs	60	76.9%	20	21.1%	<0.001
>2 yrs	18	23.1%	75	78.9%	

Interval between previous LSCS and current pregnancy had a significant statistical difference between mode of delivery (p<0.001). Interval between last LSCS and current pregnancy was more than 2 years in 75 patients who succeeded in having vaginal delivery, while it was between 18 months to 2 years in 20 patients who succeeded in trial of labour.

Table 6: Co-relation of condition of scar and mode of delivery

Condition of scar	Elective LSCS (n=77)		Emergency LSCS (n=78)		p value
	Frequency	%	Frequency	%	
Scar dehiscence	01	1.3%	06	7.7%	0.117
Scar rupture	00	0.0%	04	5.1%	0.120
Scar thinned	05	6.5%	08	10.3%	0.398
Scar intact	72	93.5%	59	75.64%	0.123

In elective LSCS patients, 6.5% patients had thinned out scar and 1.3% patient had scar dehiscence and no scar rupture .However, in patients with emergency LSCS 10.3% patients had thinned out scar, 7.7% patients had scar dehiscence and 5.1% patients had scar rupture.

Table 7: Co-relation between intra-operative finding and mode of delivery

Table 7: Co-Relation between intra-operative finding and mode of delivery						
Intra opt findings	Total	Groups				P value
		Elective LSCS		Emergency LSCS		
		Frequency	(%)	Frequency	(%)	

MSL	27	01	01.30%	26	33.30%	<0.001
Nil liquor	04	04	05.20%	00	0.00%	0.059
Atonic PPH	13	05	06.50%	08	10.38%	0.771
Bladder Adhesion	16	08	10.38%	08	10.38%	<0.001
Cord around neck	26	05	06.50%	21	26.92%	0.001
Deflexed Position	05	04	05.20%	01	01.28%	0.21
Occipito-Transverse	07	04	05.20%	03	03.80%	0.719

In our study, meconium stained liquor (MSL) were seen in 33.3% patients of emergency LSCS while only 1.3% patient in elective LSCS had MSL. Bladder adhesion was seen equally in both emergency and elective LSCS in 10.38% patients. Atonic PPH occurred in 6.5% patients of 10.38% patients of emergency LSCS. Cords around neck were seen in elective LSCS and 6.50% babies of elective LSCS and 26.92% babies of emergency LSCS.

Table 8: Co-relation between post delivery complications and mode of delivery

Post delivery complication	Total	Groups		
		Elective LSCS	Emergency LSCS	VBAC
		Frequency (%)	Frequency (%)	Frequency (%)
UTI	06	0(0%)	4(5.13%)	2(2.11%)
Vaginal hematoma	03	0(0%)	0(0%)	3(3.16%)
Vaginal tear	02	0(0%)	0(0%)	2(2.11%)
Fever	10	2(2.6%)	7(8.97%)	1(1.05%)
Secondary PPH	06	0(0%)	2(2.56%)	4(4.21%)
Wound Gape	10	3(3.9%)	7(8.97%)	0(0%)
Wound Infection	04	1(1.3%)	3(3.85%)	0(0%)

In our study ,post delivery incidence of urinary tract infection (UTI) was higher in emergency LSCS 5.13% as compared to successful VBAC 2.11%. Fever was found more common in emergency LSCS as it occurred in 8.97% cases of emergency LSCS but only 2.56% patients of elective LSCS and 1.05% patient of VBAC. Wound gape seen in 3.9% patients of elective LSCS, 8.97% patients of emergency LSCS. Wound infection in 1.3% patient of elective LSCS, 3.85% cases of emergency LSCS.

DISCUSSION

Trial of labour and vaginal birth after caesarean is being increasingly offered to patients as an option and practiced by obstetricians worldwide. Acceptance has become wide spread in the light of various studies demonstrating efficacy and safety of vaginal birth after caesarean in a variety of clinical settings. Vaginal birth after caesarean and trial of labour has been shown to reduce incidence of postpartum infection, length of hospital stays and hence, significant medical cost savings. The main emphasis today is making VBAC a safer option in carefully selected group of cases suitable for trial of

labour. Various factors predict the success of trial of labour as- indication of primary caesarean, its postoperative course, number of previous sections, any previous VBAC.

In our study total 250 patients, both booked and unbooked, with the history of prior one LSCS were studied, irrespective of their gravida, parity and time interval between the previous LSCS and current pregnancy. Out of 250 patients, 77 patients (30.8%) had undergone direct repeat elective LSCS and 173 patients (69.2%) were given trial of labour. Out of 173 patients, 95 patients (54.91%) succeeded in having vaginal delivery and rest 78(45.086%) patients had failed trial of labour and delivered by emergency LSCS.

The success rate of VBAC in our study was 54.91%. Similar results were obtained in study conducted at LHMC Delhi by Madaan M et al.¹³ which reported 53.6% VBAC success rate, Shakti V et al.²⁴ showed 72% and George et al.¹⁴ showed 60% VBAC success rate,

Table no. 9: Comparative study of success rate of VBAC.

01.	Madaan et al. ¹³	53.6%
02.	Vidyadhar et al	85%
03.	Shakti et al. ²⁴	72%
04.	George et al. ¹⁴	60%
05.	Present Study	54.91%

In a study conducted by Verramina et al.¹¹ majority of cases (59.3%) were in the age group of <25 years followed by 36.7% cases in the age group of 25-30 years. There was no significant statistical difference between age and mode of delivery ($p=0.238$).

In our study we observed that majority of patients 170(68%) were in the age group of <30 years and rest 80 (32%) patients were in the age group of >30 years. Mean age of the patients of elective LSCS was 28.61 ± 2.59 , mean age of emergency LSCS was 27.79 ± 2.14 and mean age of successful VBAC was 27.59 ± 1.99 . As the age increases, the chances of VBAC decreases ($p<0.001$ significant). 75 patients with successful VBAC was seen in age group of <30 years which was quite similar to study conducted by Patel S et al.¹⁷

In our study 117(46.8%) patients were gravida 2 followed by 68(27.2%) patients were gravida 3 and 65 (26%) patients were multi-gravida with >3 previous pregnancy. VBAC success rate in gravida 2 patients were 21.4%, in gravida 3 patients were 44% and in multigravida (gravida >3) patients were 61.5%. As the gravidity of patient increases, chances of VBAC increased. So, increased gravidity was strongly associated with successful VBAC. This is similar to the study of Patel S et al.¹⁷ which showed that 36.3% patients of successful VBAC had more than 3 obstetric history compared to failed TOLAC patient (23.5%). Another study conducted by Veeramma et al.¹¹ showed that majority of cases were para one (72.7%) and remaining multipara (27.3%). But in their study there was no significant statistical difference between parity and mode of delivery ($p=0.591$).

A prospective observational study conducted by Veeramma et al.¹¹ which showed that majority of patients (52.7%) were in between the gestational age of 37-39-weeks, rest 47.3% cases were in between the gestational age of 39-42 weeks. Similar result were found in our study, majority of patients 123(49.2%) were in between the gestational age of 37-37+6 weeks. Rest 80 (32%) cases were in between the gestational age of 38-38+6 weeks and 47 (18.8%) cases were in between the gestational age 39-39+6 weeks. There was no significant difference between gestational age and mode of delivery ($p=0.065$).

It was observed in our study that graduate patients were 87 (34.8%). Rest 50 (20%) patients were educated up to HSC. 56 (22.4%) cases educated till primary, 57 (22.8%) cases were illiterates. There was statistical significance difference between education and mode of delivery ($p<0.001$). 56.32% Graduate patients preferred trial of labour after one LSCS but success of labour was more in illiterate's patients (32%). A study conducted by Karnali DB et al.¹⁸ showed that the majority of women were educated up to 12th standard in their study.

In our study 52.4% patients resided in rural area while 47.6% patients were from urban area. There was a significant statistical difference between residential area and mode of delivery ($p=0.024$). Patients living in rural area preferred more trial of labour (40%) and success rate of VBAC was more in the same.

In our study majority of patients were booked 208 (83.2%) while 42 (16.8%) patients were unbooked. No statistical significance difference between booking status and mode of delivery ($p=0.157$). Similar result was obtained in a study conducted by Poornima M et al.²¹ which showed that majority of women were booked (76.28%) and (23.7%) patients were unbooked.

Tater et al.²⁰ observed in their study that patient in the active phase of labour on admission had more chance of successful VBAC. They concluded that 90.76% of patients admitted in the active stage of labour delivered by successful VBAC and only 60% of patients in the latent phase of labour delivered by VBAC. Similarly, in our study 72.1% of patient admitted in the active stage of labour delivered by successful VBAC and only 13.7% of patients in not labour delivered by VBAC. There was statistical significance difference between mode of delivery and stage of labour at the time of admission ($p<0.001$).

A study conducted by Singh S et al.¹⁹ which showed that most common indication of emergency LSCS was fetal distress 34.61% and second most common indication was scar tenderness being 20.51%. In our study we found that most common indication of emergency LSCS was fetal distress (26.9%) and second common indication were scar tenderness 16% which was quite similar to Singh et al.¹⁹ study while another study conducted by Patel S et al.¹⁷ showed that most common indication of emergency LSCS was failure of progress of labour (32.35%) which was dissimilar to our study

We observed in our study that most appropriate interval between previous LSCS and current pregnancy for successful VBAC were more than 2 years with success rate approximately 79%. Another similar study conducted by Tater A et al.²⁰ showed that most appropriate Interval between 2 deliveries for successful VBAC was 2 to 4 years with success rate approximately about 90% which was quite similar with our study.

There was significant statistical association ($p=0.003$) between weight of baby and mode of delivery in our study. Baby weight less than 3 kg was strongly associated with successful VBAC 61.03% babies delivered by vaginal route had weight <3 kg and 38.94% babies weight ≥ 3 kg. A study conducted by Bengal et al.¹⁵ observed that success rate of VBAC decreased (18.7%) significantly when baby's weight was more than 3 kg.

In our study total 6% refused for trial of labour. Most common reason for refusal of TOLAC was fear of scar rupture (46.7%), Other reasons were previous pregnancy with bad experience (20%), secondary infertility (20%) and no living child (13.3%). Another study conducted by Patel S et al.¹⁷ showed in their study that total 26% patients refused for trial of labour. Their study concluded that most common reason for refusal for TOLAC was previous pregnancy with bad experience (38.46%), Other reason included- secondary infertility (20.5%), no living child (10.25%), small family norms and not taking risk (30.76%).

It was observed in our study that there were 6.5% patients had thinned out scar and 1.3% patient had scar dehiscence and no scar rupture in elective LSCS patients. However in patients with emergency LSCS 10.3% patients had thinned out scar, 7.7% patients had scar dehiscence and 5.1% patients had scar rupture. Various other studies like Bengal et al.¹⁵ reported 2% scar dehiscence, Obra et al.²² reported 0.93% scar rupture and Phalan et al.²³ reported 1.9% scar dehiscence and 0.3% scar rupture, Patel S et al.¹⁷ reported 1 (2.9%) scar rupture in emergency LSCS and 8 (23.52%) scar dehiscence in emergency LSCS, Anagha A et al.¹⁶ reported 2.75% scar dehiscence.

In our study, apgar score more 6 at 5 minute was observed in 77 (100%) babies of elective LSCS, 60 (76.9%) babies of emergency LSCS and 71 (74.73%) babies with successful VBAC Study conducted by Patel S et al.¹⁷ observed apgar score >6 in 74 (96.1%) babies with VBAC and 27 (79.41%) babies who delivered by emergency LSCS.

In our study intra-operatively bladder adhesion was seen equally in both emergency and elective LSCS in 8 (10.38%) patients. Atonic PPH occurred in 5 (6.5%) patients of elective LSCS and 8 (10.38%) patients of emergency LSCS.

In our study post delivery incidence of UTI were higher in emergency LSCS (5.12%) as compared to successful VBAC (2.1%). Fever was found more common in emergency LSCS as it occurred in 8.9% cases of emergency LSCS but only 2.5% patients of elective LSCS and 1.05% patient of VBAC. Wound infection in 1.2% patient of elective LSCS, 3.8% cases of emergency LSCS. Another study Anagha A et al.¹⁶ reported that 13 patients had puerperal pyrexia, 6 patients had UTI, wound infection seen in 7 patients. 16 patients had gaping of the LSCS wound post-operatively.

The rate of cesarean sections has risen in recent years, partly due to advancements in fetal assessment techniques. Nonetheless, it is crucial to carefully evaluate the indication for a primary cesarean, as attempting vaginal birth after a previous cesarean carries a potential risk of uterine scar rupture in subsequent pregnancies.²⁵

CONCLUSION

It can be concluded that in properly selected patients, a trial of vaginal delivery after a previous one caesarean section constitutes the best obstetrical management. The significance of vaginal delivery was emphasized because of its minimum postpartum morbidity, anesthetic and operative risks. Every effort should be made in the antenatal clinic to pick up the cases that are likely to result in difficult labour, such as large babies, small pelvis, previous obstetric history etc, that may indicate the need for direct repeat caesarean delivery, in order to reduce the incidences of failed labour which would result in emergency caesarean delivery. With proper selection, appropriate timing and close supervision by competent staff, trial of vaginal delivery eliminates the need for a large proportion of repeat caesarean sections.. In our study 54.91% women had successful vaginal delivery after one lower segment caesarean section (LSCS) and 30.8% women had undergone for direct repeat LSCS and 45.086% women had failed TOLAC and had undergone emergency LSCS.

Limitation

As this was a single center, hospital based study and it does not represent an entire population and as our sample size was relatively small, our results may have less statistical power and it is difficult to draw a definite conclusion.

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None

Conflict of interest

The author declared no conflict of interest

Ethical approval

All procedures followed were in accordance with the institutional ethics committee for human research.

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