

A Hospital Based Observational Study Analyzing the Vaginal Birth with Previous Caesarean Section and its OutcomeVidya Paul¹, Seema²¹Senior Resident, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Darbhanga, Laheriasarai, Bihar, India²Associate Professor, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Darbhanga, Laheriasarai, Bihar, India

Received: 20-02-2023 Revised: 26-03-2023 / Accepted: 28-04-2023

Corresponding author: Dr. Vidya Paul

Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to analyze the vaginal birth with previous caesarean section and its outcome.**Methods:** This prospective controlled clinical study. 370 women who had undergone previous caesarean section. Out of them, 220 women (67.56%) fulfilled our criteria and were included in the study. A control group (n = 155) was matched from women without previous caesarean section.**Results:** In the study group, 200 out of 250 women were delivered vaginally, giving a VBAC success rate of 80%. The remaining 50 women (20%) were delivered by repeat caesarean section, mainly due to intrapartum fetal distress. Of the women who successfully delivered vaginally, 148 (74%) were admitted during the first stage of labour and 52 women (26%) in the second stage versus 80 (80%) and 20 (20%) respectively in the control group. There were no significant differences between the study group and control group in terms of age, parity, gestational age or obstetric and medical history. Oxytocin was used to augment labour in 20 cases (10%) but there was no uterine rupture recorded in these cases. Overall there were 2 cases (1%) of uterine dehiscence and 1 case (0.5%) of uterine rupture among the VBAC group. There were no maternal deaths and only 1 stillbirth after the case of uterine rupture. There was no significant difference between the groups in Apgar scores; 6% of neonates in the VBAC trial group had Apgar score < 6 compared with 5% in the control group (P > 0.05). We found 4 neonates (2%) weighed > 3500 g but < 4000 g in the VBAC group.**Conclusion:** Based on the findings presented, it can be inferred that in certain instances when individuals have had one previous lower segment caesarean section and are now experiencing spontaneous active labour, a vaginal delivery attempt may provide a considerable percentage of success without any notable escalation in the likelihood of adverse outcomes for both the mother and the foetus. The length of labour experienced by these ladies was comparable to that of typical births.**Keywords:** Vaginal Birth, Caesarean Section, Outcome.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The rate of caesarean section (CS) has increased worldwide leading to higher number of women with previous uterine scar. [1] Pregnant women with one previous CS are faced with two delivery options: vaginal birth after caesarean (VBAC) section or elective repeat CS. Rates of successful VBAC vary from one study to another. For instance, a large study in the USA (33,560 women) showed that women attempting a vaginal birth after a prior CS had around 73% of success rate. [2] VBAC section has less complications and faster recovery compared with CS. Conflicting data exist concerning the safety of induction of labor (IOL) in women with previous single lower segment CS

(LSCS). The greatest impact of failed trial of VBAC is emergency CS. [3,4]

CSs are associated with more blood loss, more risk of bladder and ureteral injuries, postpartum infections, pulmonary embolisms, and more risks of neonatal respiratory complications (if performed before 39 weeks). [2-4] In addition, multiple repeat CSs can lead to increased risk of maternal morbidity and mortality because of abnormal placental adherence and caesarean hysterectomy, which increases with each subsequent CS. [5,6] Such complications are difficult to manage and can cause significant consequences and even maternal death. [7] Studies have shown that women with one

previous CS who undergo IOL have lower success rates of vaginal delivery compared with those who presented in spontaneous labor. [8] Women who had a previous successful VBAC have the best chance to deliver vaginally with success rate of 85%–90%. [9] Other prognostic variables include maternal age <40 years, ethnicity, body mass index (BMI) <30, gestational age <40 weeks, infant birth weight <4 kg, and higher admission bishop score. [10,11] Success rate of VBAC correlates with the indication of the previous CS; CS for fetal malpresentation had higher success rate (84%) compared with CS for either labor dystocia (64%) or fetal distress (73%). [12]

The existing data, however, about which route of delivery is most appropriate and safe for these women VBAC or elective repeat caesarean delivery are complex and conflicting [6]. Although neither route is risk-free, the crucial issue is to ensure better maternal and perinatal outcomes. In a trial of VBAC, the main adverse outcome is uterine rupture. Deciding when to attempt VBAC is a major decision and should be based on careful selection of patients after thorough counselling, estimation of patient's risk of uterine rupture and strict adherence to the most recent guidelines for managing labour in units where there are facilities for immediate access to surgery if complications arise.

The aim of the present study was to analyse the vaginal birth with previous caesarean section and its outcome.

Materials and Methods

This prospective controlled clinical study was carried out at Darbhanga Medical College and Hospital, Darbhanga, Laheriasarai, Bihar, India for one year. The criteria for selection of women to undergo trial of VBAC in this hospital are similar to the American Congress of Obstetricians and Gynecologists (ACOG) guidelines.¹⁴ However, induction of labour using prostaglandins is totally avoided and oxytocin for augmentation of labour is occasionally given in small doses and under careful observation.

For this study, we selected women who had only one previous caesarean section and were considered candidates for trial of VBAC. We further selected the women to include only those who were at term (defined as 37 completed weeks up to 40 weeks), determined by the last menstrual period and/or first trimester ultrasonography, and who had spontaneous onset of labour (defined as cervical dilatation of > 4 cm, with regular uterine contractions of 3+ per 10 min lasting 40 s or more). Those who did not have spontaneous onset of labour, did not reach term or had other obstetric or medical indications for caesarean section were

excluded from the study. There were no post-date pregnancies noted in this study.

During the study period there were 370 women who had undergone previous caesarean section. Out of them, 220 women (67.56%) fulfilled our criteria and were included in the study. A matched control group of 105 women without previous uterine incision was selected. They were matched for age, parity, gestational age, birth weight, Apgar score, use of oxytocin and mode of delivery. 5 cases in the control group developed intrapartum fetal distress and were restored to the operating theatre for abdominal delivery, leaving 100 control women who completed the study. Informed consent for participation in the study was taken from each participant and hospital ethical committee clearance was obtained.

Data Collection

Every participant received a thorough history, clinical and obstetric examination. The data retrieved included: maternal age, parity, gestational age, indications for previous caesarean section, circumstances surrounding the previous delivery, type of uterine incision, interval since the previous caesarean and previous vaginal delivery before or after the caesarean section. We always assess pelvic adequacy using digital pelvimetry.

During the trial of labour, the senior physician responsible for the labour room was informed about the case. An intravenous line was established and maintained and intravenous infusion of 5% dextrose in water was given. At least 1 unit of blood was typed and cross-matched for each woman. For those women in both groups who presented early in the first stage (cervical dilatation > 4 but < 7 cm) the partogram was established and the fetal and maternal conditions were assessed and plotted regularly. For the other women, fetal cardiac activity, maternal vital signs and uterine contractions were assessed every 30 min in the first stage and 15 min in the second stage. The uterine scar was assessed every 30 min by noting maternal tachycardia, scar tenderness, fetal tachycardia, haematuria, vaginal bleeding and loss of the presenting part on vaginal examination. The progress of labour was assessed by abdominal and/or vaginal examination 4 hourly in the first stage and more frequently in the second stage or when membranes were ruptured or bleeding ensued. This monitoring was continued throughout the trial of labour. Our policy to augment women with oxytocin during VBAC attempt is to infuse oxytocin 2.5 units in 500 mL of dextrose (or normal saline) at 10 drops/min (2.5 mIU/min) and increase the infusion rate by 10 drops/min every 30 min until a good uterine contractions pattern is established. All the women in our study responded to the first dose without further increment. All

women had cardiotocography monitoring. Pain relief was given on the form of intramuscular injection of tramadol hydrochloride. Epidural analgesia was not available. The outcome measures were the duration of first and second stage of labour, intrapartum complications, Apgar score, birth weight, postpartum haemorrhage, uterine separation, need for blood transfusion and length of hospital stay.

Statistical Analysis

Data were analysed using Stata, version 10. The data were presented as mean and standard deviation (SD) and percentages when appropriate. Differences in means were tested by Student t-test. Chi-squared tests were used to compare frequencies. Fisher exact test was used when appropriate. Statistical significance was taken as P value < 0.05.

Results

Table 1: Maternal characteristics and outcome measures for the case group of women with trial of vaginal birth after caesarean section and the control group

Variable	Case group (n = 200)		Control group (n = 100)		P-value
	Mean	SD	Mean	SD	
Age (years)	22.6	5.6	23.6	8.2	0.745
Parity	2.8	1.0	2.8	1.2	0.356
Gestational age (weeks)	38.4	3.1	38.7	0.5	0.560
	No.	%	No.	%	
Oxytocin					< 0.001
No	180	90	48	48	
Yes	20	10	52	52	
Birth weight (g)					0.982
≤ 2500	40	20	15	15	
> 2500–3500	156	78	80	80	
> 3500	4	2	5	5	
Apgar score					0.983
< 6	12	6	5	5	
6–8	104	52	50	50	
> 8	84	42	45	45	
Postpartum complications					0.756
Dehiscence	2	1	0	0.0	
Uterine rupture	1	0.5	0	0.0	
Blood transfusion	1	0.5	0	0.0	
Length of hospital stay (hours)					0.856
2	184	92	96	96	
> 2–4	10	5	0	0.0	
> 4	6	3	4	4	

In the study group, 200 out of 250 women were delivered vaginally, giving a VBAC success rate of 80%. The remaining 50 women (20%) were delivered by repeat caesarean section, mainly due to intrapartum fetal distress. There were no significant differences between the study group and control group in terms of age, parity, gestational age or obstetric and medical history. Oxytocin was used to augment labour in 20 cases (10%) but there was no uterine rupture recorded in these cases.

Overall there were 2 cases (1%) of uterine dehiscence and 1 case (0.5%) of uterine rupture among the VBAC group. There were no maternal deaths and only 1 stillbirth after the case of uterine rupture. There was no significant difference between the groups in Apgar scores; 6% of neonates in the VBAC trial group had Apgar score < 6 compared with 5% in the control group (P > 0.05). We found 4 neonates (2%) weighed > 3500 g but < 4000 g in the VBAC group.

Table 2: Duration of first and second stages of labour for the case group of women with trial of vaginal birth after caesarean section and the control group

Stage of labour	Case group (n = 200)		Control group (n = 100)		P-value ^a
	No.	Mean (SD) duration (min)	No.	Mean (SD) duration (min)	
1st stage	148	144.4 (72.8)	80	145.5 (67.3)	0.982
2nd stage	52	32.8 (6.4)	20	28.8 (7.3)	

Of the women who successfully delivered vaginally, 148 (74%) were admitted during the first stage of labour and 52 women (26%) in the second stage versus 80 (80%) and 20 (20%) respectively in the control group.

Discussion

Although efforts were made to reduce the number of CS, it failed to achieve the 15% rate recommended by the World Health Organization (WHO). [15] Repeat CS is the most significant factor contributing to overall increased CS rates. [16] The primary indication of repeat CS is a prior CS [3]. The trial of labor after cesarean (TOLAC) is an attempt to reduce CS rates. Several national medical associations have provided practice guidelines for vaginal birth after cesarean section (VBAC) [17,18] but these differ across countries. [19] Generally speaking, VBAC is relatively safe when compared with repeat CS. [20] However, TOLAC rates have dropped significantly worldwide in recent years. [21,22] The success rate of VBAC trial was 80%. It is comparable to other similar studies. Flamm et al. demonstrated that patients presenting with dilation ≥ 4 cm had an 86% success rate of VBAC. [23,24] Although a high success rate indicates a better maternal outcome [24], these rates often apply to a selected population [25] and the overall outcome measures should include certain other delivery-related perinatal complications, such as hypoxic ischaemic encephalopathy.

In the study group, 200 out of 250 women were delivered vaginally, giving a VBAC success rate of 80%. The remaining 50 women (20%) were delivered by repeat caesarean section, mainly due to intrapartum fetal distress. Of the women who successfully delivered vaginally, 148 (74%) were admitted during the first stage of labour and 52 women (26%) in the second stage versus 80 (80%) and 20 (20%) respectively in the control group. There were no significant differences between the study group and control group in terms of age, parity, gestational age or obstetric and medical history. Oxytocin was used to augment labour in 20 cases (10%) but there was no uterine rupture recorded in these cases. Overall there were 2 cases (1%) of uterine dehiscence and 1 case (0.5%) of uterine rupture among the VBAC group. There were no maternal deaths and only 1 stillbirth after the case of uterine rupture. Uterine rupture rarely occurs in unscarred uterus (may occur in neglected prolonged labors). In western societies, rupture of uterus may occur in women undergoing VBAC. A study done in the Netherland showed that the use of PGE₂, for induction or augmentation of labor with low bishop score, increased the risk of uterine rupture. [26] One study, including 20,059 women (done in the USA) who had one previous CS, found a rate of uterine rupture of 0.52% for spontaneous

labor, 0.77% for induced labor with cervical catheter, and 2.22% for PG induction. Secondary analysis of the study showed that proper selection of women most likely to give birth vaginally and avoiding sequential use of multiple doses of PG and oxytocin are the best ways to avoid uterine rupture. [27]

However, the incidence is higher when the previous incision is classical, when there has been more one previous caesarean section, with induction of labour or with shorter interpregnancy intervals.¹⁴ There was no significant difference between the groups in Apgar scores; 6% of neonates in the VBAC trial group had Apgar score < 6 compared with 5% in the control group ($P > 0.05$). We found 4 neonates (2%) weighed > 3500 g but < 4000 g in the VBAC group. This finding shows that the estimation of fetal weight at term is relatively inaccurate whether done clinically or radiologically. Moreover, since the exact birth weight is only known after the delivery has occurred, this could limit the usefulness of birth weight as a predictor in clinical decision-making. Thus, birth weight may only be helpful when other predictors collectively are taken into consideration. Nevertheless, it implies that a woman with one prior caesarean section and estimated fetal weight of > 3500 g but < 4000 g can be strongly encouraged to undergo VBAC attempt. [28]

Conclusion

Based on the findings presented, it can be inferred that in certain instances when individuals have had one previous lower segment caesarean section and are now experiencing spontaneous active labour, a vaginal delivery attempt may provide a considerable percentage of success without any notable escalation in the likelihood of adverse outcomes for both the mother and the foetus. The length of labour experienced by these ladies was comparable to that of typical births. The results of our study may provide support for obstetricians to consider a more permissive approach towards vaginal birth after caesarean (VBAC) and reconsider the criteria for recommending caesarean surgery in low-risk patients, provided that appropriate patient selection is conducted.

References

1. Pyykönen A, Gissler M, Løkkegaard E, Bergholt T, Rasmussen SC, Smáráson A, Bjarnadóttir RI, Másdóttir BB, Källén K, Klungsoyr K, Albrechtsen S. Cesarean section trends in the Nordic countries—a comparative analysis with the Robson classification. *Acta obstetrica et gynecologica Scandinavica*. 2017 May;96(5):607-16.

2. ACOG Practice bulletin no. 115: Vaginal birth after previous cesarean delivery. *Obstet Gynecol.* 2010 Aug;116(2 Pt 1):450-463.
3. Sharvit M, Rubinstein T, Ravid D, Shechter-Maor G, Fishman A, Biron-Shental T. Patients with high-risk pregnancies and complicated deliveries have an increased risk of maternal postpartum readmissions. *Arch Gynecol Obstet.* 2014 Oct;290(4):629-33.
4. Nair M, Kurinczuk JJ, Knight M. Establishing a National Maternal Morbidity Outcome Indicator in England: A Population-Based Study Using Routine Hospital Data. *PLoS One.* 2016 Apr 7;11(4):e0153370.
5. Farquhar CM, Li Z, Lensen S, McLintock C, Pollock W, Peek MJ, Ellwood D, Knight M, Homer CS, Vaughan G, Wang A, Sullivan E. Incidence, risk factors and perinatal outcomes for placenta accreta in Australia and New Zealand: a case-control study. *BMJ Open.* 2017 Oct 5;7(10):e017713.
6. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, Moawad AH, Caritis SN, Harper M, Wapner RJ, Sorokin Y, Miodovnik M, Carpenter M, Peaceman AM, O'Sullivan MJ, Sibai B, Langer O, Thorp JM, Ramin SM, Mercer BM; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal morbidity associated with multiple repeat cesarean deliveries. *Obstet Gynecol.* 2006 Jun;107(6):1226-32.
7. van den Akker T, Brobbel C, Dekkers OM, Bloemenkamp KWM. Prevalence, Indications, Risk Indicators, and Outcomes of Emergency Peripartum Hysterectomy Worldwide: A Systematic Review and Meta-analysis. *Obstet Gynecol.* 2016 Dec;128(6):1281-1294.
8. Nair M, Soffer K, Noor N, Knight M, Griffiths M. Selected maternal morbidities in women with a prior cesarean delivery planning vaginal birth or elective repeat cesarean section: a retrospective cohort analysis using data from the UK Obstetric Surveillance System. *BMJ Open.* 2015 Jun 2;5(6):e007434.
9. Landon MB, Leindecker S, Spong CY, Hauth JC, Bloom S, Varner MW, Moawad AH, Caritis SN, Harper M, Wapner RJ, Sorokin Y, Miodovnik M, Carpenter M, Peaceman AM, O'Sullivan MJ, Sibai BM, Langer O, Thorp JM, Ramin SM, Mercer BM, Gabbe SG; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. The MFMU Cesarean Registry: factors affecting the success of trial of labor after previous cesarean delivery. *Am J Obstet Gynecol.* 2005 Sep;193(3 Pt 2):1016-23.
10. Lundgren I, Begley C, Gross MM, Bondas T. 'Groping through the fog': a metasynthesis of women's experiences on VBAC (Vaginal birth after Caesarean section). *BMC Pregnancy Childbirth.* 2012 Aug 21; 12:85.
11. Peaceman AM, Gersnoviez R, Landon MB, Spong CY, Leveno KJ, Varner MW, Rouse DJ, Moawad AH, Caritis SN, Harper M, Wapner RJ, Sorokin Y, Miodovnik M, Carpenter M, O'Sullivan MJ, Sibai BM, Langer O, Thorp JM, Ramin SM, Mercer BM; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. The MFMU Cesarean Registry: impact of fetal size on trial of labor success for patients with previous cesarean for dystocia. *Am J Obstet Gynecol.* 2006 Oct;195(4):1127-31.
12. Landon MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, Moawad AH, Caritis SN, Harper M, Wapner RJ, Sorokin Y, Miodovnik M, Carpenter M, Peaceman AM, O'Sullivan MJ, Sibai B, Langer O, Thorp JM, Ramin SM, Mercer BM, Gabbe SG; National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. *N Engl J Med.* 2004 Dec 16; 351(25):2581-9.
13. Gordan CS. Delivery after cesarean section, In: Studd J, ed. 6. Progress in obstetrics and gynaecology. Volume 17. Edinburgh, Churchill Livingstone, 2006:245-263.
14. American College of Obstetricians and Gynecologists. ACOG 4. practice bulletin no. 54. Vaginal birth after previous cesarean delivery. *Obstetrics and Gynecology*, 2004, 104:203-212.
15. World Health Organization Human Reproduction Programme A. WHO statement on caesarean section rates. *Reprod Health Matters.* 2015;23(45):149-50.
16. Cheng YW, Eden KB, Marshall N, Pereira L, Caughey AB, Guise JM. Delivery after prior cesarean: maternal morbidity and mortality. *Clin Perinatol.* 2011; 38(2):297-309.
17. Bellows P, Shah U, Hawley L, Drexler K, Gandhi M, Sangi-Haghpeykar H, Davidson C. Evaluation of outcomes associated with trial of labor after cesarean delivery after a change in clinical practice guidelines in an academic hospital. *J Matern Fetal Neonatal Med.* 2017; 30(17):2092-6.
18. RCOG: Birth after Previous Caesarean Birth (Green-top Guideline No. 45). Green-top Guideline No 45 October 2015.
19. Foureur M, Ryan CL, Nicholl M, Homer C. Inconsistent evidence: analysis of six national guidelines for vaginal birth after cesarean section. *Birth.* 2010; 37(1):3-10.
20. Dodd JM, Crowther CA, Huertas E, Guise JM, Horey D. Planned elective repeat cesarean

- section versus planned vaginal birth for women with a previous caesarean birth. *Cochrane Database Syst Rev.* 2013;12: CD0 04224.
21. Landon MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, Moawad AH, Caritis SN, Harper M, Wapner RJ, et al. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. *N Engl J Med.* 2004;351(25):2581–9.
 22. Knight HE, Gurol-Urganci I, van der Meulen JH, Mahmood TA, Richmond DH, Dougall A, Cromwell DA. Vaginal birth after caesarean section: a cohort study investigating factors associated with its uptake and success. *BJOG.* 2014;121(2):183–92.
 23. Flamm BL, Geiger AM. Vaginal birth after cesarean delivery: an admission scoring system. *Obstetrics & Gynecology.* 1997 Dec 1; 90(6):907-10.
 24. Aaron BC. Vaginal birth after cesarean delivery.
 25. American College of Obstetricians and Gynecologists. Vaginal birth after previous cesarean delivery. *ACOG Practice Patterns Bulletin.* 1999; 5:1-8.
 26. Weimar CH, Lim AC, Bots ML, Bruinse HW, Kwee A. Risk factors for uterine rupture during a vaginal birth after one previous caesarean section: a case-control study. *Eur J Obstet Gynecol Reprod Biol.* 2010 Jul;151 (1):41-5.
 27. Lundgren I, Begley C, Gross MM, Bondas T. 'Groping through the fog': a meta-synthesis of women's experiences on VBAC (Vaginal birth after Caesarean section). *BMC Pregnancy Childbirth.* 2012 Aug 21; 12:85.
 28. Macones GA, Peipert J, Nelson DB, Odibo A, Stevens EJ, Stamilio DM, Pare E, Elovitz M, Sciscione A, Sammel MD, Ratcliffe SJ. Maternal complications with vaginal birth after cesarean delivery: a multicenter study. *American journal of obstetrics and gynecology.* 2005 Nov 1;193(5):1656-62.