Labor Characteristics And Intrapartum Interventions In Women With Vaginal Birth After Cesarean Section

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Research Article

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Abstract

Background: Cesarean delivery is the most frequently performed surgical procedure worldwide. With the development of China's Two-child-policy, vaginal birth after cesarean section (VBAC) has aroused a great public concern due to the fear of perinatal complications and uterine rupture. It is important to understand the labour characteristics and intrapartum management of women attempting VBAC to enhance the rates of successful VBAC. In this study, we aimed to provide clinical evidence of standardized intrapartum management in women with a trial of labour after cesarean section (TOLAC).

Material and methods: This observational retrospective study enrolled all VBAC women who delivered vaginally with spontaneous labor at the Second Affiliated Hospital of Wenzhou Medical University from 2016 and 2019. They were allocated into observation A group (the previous cesarean section was performed before dilation of cervix) and observation B group (the previous cesarean section was performed after dilation of cervix). 149 primiparae constituted primipara control group and 155 multiparae with second vaginal birth constituted multipara control group. Durations of labor, intervention measures and perinatal outcomes were compared among the groups.

Results: The durations of labor, intrapartum interventions and maternal and neonatal outcomes in observation A group resembled to observation B group. However, compared with primiparae, women in observation group and observation A group had shorter first, second and the total stages of labor. Compared with multiparae, Women in observation group and observation B group had longer second stage of labor, but shorter third stage of labor. VBAC women were more likely to receive episiotomy and had higher incidences of postpartum hemorrhage than primipara and multipara women.

Conclusions: Labour characteristics in VBAC women with or without cervix dilation showed no significant difference, but differed significantly from those of multiparae and primiparae. Artificial rupture of membrane, oxytocin, phloroglucinol and epidural analgesia is regularly used for VBAC women. Episiotomy is encouraged to shorten the second stage of labor, while forceps delivery should be minimized whenever possible. We should be alert to the occurrence of postpartum hemorrhage in VBAC women.

Background

Cesarean section rate worldwide has increased from 10–21% over the past 15 years with a continuously increasing trend annually by 4% [1]. It's worth noting that half of all unnecessary caesareans occur in Brazil and China. This has aroused a significant global concern due to the economic burden and the increased complications after CS, especially in China after the implementation of "universal twochild policy"[2, 3]. Women following a CS opt to have a second child either by repeated cesarean section (RCS) or vaginal birth after cesarean section (VBAC) [2]. Due to the surgical indication of uterine scar, the phrase 'once a cesarean, always a cesarean' has always been repeated and supported[3, 4].

However, some studies suggest that RCS does not appear to produce the benefits previously attributed to it [3, 5]. Actually, RCS increased respiratory morbidity, hospital costs and the length of hospital stay in neonates [6]. VBAC, as a relevant factor in decreasing overall CS rate, not only shows a lower incidence of postpartum hemorrhage, embolism disease and infection, but also offers advantages in terms of reducing health-care costs, enhancing patient satisfaction, and facilitating faster recovery from giving birth [4, 5, 7]. Therefore, VBAC should be encouraged in women with a prior low transverse cesarean delivery rather than RCS [8].

Currently, most studies focus on the success factors and risks of TOLAC, and the maternal and neonatal outcomes of VBAC. However, we know little about labour characteristics and intrapartum interventions. Therefore, in this study, we tried to offer clinical evidence of labor management in VBAC by identifying the characteristics of labor, intervention measures and perinatal outcomes.

Methods

Study design, population, sample and data collection

This is an observational retrospective cohort study including all VBAC women who delivered vaginally with spontaneous labor at the Second Affiliated Hospital of Wenzhou Medical University from January 2016 and December 2019. Primiparas and multiparas who gave birth during the same period served as the control group. Pregnant women with VBAC were those who underwent a cesarean section with low-transverse segment at the time of their first delivery and went into spontaneous labor at VBCA.

Participants were eligible with singleton term pregnancy, cephalic presentation, the gestational age of 37-42 weeks, and without pregnancy complications including hypertension disorders, diabetes mellitus, intrahepatic cholestasis of pregnancy, placenta previa, placental abruption, oligohydramnios, and polyhydramnios. Exclusion criteria were women with prior classical, T-incision or longitudinal-incision, previous myomectomy, breech position, fetal birth weight of < 2.5 kg or > 4.0 kg, as well as their newborns with major congenital malformations (congenital anal atresia, congenital biliary atresia, congenital heart disease and so on). Women with incomplete information were also excluded.

VBAC women were allocated into observation A group (the previous cesarean section was performed before dilation of cervix, n=109) and observation B group (the previous cesarean section was performed after dilation of the cervix, n=30). The control group included the primipara control group (n=149) and the multipara control group (n=155). We reviewed the labour processes of all eligible participants in the electronic medical record database. Baseline characteristics included maternal age, body mass index (BMI), gestational age and neonatal birth weight. The main outcomes were the duration of each stage of labor and the total labor, and intrapartum interventions including artificial membrane breaking, phloroglucinol usage, oxytocin usage, labor analgesia, forceps delivery and mediolateral episiotomy, which were associated with the success rate of VBAC. Additionally, maternal and neonatal complications included Apgar scores at 1 min and 5 min, perineal laceration, postpartum urinary retention, blood loss during delivery and 2 hours postpartum, postpartum

hemorrhage (PPH, defined as the blood loss of more than 500 ml following a vaginal delivery or more than 1000 ml following a caesarian section), and the incidence of fever (T >38 ℃ during labor).

Intrapartum interventions were selected according to the process of labor. For example, artificial membrane rupture and oxytocin were used to accelerate labor by enhancing the uterine contractions. Phloroglucinol was used to soften the cervix. Epidural anesthesia was encouraged to provide pain control. Forceps were used for operative vaginal delivery for maternal and fetal indications. Mediolateral episiotomy was advised if necessary.

Statistical analysis

SPSS 22.0 software was used for statistical analysis. The comparisons of continuous variables with normal distributions (media mean ± standard deviation) were conducted by Student t-test. The comparisons of continuous variables without normal distribution (median with interquartile range) were conducted by Mann-Whitney U test. The comparisons of categorical variables (percentage) were conducted by Pearson's Chi-square test or Fisher exact probability test. All P-values were two-sided and if below 0.05 the results were considered statistically significant.

Results

During the study period, a total of 443 women that enrolled into the final analysis were categorized into two groups: women with VBCA (observation group, n= 139) and normal term pregnant women with vaginal delivery (control group, n= 304). The observation group was divided into two subgroups: the observation A group (VBAC women with cervix dilation before the previous CS, n=109) and the observation B group (VBAC women without cervix dilation before the previous CS, n=30). The control group included the primipara control group (n=149) and the multipara control group (n=155).

Baseline characteristics of the study groups

As shown in table 1, there were no significant differences in demographic characteristics among the groups ($P > 0.05$).

The duration of labor

There were no significant differences in the duration of all stages of labor between observation A group and observation B group ($P>0.05$). Compared with women in the primipara control group, women in the observation group and observation A group had shorter first, second and the total stage of labor ($P<0.05$) (Table 2). In contrast, compared with women in the multipara control group, women in the observation group and observation B group had longer second stage of labor and shorter third stage of labor ($P<0.05$). No differences were found in the first and the total stage of labor between the observation group and the multipara control group, as well as between the observation B group and the multipara control group ($P>0.05$). There was also no difference in the duration of the third stage of labor between the observation group and the control group, or between observation group A and the control group ($P>0.05$).

Intrapartum interventions

As shown in table 3, women who had a successful VBAC were more likely to require mediolateral episiotomy, which showed a statistical difference between the observation group and primipara control group (39 (28.1%) vs. 11 (7.4%), $P=0.001$), between the observation A group and primipara control group (29 (26.6%) vs. 11 (7.4%), $P=0.001$), between the observation group and the multipara control group (39 (28.1%) vs. 9 (5.8%), $P=0.001$), and between the observation B group and the multipara control group (10 (33.3%) vs. 9 (5.8%), $P=0.001$). But there was no significant difference in the rates of forceps delivery among these groups ($P > 0.05$).

The rates of oxytocin usage and labor analgesia in the observation group and observation A group were lower than those in the primipara control group ($P <0.05$). Similar results were showed in the rate of artificial rupture of membranes ($P <0.05$). There was no statistically significant difference in the rate of phloroglucinol usage among groups, except that it was higher in the observation group than in the multipara control group ($P <0.05$).

There were no significant differences in the rates of artificial rupture of membranes, oxytocin usage, labor analgesia, phloroglucinol usage, mediolateral episiotomy and forceps delivery between the observation A and B group ($P > 0.05$).

Maternal and neonatal outcomes of the study groups

Neonates in all groups were of similar Apgar scores at 1-minute and 5-minutes ($P>0.05$), and there was no neonatal asphyxia in each group. There was no significant difference in the incidence of postpartum urinary retention among all groups (table 4).

No differences in the rates of perineal laceration were found between the observation group and the multipara control group, between the observation B group and the multipara control group, and between observation A and B group ($P > 0.05$), but it was higher in observation group than primipara control group (86% vs. 67.4%, $P=0.001$). Similarly, the rate of perineal laceration in the observation A group was also higher than that in the primipara control group (83.8% vs. 67.4%, $P=0.001$).

Blood loss during delivery and 2 hours postpartum and the incidence of postpartum hemorrhage in VBAC women were higher than those in primipara or multipara women ($P <0.05$), except that the mothers in the observation A group had a non-significant increased risk of blood loss during delivery and 2 hours postpartum ($P=0.077$). However, they did not differ between observation A and observation B group ($P > 0.05$).

The incidence of fever during labor in the observation group did not differ from that in the primipara control group ($P > 0.05$), but was higher than that in the multipara control group (17 (12.2%) vs. 3 (1.9%), $P =0.001$). There was no significant difference in the incidence of fever during labor between the observation

group A and the primipara control group, between the observation group B and the multipara control group, and between the observation A and B group ($P > 0.05$).

Discussion

It was the first time to find that labor characteristics, intrapartum interventions and perinatal outcomes in VBAC women with cervix dilation strongly resembled those in VBAC women without cervix dilation before the previous cesarean section, but differed significantly from those of multiparae and primiparae.

The Durations Of Labor

We observed that women who underwent VBAC had shorter first and total stage of labor than primiparous women, but were comparable to the multiparous women. Likewise, Zdenek Rusavy et al. showed women with VBAC had a shorter first stage of labor than primiparous women [9]. However, Grylka-Baeschlin et al. demonstrated that overall and first-stage labor duration in women with VBAC were comparable to that of primiparae but significantly longer than that in multiparae [7]. The conflicting results may be due to the differences in the study design, the sample size, the heterogeneous study population, as well as intrapartum usage of oxytocin and analgesia [8, 11]. Prospective, multicenter, large-scale trials are needed to elucidate the characteristics of labor in women with VBAC.

Considerable attention had been paid to the durations of labor in VBAC women with and without cervical dilation in their prior labor. And we found VBAC women with cervical dilation showed comparable first and total stage of labor than multiparae. However, compared with primiparae, we found VBAC women without cervical dilation showed shorter first and total stage of labor. The reduced cervical resistance to dilatation in parous women might account for the differences [9].

As for the second stage of labor, we found it was shorter in VBAC women than that in primiparous women, but longer than that in multiparous women, which was in agreement with the previous study [7]. Likewise, women who underwent VBAC without cervical dilation showed a shorter second stage of labor than primiparae, while those with cervical dilation showed a longer one than multiparae. It might be related to the loss of pelvic floor contractility in prior pregnancy [12]. There is little research on the third stage of labor, and we found that the third stage of labor was shorter for VBAC women than for multiparae. Similar results were discovered between VBAC women with cervical dilation and multiparae. However, no difference in the third stage of labor was found between VBAC women and primiparous women, and between VBAC women without cervical dilation and primiparous women. This might be because our midwives paid more attention to the women with VBAC and took more active measures to prevent the occurrence of postpartum hemorrhage, resulting in early delivery of the placenta in the third stage of labor.

Usage Of Interventions During The Labor

Oxytocin and artificial rupture of membrane are routine methods to strengthen contractions and accelerate labor whenever required, which was associated with increased rates of uterine rupture during VBAC [5, 11]. Our study analyzed the rate of oxytocin usage and the rate of artificial rupture of membrane (AROM) among VBAC women, primiparae and multiparae. The results showed that the rate of oxytocin and AROM usage in VBAC women was lower than those in primiparae but comparable to those in multiparae, which was consistent with a previous study [14]. However, Grylka-Baeschlin et al. found the women with VBAC received oxytocin significantly less often than primiparae, but more often than multiparae [7]. Given the dose-dependent relationship between oxytocin use and uterine rupture [11], low-dose oxytocin is safe and effective in VBAC.

Phloroglucinol is recommended to facilitate labor not only by reducing spasms and edema of the cervix but also by harmonizing shrinkage of the uterus [16]. Besides, Tabassum et al. found that pain intensity seemed lower in laboring women who received phloroglucinol as compared to those who received placebo [26]. This might be because pain during the delivery mainly comes from dilation of the cervix and contraction of the uterus. Phloroglucinol, as one of the spasmolytics and spasmoanalgesics, also showed few side effects in both mother and fetus [16, 26]. The fear of masking the pain of a uterine rupture had made the use of epidural anesthesia a dilemma [5]. Our data showed women with successful VBAC had a lower rate of epidural analgesia than primiparae but was comparable to multiparae, which was similar to a former research [14]. Conversely, the women with VBAC were more likely to use phloroglucinol than multiparae, but not primiparae. Furthermore, the rate of phloroglucinol usage in the VBAC women with cervical dilation before the previous cesarean section was similar to that of multiparae, while the rate of phloroglucinol usage in the VBAC women without cervical dilation before the previous cesarean section was similar to that of primiparae, which might be because they have similar cervical conditions. Epidural analgesia is encouraged for women undergoing TOLAC to provide pain control without increasing the risk of postpartum bleeding or uterine rupture [15]. The rate of epidural analgesia might be related to different durations of labor in women between groups.

Some studies demonstrated prolonged labour, especially the prolongation in the second stage of labor, was associated with multiple adverse maternal and foetal outcomes such as obstructed labour, postpartum haemorrhage, perineal injuries [4, 16, 17]. To shorten the second stage of labor, forceps and episiotomy were frequently used for operative vaginal delivery [11]. Our study showed that episiotomy were more common for VBAC women compared with multiparous women and primiparous women, which was in agreement with a recent study [3]. But there was no significant difference in the rates of forceps deliveries among VBAC, primiparae and multiparae in our study. And Madi JM et al. [25] found the rate of forceps deliveries was 5.3% in women who underwent VBAC, which was similar to our result (3.6%). Forceps-assisted vaginal deliveries are associated with maternal adverse outcomes such as sphincter damage, pudendal nerve damage, third- and fourth-degree perineal laceration, as well as neonatal adverse outcomes like subdural or cerebral hemorrhage, facial-nerve injury, brachial plexus injury, and the increased rate of mechanical ventilation [12, 17, 18, 19]. Consequently, the use of forceps should be minimized whenever possible in current study, and to avoid uterine rupture by shortening the second stage of labor might be the reason for the increased rate

of episiotomy usage in VBAC women. In contrast, Zdenek Rusavy et al. found that primiparous women and multiparous women had comparable rates of episiotomy to women with VBAC [9]. The differences may be explained by differences in the discretion of obstetricians and indications for episiotomy.

Maternal And Neonatal Outcomes Of The Study Groups

Previous studies had shown a positive correlation between perineal lacerations and operative vaginal deliveries, but most of these studies concentrated on third- and fourth-degree perineal tears [2, 9, 18, 20]. Our study included perineal lacerations from first- to fourth-degree, and the result was consistent with the observation reported elsewhere, [9] showing a higher risk of spontaneous perineal tears in VBAC women and VBAC women without cervical dilation compared to the primipara control group. A possible explanation is related to the faster progress in labor in VBAC women, which when coupled with the nulliparous pelvic floor in these without cervical dilation may lead to higher risk of perineal rupture [9, 18].

Postpartum hemorrhage (PPH) can be caused primarily by atony uterus, retained tissue, genital tract tear, coagulation problem, and uterine rupture [22]. Previous studies had almost focused on the rate of PPH in VBAC and elective repeat cesarean delivery, and found PPH occurred more often in VBAC and mothers with PPH were exposed to more blood transfusion [11, 22, 23]. This was the first time to compare the rate of PPH between women who underwent VBAC and vaginal delivery. Our study showed a higher rate of PPH in VBAC than primiparae and mulriparae. We also found there was more blood loss during and after VBAC within two hours than primiparae and multiparae delivered by vaginal. However, some studies revealed VBAC was associated with a lower incidence of PPH and was considerably less expensive than repeat cesarean section [2, 3, 4]. That's probably because, with the increase of parity and gravidity, women's myometrial muscular strength may get reduced due to the reduction of collagen fibers, especially in women with a history of cesarean section [22]. To reduce the occurrence of PPH, effective labor management such as actively prepared blood, uterus massage and drug therapy should be encouraged in VBAC women.

With regard to infectious complications, maternal fever was more common in VBAC than elective repeat cesarean delivery [6, 13]. Rita E. Fisler et al. found the increased rate of maternal intrapartum fever was associated with the use of epidural analgesia, resulting in adverse neonatal outcomes [24]. However, the relationship between epidural analgesia and the rate of maternal intrapartum fever in our study was not clear. And few data was found in comparing the rate of maternal fever in women with between VBAC and vaginal delivery. Our research found no differences between women who underwent VBAC without cervix dilation before the previous cesarean section and primiparae, women who underwent VBAC with cervix dilation and multiparae, women who underwent VBAC and primiparae. However, intrapartum fever occurred more often in women with VBAC than multiparae, which might be the result of the prolonged labor.

Few previous studies have investigated postpartum urinary retention in VBAC women. It was the first time to find there was no significant difference in the occurrence of postpartum urinary retention in VBAC women, primiparae and multiparae. Regarding the postnatal condition of the newborn such as neonatal asphyxia, Apgar score in 1st minute plays an important role. No significant difference was found in women who had normal spontaneous vaginal delivery as compared to women who had VBAC [3], which was in agreement with our study. A previous study indicated that compared with a trial of labor, there was a higher rate of transient tachypnea of the newborn after elective repeat cesarean section [24]. This condition is due to delayed clearance of fluid from the lung at the time of birth and results in some degree of respiratory distress. Therefore, VBAC may reduce the occurrence of neonatal asphyxia.

Strengths And Limitations

The major strength of the present study lies in its design. Unlike most previous studies on this topic, our study took cervical dilation prior to the cesarean section into account. And it was the first time to compare durations of labor, intrapartum interventions and perinatal outcomes between VBAC women without cervical dilation before the previous cesarean section and primiparae, and between VBAC women with cervical dilation before the previous cesarean section and multiparae, respectively. Besides, we found a remarkable resemblance between women who underwent VBAC with and without cervical dilation in their prior labor respect to the results. Therefore, TOLAC is well recommended in women without contraindications of VBAC. The major limitation of the study is certainly the number of women in our groups, however, the size still allowed a proper statistical analysis. Naturally, the survey is slightly incomplete as all the necessary information could not be gathered. Another limitation is that there might be some missing data in such a retrospective study.

Conclusions

In conclusion, labor characteristics, intrapartum interventions and perinatal outcomes in VBAC women with cervix dilation strongly resembled those in VBAC women without cervix dilation before the previous cesarean section, but differed significantly from those of multiparae and primiparae. VBAC women had shorter first and total labor than primiparae, but comparable to multiparae, and showed a longer second stage of labor than primiparae, but shorter than multiparae. The duration of the third stage of labor was shorter than both primiparae and multiparae. Hence, strict labor management, especially that in the second stage of labor of VBAC should be emphasized. Artificial rupture of membrane, oxytocin, phloroglucinol and epidural analgesia are appropriate intervention measures for VBAC women during delivery. In addition, episiotomy is encouraged to shorten the second stage of labor, but forceps delivery should be minimized whenever possible. We should pay more attention to the third stage of labor to avoid PPH in VBAC women.

Abbreviations

VBAC: vaginal birth after cesarean section;

TOLAC: trial of labour after cesarean section

CS: Cesarean section

RCS: repeated cesarean section

BMI: body mass index

PPH: postpartum hemorrhage

AROM: artificial rupture of membrane.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained by the Research Ethics Committee of the Second Affiliated Hospital of Wenzhou Medical University (approval number: LCKY2020-218). The consent form included information and contact details

of the supervising researcher Ying Hua. All participants were above 18. Informed

consent was obtained from all the participants and all methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Yanyan Ma contributed to the design of the work and collected the data. Lingli Peng and Ruyang Chen organized the data and performed statistical analyses. Yehui Lan and Shuangjia Pan drafted the article. Ying Hua supervised the analyses. All authors have contributed to the design of the study, drafting the paper and revising it critically for important intellectual content and approved it for publication.

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Tables

Table 1 Baseline characteristics of the study groups

	Observation group (n=139)	Observation A group (n=109)	Observation B group (n=30)	Primipara Control group (n=149)	Multipara Control group (n=155)	*P* values				
						p^a	p^b	p^c	p^d	p^e
Mother's age (years)	30.36±3.76	30.21±3.75	30.90±3.81	29.87±2.68	29.85±3.29	0.198	0.217	0.389	0.121	0.376
Antepartum BMI (kg/m^2)	25.69±2.68	25.49±2.69	26.41±2.55	25.26±2.74	25.56±2.60	0.188	0.689	0.515	0.104	0.097
Gestational age (weeks)	38.82±0.97	38.85±0.97	38.69±0.98	38.88±1.08	39.01±0.87	0.623	0.073	0.749	0.075	0.433
Newborn weight (g)	3225.76±369.32	3200.18±357.26	3318.67±402.93	3213.02±285.27	3295.87±283.63	0.743	0.067	0.845	0.709	0.120

Data are given as mean ± SD.

[a] The comparison between Observation group and Primipara Control group.

[b] The comparison between Observation group and Multipara Control group.

[c] The comparison between Observation A group and Primipara Control group.

[d] The comparison between Observation B group and Multipara Control group.

[e] The comparison between Observation A group and Observation B group.

Table 2 Durations of labor

	Observation group (n=139)	Observation A group (n=109)	Observation B group (n=30)	Primipara Control group (n=149)	Multipara Control group (n=155)	*P* values				
						p^a	p^b	p^c	p^d	p^e
The first stage of labor (min)	390(240,660)	405(242,657)	304(240,770)	630(377,847.5)	380(260, 530)	0.001	0.378	0.001	0.764	0.411
The second stage of labor (min)	39(15,83)	39(14,77)	48(26,98)	72(42,113.5)	15(9, 43)	0.001	0.001	0.001	0.001	0.206
The third stage of labor (min)	5(4,7)	5(4,7)	5(3,6)	5(4,8)	6(5, 10)	0.378	0.001	0.671	0.002	0.283
The total stage of labor (min)	453(267,739)	479(268,733)	404(264,801)	703(472,941.5)	435 (280, 600)	0.001	0.230	0.001	0.895	0.610

Data are given as median (interquartile range, IQR).

[a] The comparison between Observation group and Primipara Control group.

[b] The comparison between Observation group and Multipara Control group.

[c] The comparison between Observation A group and Primipara Control group.

[d] The comparison between Observation B group and Multipara Control group.

[e] The comparison between Observation A group and Observation B group.

Table 3 Usage of interventions during the labor

	Observation group (n=139)	Observation A group (n=109)	Observation B group (n=30)	Primipara Control group (n=149)	Multipara Control group (n=155)	*P* values				
						p^a	p^b	p^c	p^d	p^e
Artificial membrane breaking	29(20.9%)	23(21.1%)	6(20.0%)	50(33.6%)	20(12.9%)	0.016	0.067	0.000	0.461	0.895
Oxytocin usage	16(11.5%)	11(10.1%)	5(16.7%)	71(47.7%)	15(9.7%)	0.001	0.609	0.001	0.432	0.499
Labor analgesia	60(43.2%)	49(45.0%)	11(36.7%)	110(73.8%)	64(41.3%)	0.001	0.745	0.001	0.637	0.417
phloroglucinol	8(5.8%)	8(7.3%)	0(0.0%)	17(11.4%)	1(0.6%)	0.089	0.028	0.275	1.000	0.278
Mediolater al episiotomy	39(28.1%)	29(26.6%)	10(33.3%)	11(7.4%)	9(5.8%)	0.001	0.001	0.001	0.001	0.534
Forceps delivery	5(3.6%)	4 (3.7%)	1(3.3%)	4(2.7%)	1 (0.6%)	0.916	0.169	0.652	0.299	1.000

Data are given as n (%).

[a] The comparison between Observation group and Primipara Control group.

[b] The comparison between Observation group and Multipara Control group.

[c] The comparison between Observation A group and Primipara Control group.

[d] The comparison between Observation B group and Multipara Control group.

[e] The comparison between Observation A group and Observation B group.

Table 4 Maternal and neonatal outcomes of the study groups

	Observation group (n=139)	Observation A group (n=109)	Observation B group (n=30)	Primipara Control group (n=149)	Multipara Control group (n=155)	*P* values				
						p^a	p^b	p^c	p^d	p^e
Apgar score at 1 min	10(10, 10)	10(10, 10)	10(10, 10)	10(10, 10)	10 (10, 10)	0.102	0.138	0.245	0.915	0.261
Apgar score at 5 min	10(10, 10)	10(10, 10)	10(10, 10)	10(10, 10)	10(10, 10)	0.142	0.743	0.098	0.444	0.456
Blood loss during delivery and 2 hours postpartum (ml)	210(140, 410)	200(140,365)	310(167,472)	190(140,250)	140(110,195)	0.012	0.001	0.077	0.001	0.091
Postpartum hemorrhage	19(13.7%)	14(12.8%)	5(16.7%)	8(5.4%)	5(3.2%)	0.016	0.001	0.034	0.011	0.462
Fever during labor	17(12.2%)	15(13.8%)	2(6.7%)	11(7.4%)	3(1.9%)	0.165	0.001	0.093	0.186	0.349
Perineal laceration	86(86%)	67(83.3%)	19(95.0%)	93(67.4%)	120(82.2%)	0.001	0.427	0.008	0.146	0.195
Postpartum urinary retention	5(3.6%)	4(3.7%)	1(3.3%)	7(4.7%)	1 (0.6%)	0.640	0.169	0.686	0.299	1.000

Data are given as n (%) or median (interquartile range, IQR).

[a] The comparison between Observation group and Primipara Control group.

[b] The comparison between Observation group and Multipara Control group.

[c] The comparison between Observation A group and Primipara Control group.

[d] The comparison between Observation B group and Multipara Control group.

[e] The comparison between Observation A group and Observation B group.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- RawData1.18.xlsx