

Research Article

Draining the Placenta: A Simple Step with Great Impact on Postpartum Hemorrhage, Blood Transfusion Requirement, and Maternal Hemoglobin Reduction Following Vaginal Delivery: A Prospective Comparative Study

Dr. Sumitra Sangavi^{1*}, Dr. Bhavani², Dr. Aishwarya. B. Shivakeri³

^{1*,2,3}Assistant Professor, Department of Obstetrics and Gynaecology, Mahavir Institute of Medical Sciences, Vikarabad, Telangana.

Email: ¹sumitrasangavi@gmail.com, ²bhavanireddy594@gmail.com, ³aishwaryabshivakeri@gmail.com

Corresponding Author: Dr. Sumitra Sangavi

Assistant Professor, Department of Obstetrics and Gynaecology, Mahavir Institute of Medical Sciences Vikarabad, Telangana.

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ABSTRACT

Background: Postpartum hemorrhage (PPH) remains an important cause of maternal morbidity and mortality. Placental cord drainage is a simple, non-invasive intervention that may facilitate placental separation and reduce maternal blood loss following vaginal delivery.

Objective: To evaluate the effect of placental cord drainage on the incidence of PPH, requirement for blood transfusion, and postpartum reduction in maternal hemoglobin.

Methods: This prospective comparative study included 400 women undergoing vaginal delivery. Women were allocated to a placental cord drainage group (n=200) or control group (n=200). In the study group, the placental end of the clamped and cut umbilical cord was opened and allowed to drain, whereas it remained clamped in controls. Maternal outcomes were compared between groups.

Results: PPH occurred in 2% of the drainage group compared with 8.5% of controls (p=0.004). Blood transfusion was required in 2% and 7.5%, respectively (p=0.010). Mean reduction in hemoglobin was significantly lower with cord drainage (0.28±0.13 vs 0.70±0.31 g/dL; p<0.001).

Conclusion: Placental cord drainage was associated with lower PPH incidence, transfusion requirement, and postpartum hemoglobin reduction.

Keywords: Placental Cord Drainage, Postpartum Hemorrhage, Blood Transfusion, Maternal Hemoglobin, Vaginal Delivery, Third Stage of Labour.

INTRODUCTION

Postpartum hemorrhage (PPH) remains a major contributor to maternal morbidity and mortality worldwide and continues to represent an important challenge in obstetric practice. Hemorrhage accounts for a substantial proportion of direct maternal deaths, with the burden being particularly high in low-resource regions where delays in recognition, resuscitation, availability of blood products, and access to definitive treatment may adversely influence outcomes.[1] Prevention and early control of postpartum blood loss are therefore fundamental components of safe maternity care.

PPH following vaginal birth has traditionally been defined as estimated blood loss exceeding 500 mL within 24 hours after delivery, although lower volumes may be clinically important in women with low body mass, pre-existing

anemia, or impaired physiological reserve.[2] Contemporary definitions also emphasize cumulative blood loss and clinical signs of hypovolemia when identifying clinically significant obstetric hemorrhage. Regardless of the definition applied, excessive postpartum blood loss can lead to maternal anemia, need for blood transfusion, hemodynamic instability, and potentially life-threatening complications. The third stage of labour begins immediately after delivery of the fetus and continues until complete separation and expulsion of the placenta and membranes.[3] During this period, effective contraction and retraction of the myometrium play a central role in achieving hemostasis. The blood vessels supplying the placental bed pass through interlacing myometrial fibers, and uterine contraction compresses these vessels after placental separation, functioning as physiological "living

ligatures." Failure of this mechanism results in uterine atony, one of the major mechanisms underlying postpartum hemorrhage.

Active management of the third stage of labour is widely used to reduce maternal blood loss and prevent PPH. Its principal components include prophylactic administration of uterotonics, controlled cord traction, and appropriate assessment of uterine contraction.[4] Oxytocin is commonly preferred as the prophylactic uterotonic because of its ability to increase the frequency and amplitude of uterine contractions.[5] Active rather than expectant management has been associated with reductions in PPH, postpartum anemia, prolonged third stage, therapeutic uterotonic use, and blood transfusion requirements.[6]

Placental cord drainage represents a simple adjunct to third-stage management. After delivery of the infant and division of the umbilical cord, the placental end of the cord is unclamped and residual placental blood is allowed to drain freely. Reduction in placental bulk may facilitate uterine contraction and retraction, thereby assisting placental separation and potentially reducing maternal blood loss.[7] The technique is non-invasive and does not require additional drugs, sophisticated equipment, or substantial technical expertise.

Several clinical investigations have examined maternal outcomes associated with placental cord drainage. Previous evidence has demonstrated lower third-stage blood loss among women undergoing placental drainage, with fewer cases of PPH observed in drainage groups compared with controls.[8] These findings suggest that cord drainage may serve as a simple additional intervention during third-stage management.

Similarly, other clinical studies have reported a lower incidence of PPH with placental cord drainage compared with conventional management and have described the procedure as simple, non-invasive, and potentially useful in both tertiary-care and resource-limited settings.[9] However, the reported effects on PPH have varied across studies. Although reductions in blood loss and third-stage duration are frequently observed, the magnitude of effect on clinically defined PPH may differ depending on study population and management protocols.

Beyond measured blood loss, clinically relevant maternal outcomes include the requirement for blood transfusion and the decline in hemoglobin

concentration after delivery. These outcomes may provide additional evidence regarding the maternal impact of postpartum blood loss. An intervention that reduces PPH while simultaneously limiting postpartum hemoglobin reduction and transfusion requirements could have particular value in settings where maternal anemia is common or access to blood products is limited.

MATERIALS AND METHODS

Study Design and Setting

This prospective comparative study was conducted in the teaching hospitals attached to J.J.M. Medical College, Davangere, namely Bapuji Hospital, Women and Child Hospital, and Chigateri General Hospital.

A total of 400 pregnant women were included and divided into two groups:

- Study group (Group A; n=200): placental cord drainage was performed.
- Control group (Group B; n=200): placental cord drainage was not performed.

The thesis states that a random sampling method was used for allocation into the two groups.

Eligibility Criteria

Women were included if they were primigravidae or multigravidae up to gravida 3, aged 18–30 years, and had a term, singleton, viable pregnancy with vertex presentation and adequate liquor.

Women were excluded in the presence of hemoglobin <8 g/dL, overdistended uterus due to hydramnios, multiple pregnancy or a large baby, antepartum hemorrhage, instrumental delivery, previous lower-segment cesarean section, premature rupture of membranes, or a known coagulation disorder.

Enrollment and Clinical Assessment

Women presenting to the labour room were screened according to the predefined eligibility criteria. Informed consent was obtained from eligible participants. A detailed history, including complications of the current pregnancy, was recorded, followed by general physical and obstetric examination.

Gestational age was established using menstrual history, clinical examination, and ultrasonography. Routine hematological and urine investigations were performed. Maternal vital parameters and fetal heart rate were monitored during the first and second stages of labour.

Women with ineffective uterine contractions received augmentation with intravenous oxytocin or artificial rupture of membranes according to individual requirements. Following vaginal delivery, participants were managed according to their allocated study group.

Placental Cord Drainage Procedure

In the study group, after delivery of the fetus, the placental end of the previously clamped and cut umbilical cord was immediately unclamped and allowed to drain freely until blood flow ceased. The drained placental blood was collected separately in a kidney tray.

In the control group, the placental end of the umbilical cord remained clamped.

A blood-collection drape was applied in both groups. Following the appearance of signs of placental separation, the placenta was delivered by the Brandt-Andrews method of controlled cord traction in both groups.

Management of the Third Stage of Labour

Both groups received 10 units of intramuscular oxytocin following delivery of the fetus. According to the original study protocol, prophylactic intravenous methergine 0.2 mg was administered following placental delivery. If uterine atony occurred, 10 units of oxytocin in 500 mL saline was administered. If the uterus remained inadequately contracted, intramuscular carboprost (PGF_{2α}) 250 µg was given.

Following delivery, the placenta was examined for missing cotyledons or membranes. The cervix, vagina, perineum, and paraurethral region were examined for trauma. Women were observed for the subsequent two hours, with uterine contraction assessed at 15-minute intervals.

Assessment of Blood Loss

Blood loss during the third stage of labour was measured using a blood-collection drape in both groups. Care was taken to prevent blood from an episiotomy wound from mixing with uterine blood loss, and mops used for episiotomy were separately discarded.

After adequate uterine contraction and cessation of active bleeding, residual vaginal blood was removed and the amount collected in the plastic drape was measured.

Outcome Measures

RESULTS

Table 1. Baseline maternal characteristics

For the present paper, three maternal outcomes recorded in the original study were evaluated.

1. Postpartum Hemorrhage

The thesis classified women with blood loss of **≥500 mL** as having PPH for its analysis. The occurrence of PPH was compared between the placental cord drainage and control groups. None of the women in either group had blood loss exceeding 1000 mL.

2. Requirement for Blood Transfusion

The need for maternal blood transfusion was recorded in both groups. The study methodology states that transfusion was considered when blood loss exceeded 1000 mL or when clinically indicated according to the patient's condition.

3. Change in Maternal Hemoglobin

Maternal hemoglobin was measured during the antenatal period and again after delivery. The thesis methodology states that the postnatal hemoglobin difference was assessed after 24 hours, whereas its Results section reports repeat hemoglobin measurement 48 hours after delivery. Because these two sections are inconsistent, the manuscript should not silently choose between them until the original records/protocol are checked.

The difference between antenatal and postnatal hemoglobin concentrations was calculated and compared between the two groups.

Additional Variables

Maternal age, obstetric status, height, weight, body mass index, gestational age, oxytocin augmentation, mode of delivery, and neonatal birth weight were recorded to describe and compare the study groups. The original Results showed no statistically significant between-group differences in these baseline variables.

Statistical Analysis

Data were entered into a Microsoft Excel spreadsheet and analyzed using SPSS version 25. Qualitative variables were expressed as frequencies and percentages, while quantitative variables were summarized as mean±standard deviation.

The Chi-square test was used to evaluate associations between categorical variables, and the unpaired t-test was used to compare continuous variables between the two groups. A p-value <0.05 was considered statistically significant.

Characteristic	Study group (n=200)	Control group (n=200)	p-value
Age (years), mean±SD	25.78±4.23	25.80±4.18	0.9621
Primigravida, n (%)	105 (52.5)	97 (48.5)	0.4236
Multigravida, n (%)	95 (47.5)	103 (51.5)	
Height (cm), mean±SD	155±4.99	154±5.19	0.0502
Weight (kg), mean±SD	59.15±6.51	59.21±6.91	0.8934
BMI (kg/m ²), mean±SD	24.77±2.61	24.86±2.73	0.7363
Gestational age (weeks), mean±SD	38.31±0.61	38.20±0.59	0.0675

Table 2. Labour and delivery characteristics

Characteristic	Study group (n=200)	Control group (n=200)	p-value
Oxytocin augmentation, n (%)	178 (89.0)	180 (90.0)	0.7442
No oxytocin augmentation, n (%)	22 (11.0)	20 (10.0)	
FTND, n (%)	4 (2.0)	3 (1.5)	0.1807
FTVD + RMLE, n (%)	174 (87.0)	185 (92.5)	
FTVD, n (%)	22 (11.0)	12 (6.0)	
Birth weight (kg), mean±SD	2.87±0.38	2.80±0.38	0.0662

Table 3. Comparison of postpartum hemorrhage between groups

PPH	Study group, n (%)	Control group, n (%)	p-value
Yes	4 (2.0)	17 (8.5)	0.004
No	196 (98.0)	183 (91.5)	
Total	200 (100)	200 (100)	

Table 4. Requirement for maternal blood transfusion

Blood transfusion	Study group, n (%)	Control group, n (%)	p-value
Yes	4 (2.0)	15 (7.5)	0.010
No	196 (98.0)	185 (92.5)	
Total	200 (100)	200 (100)	

Table 5. Comparison of maternal hemoglobin reduction

Outcome	Study group (n=200)	Control group (n=200)	p-value
Mean Hb reduction (g/dL)	0.28	0.70	<0.001
SD	0.13	0.31	
Mean±SD	0.28±0.13	0.70±0.31	<0.001

DISCUSSION

The present study evaluated the effect of placental cord drainage on maternal outcomes following vaginal delivery, with particular emphasis on postpartum hemorrhage (PPH), blood transfusion requirement, and postpartum reduction in hemoglobin. The findings demonstrated significantly lower rates of PPH and blood transfusion and a smaller decline in maternal hemoglobin among women who underwent placental cord drainage compared with those in the control group.

PPH occurred in 2% of women in the placental cord drainage group compared with 8.5% in the control group, and the difference was

statistically significant ($p=0.004$). None of the women in either group experienced blood loss exceeding 1000 mL. These findings are supported by previous evidence evaluating placental cord drainage. A systematic review involving 1257 women reported that cord drainage reduced the duration of the third stage of labour and mean blood loss; however, no statistically significant difference in PPH was demonstrated between drainage and control groups.[10] This variation suggests that although cord drainage has shown a relatively consistent effect on measured blood loss, its effect on the incidence of clinically defined PPH may vary across study populations.

Previous clinical evidence has reported PPH in 3% of women undergoing placental drainage compared with 10% in the control group and demonstrated that placental drainage shortened the third stage of labour without producing adverse outcomes.[11] Another study similarly observed lower blood loss among women undergoing cord drainage, with no cases of PPH in the drainage group compared with two cases in the control group.[12] These findings are consistent with the direction of the present results and support a potential role for placental cord drainage in reducing excessive postpartum blood loss.

Not all previous investigations, however, have demonstrated a substantial reduction in PPH. One study reported PPH rates of approximately 9% in the study group and 9.6% in the control group, despite observing reductions in third-stage duration and blood loss with cord drainage.[13] Differences in participant characteristics, sample size, obstetric management, uterotonic use, and methods of blood-loss assessment may contribute to variation in PPH rates across studies.

Another important finding of the present study was the significantly lower requirement for blood transfusion in the placental cord drainage group. Blood transfusion was required in 2% of women in the study group compared with 7.5% of controls ($p=0.010$). Among women who developed PPH, hemorrhage was managed using general measures, uterotonic therapy, and blood transfusion when indicated. None of the women in either group required surgical management, and no patient required more than two blood transfusions. The lower transfusion requirement observed with cord drainage is clinically relevant because reducing maternal blood loss may decrease the subsequent need for blood-product support.

The postpartum change in maternal hemoglobin further supports the observed difference in blood loss. Mean hemoglobin reduction was 0.28 ± 0.13 g/dL in the placental cord drainage group compared with 0.70 ± 0.31 g/dL in the control group ($p < 0.001$). Previous evidence has similarly demonstrated a greater difference between pre-delivery and postnatal hemoglobin values among controls than among women undergoing placental cord drainage, with the difference reaching statistical significance.[14] Other studies have also reported lower average blood loss in placental drainage groups compared with controls,

further supporting the beneficial effect of drainage on maternal blood loss.[15]

CONCLUSION

The present study demonstrated that placental cord drainage was associated with a lower incidence of PPH, reduced blood transfusion requirement, and a smaller postpartum decline in maternal hemoglobin. The findings are broadly consistent with previous evidence, although variation in the reported effect on PPH indicates the need for cautious interpretation. Given its simplicity and non-invasive nature, placental cord drainage may represent a useful adjunct to third-stage management in appropriately selected women.

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