

Obstetric Outcomes of Vaginal Birth After Cesarean Section: A Case-Control Study

Zahra Soleimani^{1,2} , Afsaneh Lalaie^{1,3*} , Arman Jenab⁴ , Azam Soleimani⁵ 

1. Dept. Obstetrics and Gynecology, School of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Trauma Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
3. Nephrology and Urology Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
4. Student Research Committee, Baqiyatallah University of Medical Sciences, Tehran, Iran
5. Cardiac Rehabilitation Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Article Info

 [10.30699/jambs.31.146.250](https://doi.org/10.30699/jambs.31.146.250)

Received: 2022/06/26;

Accepted: 2023/01/20;

Published Online: 26 June 2023;

Use your device to scan and read the article online



Corresponding Information:

Afsaneh Lalaie,

Dept. Obstetrics and Gynecology,
School of Medicine, Baqiyatallah
University of Medical Sciences,
Tehran, Iran

E-Mail: dr.afsane.lalaie@gmail.com

ABSTRACT

Background & Objective: Given the importance of the benefits of natural childbirth and the complications of recurrent cesarean section, we have conducted the present study to determine the maternal and neonatal complications of natural childbirth after cesarean section.

Materials & Methods: In this case-control study, the obstetric complications of 84 women who had undergone a previous cesarean delivery referred to Baqiyatallah Hospital in 2018 for vaginal delivery after cesarean section (VBAC) delivery compared with 84 women with a previous vaginal delivery, who intended to give birth vaginally for the second delivery. Demographic, anthropometric, obstetric, and perinatal data of them were collected and registered in a researcher-developed form. Two groups were compared using the t-test and chi-square test.

Results: The mean age in VBAC and control group was 30.49 ± 6.83 and 32.08 ± 7.28 years, respectively ($P=0.15$). There were not any occurrence of urinary rupture, bladder rupture, stool control disorder, uterine rupture, nephrotic infection, and ICU hospitalization of the mothers in the two groups. Regarding puerperal infection (3.57% in the VBAC group and 4.76% in the control group, $P=0.69$) and hospitalization of neonates in ICU (9.52% in the VBAC group and 5.95% in the control group, $p=0.39$), there was no significant difference between the two groups.

Conclusion: It seems that the overall incidence of obstetric complications in women attempting vaginal birth after cesarean delivery is low and not higher than those with prior vaginal delivery. Therefore, for the achievement of benefits of natural childbirth for both the mother and the fetus, women with a prior cesarean should be offered VBAC.

Keywords: Cesarean section, Vaginal birth after cesarean, Pregnancy Complications



Copyright © 2023, This is an original open-access article distributed under the terms of the Creative Commons Attribution-noncommercial 4.0 International License which permits copy and redistribution of the material just in noncommercial usages with proper citation.

Introduction

In recent years, the rate of cesarean delivery has increased significantly (1). In the United States, for example, this rate has risen from 5% of deliveries in 1970 to more than 30% in 2016 (2). Cesarean section has always played an important role in reducing mortality and complications from childbirth in emergencies (1). But its uncontrolled performance as a common method of delivery in non-emergency cases is the main challenge recently (3, 4). The risk of maternal death due to cesarean delivery is three times higher than vaginal delivery. In addition, cesarean delivery has far more complications and risks than normal delivery (5). As with any surgery, cesarean section is associated with both short-term and long-term risks that can affect the health of the mother, child, and future pregnancies in the postpartum years.

According to the World Health Organization (WHO), the expected rate of cesarean section in different countries of the world is 10 to 15% of the total number of deliveries (6). Before the implementation of the Health Transformation Plan (HTP) in Iran, the rate of cesarean section was almost three times the global standard, which of course varies in different parts of the country and between public and private hospitals (7).

One of the indications for repeat cesarean delivery is a history of previous cesarean sections (8). Several national medical associations have provided practical guidelines for vaginal delivery after cesarean section (VBAC) (9). In general, VBAC is relatively safe compared to repeat cesarean section (10). The rate of VBAC has been reported to be 14.40% in the United States (11).

Moreover, the success rate of VBAC was reported from 61% to 85% in previous studies (12, 13). Results of the national study in the Qom city showed 85.3% success rate of VBAC, and in this study lower complications were reported when the interval between inter-deliveries was 2-4 years (14).

With the introduction of this method, mothers with a history of cesarean section will have a new chance to experience natural childbirth to be safe from the complications of cesarean section and surgery. Also, the country's health policies are based on avoiding cesarean section as much as possible and encouraging natural childbirth as much as possible. VBAC is a valuable method because of the many benefits that natural childbirth has for both the mother and the fetus as well as the family and the community economy. Naturally, we know that the delivery process may have complications, and this method is no exception to this rule, so the present study was designed to investigate the possible complications of VBAC compared to the control group.

Materials and Methods

In this case-control study, 84 women who had undergone a previous cesarean delivery and referred to Baqiyatallah Hospital for VBAC delivery between April to October 2018 were considered as the case group and 84 women with a previous vaginal delivery, who intended to give birth vaginally for the second delivery in the mentioned time period were considered as the control group.

Inclusion criteria were: pregnant women between 15-45 years, gestational age at birth between 24+0 and 41+6 weeks, the birth weight of more than 500 g, who had undergone a previous cesarean delivery for the VBAC group and vaginal delivery for the control group. Exclusion criteria for both groups included more than one previous birth, multiple pregnancies, previous uterine surgery and contraindications for vaginal childbirth such

as macrosomia, bleeding, premature birth, preeclampsia and breech presentation.

The ethics committee of the Baqiyatallah University of Medical Sciences approved the study protocol (IR.BMSU.BAQ.REC.1398.033). Demographic (age, education), anthropometric (BMI, hemoglobin level), obstetric and perinatal data (neonate weight) of subjects were collected and registered in a researcher developed form, which was retrieved from their medical records or interview. The investigated outcomes in two groups included urinary and bladder rupture, stool control disorder, uterine rupture, rectal rupture, uterine atony, nephrotic infection, fetal death and the need for maternal hospitalization in the ICU.

For statistical analysis, results were presented as mean \pm SD for quantitative variables and were summarized by frequency (percentage) for categorical variables. Continuous variables were compared using the student t-test and qualitative variables were compared using chi-square test or Fisher exact test if appropriate. P values of ≤ 0.05 were considered statistically significant. For the statistical analysis, the statistical software SPSS version 23.0 for windows (IBM, Armonk, New York) was used.

Results

Table 1 shows the baseline and disease history of patients in the two investigated groups. There was no significant difference in the mean age of the patients ($P=0.71$), BMI ($P=0.13$), hemoglobin ($P=0.54$) and neonate weight ($P=0.09$) between the two groups. Moreover, as shown in Table 1, two groups were homogenous in relation to education ($P=0.52$). None of the women in the two groups had a history of hypertension or chemotherapy. Two women in the VBAC group and one in the control group had diabetes and the rate of gestational diabetes in the two groups was 3.57% and 4.76%, respectively.

Table 1. Comparison of the baseline characteristics of patients between patients in VBAC and control groups

Variables		VBAC group N = 84	Control group N = 84	p-value
Age (Year)		30.49 \pm 6.83	32.08 \pm 7.28	0.153*
Neonate weight (gr)		3150 \pm 215.6	3220 \pm 313.08	0.090*
Hemoglobin level		11.99 \pm 0.83	12.08 \pm 1.04	0.541*
BMI (Kg/m ²)		26.33 \pm 5.25	24.98 \pm 6.13	0.132*
Education	Diploma or less	27 (32.14)	31 (36.9)	0.524**
	Academic	57 (67.85)	53 (63.09)	
Disease history	Hypertension	0	0	-
	Diabetes	2 (2.38)	1 (1.19)	>0.99**
	Gestational diabetes	3 (3.57)	4 (4.76)	>0.99**
	Chemotherapy	0	0	-

*Student t-test, ** Exact fisher test

VBAC: vaginal delivery after cesarean section, BMI: Body mass index

The occurrence of obstetric outcomes, in VBAC and control groups are shown in [Table 2](#). There was no occurrence of urinary rupture, bladder rupture, stool control disorder, uterine rupture, nephrotic infection and ICU hospitalization of the mothers in the two groups. Moreover, in the control group, none of them

reported rectal rupture and uterine atony. With regards to puerperal infection (3.57% in VBAC group and 4.76% in control group, $P=0.69$) and hospitalization of neonates in ICU (9.52% in VBAC group and 5.95% in control group, $p=0.39$), there was no significant difference between two groups.

Table 2. The comparison of the obstetric outcomes between patients in VBAC and control groups

Perinatal outcome	VBAC group	Control group	p-value*
	N = 84	N = 84	
Urinary rupture	0	0	-
Bladder rupture	0	0	-
Stool control disorder	0	0	-
Uterine rupture	0	0	-
Rectal rupture	1 (1.19)	0	0.332
Uterine atony	2 (2.38)	0	0.150
Nephrotic infection	0	0	-
Puerperal infection	3 (3.57)	4 (4.76)	0.691
Fetal death	0	1 (1.19)	0.333
Neonate NICU hospitalization	8 (9.52)	5 (5.95)	0.391
Mother ICU hospitalization	0	0	-

*Exact Fisher test

VBAC: Vaginal delivery after cesarean section, NICU: Newborn intensive care unit, ICU: Intensive care unit

Discussion

Vaginal delivery is a natural process that usually does not require medical intervention and the country's health policies are based on avoiding cesarean section as much as possible. This study was conducted to investigate the possible complications in women attempting vaginal birth after cesarean delivery. We found that the overall incidence of obstetric complications in those attempting VBAC was low and there was no significant difference between this group compared those with prior vaginal delivery.

In the study of Charitou and colleagues in 2019 (15), severe maternal and fetal complications were very rare. In our study, in line with this study, no severe maternal or fetal complications were observed. Moreover, in another study in Tanzania in 2018 (16), the maternal and neonatal outcomes of the VBAC group were similar to those of women undergoing repeated cesarean section. Takeya et al. in their study only found 0.46% of uterine rupture and no maternal and perinatal death in women who underwent VBAC (17). Moreover, in the multi-center study in Italy on 224 pregnant women that underwent VBAC, there were no report of maternal and neonatal adverse events (18). The results of all the above studies indicate that VBAC is justifiable. However, predictors of success in VBAC should be identified and addressed to eligible women. For example, in Asgarian et al. (14) successful of

VBAC was associated with the long interval between inter-deliveries. In Mizrachi et al. study, previous successful VBAC, lower head station on decision at previous cesarean delivery, the lower newborn weight at previous cesarean delivery and larger cervical effacement on admission at delivery were the predictors of successful VBAC (19). In the Lazarou et al. study high BMI, no previous spontaneous delivery, and fetal distress as a cesarean indication were negatively correlated with a successful VBAC (20). In Li et al. study, gestational age, history of vaginal delivery, birth weight, BMI, spontaneous onset of labour, and rupture of membranes were independently associated with VBAC (21). Clinical judgment is important in deciding whether to have a vaginal delivery after a cesarean or a repeat cesarean section. It seems that most women who have already had a cesarean section can give birth vaginally if the patient is carefully selected and the delivery is well supervised.

However, this study had some limitations, due to the small sample size of the study and the low occurrence of complications, we could not have a strong statistical inference and enough power to distinguishing possible differences. Secondly, due to the retrospective nature of the study, we could not include data on neonatal outcomes. Finally, due to low resource we could not include a third group including those who had an

elective repeated cesarean delivery and compared their complications with these two investigated groups to determine the safest mode of delivery.

Conclusion

It seems that the overall incidence of obstetric complications in women attempting vaginal birth after cesarean delivery is low and not higher than those with prior vaginal delivery. Therefore, for the achievement of benefits of natural childbirth for both the mother and the fetus, women with a prior cesarean should be offered VBAC.

Funding

This study was funded by the Baqiyatallah University of Medical Sciences, I.R. Iran.

Authors' contributions

ZS, and AJ developed the idea and the proposal, abstracted, and prepared the manuscript. ZS, AS and AJ participated in the study design and analyzed the data. AJ contributed to the data gathering. All authors read and approved the final manuscript.

Acknowledgments

None.

Conflict of Interest

The authors declare that they have no competing interests.

References

1. Roberts CL, Nippita TA. International cesarean section rates: the rising tide. *The Lancet Global Health*. 2015; 3(5):e241-e2. [DOI:10.1016/S2214-109X(15)70111-7] [PMID]
2. Martin J, Hamilton B, Osterman M. Births in the United States, 2016 (NCHS Data Brief No. 287). Hyattsville, MD: National Center for Health Statistics; 2017.
3. Lurie S, Shalev A, Sadan O, Golan A. The changing indications and rates of cesarean section in one academic center over a 16-year period (1997-2012). *Taiwanese J Obstet Gynecol*. 2016; 55(4):499-502. [DOI:10.1016/j.tjog.2014.12.014] [PMID]
4. Nilsen C, Østbye T, Daltveit AK, Mmbaga BT, Sandøy IF. Trends in and socio-demographic factors associated with cesarean section at a Tanzanian referral hospital, 2000 to 2013. *Int J Equit Health*. 2014; 13(1):1-11. [PMID] [PMCID] [DOI:10.1186/s12939-014-0087-1]
5. Chauhan S, Beydoun H, Hammad I, et al. Indications for caesarean sections at ≥ 34 weeks among nulliparous women and differential composite maternal and neonatal morbidity. *Int J Obstet Gynaecol*. 2014; 121(11):1395-402. [DOI:10.1111/1471-0528.12669] [PMID]
6. Katikireddi SV, Gorman DR, Leyland AH. A comparison of trends in caesarean section rates in former communist (transition) countries and other European countries. *Europ J Pub Health*. 2013; 23(3):381-3. [DOI:10.1093/eurpub/cks165] [PMID] [PMCID]
7. Yavangi M, Sohrabi MR, Alishahi TA. Effect of Iranian ministry of health protocols on cesarean section rate: a quasi-experimental study. *J Res Health Sci*. 2013; 13(1):48-52.
8. Cheng YW, Eden KB, Marshall N, Pereira L, Caughey AB, Guise J-M. Delivery after prior cesarean: maternal morbidity and mortality. *Clin Perinatol*. 2011; 38(2):297-309. [PMID] [PMCID] [DOI:10.1016/j.clp.2011.03.012]
9. Bellows P, Shah U, Hawley L, et al. Evaluation of outcomes associated with trial of labor after cesarean delivery after a change in clinical practice guidelines in an academic hospital. *J Maternal Fetal Neonat Med*. 2017; 30(17):2092-6. [DOI:10.1080/14767058.2016.1237498] [PMID]
10. Dodd JM, Crowther CA, Huertas E, Guise JM, Horey D. Planned elective repeat caesarean section versus planned vaginal birth for women with a previous caesarean birth. *Cochrane Database Syst Rev*. 2013; 10(12):CD004224. [DOI:10.1002/14651858.CD004224.pub3] [PMID]
11. Ananth CV, Friedman AM, Keyes KM, Lavery JA, Hamilton A, Wright JD. Primary and repeat cesarean deliveries: a population-based study in the United States, 1979-2010. *Epidemiol (Cambridge, Mass)*. 2017;28(4):567. [PMCID] [DOI:10.1097/EDE.0000000000000658] [PMID]
12. Naji O, Wynants L, Smith A, Abdallah Y, Stalder C, Sayasneh A, et al. Predicting successful vaginal birth after Cesarean section using a model based on Cesarean scar features examined by transvaginal sonography. *Ultrasound Obstet Gynecol*. 2013; 41(6):672-8. [DOI:10.1002/uog.12423] [PMID]
13. Haumonte JB, Raylet M, Christophe M, et al. French validation and adaptation of the Grobman nomogram for prediction of vaginal birth after cesarean delivery. *J Gynecol Obstet Human Reproduct*. 2018; 47(3):127-31. [DOI:10.1016/j.jogoh.2017.12.002] [PMID]
14. Asgarian A, Rahmati N, Nasiri F, Mohammadbeigi A. The failure rate, related factors, and neonate complications of vaginal delivery after cesarean section. *Iran J Nursing*

- Midwif Res. 2020;25(1):65. [PMID] [PMCID] [DOI:10.4103/ijnmr.IJNMR_101_19]
15. Charitou A, Charos D, Vamenou I, Vivilaki VG. Maternal and neonatal outcomes for women giving birth after previous cesarean. *Europ J Midwif.* 2019; 3. [DOI:10.18332/ejm/108297]
 16. Rweyemamu MA. Predictors and outcomes of women attempting vaginal birth after cesarean delivery at Iringa regional referral hospital: The University of Dodoma; 2018.
 17. Aya T, Emi A, Takahashi Y, Eiji K, Masaki M, Takeo N. Trial of labor after cesarean delivery (TOLAC) in Japan: rates and complications. *Arch Gynecol Obstet.* 2020; 301(4):995-1001. [DOI:10.1007/s00404-020-05492-8] [PMID]
 18. Familiari A, Neri C, Caruso A, et al. Vaginal birth after caesarean section: a multicentre study on prognostic factors and feasibility. *Arch Gynecol Obstet.* 2020; 301(2):509-15. [DOI:10.1007/s00404-020-05454-0] [PMID]
 19. Mizrachi Y, Barber E, Kovo M, Bar J, Lurie S. Prediction of vaginal birth after one cesarean delivery for non-progressive labor. *Arch Gynecol Obstet.* 2018; 297(1):85-91. [DOI:10.1007/s00404-017-4569-4] [PMID]
 20. Lazarou A, Oestergaard M, Netzl J, Siedentopf JP, Henrich W. Vaginal birth after cesarean (VBAC): fear it or dare it? An evaluation of potential risk factors. *J Perinat Med.* 2021;49(7):773-82. [DOI:10.1515/jpm-2020-0222] [PMID]
 21. Li YX, Bai Z, Long DJ, et al. Predicting the success of vaginal birth after caesarean delivery: a retrospective cohort study in China. *BMJ open.* 2019; 9(5):e027807. [PMID] [PMCID] [DOI:10.1136/bmjopen-2018-027807]

How to Cite This Article:

Soleimani Z, Jenab A, Soleimani A. Obstetric Outcomes of Vaginal Birth After Cesarean Section: A Case-Control Study. *J Adv Med Biomed Res.* 2023; 31(146):250-4.

Download citation:

[BibTeX](#) | [RIS](#) | [EndNote](#) | [Medlars](#) | [ProCite](#) | [Reference Manager](#) | [RefWorks](#)

Send citation to:

 [Mendeley](#)  [Zotero](#)  [RefWorks](#) [RefWorks](#)