Original Article

Vaginal Birth after Caesarean Section (VBAC) Success Rate and Predictors of Success in a Tertiary Care Hospital

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Abstract

Objective: To evaluate the predictor for a successful VBAC in a busy tertiary care hospital and assess the success rate in the cases of previous Lower Segment Caesarean Section (LSCS).

Methodology: This retrospective study was carried out at a tertiary care teaching hospital PIMS MCH-II from March 2019 to August 2019. The study involved 160 cases of the previous one lower segment CS duty approved from the ethical committee. The exclusion was based on patients with more than one CS. Twins, history of uterine rupture, other scars on the uterus or scar dehiscence, previous classical or inverted T-shaped incision, contracted pelvis, cephalopelvic disproportion, abnormal and presentation. Patients with other medical or obstratical complications were also excluded from the study. Medical complications were also excluded from the study.

Results: 10% of the induced cases went for VBAC while 90% induced cases went for C-section. On the other hand, 58.8% of the spontaneous cases went for VBAC while 41.2% of the spontaneous women went for C-section. 62.8% booked patients were delivered via VBAC versus 13.6% of non-booked while 37.2% delivered via LSCS were booked versus 86.4% of non-booked.

Conclusion: The main predictors noticed, included evaluation assurance and counselling by a senior obstetrician, proper antenatal care, gestational age, BMI of the mother, spontaneous onset of labour, and engagement of the fetal head, estimated fetal weight. Confidence building reassurance about progress and status of the study claims safe delivery by the vaginal route without any major complications to the mother and newborn.

Keywords: Vaginal Birth after C-section (VBAC), C-section, Cesarean, Vaginal delivery, Low Segment Cesarean Section (LSCS)

Cite this article as: Masoom K, Asif R, Aara Y, Javaid N, Luqman S, Naeem S,. Vaginal Birth after Caesarean Section (VBAC) Success Rate and Predictors of Success in a Tertiary Care Hospital. J Soc Obstet Gynaecol Pak. 2021; 11(2):75-81

Introduction

Vaginal Birth after Cesarean section (VBAC) is one of the methods of birth in order to control the rising trend of Cesarean Section (CS). The present study reports the possibility of normal vaginal delivery in patients who had previously undergone CS in a tertiary care hospital.[1]

In 1916, Cragin popularized the dictum, “once a caesarean section, always caesarean section”. That was the era of the classical CS. In the modern era of Lower Segment Caesarean section (LSCS), cesarean related mortality and morbidity have significantly decreased. The dictum now is “once a cesarean section, always an institutional delivery in a well-developed hospital”. The reason of this change is the modern concept of scar integrity assessment, improved emergency facilities of CS and in some cases, induction leading to VBAC.[2] The selection criteria for labor trial has gradually relaxed over the period of time due to increasing experience and knowledge with VBAC. As, with time and experience it came to knowledge that indeed VBAC in completely safe and did not lead to any increase in the pregnancy related

Authorship Contribution: [1]Final approval of the version to be published, [2] Conception, Synthesis and Planning of the research, Interpretation, analysis and discussion, revising it critically for important intellectual content, [3]Collecting the data, drafting the work, [4-6]Active participation in active methodology

Funding Source: none
Conflict of Interest: none

Received Feb 03, 2021
Accepted: June 09, 2021

morbidity and mortality in comparison to elective CS, the "Guidelines for vaginal delivery after a previous caesarean birth" were published in 1988 by ACOG. In the light of increasing knowledge and data regarding VBAC, Royal College of Obstetricians and Gynecologists (RCOG) in their guidelines in 2007 and 2015 endorsed it as a safe and viable option for most women who have a history of single LSCS.[3] Planned VBAC can be utilized as a safe option to limit CS, which has been linked to maternal morbidities. It does not lead to any delivery related complications.[4]

Indeed, VBAC has been reported that VBAC leads to lower short-term and long-term morbidities as compared to CS. Although, some studies report increase morbidity in unsuccessful cases of VBAC after CS. Keeping this in mind, cases should be considered for VBAC after careful consideration and should be adapted in women who don't have any contraindications. [5]

Therefore, the current study was designed and undertakes in order to assess the safety of VBAC in patients having history of LSCS and also to find out indicators for successful VBAC.

Methodology

This retrospective study was carried out at a tertiary care teaching hospital PIMS MCH-II from March 2019 to August 2019. High-risk cases from hospitals in the neighboring towns get referred to this hospital. Among approximately 15,000 deliveries taking place in the hospital annually, CS accounts for up to 40-45%. In this study, 160 cases having previously undergone CS were included.

The study exempts patients having undergone previous medical or obstetrical complications during delivery, Classical uterine incisions, previously more than one LSCSs, having scarred uterus, uterine rupture, contracted pelvis or cephalopelvic disproportion, however cases with singular previous transverse lower uterine segment scar were included in the study.

Medical history was reviewed and VBAC was decided by a senior obstetrician in the third trimester or even during labor. Head engagement was considered to be an important point in deciding the fitness for the trial of labor. Women with non engaged head at 37 weeks and fit for the trial otherwise were given time for head engagement and spontaneous onset of labor. The selected cases were continuously and carefully monitored using electronic fetal monitoring. Provisional preparations for emergency CS were done for all the enrolled cases. World Health Organization (WHO) standard partograph was adapted for Intrapartum monitoring. VBAC trail was continued till satisfactory progress, unless there was unsatisfactory progress, in that case the trial was stopped and emergency repeat CS was performed. Cases with successful VBAC delivery were discharged on the same day and those who underwent repeat CS were kept for two more days post-surgery.

A structured proforma was developed to gather the relevant information on both fetal and maternal parameters. SPSS software (Version 16.0) was utilized for data analysis. In order to compare mean, student´s *t*-test was adapted. A value of <0.05 as p value was considered significant. Proportions and percentages were used to represent all the data.

Results

Our study shows a VBAC success rate of 56% and 44% of emergency lower segment caesarean section in a population of 159 patients (Table I). They were all assessed by senior obstetrician and considered fit for the trial of VBAC. 62.8% booked patients were delivered via VBAC versus 13.6% of non-booked while 37.2% delivered via LSCS were booked compared to 86.4% of non-booked (Table I).

10% of the induced cases went for VBAC while 90% induced cases went for C-section (Table I). On the other hand, 58.8% of the spontaneous cases went for VBAC while 41.2% of the spontaneous women went for C-section (Table I). Chi-square test is significant at 1% level of significance which implies that there is a significant association between mode of delivery and spontaneous onset of labor.

Regarding the factors associated with successful VBAC, 66.7% had a history of previous vaginal delivery after one LSCS (Table I). 33.3% of patients had a history of failed Induction of Labor (IOL), 64.8% had a history of meconium staining of liquor, 61.1% had a history of breech presentation and 45.2% of were miscellaneous cases were delivered via VBAC (Table II).

71% of the patients who had successful VBAC presented with a Bishop score of equal to or more than 5. On the other hand only 7% of the patients in the caesarean category had a Bishop score of 5 or more and all of these patients had emergency cesarean due to fetal distress (Table II).

Additional results showed that 55.7% were having Hb >10 among VBAC and 55.6 % were found to be having Hb <10 (Table II). BMI was recorded in the first trimester. 72.5% had a successful VBAC with BMI 19-24.4, while it was reduced among patients with BMI 25-29.9 (Table II). Successful VBAC was 60.3% in cases with inter pregnancy interval of more than year as compared to 42.1% in patients having inter pregnancy interval of less than one year (Table II).

71.4% had a successful VBAC with no previous history of abortion versus 38.7% with previous history of abortion (Table III). Chances of successful VBAC observed with greater parity i.e. 89% versus 47.5% with one child.

T-test statistics were insignificant regarding age of women and hence, there was no significant difference between average age of the two categories of Mode of Delivery (MOD). It implies that age of the women plays no significant role in MOD. Moreover, the current pregnancy number was a factor of significant importance.

Table I: Rate of Successful VBAC in relation to Delivery history, Mode of delivery, Induction of Labor, Previous history of VBAC.

		VBAC	Emergency Lower Segment Caesarean Section (EmLSCS)	Total
Non-Booked	Count	3	19	22
	Percentage (%)	13.6	86.4	100.0
	Percentage of total (%)	1.9	11.9	13.8
Booked	Count	86	51	137
	Percentage (%)	62.8	37.2	100.0
	Percentage of total (%)	54.1	32.1	86.2
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
No History of normal delivery before Caesarean	Count	60	46	106
	Percentage (%)	56.6	43.4	100.0
	Percentage of total	38.0	29.1	67.1
History of normal delivery before Caesarean	Count	28	24	52
	Percentage (%)	53.8	46.2	100.0
	Percentage of total (%)	17.7	15.2	32.9
Total	Count	88	70	158
	Percentage of total patients in the study (%)	55.7	44.3	100.0
Induced labor	Count	1	9	10
	Percentage (%)	10.0	90.0	100.0
	Percentage of total	0.6	5.7	6.3
Spontaneous labor	Count	87	61	148
	Percentage (%)	58.8	41.2	100.0
	Percentage of total (%)	55.1	38.6	93.7
Total	Count	88	70	158
	Percentage of total patients in the study (%)	55.7	44.3	100.0
No History of VBAC	Count	61	56	117
	Percentage (%)	52.1	47.9	100.0
	Percentage of total (%)	38.4	35.2	73.6
History of VBAC	Count	28	14	42
	Percentage (%)	66.7	33.3	100.0
	Percentage of total (%)	17.6	8.8	26.4
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0

Table II: Rate of successful VBAC in relation to failed delivery attempts, Hemoglobin (Hb) level, Body Mass Index (BMI), Birth weight, Inter pregnancy Interval.

		VBAC	Emergency Lower Segment Caesarean Section (EmLSCS)	Total
Non progress of labor, Failed Induction of Labor (IOL)	Count	7	14	21
	Percentage (%)	33.3	66.7	100.0
	Percentage of total	4.4	8.8	13.2
Fetal distress, Meconium	Count	46	25	71
	Percentage (%)	64.8	35.2	100.0
	Percentage of total (%)	28.9	15.7	44.7
Malpresentation and multiple pregnancy	Count	22	14	36
	Percentage (%)	61.1	38.9	100.0
	Percentage of total (%)	13.8	8.8	22.6
Miscellaneous	Count	14	17	31
	Percentage (%)	45.2	54.8	100.0
	Percentage of total (%)	8.8	10.7	19.5
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
Hb Level less than 10	Count	20	16	36
	Percentage (%)	55.6	44.4	100.0
	Percentage of total (%)	12.7	10.1	22.8
Hb level more than or equal to 10	Count	68	54	122
	Percentage (%)	55.7	44.3	100.0
	Percentage of total (%)	43.0	34.2	77.2
Total	Count	88	70	158
	Percentage of total patients in the study (%)	55.7	44.3	100.0
Body Mass Index (BMI) in first trimester less than 19	Count	1	0	1
	Percentage (%)	100.0	0.0	100.0
	Percentage of total (%)	0.6	0.0	0.6
Body Mass Index (BMI) in first trimester 19-24.99	Count	29	11	40
	Percentage (%)	72.5	27.5	100.0
	Percentage of total (%)	18.2	6.9	25.2
Body Mass Index (BMI) in first trimester 25-29.99	Count	32	34	66
	Percentage (%)	48.5	51.5	100.0
	Percentage of total (%)	20.1	21.4	41.5
Body Mass Index (BMI) in first trimester greater than 30	Count	27	25	52
	Percentage (%)	51.9	48.1	100.0
	Percentage of	17.0	15.7	32.7

	total (%)			
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
Birth weight less than 2 Kg	Count	28	41	69
	Percentage (%)	40.6	59.4	100.0
	Percentage of total (%)	17.6	25.8	43.4
Birth weight 3-4 Kg	Count	59	29	88
	Percentage (%)	67.0	33.0	100.0
	Percentage of total (%)	37.1	18.2	55.3
Birth weight more than 4 Kg	Count	2	0	2
	Percentage (%)	100.0	0.0	100.0
	Percentage of total (%)	1.3	0.0	1.3
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
Inter pregnancy interval less than 1 year	Count	16	22	38
	Percentage (%)	42.1	57.9	100.0
	Percentage of total (%)	10.1	13.8	23.9
Inter pregnancy interval of 1 or more than 1 year	Count	73	48	121
	Percentage (%)	60.3	39.7	100.0
	Percentage of total (%)	45.9	30.2	76.1
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0

Table III: Rate of successful VBAC in relation to history of previous miscarriages, Gestational age, No of children.

		VBAC	Emergency Lower Segment Caesarean Section (EmLSCS)	Total
No history of previous miscarriage	Count	60	24	84
	Percentage (%)	71.4	28.6	100.0
	Percentage of total (%)	37.7	15.1	52.8
History of one or more previous miscarriages	Count	29	46	75
	Percentage (%)	38.7	61.3	100.0
	Percentage of total (%)	18.2	28.9	47.2
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
Gestational age less than or equal to 38 weeks	Count	38	42	80
	Percentage (%)	47.5	52.5	100.0
	Percentage of total (%)	23.9	26.4	50.3
Gestational age greater than 38 weeks	Count	51	28	79
	Percentage (%)	64.6	35.4	100.0
	Percentage of total (%)	32.1	17.6	49.7
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0
1 child before the current delivery	Count	38	42	80
	Percentage (%)	47.5	52.5	100.0
	Percentage of total (%)	23.9	26.4	50.3
2 children before the current delivery	Count	30	8	38
	Percentage (%)	78.9	21.1	100.0
	Percentage of total (%)	18.9	5.0	23.9
3 children before the current delivery	Count	15	17	32
	Percentage (%)	46.9	53.1	100.0
	Percentage of total (%)	9.4	10.7	20.1
4 children before the current delivery	Count	5	3	8
	Percentage (%)	62.5	37.5	100.0
	Percentage of total (%)	3.1	1.9	5.0
6 children before the current delivery	Count	1	0	1
	Percentage (%)	100.0	0.0	100.0
	Percentage of total (%)	0.6	0.0	0.6
Total	Count	89	70	159
	Percentage of total patients in the study (%)	56.0	44.0	100.0

Discussion

With the alarming rise in primary CS due to various indications, a significant proportion of pregnant women visiting hospitals report having undergone CS.

Due to the risk that a scar can get ruptured, such patients are at a higher risk. These types of cases are always highly sensitive for the obstetrician to decide. As a result, each case is evaluated individually for the viability of a successful VBAC. The patient has a uterine scar, this further complicates the decision for an obstetrician about the subsequent labor. There are different schools of thought here. Some experts recommend CS in such situations, while some recommend VBAC trial. Some other experts recommend a middle ground and suggest considering each case individually. Among all the risk factors, maintaining uterine scar integrity is of the utmost concern.[6] Rupture of the uterine scar can have devastating effects on pregnant women and unborn baby. In comparison, the advantages of VBAC outweigh the risks in the case of repeat CS.

Our study shows that only 10% of the induced patients had successful VBAC whereas the patients who presented in spontaneous labor had a percentage of

58.8% of successful VBAC which is very significant. Women with one previous CS, who undergo IOL, have lower success rates of vaginal delivery compared with those who presented in spontaneous labor. They also have higher risk of CS delivery due to fetal distress. Another study compared the success rates of VBAC in women who had IOL with those who came with spontaneous labor and shows similar results. The rate of VBAC was 66.6% in the spontaneous onset of labor group. There was a significant increase in the rate of cesarean delivery due to fetal distress in the induced

group.[7] Success rate of VBAC can be affected by risk factors such as: no history of vaginal delivery, labor induction and premature delivery.[17]

Booking status of a patient with previous one cesarean section is very important while deciding the labor management plan, respecting the patient's own wish and at the same time giving her the best possible medical advice. Our study shows that patients who had an antenatal follow up tend to have a successful VBAC. 62.8% of the booked patients had VBAC whereas only 13.6% of the non booked patients had successful VBAC. Management of the woman who has had one previous caesarean section is controversial, and there is significant variation in VBAC rates between Europe and the US. However, VBAC rates are declining slowly in Europe, and the reasons for this are complex. There are minimal data available pertaining to the recent downward trends and their contributory factors. One of the important factors to consider in this regard is the number of women who entered for antenatal care having had one previous CS along with VBAC attempt rates and actual VBAC rates that took place.[8]

One of the major predictors of the success of a VBAC is the history of previous vaginal deliveries and VBACs. In this study, 66.7% had a history of successful VBAC previously, and 53.8% of the participants who underwent VBAC had prior spontaneous vaginal deliveries. Another recent study reports the same. This significant association with successful vaginal delivery has been found to be significantly influenced by prior history of previous vaginal delivery before and after caesarean delivery. This significant association with successful VBAC is shown by the P <0.05.[9,19]

Data regarding the indications for which first cesarean section was carried out shows both recurrent and nonrecurring reasons like cephalopelvic disproportion, fetal distress, malpresentation and twins/higher multiples etc. patients with non-recurrent reasons have a higher chance of VBAC in subsequent pregnancy. Out of all the indications, cesarean sections carried out for fetal distress had the highest percentage of successful VBAC followed by multiple pregnancies and malpresentation. Interestingly, out of the patients whose indication of cesarean was failed induction and poor progress in labor only 33.3% had successful VBAC while 66.7% ended up in repeat emergency cesarean. Another recent research indicates the similar findings and states that clinical predictors of a successful VBAC include non-recurrent indications for the previous caesarean section, previous vaginal delivery and spontaneous onset of labor. Whereas the stagnation of the labor process and the failure of the fetal head to descend decrease the likelihood of VBAC.[10,12,16]

71% of the patients who had successful VBAC presented with a Bishop score of equal to or more than 5. On the other hand only 7% of the patients in the caesarean category had a Bishop score of 5 or more and all of these patients had emergency cesarean due to fetal distress. These findings are in accordance with that of another study showing that cervical score (5.2±1.9,4.3±1.6) of the VBAC group were significantly different from the failed TOLAC group (*P*<0.05).[11]

BMI of the mother is very important predictor of success for VBAC. Our study shows that participants having BMI in the range of 19-24 had a VBAC success rate of 72.5% with the falling trend as the BMI moves towards obesity. A study from Islamabad shows that the success rate of Trial of labor after one previous cesarean delivery was lower in obese (64.38%) as compared to non-obese women (82.06%) (p<0.001).[12]

Inter pregnancy interval is thought to effect the scar strength and integrity. This study results show that patients with interval of more than 1 year had higher VBAC rate i.e.; 60.3% compared to 42.1% of less than 1 year gap in between the pregnancies. Comparable evidence from a study suggests that an interval between 2 and 4 years increases the likelihood of successful VBAC.[13]

It was shown in one study that, morbidities increase 50-75% in VBAC candidates with short inter pregnancy interval.[14] However another study reports that when intra operative visual scar health was assessed in relation with inter pregnancy interval, no significant difference was found in uterine scar health.[15] This study in contrast to ours only included the patients with an inter pregnancy interval of 12 months and more.

The majority of the patients who had successful VBAC were at the gestational age of 38 weeks or more (64.6%) as compared to the patients with gestational age of less than 38 weeks (47.5%). In contrast to our study it is reported by Azadeh *et al*, and Yan *et al*,that gestational age was not a significant factor in VBAC success or failure.[18,19]

Our study showed that the birth weight of babies in the range of 3-4 kg were mostly delivered by VBAC i.e. 67% followed by 40.6% of the babies having weight of

less than or equal to 2.9kg while the patients with the estimated fetal weight of 4kg or more than 4 kg were not given the trial of labor. Similar results have been reported by other studies.[10,11] In contrast to these findings a study suggested that mean of neonatal birth weight was not different between women with successful and unsuccessful VBAC[18]

Parity is a significant indicator of the success of VBAC. As the parity increases successful VBACs increased. Participants with a parity of 4 and more has 62.5 % VBAC rate and those of the second gravida was 47.5%. A study from Kerbala states that the success rate was positively associated with older maternal age, higher parity and lower neonatal birth weight.[20]

In patients with no history of miscarriages 71.4% had successful VBAC while 38.7% had a previous miscarriage. As the study was reterospective so the history of evacuation could not be obtained of all participants. In disagreement with our study another shows the p value of 0.9 for the history of miscarriage in successful and unsuccessful VBAC groups depicting it to be insignificant.[18]

Hemoglobin levels of both groups show comparable results of VBAC in patients having Hb more than 10g/dl (55.6%) and less than 10g/dl (55.7%).

In accordance with our study, it has been suggested by another study as well that gestational age, history of vaginal delivery, estimated birth weight, body mass index, spontaneous onset of labor and Bishop score were independently associated with VBAC.[21] Findings of our study are therefore in good correlation with similar studies conducted elsewhere.[22]

Patients with VBAC have a shorter hospital stay which have positive psychological effects on the women and also financially attractive. Government campaigns for small families haven't been that successful so far. Women who refuse sterilization after 2nd CS are at a higher risk to experience complications in their subsequent pregnancies.

If women are explained about the option of VBAC and adequately counseled about further associated risks of a repeat cesarean, many cesarean sections can be avoided. VBAC should be encouraged in selected cases to reduce this risk. Moreover many obstetricians running private nursing homes do not conduct VBAC deliveries, with the fear of scar rupture and subsequent medico-legal litigations. They ignore the possible increase in the risk of scar rupture and other grave complications like placenta accrete and percreta. For the aforementioned reasons, conducting VBAC deliveries has a special significance and should be encouraged in the patients with previous one cesarean section on individual case assessment base.

A skilled team providing vigilant monitoring and supportive care during labor along with evidence based counseling can play a vital role for a safe birth after cesarean section.

Limitation: The limitation of the study lies in the fact that the study was carried out in a tertiary care center, where there is adequate manpower to supervise each delivery, reducing complication rates of VBAC. Similar results may not be replicated at centers other than tertiary care centers. Moreover, it was a retrospective study and some data regarding rupture of membranes, history of evacuation in previous miscarriages and use of oxytocin etc could not be obtained for all the patients.

Conclusion

The study concludes that a significant ratio of previous CS cases can be successfully delivered via VBAC, and it has no major risks for the mother or the newborn. The procedure can be performed in any healthcare facility which has the capability to perform emergency CS. It has been proven to be a safe alternative to a repeat elective caesarean delivery.

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