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The Comparison of Blood Loss After Vaginal Delivery Between Placental Cord Drainage and Cord Clamping Before Placental Delivery in Buddhachinaraj Phitsanulok Hospital

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ABSTRACT

Objectives: To compare blood loss after vaginal delivery between placental cord drainage and cord clamping before placental delivery.

Materials and Methods: A randomized controlled trial was done on 180 pregnant women who were admitted for vaginal delivery in Buddhachinaraj Phitsanulok Hospital during 1st July 2015 to 30th June 2016. The patients were divided equally into two groups: a study group and a control group. In the study group, the placental cord was drained before placental delivery whereas in the control group, the placental cord was clamped. Postpartum blood loss and other complications were recorded.

Results: Median duration of the third stage of labor and postpartum blood loss were significantly different between two groups. The median (interquartile range) duration of the third stage in the study group (3 (2,4) minute) was shorter than the control group (4 (3,6) minute, $p < 0.05$). The median blood loss in study group (300 (250, 330) mL) was also lower than the control group (320 (300, 350) mL, $p < 0.05$). There was not significantly different in postpartum hemorrhage between the two groups.

Conclusion: Placental cord drainage could reduce postpartum blood loss and the duration of the third stage of labor. This technique was safe, simple and noninvasive to practice for reducing amount of postpartum blood loss and no serious complications occurred.

Keywords: Placental cord drainage, postpartum hemorrhage, third stage of labor.

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การเปรียบเทียบปริมาณการเสียเลือดหลังคลอดในหญิงตั้งครรภ์ที่คลอดทางช่องคลอดระหว่างกลุ่มที่ปล่อยเลือดจากสายสะดือและกลุ่มที่ไม่ได้ปล่อยเลือดจากสายสะดือก่อนคลอดรกในโรงพยาบาลพุทธชินราช พิษณุโลก

ศราวุธ มิทะลา, กัญจน์พรรณ สุคนธ์พันธุ์, โชคดี จุลภาคี

บทคัดย่อ

วัตถุประสงค์: *เปรียบเทียบผลการเสียเลือดหลังคลอดในหญิงตั้งครรภ์ที่คลอดทางช่องคลอดระหว่างกลุ่มที่ปล่อยเลือดออกจากสายสะดือและกลุ่มที่ไม่ได้ปล่อยเลือดออกจากสายสะดือหลังคลอด*

วัสดุและวิธีการ: *งานวิจัยนี้เป็นแบบ Randomized controlled trial มีผู้เข้าร่วมการศึกษา 180 คนที่รับไว้รักษาในโรงพยาบาลพุทธชินราช พิษณุโลก และคลอดเองทางช่องคลอดในช่วง 1 กรกฎาคม 2558 ถึง 30 มิถุนายน 2559 โดยแบ่งเป็นกลุ่มศึกษาและกลุ่มควบคุมกลุ่มละ 90 คน กลุ่มศึกษาคือกลุ่มที่ปล่อยเลือดจากสายสะดือก่อนทำคลอดรก ส่วนกลุ่มควบคุมคือกลุ่มที่ไม่ได้ปล่อยเลือดจากสายสะดือก่อนทำคลอดรก การศึกษานี้ทำคลอดรกด้วยวิธี controlled cord traction ทั้งสองกลุ่ม และมีการบันทึกข้อมูลพื้นฐาน การดำเนินการคลอด และเปรียบเทียบปริมาณเลือดหลังคลอดรวมถึงภาวะแทรกซ้อนที่เกิดขึ้นขณะศึกษา*

ผลการศึกษา: *พบว่ามีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติระหว่างปริมาณการเสียเลือดหลังคลอดและระยะเวลาการคลอดระยะที่สามของทั้งสองกลุ่ม ค่ากลางของปริมาณการเสียเลือดของกลุ่มศึกษา (300 (250, 330) มิลลิลิตร) มีปริมาณน้อยกว่ากลุ่มควบคุม (320 (300 ,350) มิลลิลิตร) อย่างมีนัยสำคัญทางสถิติ (pvalue < 0.001) ส่วนค่ากลางของระยะเวลาของระยะที่สามของการคลอดของกลุ่มศึกษา (3 (2, 4) นาที) น้อยกว่ากลุ่มควบคุม (4 (3, 6) นาที) อย่างมีนัยสำคัญทางสถิติเช่นกัน (p value <0.001) แต่ไม่มีความแตกต่างกันของจำนวนการตกเลือดหลังคลอด*

สรุป: *การปล่อยเลือดออกจากสายสะดือก่อนคลอดรกสามารถลดปริมาณการเสียเลือดหลังคลอดและระยะที่สามของการคลอดได้ เป็นวิธีที่สะดวกและปลอดภัยเพื่อลดปริมาณการเสียหลังคลอดและไม่มีภาวะแทรกซ้อนที่รุนแรงเกิดขึ้น*

คำสำคัญ: *ปล่อยเลือดจากสายสะดือ, ตกเลือดหลังคลอด, การคลอดระยะที่สาม*

Introduction

Postpartum hemorrhage (PPH) is one of the most common causes of maternal death worldwide[1, 2]. There are many causes of early postpartum hemorrhage, with the most common cause being uterine atony, which is caused by uterine overdistension, chorioamnionitis, tocolytic drugs, or prolonged labor. Nowadays, the World Health Organization (WHO)[3] recommendation for the prevention of PPH is the active management of the third stage of labor, consisting of three steps: intramuscular administration of 10 units of oxytocin immediately after anterior shoulder is delivered; placenta was delivered by controlled cord traction technique; followed by uterine massage. Furthermore, placental cord drainage in the third stage of labor involves unclamping the previously clamped and allowing the blood from the maternal side of placenta to drain freely, is one of the techniques for reducing postpartum blood loss and some complications, such as prolonged third stage, retained placenta.

According to the previous studies[4, 5, 6], showed that placental blood drainage is a noninvasive, simple and simple technique for shortening the length of the third stage labor and reducing the amount of postpartum blood loss. The information about the use of this method is still sparse in Thailand. Also, the previous studies in Thailand had small sample size[7] and unclear technique of the measurement of blood loss[8, 9] - so these shortcomings are a motivation for this study. The main objective is to compare blood loss after vaginal delivery between placental cord drainage and cord clamping before placental delivery in Buddhachinaraj Phitsanulok Hospital, Phitsanulok province. It is in the central region of Thailand, where the incidence of postpartum hemorrhage is about 4.2 percent per year.

Materials and Methods

This study was designed as a prospective randomized controlled trial. The sample size was calculated from Chalaew Sattamai's study[9] and approved by the ethics committee of Buddhachinaraj Phitsanulok Hospital. The pregnant women who were admitted to the labor room in Buddhachinaraj Phitsanulok Hospital from 1st July 2015 to 30th June 2016 and met the criteria were recruited. The inclusion criteria included Thai pregnant women who had 34-42 weeks of gestational age, vertex presentation, viable fetus, no detected fetal anomalies, estimated fetal weight < 4,000 gm, history of childbirth less than 4 times, no history of previous cesarean section, no history of antepartum hemorrhage and postpartum hemorrhage, no obstetric indications for cesarean section, no medical complication such as liver disease, coagulopathy and anticoagulant use. The exclusion criteria included third degree of episiotomy tear, chorioamnionitis, preeclampsia with severe features and delivery with cesarean section during the study. The protocol and informed consent were explained to all participants. For underage patients, the informed consent were explained to their guardians and signed by themselves.

The patients were randomized by block randomization to the study and control groups according to a code kept in a sealed envelope; it was opened when the doctors performed the vaginal delivery. The general maternal baseline characteristics, history taking, physical examination, and progression of labor of all pregnant women were recorded. In the study group, after cutting of umbilical cord, blood was freely released from the maternal side into a sterile container, until no blood was seen in the end of the cord. Then, controlled cord traction was performed to deliver the placenta[6]. Postpartum blood loss was assessed by a plastic collecting bag with scale and the released blood was drained to a sterile container and measured by a syringe. The duration of third stage of labor, degree of episiotomy, placental weight, neonatal weight, uterotonic drugs used, vital signs and blood transfusion were recorded. In the control group, the umbilical cord was clamped immediately after fetal delivery. Placental delivery was performed with controlled cord traction technique. All information was

recorded in the same method as the study group.

Postpartum hemorrhage is defined as a blood loss of 500 milliliters (mL) or more after completion of the third stage of labor[1]. The duration of the first, second, and third stages, and the duration of membranes ruptured until delivery, postpartum blood loss, retained placenta, placental cord rupture during placental delivery, manual removal of placenta, and blood transfusion were recorded in both groups.

Statistical analysis

Descriptive statistics were used to analyze demographic data, labor and delivery characteristics. Fisher's exact or Chi-square was used to compare the categorical variables, and Mann-Whitney test was used to compare continuous variables (median) between the two groups. A p value of less than 0.05 was considered a statistically significant difference.

Results

One hundred and eighty pregnant women were recruited and were randomly divided into two groups, so that there were 90 participants in each group. For the baseline maternal characteristics, there were not a significant differences between the two groups in maternal age, gravidity, parity, gestational age, body mass index (BMI), maternal weight gain and maternal underlying diseases (Table 1, 2).

There was no statistically significant difference in mode of delivery, duration of the first stage and second stage of labor, duration of rupture of membranes, birthweight, placental weight and uterotonic agents use (Table 3). There was a statistically significant difference in postpartum blood loss and duration of the third stage of labor. Median (interquartile range) of postpartum blood loss in the study group (300 (250, 330) mL) was lower than the control group (320 (300, 350) mL, $p < 0.001$). There were 5 and 6 cases of postpartum hemorrhage in the study and control groups, respectively. There were three cases in the control groups who had postpartum hemorrhage as 1,000 mL or more after completion of the third stage of labor (1,000, 1,200, 1,200 mL, respectively). They received a blood transfusion because of hypovolemic shock due to acute blood loss and hematocrit was 27, 25 and 24 percent respectively. PPH was detected in the study group but did not require blood transfusion because they had PPH less than 1,000 mL and no signs of hypovolemic shock or decreasing of hematocrit less than 30 percent after transfer to postpartum ward (Table 4). There was no statistically significant difference in PPH was observed between the two groups. The median (interquartile range) duration of the third stage in the study group (3 (2,4) minutes) was also shorter than the control group (4 (3, 6) minutes, $p < 0.001$). The mean volume of released blood was 39.9 mL. In the control group, one case had cord rupture during placental delivery. There was no manual placental removal in all participants.

Table 1. Maternal baseline characteristics.

Characteristics	Study group (n=90)	Control group (n=90)	p value
Age (year)	25 (21, 29)	24 (19, 32)	0.79
Gravid	2 (1, 2)	2 (1, 2)	0.51
Parity	0 (0, 1)	0 (0, 1)	0.60
Gestational age (weeks)	38 (37, 39)	39 (38, 40)	0.29
BMI (kg/m^2)	21.5 (19.3, 23.8)	21.2 (18.7, 23.5)	0.47
Maternal weight gain (kg)	14 (11, 17)	13 (10, 16)	0.43

* Mann-Whitney test, Data were represented as median (interquartile range)

Table 2. Maternal underlying diseases.

Underlying disease	Study group (n = 15)	Control group (n = 24)	p value
Chronic hypertension	3	1	0.62
Gestational hypertension	1	4	0.36
Preeclampsia without severe feature	1	2	1.00
Overt DM	1	0	1.00
GDMA1	2	1	1.00
GDMA2	0	1	1.00
Anemia	3	10	0.81
Hepatitis B viral infection	2	0	0.49
HIV infection	0	1	1.00
Latent syphilis	0	2	0.49
Thyroid goiter	0	1	1.00
Asthma	1	0	1.00
Hypercholesterolemia	1	0	1.00
G6PD deficiency	0	1	1.00

* Fisher's exact

Table 3. Labor and delivery characteristics.

	Study group (n=90)	Control group (n=90)	p value
Mode of delivery[1]			0.28
Normal delivery	85	80	
Vacuum extraction	5	10	
Progression of labor[2]			
First stage of labor (min)	437 (315, 660)	455 (270, 615)	0.19
Second stage of labor (min)	10 (5, 17)	11 (7, 17)	0.91
Duration of membrane ruptured (min)	145 (65, 269)	149 (60, 260)	0.90
Third stage of labor (min)	3 (2, 4)	4 (3, 6)	< 0.001
Uterotonic drugs used[1]			
Oxytocin (Syntocinon)	90	90	1.00
Ergometrine (Methergine)	20	32	0.07
Misoprostol (Cytotec)	6	12	0.21
Postpartum blood loss[2]	300 (250, 330)	320 (300, 350)	< 0.001

1 = Fisher's exact 2 = Mann-Whitney test

Table 4. Postpartum outcomes.

	Study group (n = 90)	Control group (n = 90)	p value
Episiotomy tear[1]			1.00
No tear	1	0	
First degree	1	2	
Second degree	88	88	
Birth weight (gm)[2]	3115 (2970, 3350)	3185 (2900, 3330)	0.87
Placental weight (gm)[2]	620 (600, 650)	620 (600, 650)	0.65
Postpartum hemorrhage[1]	5	6	0.5
Blood transfusion[1]	0	3	0.12
Hypovolemic shock[1]	0	3	0.12
Placental cord ruptured during placental delivery[1]	0	1	1.00

1= Fisher's exact 2 = Mann-Whitney test

There was no statistically significant difference in mode of delivery, duration of the first stage and second stage of labor, duration of rupture of membranes, birthweight, placental weight and uterotonic agents use (Table 3). There was a statistically significant difference in postpartum blood loss and duration of the third stage of labor. Median (interquartile range) of postpartum blood loss in the study group (300 (250, 330) mL) was lower than the control group (320 (300, 350) mL, $p < 0.001$). There were 5 and 6 cases of postpartum hemorrhage in the study and control groups, respectively. There were three cases in the control groups who had postpartum hemorrhage as 1,000 mL or more after completion of the third stage of labor (1,000, 1,200, 1,200 mL, respectively). They received a blood transfusion because of hypovolemic shock due to acute blood loss and hematocrit was 27, 25 and 24 percent respectively. PPH was detected in the study group but did not require blood transfusion because they had PPH less than 1,000 mL and no signs of hypovolemic shock or decreasing of hematocrit less than 30 percent after transfer to postpartum ward (Table 4). There was no statistically significant difference in PPH was observed between the two groups. The median (interquartile range) duration of the third stage in the study group (3 (2,4) minutes) was also shorter than the control group (4 (3, 6) minutes, $p < 0.001$). The mean volume of released blood was 39.9 mL. In the control group, one case had cord rupture during placental delivery. There was no manual placental removal in all participants.

Discussion

Our study showed postpartum blood loss and duration of the third stage of labor were significantly different in the study and control groups, while the general characteristics of participants were not different. On the other hand, the incidence of postpartum hemorrhage was no statistically significant difference between two groups. The outcomes of this study were similar to the previous studies[7, 9, 10] which could reduce postpartum blood loss and short of duration of the third stage of labor. The mechanism of placental cord drainage is reduction of the uterine bulkiness that can make a good uterine contraction so that can reduce blood loss after delivery. Therefore, releasing blood from the umbilical cord in the maternal side is one of the techniques that can reduce duration of the third stage of labor and postpartum blood loss. Although the incidence of PPH did not decrease significantly, but serious complications such as retained pieces of placenta, placental cord rupture, hypovolemic shock

and blood transfusion were not found in the placental cord drainage group.

In Thailand, the study of Surasak[11] showed that the postpartum hemorrhage was the most important factor in maternal health and postpartum complications such as health recovery, breast feeding and neonatal development. The incidence of PPH in Thailand was 11.89 percent compared with the information from World Health Organization (WHO), which is 24 percent worldwide. Therefore, placental cord drainage combined with the active management of the third stage of labor could reduce postpartum blood loss and improve postpartum complications. Regarding the safety of placental cord drainage, data from this study were congruent with Jeborry's study[12] that was simple, safe and noninvasive to practice, and there were no serious complications such as uterine inversion, retained placenta which was managed with manual placental removal, or increased the incidences of PPH. On the others hand, the outcome of this study was in contrast to Leduc D et al.'s study[13] which did not recommend placental cord drainage as a routine practice in third stage of labor because there was no significant difference in PPH. However, every complication was dependent on the experience of the doctors.

Although, there was no statistically significant difference in postpartum hemorrhage between placental cord drainage and cord clamping groups but the complications in the control group occurred more than the study group such as placental cord ruptured during placental delivery and hypovolemic shock who required blood transfusion. From these complications, the clinical benefit of placental cord drainage could reduce these serious complications.

However, this study did not show a significant difference of postpartum hemorrhage among both groups. Thus, further studies should be considered of more sample size to show the PPH and some serious complications obviously.

Conclusion

Placental cord drainage could reduce postpartum blood loss and the duration of the third stage of labor. This technique was safe and simple and noninvasive to practice for reducing postpartum blood loss, and no serious complications occurred.

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Potential conflicts of interest

The authors declare no conflict of interest.

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