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Research Article

Pregnancy Outcomes in Women Attempting Vaginal Birth after Cesarean Section Using Oxytocin for Augmentation at Tu Du Hospital

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Abstract

Objective: To identify the success rate of vaginal birth after cesarean section when using oxytocin for augmentation and factors associated with vaginal delivery in women that previously had a Cesarean section at Tu Du hospital in Vietnam.

Methods: The study reported on a series of 136 cases of Vaginal Birth After Cesarean section (VBAC) that used oxytocin for augmentation and was conducted between January 2017 and January 2019 at Tu Du Hospital.

Results: 136 pregnant women who had one previous Cesarean section and underwent oxytocin augmentation were enrolled in the study. The success rate of VBAC with oxytocin for augmentation was 62.5% [95% CI: 53.79 – 70.65]. The variables that affected the success rate of VBAC were spontaneous labor (OR* =4.36) compared to labor induction, Bishop Score at time of augmentation of 5 to 6 (OR*=4.68) or Bishop Score ≥7 (OR*=14.3) compared to Bishop Score at time of augmentation of < 5. There was no maternal and neonatal mortality in the study. **Conclusion:** The success rate of VBAC with oxytocin for augmentation was 62.5%. Women who have had a previous cesarean section can receive oxytocin augmentation to regulate uterine contractions to be optimally consistent with labor stage and increase the success rate of vaginal birth after Cesarean section.

Keywords: Vaginal birth after cesarean section; Augmentation; Oxytocin

Introduction

The World Health Organization has recommended that the optimal rate of Cesarean section should be between 10% to 15%. However, this rate has continued to grow, with the average rate of Cesarean sections worldwide at 18.6% in 2014 [1,2]. The management of pregnant women who have previously had a Cesarean section is a challenge for obstetricians, both in Vietnam and worldwide. The American College of Obstetricians and Gynecologists has encouraged counselling pregnant women regarding trial of labor for those with a previous Cesarean scar. A successful vaginal birth after Cesarean not only lowers the rate of Cesarean section and its associated complications, it also reduces maternal mortality and future sequelae [3,4]. Both the American College of Obstetricians and Gynecologists and the Society of Obstetricians and Gynaecologists of Canada have agreed that in trial of labor after Cesarean, using oxytocin for labor augmentation in women with unsuitable contractions is an option [5,6].

In an observational study at Tu Du hospital in 2014, it was identified that the rate of successful vaginal birth after Cesarean was 54.14%, and the rate of repeated Cesarean section was 45.86%, with 50.27% of these women undergoing repeated section due to prolonged labor [7]. However, at that time, Tu Du hospital had not implemented the use of oxytocin in trial of labor after Cesarean section. In 2017, our hospital issued a protocol for labor augmentation with oxytocin in women undergoing trial of labor after Cesarean section [8]. Since then, there have not been any reports on the efficacy and safety of using oxytocin for labor augmentation in women who have previously had a Cesarean section. Therefore, we conducted this study in order to answer the following question: "What is the rate of vaginal delivery in women undergoing trial of labor after Cesarean section who had labor augmented with oxytocin?"

Objective

Primary objective: Identify the rate of vaginal delivery in women undergoing trial of labor after Cesarean section who had labor augmented with oxytocin.

Secondary objective: Describe maternal and neonatal outcomes in women undergoing trial of labor after Cesarean section who had labor augmented with oxytocin, and identify factors associated with successful vaginal birth.

Materials and Methods

Study design

Retrospective case series.

Study population

Target population: Women with prior Cesarean section undergoing labor augmentation with oxytocin.

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Study population: Women with prior Cesarean section undergoing labor augmentation with oxytocin as per current protocol at Tu Du hospital, under observation at the labor ward.

Accessible population: Women with prior Cesarean section undergoing labor augmentation with oxytocin as per current protocol at Tu Du hospital, under observation at the labor ward from January 2017 to January 2019.

Inclusion criteria: Women with one transverse lower segment Cesarean section undergoing labor augmentation with oxytocin as per current protocol at Tu Du hospital. Fetal criteria include live fetus or stillbirth or major congenital malformation, singleton, cephalic presentation and with gestational age ≥ 28 weeks.

Exclusion criteria: Multiple gestation, malpresentation or missing record.

Sample size and collection: We collected the entire accessible population.

Patient recruitment and data collection

From January 2017 to January 2019, we reviewed all the cases of women with prior Cesarean section undergoing trial of labor at the labor ward at Tu Du hospital by searching for the ICD of prior Cesarean scar, O34.2, on the digital records. Of these women, we examined cases that underwent oxytocin augmentation as per Tu Du hospital's current protocol in the hospital archive. We collected data according to the designed data collection form, analysed the data and presented the results and discussion.

After collecting the data, we analysed and presented the report. Data was analysed using the software Stata 13.0 in two steps. Step 1 was description and univariate analysis. Step 2 used a multivariate regression model to control confounding factors and calculated the adjusted OR (OR*) for each variable. All tests were performed with a 95% confidence interval.

This study was approved by the Department of Obstetrics and Gynecology, the Ethics Board of the University of Medicine and Pharmacy, Ho Chi Minh City, and Tu Du hospital.

Results

We examined cases of women undergoing trial of labor after Cesarean section who received oxytocin augmentation as per our current protocol from January 2017 to January 2019 at Tu Du hospital. We identified 136 cases that fulfilled our inclusion criteria and analysed them (Table 1).

The mean age of participants was 31,37 ± 4,69 years, varying from 20 to 42 years. Additionally, the majority of women were between 25 and 35 years old (69,11%), while only 19.11% of the women were above 35 years old. The age group of women below 25 years old made up 11,78% of the study population.

Most of the participants had one prior delivery (88.23%). Only 2 cases had 3 prior deliveries (1.46%). Out of all of the participants, 7.35% had a vaginal birth before having a Cesarean section while there were only 5 instances of women who had had a successful vaginal birth after Cesarean section (3.68%).

Table 1: Background Characteristics of Participants.

Characteristics	Frequency (N= 136)	Percentage (%)
Maternal Age		
≤ 25 years	16	11,68
25 – 35 years	94	69,11
> 35 years	26	18,98
Maternal BMI		
Normal	73	53,68
Underweight	20	14,71
Obesity	43	31,61
Parity		
One	120	88,23
≥ 2	16	11,77
Prior Vaginal Birth After Cesarean		
No	131	96,32
Yes	5	3,68
Interval Between Last Cesarean Section and This Trial of Labor		
≤ 24 months	7	5,15
> 24 months	129	94,85

Table 2: Labor Characteristics.

Characteristics	Frequency (N= 136)	Percentage (%)
Gestational Age		
28 to < 37 weeks	40	29,41
37 to < 40 weeks	44	32,35
≥ 40 weeks	52	38,24
Labor Initiation		
Labor Induction	77	56,62
Spontaneous Labor	59	43,38
Time of Augmentation		
Latent Phase of Labor	135	99,27
Active Phase of Labor	1	0,73
Stillbirth		
No	111	81,62
Yes	25	18,38

The interval between last cesarean section and this trial of labor ranged from 19 months to 187 months, with the mean interval at 63,69 ± 32,29 months (Table 2).

In our study, more women had labor induction (77 cases, 56.62%) compared to spontaneous labor (59 cases, 43.38%). The method of induction was with a Foley catheter. The most common reasons for induction were prolonged pregnancy (49.35%) and stillbirth (25.97%). Other reasons included oligohydramnios, preeclamsia, fetal growth restriction, and gestational diabetes.

At the time of augmentation, a majority of women had a BISHOP score of 5 – 6 (64.96%), while the two groups of BISHOP scores < 5 and ≥ 7 each accounted for 17.52% (Table 3).

Table 3: Pregnancy Outcome in Women with Prior Cesarean Scar Underwent Augmentation.

Outcomes	Frequency (N= 136)	Percentage (%)
Method of Delivery		
Vaginal Delivery	71	52,21
Instrumental Delivery	14	10,29
Cesarean Delivery	51	37,50
Reason for Instrumental Delivery		
Fetal Distress	5	35,71
Fail to Progress, Second Stage	8	57,15
Maternal Effort Restriction	1	7,14
Reason for Cesarean Delivery		
Induction Failure	33	65,38
Fetal Distress	4	7,69
Cephalopelvic Disproportion	2	3,85
Fail to Progress	7	13,46
Hyperstimulation	2	3,85
Pain at Cesarean Scar	3	5,77
Time of Cesarean Delivery		
Latent Phase of Labor	43	84,31
Active Phase of Labor	8	15,69
Blood Loss (mL)	223,72 ±149,40	
< 500	130	95,60
500 to < 1000	5	3,67
≥ 1000	1	0,73

Table 4: Maternal and Neonatal Outcomes of Women with Prior Cesarean Scar Underwent Augmentation.

Outcomes	Frequency	Percentage (%)
Postpartum Hemorrhage (n = 136)		
No	130	95,60
Yes	6	4,40
Deep Perineal Laceration (n = 85)		
No	84	98,82
Yes	1	1,18
Uterine Rupture (n = 136)		
No	136	100
Yes	0	0
Myometrial Infection (n = 136)		
No	135	99,27
Yes	1	0,73
APGAR Score at 1 Minute (n=111)		
≥ 7	105	94,59
< 7	6	5,41
APGAR Score at 5 Minute (n=111)		
≥ 7	111	100
< 7	0	0

Maternal and neonatal outcome of women with prior cesarean scar underwent augmentation

Our results show that of all women undergoing trial of labor after Cesarean section with oxytocin augmentation, 62.5% had a successful vaginal birth (CI 95% [53,79 – 70,65]). Also, the rate of repeated Cesarean delivery in our study was 37.5% (Table 4).

Factors associated with method of delivery in women with prior cesarean scar undergoing oxytocin augmentation.

After performing a univariate regression analysis between the variables and outcomes of our participants, we found 5 variables that had significant association with vaginal delivery, including method of labor initiation, BISHOP score at time of augmentation, stillbirth, maintenance dose of oxytocin, and birthweight.

However, since we were not able to rule out the effect of confounding factors on the aforementioned associations, a multivariate regression analysis was performed on variables with $P < 0.20$, which revealed 3 factors associated with vaginal delivery in women with prior cesarean scar who underwent augmentation (Table 5).

Discussion

We reviewed all cases of women with prior Cesarean section undergoing trial of labor who had oxytocin augmentation as per Tu Du hospital's current protocol. Of the 136 cases that fulfilled our criteria, 85 women successfully delivered vaginally (62.5%), and 51 women had repeated Cesarean section (37.5%). In the vaginal birth group, the rate of normal vaginal delivery was 5.07 times higher than assisted instrumental delivery.

The vaginal birth rate after Cesarean section in our study is higher than in Tuan's study (54.14%), which was also conducted at Tu Du hospital in 2014 [7]. This difference could be attributed to the implementation of the "Labor augmentation with oxytocin in women undergoing trial of labor after Cesarean section" protocol at our hospital at the time of our study, which regulates the frequency and

Table 5: Factors associated with vaginal delivery in women with prior cesarean scar underwent augmentation.

Factors	Vaginal Delivery (N= 85)	Cesarean Section (N= 51)	OR	Adjusted OR	P*
Labor Initiation					
Labor Induction	42 (54,55)	35 (45,45)	1	1	
Spontaneous Labor	43 (72,89)	16 (27,11)	2,11	4,36	0,006
BISHOP Score at Time of Augmentation					
< 5 points	11 (45,83)	13 (54,17)	1	1	
5- 6 points	54 (61,36)	34 (38,64)	1,82	4,68	0,016
≥ 7 points	20 (83,33)	4 (16,67)	5,91	14,30	0,003
Birthweight (gram)					
< 2500	23 (82,14)	5 (17,86)	1	1	
2500 – 2950	24 (64,86)	13 (35,14)	0,37	0,27	0,158
3000 – 3450	29 (55,77)	23 (44,23)	0,27	0,11	0,030
≥ 3500	9 (47,37)	10 (52,63)	0,20	0,06	0,014

intensity of contractions to be optimally consistent with labor stage. Our vaginal birth rate was also higher than that seen in Gobillot's study, who reported the rate of vaginal birth after Cesarean section as 58.5%. In addition, 81.71% delivered vaginally in the BISHOP ≥ 6 group, which indicated that the use of oxytocin in women undergoing trial of labor after Cesarean section who have a favorable cervix will be more likely to be able to facilitate vaginal birth [9].

A study by Kohei Nakamura, conducted in Japan, reported 72.7% of women who had a prior Cesarean section delivered vaginally, while 12.6% of them had a repeated Cesarean section before labor and 14.7% had an emergency Cesarean section during labor [10]. Compared to ours, the higher vaginal birth rate seen in Kohei Nakamura's study could be explained by the elimination of cases with labor induction, and oxytocin use, both before and during labor.

The mean blood loss during the first 24 hours after birth was 223.72 ± 149.40 mL, ranging from 50 mL to 1350 mL. There were 6 cases of postpartum hemorrhage (blood loss ≥ 500 mL), all delivered vaginally (7.06%). Furthermore, there was 1 case with a third-degree perineal tear, cervical laceration, and 1350 mL blood loss after instrumental delivery, and transfusion was indicated. Our postpartum hemorrhage rate is higher than Tuan's report of 6.02% [7], which demonstrates the use of oxytocin for augmentation is a risk factor for postpartum hemorrhage, mostly due to uterine atonia from overstimulation. Therefore, oxytocin use should be restricted to cases with a clear indication for it.

There were no cases with bladder, ureter, or intestine injury. There were no instances of uterine rupture in our 136 observed cases. The uterine rupture incidence in our study is lower than levels in the Tuan and Vidyadhar reports, which were 1%, and 2%, respectively [7,11]. The uterine rupture incidence from Gobillot's report was 3%, which is also higher than ours [9]. The higher dose of oxytocin used in Gobillot's study, which was 2.5 mIU/min for both starting and incremental dosing compared to 1 mIU/min for starting and incremental dose in our protocol, could have contributed to the difference in the uterine rupture incidence.

There were 25 cases of stillbirth in our study (18.38%) and most of these cases had some major fetal malformations, for which feticide was performed prior to termination of pregnancy. The rest of the study population accounted for 111 cases of livebirth in our study (81.62%). Most of the neonates had an Apgar score at 1 minute of ≥ 7 (105 cases, 93.75%), and 6 cases had a 1-minute Apgar score of < 7 (6.25%). After resuscitation, all of the neonates had a 5-minute Apgar score of ≥ 7.

The rate of vaginal delivery in the spontaneous labor group was 4.36 times higher than in women whose labor was induced (P < 0.05, CI 95% [1,52 – 12,44]). This is consistent with Tuan's reported results from 2014 [7].

It was also found that women with a higher the BISHOP score at the time of augmentation had a higher chance of completing a successful vaginal birth when undergoing trial of labor after Cesarean section. Specifically, this association was clearly seen in the 5 – 6-point group (OR = 4.68, CI 95% [1,34 – 16,37]) and the ≥ 7-point group (OR = 14.30, CI 95% [2,52 – 81,25]). We draw the same conclusion as Tuan, Vidyadha, and Gobillot, who all state that a high BISHOP score is associated with a higher likelihood of a successful vaginal birth after Cesarean section [7,9,11].

Birthweight is also a predictor of successful vaginal birth after Cesarean. Compared to the group of women with birthweight below 2500g, women whose neonatal birthweight was more than 3500g had their likelihood of successful vaginal delivery reduced by 94% (P < 0.05, CI 95% [0,007 – 0,57]). In addition, women with a neonatal birthweight of 3000g to 3450g were 89% less likely to deliver vaginally (P < 0.05, CI 95% [0,02 – 0,81]). Gobillot's study also concluded that birthweight of more than 3000g significantly reduces the rate of vaginal delivery in women with prior Cesarean section.

Conclusion

We report a rate of successful vaginal delivery in women with prior Cesarean section undergoing labor augmentation with oxytocin of 62.5%, which is higher than previously reported at Tu Du hospital. We also observed a 0% incidence of maternal and neonatal mortality.

Therefore, our study has shown that the correct use of oxytocin during labor in order to regulate the frequency and intensity of contractions to be consistent with labor stage is safe, with an especially high chance of successful vaginal birth after Cesarean section in women with a BISHOP score ≥ 7. However, these women need to be monitored closely and appropriately managed should adverse events occur.

We are planning to conduct a larger study that is powered enough to identify factors associated with successful vaginal birth after Cesarean section with oxytocin use.

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