

Research Article

Impact of Placental Cord Drainage in Reducing Duration of Third Stage of Labour and Postpartum Blood Loss

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ABSTRACT

Background: The third stage of labour is a critical period during which effective placental separation and uterine contraction are essential to minimize maternal blood loss. Placental cord drainage is a simple, non-invasive technique that may facilitate placental delivery and reduce postpartum blood loss.

Objective: To evaluate the effect of placental cord drainage on the duration of the third stage of labour and blood loss following vaginal delivery.

Methods: This prospective comparative study included 400 women undergoing vaginal delivery, allocated into a placental cord drainage group (n=200) and a control group (n=200). In the study group, the placental end of the clamped and cut umbilical cord was unclamped and allowed to drain until blood flow ceased, whereas it remained clamped in controls. The duration of the third stage and blood loss were compared between groups.

Results: Mean duration of the third stage was significantly shorter in the drainage group than in controls (3.56±1.33 vs 5.06±1.90 minutes; p<0.0001). Mean blood loss was also significantly lower (187±109.1 vs 308.95±172.35 mL; p<0.0001).

Conclusion: Placental cord drainage significantly reduced third-stage duration and postpartum blood loss and may serve as a simple adjunct to third-stage management.

Keywords: Placental Cord Drainage, Third Stage of Labour, Postpartum Blood Loss, Vaginal Delivery, Postpartum Haemorrhage.

INTRODUCTION

Postpartum hemorrhage (PPH) remains an important cause of maternal morbidity and mortality worldwide, particularly in settings where access to timely obstetric care and blood transfusion services may be limited. Hemorrhage contributes substantially to maternal deaths globally, with a considerable proportion occurring during the postpartum period.[1] PPH following vaginal delivery has traditionally been defined as blood loss exceeding 500 mL within 24 hours of birth, although the clinical significance of blood loss also depends on the woman's baseline health status and hemodynamic condition.[2] Consequently, strategies that minimize blood loss during and immediately after delivery remain an important component of safe obstetric practice.

The third stage of labour begins after delivery of the fetus and ends with complete separation and expulsion of the placenta and its

membranes. Although considerably shorter than the first and second stages, it represents a clinically important period because inadequate uterine contraction, delayed placental separation, or retained placental tissue can contribute to excessive bleeding.[3] Following placental separation, contraction and retraction of the myometrium compress the blood vessels supplying the placental bed, thereby providing the principal physiological mechanism for limiting postpartum blood loss. Failure of effective uterine contraction may therefore result in uterine atony and substantial hemorrhage.

Active management of the third stage of labour has been widely adopted to reduce postpartum blood loss and associated complications. Its principal components include prophylactic administration of a uterotonic, controlled cord traction, and appropriate uterine assessment or massage.[4] Oxytocin is commonly used as the preferred uterotonic because it promotes

effective uterine contraction and thereby facilitates placental separation and hemostasis.[5] Nevertheless, additional simple interventions that can facilitate placental delivery without requiring sophisticated equipment may be particularly valuable in resource-constrained settings.

Placental cord drainage is a simple technique in which the placental end of the previously clamped and divided umbilical cord is unclamped and allowed to drain freely after delivery of the infant. Drainage of residual placental blood may decrease placental bulk, potentially allowing more effective uterine contraction and retraction and facilitating placental separation and expulsion.[6] The procedure is non-invasive, does not require specialized equipment, and can readily be incorporated into routine management of the third stage of labour.

Previous clinical studies have reported beneficial effects of placental cord drainage on third-stage outcomes. Dutta and Mahanta observed significantly lower blood loss in women undergoing placental drainage compared with controls and described the procedure as a safe and simple additional component of third-stage management.[7] Pandey et al. similarly reported that placental cord drainage was associated with a significantly shorter third stage and reduced postpartum blood loss.[8] A comparative study by Mittal et al. also demonstrated reductions in third-stage duration and blood loss and suggested that the technique may be useful in both tertiary-care and resource-limited settings.[9]

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, Karnataka, including Bapuji Hospital, Women and Child Hospital, and Chigateri General Hospital.

A total of 400 pregnant women fulfilling the eligibility criteria were included. They were divided into two groups of 200 women each:

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

Random sampling was used for allocation of cases into the two groups.

Eligibility Criteria

Inclusion Criteria

Women were eligible for inclusion if they fulfilled the following criteria:

- Primigravida or multigravida up to gravida 3
- Term, singleton, viable pregnancy
- Vertex presentation with adequate liquor
- Maternal age between 18 and 30 years

Exclusion Criteria

Women with any of the following conditions were excluded:

- 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
- Known coagulation disorders

These criteria were applied during screening before enrollment.

Enrollment and Assessment

Eligible women presenting to the labour room were screened according to the predefined inclusion and exclusion criteria. Written informed consent was obtained before participation. A detailed history, including complications during the current pregnancy, was recorded, followed by general physical and obstetric examinations.

Gestational age was determined using menstrual history, clinical examination, and ultrasonography. Routine hematological and urine investigations were performed. Maternal vital parameters and fetal heart rate were monitored throughout 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 clinical requirements.

Intervention

Following vaginal delivery, women were managed according to their assigned group.

In the study group, 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 and no placental cord drainage was performed.

After signs of placental separation appeared, the placenta was delivered by the Brandt-

Andrews method of controlled cord traction in both groups. A blood-collection drape was used for assessment of maternal blood loss.

Management of the Third Stage of Labour

All participants received **10 units of intramuscular oxytocin after delivery of the fetus**. Prophylactic intravenous methergine 0.2 mg was administered after placental delivery as described in the study protocol.

If uterine atony occurred, 10 units of oxytocin in 500 mL saline was administered. If adequate uterine contraction was still not achieved, intramuscular carboprost (PGF_{2α}) 250 µg was given.

Following placental delivery, the placenta and membranes were carefully examined for completeness. Women were also examined for cervical, vaginal, perineal, and paraurethral tears. Episiotomy, where performed, was repaired in layers. Participants were monitored for at least two hours after delivery, with uterine contraction assessed at 15-minute intervals.

Outcome Measures

Primary Outcomes

The principal outcomes for the present paper were:

1. Duration of the third stage of labour

The duration was measured using a stopwatch in relation to delivery of the baby and complete delivery of the placenta with its attached membranes. The duration was recorded for each participant and subsequently compared between the study and control groups.

2. Blood loss during the third stage of labour

Maternal blood loss was measured using a blood-collection drape. Blood arising from an episiotomy wound was prevented from mixing

with uterine blood loss; mops used during episiotomy management were separately discarded. Once the uterus was adequately contracted and active bleeding had ceased, residual vaginal blood was removed and the blood collected in the drape was measured.

For this paper, blood loss was analyzed both as a continuous variable and according to the categories reported in the thesis: ≤100, 101–200, 201–300, 301–400, 401–499, and ≥500 mL.

Additional Variables

Baseline and obstetric characteristics evaluated for comparability between the two groups included maternal age, gravidity, height, weight, body mass index, gestational age, augmentation of labour with oxytocin, mode of delivery, and neonatal birth weight.

The duration of the first and second stages of labour was also recorded. These variables were considered relevant for assessing the comparability of the study and control groups before interpreting differences in the principal outcomes.

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 presented as mean ± standard deviation.

The Chi-square test was used to assess associations between categorical variables, and the unpaired t-test was used to compare mean values between the study and control groups. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1. Baseline maternal and obstetric characteristics

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 duration of stages of labour

Stage of labour	Study group	Control group	p-value
First stage (hours)	8.17±2.68	8.13±2.72	0.8823
Second stage (minutes)	21.87±8.12	26.60±9.03	<0.0001
Third stage (minutes)	3.56±1.33	5.06±1.90	<0.0001

Table 4. Distribution of blood loss during the third stage of labour

Blood loss (mL)	Study group, n (%)	Control group, n (%)
≤100	31 (15.5)	10 (5.0)
101–200	94 (47.0)	40 (20.0)
201–300	51 (25.5)	85 (42.5)
301–400	16 (8.0)	39 (19.5)
401–499	4 (2.0)	9 (4.5)
≥500	4 (2.0)	17 (8.5)
Mean±SD (mL)	187±109.1	308.95±172.35

Table 5. Blood loss according to mode of delivery

Mode of delivery	Study group, mean±SD (mL)	Control group, mean±SD (mL)	p-value
FTVD	163±64.67	253±105.30	<0.0001
FTVD + RMLE	191±114.19	314±175.70	<0.0001
FTND	173±38.62	177±83.27	0.5381

DISCUSSION

The present study evaluated the effect of placental cord drainage on the duration of the third stage of labour and postpartum blood loss among 400 women undergoing vaginal delivery. The two groups were generally comparable with respect to maternal age, gravidity, anthropometric parameters, gestational age, oxytocin augmentation, mode of delivery, and neonatal birth weight. The principal findings demonstrated that placental cord drainage was associated with a significantly shorter third stage of labour and substantially lower postpartum blood loss compared with no drainage.

The mean duration of the third stage was 3.56±1.33 minutes in the placental cord drainage group compared with 5.06±1.90 minutes in the control group (p<0.0001), representing a reduction of approximately 1.5 minutes. This finding is consistent with previous evidence demonstrating that placental cord drainage can significantly shorten the duration of the third stage of labour.[10] Similar reductions in third-stage duration have also been reported in other clinical studies evaluating placental cord drainage.[11]

Previous studies have likewise demonstrated significantly shorter third-stage duration among women undergoing placental cord drainage compared with controls.[12] Randomized evaluations of different third-stage management techniques have also reported a reduction in the duration of the third stage with cord drainage, although the magnitude of the effect has varied across studies.[13] Differences in study populations, third-stage management protocols, uterotonic administration, and measurement techniques may account for variations in the magnitude of effect across studies.

The second principal finding was the marked reduction in maternal blood loss. Mean blood loss was 187±109.1 mL in the drainage group compared with 308.95±172.35 mL in controls (p<0.0001), corresponding to an absolute reduction of approximately 122 mL. Moreover, 62.5% of women in the drainage group experienced blood loss ≤200 mL compared with only 25% of controls. Blood loss ≥500 mL occurred in 2% and 8.5% of women, respectively.

These findings are consistent with previous investigations demonstrating reduced

postpartum blood loss following placental cord drainage.[10] Earlier studies have also reported beneficial outcomes associated with placental drainage, including reductions in both third-stage duration and postpartum hemorrhage.[11] Similar findings have been reported in comparative studies in which mean blood loss was substantially lower among women undergoing placental cord drainage than among controls.[12]

Blood loss was also significantly lower in the drainage group when examined according to the common modes of vaginal delivery. Among women with FTVD, mean blood loss was 163 ± 64.67 mL in the study group compared with 253 ± 105.3 mL in controls. Among those undergoing FTVD with right mediolateral episiotomy, corresponding values were 191 ± 114.19 mL and 314 ± 175.7 mL, respectively (both $p < 0.0001$). No significant difference was observed for FTND, although the number of women in this subgroup was small. The clinical relevance of reducing postpartum blood loss is supported by evidence showing that appropriate management of the third stage of labour can reduce postpartum hemorrhage, postpartum anemia, prolonged third stage, and the requirement for blood transfusion.[14] Placental cord drainage has the additional practical advantages of being simple, non-invasive, inexpensive, and requiring no specialized equipment. Previous clinical evidence has also demonstrated lower postpartum blood loss with placental cord drainage, further supporting its potential role as an adjunctive measure in the management of the third stage of labour.[15]

CONCLUSION

Placental cord drainage following vaginal delivery was associated with a significant reduction in the duration of the third stage of labour and maternal blood loss. The mean third-stage duration decreased from 5.06 minutes in the control group to 3.56 minutes in the drainage group, while mean blood loss decreased from 308.95 mL to 187 mL.

Placental cord drainage is a simple, non-invasive technique that does not require additional equipment or substantial resources. Within the population studied, it may therefore serve as a useful adjunct to the management of the third stage of labour.

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