

Placental Cord Drainage Versus Clamping for Prevention of Blood Loss in the Third Stage of Labour

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Abstract

Background: Third stage of labour may contribute greatly in postpartum haemorrhage and maternal mortality if not well conducted. Unclamping of the maternal side of the umbilical cord after cutting may allow the placental cord blood to release freely and minimize blood loss.

Aim of Study: This study aimed to investigate the effect of placental cord drainage on outcome of the third stage of labour.

Patients and Methods: A randomized controlled clinical trial was conducted at the Emergency Unit of Obstetrics and Gynecology department, Mansoura University Hospital, Egypt. This study comprised a random sample of 116 parturient women who were expected to have spontaneous vaginal delivery and at low risk for postpartum hemorrhage. Women were divided into two equal groups (n=58 per each); the control group received the conventional management of the third stage of labour, similarly the study group in addition to the placental cord blood drainage. Data were collected assessing the participants' baseline characteristics and the third stage outcome sheet was used to evaluate outcomes of the third stage of labour.

Results: Showed that the 3rd stage blood loss was significantly lower by 146.7 ml in the study group compared to the control group (143.1 ±56 vs. 289.8 ±114.5; 95% CI, 113.6-179.9, $p < 0.001$). The third stage length was shorter in the study group than the control group by 2.6 minutes (4.5 ±1.7 vs. 7.1 ±2.9; $t = 5.788$, $p < 0.001$).

Conclusion: Placental cord drainage during the third stage of labour was an effective method in reducing the blood loss and duration of third stage of labour.

Being a safe, costless, and effective method placental cord drainage should be encouraged.

Key Words: *Placental cord drainage – Maternal outcomes – Third stage of labour.*

Introduction

THE third stage of labour is the stage of placental delivery [1]. Although, it is the shortest stage of

labour where it ranges from 5 to 30 minutes, yet it is potentially the most risky stage of labour. First and foremost because of the threat of primary postpartum haemorrhage (PPH) that refers to an excessive blood loss that exceeds anticipated maternal blood loss of 500 mL within 24 hours of delivery. It affects 5 to 10% of deliveries in developed countries, while in low and middle income countries it is the contributing factor for 99% of maternal deaths [2,3]. In Egypt PPH is the leading factor to 27% of maternal deaths [4].

Delivery of the placenta is associated with blood loss. Its amount depends on the time taken by the placenta to separate from the uterine wall and on the effectiveness of the uterine contractions. Prolonged third stage with inefficient uterine contractions gives rise to increased risk of PPH [1]. Opportunely, PPH is avoidable with effective obstetric interventions. Two fairly different approaches are used for managing the third stage of labour. Expectant management approach chiefly depends on waiting for signs of placental separation and allowing the placenta to deliver spontaneously. Even so, active management in the main involves routine administration of uterotonic agent, early cord clamping and cutting, and controlled cord traction [5,6].

Given the risk of PPH on maternal mortality is high, evidence based practices that decrease this incidence are recommended. Placental cord drainage involves clamping and cutting the cord immediately after delivery of the baby followed by immediate unclamping of the maternal side and allowing the placental cord blood to release freely [7]. This approach was evaluated in some clinical trials. One of them concluded that placental cord drainage reduces the third stage blood loss with a reduction of the PPH risk [8]. Conversely, the other

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two studies found no decrease in the PPH incidence following this approach [9,10].

Cochrane database review had concluded that the significance of the little reduction in blood loss (77mL) and lessening in the duration of the third stage (3 minutes) secondary to placenta drainage is debatable [11]. Given that, evidence suggests that the use of placental cord drainage is still open for investigation and discussion.

Aim of the study:

This study aimed to investigate the effect of placental cord drainage on outcome of the third stage of labour.

Patients and Methods

This study was designed as a randomized controlled clinical trial. It was carried out at the Labour and Delivery Unit of Obstetrics and Gynecology department, Mansoura University Hospital, Egypt.

Sampling:

A random sample of one hundred sixteen parturient women who had attended the study setting (Emergency Unit, Mansoura University Hospital) between September 2016 and February 2017 were selected. Parturient women were eligible to enroll in this study when they expected to have spontaneous vaginal delivery for a singleton pregnancy to live term fetus in cephalic presentation and being at low-risk for postpartum hemorrhage.

Sample size:

A previously performed study [12] found that blood loss during the third stage of labor was 277.63 ± 246.9 mL in the control group and 207.04 ± 123.3 mL in the drainage group. On the basis of these data, to keep the power of the study at 90% with α level of 0.05, a total sample size of 116 patients (n=58 in each of study and control groups) was required.

Randomization and groups' assignment:

At the admission time and using the hospital admission registration book women who had odd number in their hospital files were recruited to the study. Randomization was ensured where the eligible women were randomly assigned either to the study or the control group based on selecting a sealed opaque envelope that contains either letter "S" indicating study or letter "C" denoting control immediately after delivery of the baby. Both groups received the same conventional hospital care for managing the third stage of labor; while the study group had additionally exposed to placental cord blood drainage.

Basic data structured interviewing schedule was developed and filled in by the investigators. It consists of two parts; the participants' sociodemographic data was the first part of the schedule that entails age, occupation and level of education; while, the Obstetric history and initial assessment data were the 2nd part. Obstetric history includes gravidity and parity and the initial assessment data includes; the general assessment finding; such as vital signs, body weight, height, and blood investigation results as hemoglobin level and Rh factor, abdominal examination findings (i.e. fundal level, fetal presentation and position, and fetal heart rate), vaginal examination finding with the total Bishop score at the time of labour room attendance, and the finding of abdominal ultrasound scanning was included; in order to identify the eligibility to the study.

Third stage outcome observation check-list consists of two parts. The first part describes the clinical events of the third stage of labour; such as the amount of blood loss, the need for additional uterotonic agents or for blood transfusion. Additionally, the duration of the third stage of labour was included in this part. While, the second part describes the characteristics of the placenta; including its weight and mode of delivery either spontaneously, needs manual removal or retained.

Ethical considerations:

Before carrying out this study an official approval was obtained from the head of Obstetrics and Gynecology department of Mansoura University Hospital as well from the Ethics Committee at the Faculty of Nursing, Mansoura University. Written informed consent was taken from each parturient woman to participate after clarifying the study aim and method. The researchers emphasized that participation in the study is entirely voluntary and confidentiality of data were assured.

History taking and general & Obstetrical assessment; in terms of general, abdominal and vaginal examination were carried out. As well as, doing the assigned investigations according to the setting protocol; specifically, taking a blood sample for complete blood picture and Rh factor, spot urine analysis for protein and acetone, also, abdominal ultrasound was done to exclude those at risk for PPH or cesarean birth. Thereafter, the aim and method of the study were explained to each eligible woman, got the woman's consent to share in the study.

On childbirth, each eligible woman was allocated randomly either to study or control group.

Study group:

Women allocated in this group were exposed to the placental cord blood drainage. Immediately after delivery of the newborn, infusion of 10 international units of Oxytocin diluted in 500ml Ringer's lactate was commenced, the umbilical cord was clamped by two clamps; one from the newborn site and the other from the maternal site. It was clamped for few seconds until handling the neonate and then immediately unclamped and allowing the placental blood to drain freely in a separate receptacle. As signs of placental separation appear the cord was reclamped and the placenta was delivered by controlled cord traction (Brandt-Andrews maneuver) and then intramuscular injection of 0.2mg methyl ergometrine was given.

Control group:

In this group the conventional hospital protocol for managing the third stage of labour was applied, including infusion of 10 international units of Oxytocin in 500ml Ringer's lactate immediately after complete delivery of the neonate, concurrently clamping and cutting the cord. Then, waiting for signs of placental separation and applying controlled cord traction and suprapubic support until complete placental expulsion; thereafter, intramuscular injection of 0.2mg methyl ergometrine was given. The same protocol was applied for the study group except for maintaining clamping the cord from the maternal site.

Outcomes evaluation:

Amount of blood loss during the third stage of labour was the main outcome for this research. The blood loss during the third stage was determined by collecting such blood in a clean metal receptacle that was kept at the tail end of the delivery table and then it was poured in a plastic graduated jar to determine its amount in milliliters, and caution was kept to avoid mixing the placental cord blood with that lost during the third stage.

Duration of the third stage of labour refers to the time difference between the newborn delivery and placenta delivery. It was determined by using a stopwatch and recorded in minutes. Additionally, incidence of retained placenta was reported. If the placenta failed to expel within 30 minutes of the newborn delivery it was reported as a retained [1]. In this instance the placenta removed manually and the third stage of labor was calculated from delivery of the neonate until the placenta was manually removed. As well, the need for manual removal of the placenta and placenta weight were

reported. Moreover, the need for additional uterotonic agents was also reported when the woman receives more than the conventional predetermined dose of oxytocin and methyl ergometrine.

Limitations of the study:

Recruiting the participants from one institution and restricting the subjects for those at low risk for postpartum hemorrhage were limitations for this study that impairs to generalize the study findings.

Data analysis:

All statistical analyses were performed using SPSS for windows version 17.0 (SPSS, Chicago, IL). Continuous data were expressed as mean \pm SD and compared between the two groups using independent Student's *t*-test. Categorical data were expressed in number and percent and compared using the χ^2 test. The 95% confidence intervals (CI) for the difference in means were calculated. Statistical significance was set at $p < 0.05$.

Results

Basic characteristics of the study and control groups:

Table (1) shows the basic characteristics of the study and the control groups. It reveals that characteristics for both groups were almost similar ($p > 0.05$). The mean age of the women in the study group was 27.2 ± 5 years compared to 27.3 ± 5.6 years in the control group. Concerning the education level, primary/preparatory education represented the highest percentage in the control group (43.1 %), while the highest percentage in the study group (39.7%) was illiterate. More than half (56.9%) of the control group were from rural areas, while 53.4% of the study group were from urban areas. Yet, slightly more than three quarters (76.9%) of the control group, and most (87.6%) of the study group had a parity of 1-3 times.

Third stage blood loss and duration for the both groups:

According to Table (2), the amount of the third stage blood loss was lower by 146.7ml among women of the study group compared to those in the control group. This difference was highly statistically significant (95% CI, 113.6-179.9, $p < 0.001$). Fig. (1) illustrates the duration of the third stage of labour between the two groups. It was shorter in the study group than that of the control group by 2.6 minutes. This difference was highly statistically significant ($p < 0.001$).

Table (1): Basic characteristics of the study and control groups.

Basic characteristic	Study group	Control group	Significant tests	
	(n=58)	(n=58)	X ² or t	p
Maternal age (years):				
Mean ± SD	27.2±5.0	27.3±5.6	0.104*	0.917
Range	18-35	18-35		
Education n (%):				
Illiterate	23 (39.7%)	21 (36.2%)	0.980	0.613
Primary/preparatory	20 (34.5%)	25 (43.1%)		
Secondary/university	15 (25.9%)	12 (20.7%)		
Residence n (%):				
Rural	27 (46.6%)	33 (56.9%)	1.243	0.265
Urban	31 (53.4%)	25 (43.1%)		
Gestational age (weeks):				
Mean ± SD	38.2 ± 1.4	38.1 ± 1.4	0.270*	0.788
Parity n (%):				
Primigravida	14 (24.1%)	13 (22.4%)	0.049	0.827
Para 1-3	44 (76.9%)	45 (87.6%)		

* Independent Student's t-test.

Table (2): Amount of the third stage blood loss in both groups.

Blood loss (ml)	Study group	Control group	Mean difference	95% (Student's t-tests)	
	(n=58)	(n=58)		t	p
Mean ± SD	143.1±56	289.8±114.5	146.7	113.6-8.76	<0.001
Range	50-230	90-470		179.9	

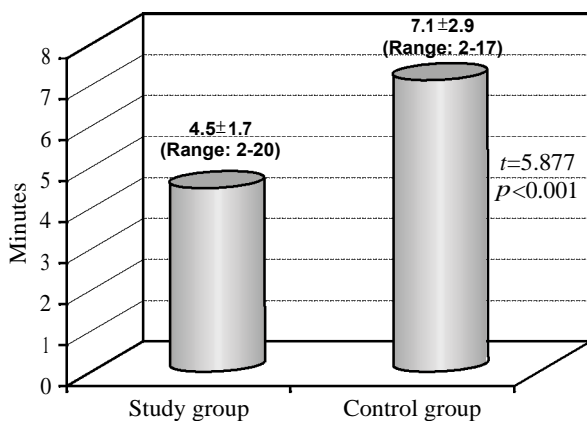


Fig. (1): Duration of the third stage of labor for the both groups.

Characteristics of the placenta and the need for additional uterotonic agents for the both groups:

Table (3) showed that the weight of the placenta did not differ significantly between the study and control groups (492.6±21.4 vs. 487.4±18.3 respectively). None of the patients of both groups had a retained placenta and all placentae were delivered spontaneously. Additionally, all women of the study group had delivered their placenta within 15 minutes after the newborn delivery compared to 3 (5.2%) women in the control group passed that

time to deliver their placenta. This observed difference was not statistically significant ($p>0.05$). Fig.(2) shows a statistically significant difference between the study and control groups as regards to the need for additional uterotonic agents (1.7% vs. 12.1%, $p=0.028$, $X^2=4.833$).

Table (3): Characteristics of the placenta between the study and the control groups.

Variables	Study group	Control group	Significant tests	
	(n=58)	(n=58)	X ² or t	p
Placental weight (gm):				
Mean ± SD	492.6±21.4	487.4±18.3	1.3820	0.165*
Range	450-520	450-520		
Mode of delivery n (%):				
Immediate	58 (100%)	58 (100%)	3.08	0.079
Within minutes 15	58 (100%)	55 (94.8%)		
After 15 minutes	0 (0%)	3 (5.2%)		
Retained placenta	0	0	-	-
Manual removal	0	0	-	-

* Independent Student's t-test.

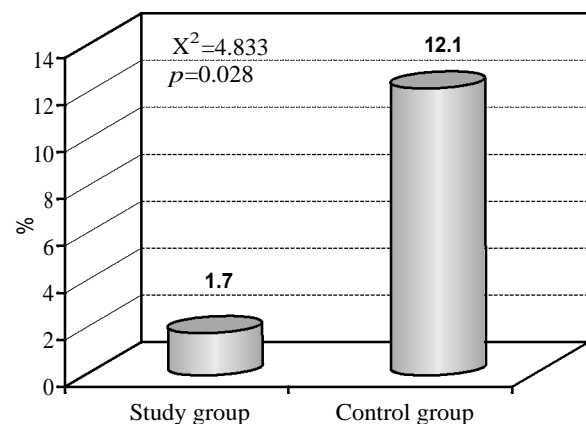


Fig. (2): Comparison of the need for additional uterotonic agents between the study and control groups.

Discussion

This study aimed to investigate the effect of placental cord drainage on outcome of the third stage of labour. This aim was achieved through the present study finding which revealed that the study group had statistically significantly less blood loss during the 3rd stage of labour than the control group. Accordingly the study hypothesis "parturient women who are exposed to placental cord drainage after childbirth exhibit less blood loss during the third stage than those who are not" was accepted.

Such study finding is supported by the findings of other studies that had addressed the effect of placental cord drainage on reducing the postpartum blood loss. In an Indian randomized controlled

trial 200 women expected to have spontaneous vaginal delivery were randomly assigned to placental cord drainage or non drainage groups during the third stage of labour. Such study results had demonstrated that the mean blood loss was significantly decreased by 177ml blood from 252.05 ± 145.48 ml in the control group to 175.05 ± 118.15 ml in the study group ($p < 0.001$) [9]. Parallel with these findings a prospective randomized controlled trial conducted in Iraq on 200 women during their third stage after vaginal delivery who exposed to the same intervention. The investigators concluded that the mean blood loss was (184.3 ± 118 vs. 249.7 ± 147 ml) among the placental cord drainage and non drainage group respectively with a statistically significant difference by 65.4ml blood [13]. Additionally, in another prospective randomized controlled trial conducted at two tertiary teaching hospitals in Istanbul, Turkey Ascioglu et al., 2015 randomly allocated 242 women post vaginal delivery to the placental cord blood drainage group and 243 women to the control group and they had reported that the mean blood loss was significantly lower in the placental drainage group than in the control group (207.04 ± 123.3 vs. 277.63 ± 246.9 ml, respectively; $p < 0.001$), indicating a decrease of 70ml blood in the drainage group [12]. The investigators of the present study also demonstrated the duration of the third stage of labour for the both group and found that the study group had a shorter duration than the control group. Accordingly, the study proved that the parturient women who are exposed to placental cord drainage after childbirth goes through a faster third stage than those who are not. Consistent with this finding a randomized controlled trial in Thailand on 99 women that concluded a significant decrease by 1.9 minutes in the duration of the third stage from 7.0 ± 6.1 minutes in the control group to 5.1 ± 2.4 minutes in the placental drainage group [10]. Additionally, Sreelatha et al., 2013 in their prospective trial noted a significant decrease by 3.9 minutes in the length of the third stage of labour from 7.990 ± 5.77 minutes in the control group to 4.14 ± 1.67 minutes in the study group among 100 Bangalore women allocated either to placental drainage or non drainage method [14].

The investigators of the present study had explained the shorter length of the third stage of labour and the decrease in mean postpartum blood loss among the placental drainage group by that the drainage of blood from the placental bed results in a decrease of the placental size that led to the stimulation of uterine contractions and decrease in the area of placental attachment. This mechanism results in placental expulsion thus reducing the

duration of the third stage of labour with subsequently decrease in the mean blood loss.

Among the both groups of the current study there were no cases of retained placentae and no woman required manual removal of the placenta. Accordingly, the study did not fully support the rationale that parturient women who are exposed to placental cord drainage after childbirth experience less number of placenta retained or manually removed than those who are not. This finding is consistent with the finding of two studies [8,12]. Interestingly to attribute this agreement to the fact that the need for manual removal of the placenta is based on the placenta retention for more than 30 minutes which was not encountered among the present study sample. Yet, the same study finding contradicts with one study that found a higher incidence (2%) for retained placenta and manual removal of the placenta among the control group compared to non among the drainage group but this difference was statistically insignificant [13]. Such contradiction may be explained by the difference of the sample size; where with increased sample size there is a higher chance to detect a certain deviation.

Lastly, the need for uterotonic agents more than the followed study setting protocol was significantly lower among the study group compared to the control group that is consistent with the report of Ascioglu et al., 2015. The researchers speculated on the rationale for the lower need to additional uterotonic agents among the study group and attributed such finding to the notion that the use of uterotonic agents is mainly indicated during postpartum period to enhance the uterine contractility aiming to help placental expulsion and reducing the third stage length which were already achieved by the placental cord drainage.

Conclusion and recommendations:

Based on the study findings, it can be concluded that the placental cord drainage during the third stage of labour is an effective method in reducing the blood loss and duration of the third stage in spontaneous vaginal deliveries. Being a safe, costless, and effective approach, placental cord drainage should be encouraged post vaginal deliveries. Future research on larger sample to confirm these findings and others investigating placental cord drainage post cesarean deliveries are recommended.

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تفريغ الحبل المشيمي بالمقارنة بربطه على الوقاية من فقدان الدم في المرحلة الثالثة للولادة

مقدمة: المرحلة الثالثة للولادة هي مرحلة ولادة المشيمة، وعلى الرغم من أنها أقصر مراحل المخاض حيث تتراوح من ٥ إلى ٣٠ دقيقة، إلا أنها هي المرحلة الأكثر خطورة من المخاض. وذلك بسبب احتمالية نزيف ما بعد الولادة والذي يشير إلى فقدان الدم المفرط الذي يتجاوز المتوقع من ٥٠٠ مل في غضون ٢٤ ساعة من الولادة. يؤثر نزيف ما بعد الولادة على ٥-١٠٪ من الولادات في البلدان المتقدمة، بينما في البلدان المنخفضة الدخل هو العامل المساهم من وفيات الأمهات.

الهدف من البحث: بهدف هذا البحث إلى فحص تأثير تفريغ الحبل المشيمي على نتائج المرحلة الثالثة للولادة.

تصميم ومكان البحث: أجريت دراسة عشوائية بمجموعة ضابطة في وحدة الاستقبال بمستشفى جامعة المنصورة، مصر.

عينة البحث وجمع البيانات: تضمنت هذه الدراسة عينة عشوائية من ١١٦ سيدة من المتوقع أن يلدن ولادة مهبلية. تم تقسيم العينة إلى مجموعتين متساويتين: المجموعة الضابطة تلقت العناية التقليدية للمرحلة الثالثة من المخاض، والتي تشمل ١٠ وحدات من الأوكسيتوسين بمجرد ولادة الطفل، ربط وقص الحبل السرى من جهتي الأم والطفل، ثم ولادة المشيمة بعد ظهور علامات انفصالها. مجموعة الدراسة تلقت العناية التقليدية للمرحلة الثالثة من المخاض مثل المجموعة الضابطة لكن بدون ربط الحبل السرى من جهة الأم (المشيمة) لإعطاء الفرصة لتفريغ دم المشيمة.

نتائج البحث: كمية الدم المفقودة أثناء المرحلة الثالثة كانت أقل بقيمة ١٤٦.٧ مل في مجموعة الدراسة مقارنة بالمجموعة الضابطة (١٤٣.١ ± ٥٦ مقابل ٢٨٩.٨ ± ١١٤.٥). كما أن مدة المرحلة الثالثة أقصر في مجموعة الدراسة عنها في المجموعة الضابطة بمعدل ٢.٦ دقيقة (٤.٥ ± ١.٧ مقابل ٧.١ ± ٢.٩). بفروق ذات دلالة إحصائية.

الخلاصة والتوصيات: تفريغ دم المشيمة أثناء المرحلة الثالثة وسيلة فعالة لتقليل كمية الدم المفقودة ومدة المرحلة الثالثة في الولادات المهبلية. باعتبار تفريغ دم المشيمة وسيلة فعالة وأمنة ينبغي التوعية بها وتطبيقها.