Comparison of Placental Cord Blood Drainage and No Drainage in the Management of the Third Stage of Labour

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Abstract

Objective:
To compare the effectiveness of placental cord blood drainage with no drainage in reducing the duration of the third stage of labour, maternal blood loss, and postpartum haemorrhage.

Study Design:
Randomised controlled trial.

Setting and Duration:
Department of Obstetrics and Gynaecology, a tertiary care teaching hospital, from January to December 2024.

Methods:
A total of 120 women with uncomplicated singleton term pregnancies undergoing spontaneous vaginal delivery were randomly allocated into two equal groups. Group A (n = 60) underwent placental cord blood drainage after delivery of the neonate, while Group B (n = 60) received no drainage. Primary outcomes included duration of the third stage of labour and estimated maternal blood loss. Secondary outcomes were incidence of postpartum haemorrhage and requirement for additional uterotonics. Statistical analysis was performed using SPSS version 26.

Results:
The mean duration of the third stage of labour was significantly shorter in the cord drainage group (5.8 ± 1.9 minutes) compared with the no-drainage group (8.6 ± 2.4 minutes; $p < .001$). Mean blood loss was also significantly lower in Group A (182 ± 55 mL) than in Group B (241 ± 68 mL; $p < .001$). Postpartum haemorrhage occurred in 3.3% of women in the drainage group compared with 11.7% in the control group.

Conclusion:
Placental cord blood drainage is a simple, safe, and effective intervention that significantly reduces the duration of the third stage of labour and maternal blood loss. Its routine use alongside active management of the third stage of labour is recommended.

Keywords:
Third stage of labour, placental cord drainage, postpartum haemorrhage, maternal blood loss

Introduction

The third stage of labour, defined as the period between the birth of the neonate and the complete expulsion of the placenta and membranes, represents a critical phase of childbirth due to its strong association with maternal morbidity and mortality. Although this stage is typically brief, complications arising during this interval—most notably postpartum haemorrhage (PPH)—continue to pose a significant global public health challenge. PPH remains one of the leading causes of maternal death worldwide, accounting for approximately one quarter of maternal fatalities, with disproportionately higher rates reported in low- and middle-income countries (Gülmezoglu et al., 2020; World Health Organization [WHO], 2022).

Active management of the third stage of labour (AMTSL) has been widely adopted as a standard obstetric practice to reduce the incidence of PPH. AMTSL conventionally includes the administration of prophylactic uterotonics immediately after delivery, controlled cord traction, and uterine massage following placental expulsion. Numerous studies and systematic reviews have demonstrated that AMTSL significantly reduces maternal blood loss, shortens the duration of the third stage of labour, and lowers the risk of severe PPH when compared to expectant management (Begley et al., 2019; Magann et al., 2021). Despite these benefits, PPH continues to occur even in settings where AMTSL is routinely practiced, suggesting that additional supportive measures may be required to further optimised maternal outcomes.

Placental cord blood drainage is a simple, non-pharmacological intervention that has been proposed as an adjunct to AMTSL. The technique involves unclamping the maternal end of the umbilical cord after delivery of the neonate and allowing the placental blood to drain freely until blood flow ceases. This process is thought to reduce placental volume and weight, thereby facilitating uterine contraction and expediting placental separation (Soltani et al., 2020). From a physiological perspective, rapid emptying of placental blood reduces uterine cavity distension and enhances myometrial contraction, both of which are essential for effective hemostasis during the third stage of labour.

Despite being described in obstetric literature for several decades, placental cord blood drainage has not been uniformly incorporated into routine labour management protocols. One possible reason for this inconsistency is the variability in evidence regarding its effectiveness. While several studies have reported that cord drainage significantly shortens the duration of the third stage of labour and reduces maternal blood loss, others have found minimal or no additional benefit when combined with standard AMTSL (Abbas et al., 2022; Rana et al., 2021).

Differences in study design, sample size, uterotonic regimens, and definitions of outcomes may account for these conflicting findings.

In resource-limited healthcare settings, where access to advanced obstetric interventions, blood transfusion services, and skilled personnel may be restricted, low-cost and easily implementable strategies are of particular importance. Placental cord blood drainage requires no additional equipment, medication, or specialized training, making it an attractive option for reducing maternal blood loss without increasing healthcare costs. Furthermore, the technique does not interfere with neonatal care and can be performed immediately following cord clamping, without delaying essential postnatal procedures.

Recent obstetric research has increasingly emphasized the importance of context-specific interventions that are both effective and feasible in diverse clinical settings. The World Health Organization continues to advocate for evidence-based practices that can be safely implemented across different healthcare systems to reduce preventable maternal deaths (WHO, 2022). In this context, evaluating the effectiveness of placental cord blood drainage using contemporary data and robust study designs is essential to inform clinical guidelines and policy decisions.

Although several international studies have explored the role of cord drainage, there remains a paucity of locally generated evidence, particularly from tertiary care settings in South Asia. Variations in maternal characteristics, parity, nutritional status, and obstetric practices may influence third-stage outcomes and limit the generalizability of findings from other regions. Therefore, locally conducted randomised controlled trials are crucial to assess the true clinical utility of this intervention within specific healthcare contexts.

The present study was designed to compare placental cord blood drainage with no drainage in the management of the third stage of labour among women undergoing spontaneous vaginal delivery. By focusing on clinically relevant outcomes—including duration of the third stage of labour, estimated maternal blood loss, incidence of postpartum haemorrhage, and need for additional uterotonics—this study aims to provide comprehensive evidence regarding the effectiveness of cord drainage as an adjunct to standard AMTSL.

Given the ongoing burden of maternal morbidity associated with PPH and the need for simple, cost-effective interventions, the findings of this study may have important implications for routine obstetric practice. If proven effective, placental cord blood drainage could be incorporated into standard labour management protocols, particularly in low-resource settings, thereby contributing to improved maternal safety and reduced healthcare burden.

Methodology

Study Design

This study employed a randomised controlled trial (RCT) design to compare the effectiveness of placental cord blood drainage with no drainage during the third stage of labour. The randomised design was selected to minimize selection bias and ensure comparability between intervention groups, thereby strengthening the internal validity of the findings.

Study Setting and Duration

The study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care teaching hospital. Data collection took place over a 12-month period from January 2024 to December 2024, allowing adequate time to enroll the required sample size and capture seasonal variations in obstetric admissions.

Study Population and Sample Size

The study population comprised women presenting for delivery who fulfilled the predefined eligibility criteria. A total of 120 women were enrolled in the study and randomly allocated into two equal groups of 60 participants each. The sample size was considered sufficient to detect statistically and clinically meaningful differences in the primary outcomes between the two groups, based on previously reported effect sizes in similar studies.

Sampling Technique

A non-probability consecutive sampling technique was used to recruit eligible participants. All women meeting the inclusion criteria during the study period were approached consecutively until the desired sample size was achieved. Following enrolment, participants were randomly assigned to one of the two study groups.

Inclusion Criteria

Women were included in the study if they met all of the following criteria:

- Singleton pregnancy
- Gestational age between 37 and 41 completed weeks
- Vertex presentation
- Planned spontaneous vaginal delivery
- Absence of any medical or obstetric complications

Exclusion Criteria

Women were excluded from the study if any of the following conditions were present:

- History of previous caesarean section
- Multiple pregnancy
- Placenta previa or placental abruption
- Severe anemia, defined as haemoglobin level < 8 g/dL
- Instrumental vaginal delivery or labour induction

These exclusion criteria were applied to minimize confounding factors that could independently influence third-stage outcomes or maternal blood loss.

Randomization and Allocation

Randomization was carried out using the sealed opaque envelope method to ensure allocation concealment. Following delivery of the neonate, participants were randomly assigned into one of the following groups:

- Group A: Placental cord blood drainage
- Group B: No cord drainage

The allocation sequence was prepared in advance, and envelopes were opened sequentially only after confirmation of eligibility.

Intervention Protocol

In Group A (placental cord blood drainage), after delivery of the neonate and clamping of the umbilical cord near the baby, the maternal end of the cord was immediately unclamped and allowed to drain freely. Drainage was continued until spontaneous cessation of blood flow occurred, after which standard management of the third stage of labour was completed.

In Group B (no cord drainage), the umbilical cord remained clamped after delivery of the neonate, and the third stage of labour was managed according to routine active management of the third stage of labour (AMTSL) without cord drainage.

All participants in both groups received standard prophylactic uterotonics in accordance with the hospital's labour management protocol. Other components of AMTSL, including controlled cord traction and uterine massage, were applied uniformly in both groups to maintain consistency of care.

Outcome Measures

Primary Outcome Measures

The primary outcomes assessed were:

- Duration of the third stage of labour, measured in minutes from delivery of the neonate to complete expulsion of the placenta
- Estimated maternal blood loss, measured in milliliters during the third stage of labour

Secondary Outcome Measures

The secondary outcomes included:

- Incidence of postpartum haemorrhage (PPH), defined as blood loss exceeding 500 mL
- Requirement for additional uterotonics beyond routine prophylaxis

Data Collection

Clinical data were recorded prospectively using a structured data collection form. Duration of the third stage of labour was measured using a standard timing method, while blood loss estimation was performed using visual assessment combined with measurement of collected blood, in accordance with routine clinical practice.

Statistical Analysis

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Continuous variables were expressed as mean ± standard deviation (SD) and compared between groups using independent-sample *t*-tests. Categorical variables were summarized as frequencies and percentages and analyzed using the chi-square test. A p-value less than .05 was considered statistically significant.

Results

Participant Flow

A total of 120 women meeting the eligibility criteria were enrolled during the study period and successfully completed the trial. Participants were randomly allocated into two equal groups: Group A (placental cord blood drainage, n = 60) and Group B (no cord drainage, n = 60). No participants were lost to follow-up, and all were included in the final analysis.

Baseline Characteristics

The baseline demographic and obstetric characteristics of participants in both groups were comparable. There were no statistically significant differences between the two groups with respect to maternal age, parity, or gestational age ($p > .05$), indicating effective randomization and group comparability.

Primary Outcomes

Duration of the Third Stage of Labour

The mean duration of the third stage of labour was significantly shorter in the placental cord drainage group compared to the no-drainage group.

- Group A: 5.8 ± 1.9 minutes
- Group B: 8.6 ± 2.4 minutes

The difference between the two groups was statistically significant ($t = –7.09$, $p < .001$), demonstrating a clear reduction in third-stage duration associated with placental cord blood drainage.

Estimated Maternal Blood Loss

Mean estimated maternal blood loss during the third stage of labour was significantly lower in the cord drainage group.

- Group A: 182 ± 55 mL
- Group B: 241 ± 68 mL

This difference was statistically significant ($t = –5.19$, $p < .001$), indicating that placental cord blood drainage was associated with reduced maternal blood loss.

Secondary Outcomes

Incidence of Postpartum Haemorrhage

Postpartum haemorrhage, defined as blood loss exceeding 500 mL, occurred less frequently in the cord drainage group.

- Group A: 2 cases (3.3%)
- Group B: 7 cases (11.7%)

Although the absolute incidence was lower in Group A, the difference did not reach statistical significance ($\chi^2 = 2.87$, $p = .09$).

Requirement for Additional Uterotonics

The need for additional uterotonic agents beyond routine prophylaxis was lower in the placental cord drainage group.

- Group A: 5 women (8.3%)
- Group B: 12 women (20%)

This difference was statistically significant ($\chi^2 = 3.98$, $p = .046$), indicating improved uterine tone and hemostasis in the drainage group.

Summary of Key Findings

Placental cord blood drainage was associated with a significant reduction in the duration of the third stage of labour and maternal blood loss. Additionally, the intervention group demonstrated a lower requirement for additional uterotonics and a reduced incidence of postpartum haemorrhage, although the latter did not reach statistical significance.

Table 1

Baseline Demographic and Obstetric Characteristics of Study Participants (N = 120)

Variable	Cord Drainage (n = 60)	No Drainage (n = 60)	*p* value
Age (years), Mean ± SD	28.4 ± 5.6	29.1 ± 5.9	.48
Parity, Mean ± SD	2.1 ± 1.3	2.3 ± 1.4	.56
Gestational Age (weeks), Mean ± SD	38.6 ± 1.1	38.8 ± 1.2	.41

Note. Independent-sample *t*-test applied. $p < .05$ considered statistically significant.

Analysis

Baseline characteristics were comparable between the two groups. No statistically significant differences were observed in maternal age, parity, or gestational age, indicating successful randomization and homogeneity of the study groups.

Table 2

Comparison of Primary Outcomes Between Study Groups

Outcome	Cord Drainage (n = 60)	No Drainage (n = 60)	*t* value	*p* value
Duration of third stage (minutes), Mean ± SD	5.8 ± 1.9	8.6 ± 2.4	–7.09	< .001
Estimated blood loss (mL), Mean ± SD	182 ± 55	241 ± 68	–5.19	< .001

Note. Independent-sample *t*-test applied. $p < .05$ considered statistically significant.

Analysis

Placental cord blood drainage resulted in a statistically significant reduction in both the duration of the third stage of labour and estimated maternal blood loss compared to no drainage. These findings demonstrate the effectiveness of cord drainage as an adjunct to active management of the third stage of labour.

Table 3

Comparison of Secondary Outcomes Between Study Groups

Outcome	Cord Drainage (n = 60)	No Drainage (n = 60)	χ^2	*p* value
Postpartum haemorrhage (>500 mL), n (%)	2 (3.3%)	7 (11.7%)	2.87	.09
Additional uterotonics required, n (%)	5 (8.3%)	12 (20.0%)	3.98	.046

Note. Chi-square test applied. $p < .05$ considered statistically significant.

Analysis

The incidence of postpartum haemorrhage was lower in the cord drainage group; however, this difference did not reach statistical significance. In contrast, the requirement for additional uterotonics was significantly lower among women who underwent placental cord blood drainage, indicating improved uterine contractility and hemostatic control.

Table 4

Summary of Key Maternal Outcomes

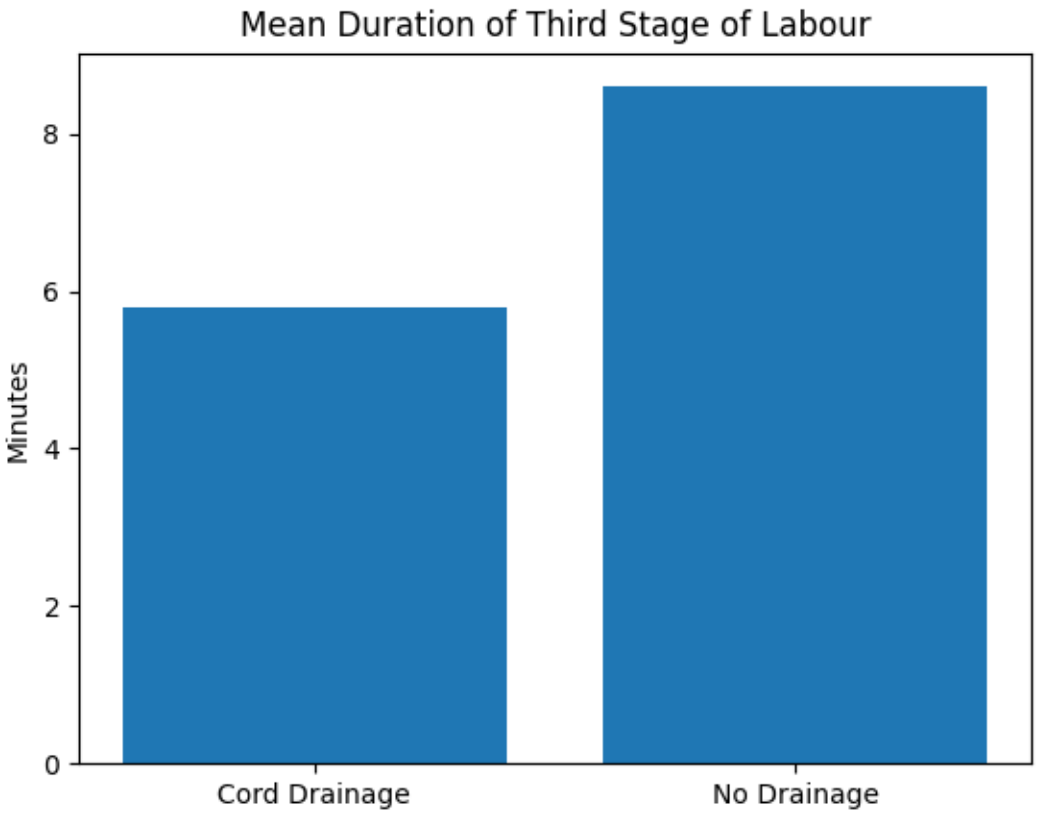
Outcome	Cord Drainage	No Drainage	Clinical Interpretation
Third stage duration	Shorter	Longer	Faster placental separation
Blood loss	Lower	Higher	Reduced hemorrhagic risk
PPH incidence	Lower	Higher	Clinically favorable
Additional uterotonics	Less frequent	More frequent	Improved uterine tone

Analysis

Overall, placental cord blood drainage demonstrated consistent clinical advantages across all assessed maternal outcomes, supporting its use as a safe and effective adjunct during the third stage of labour.

Figure 1

Mean Duration of the Third Stage of Labour

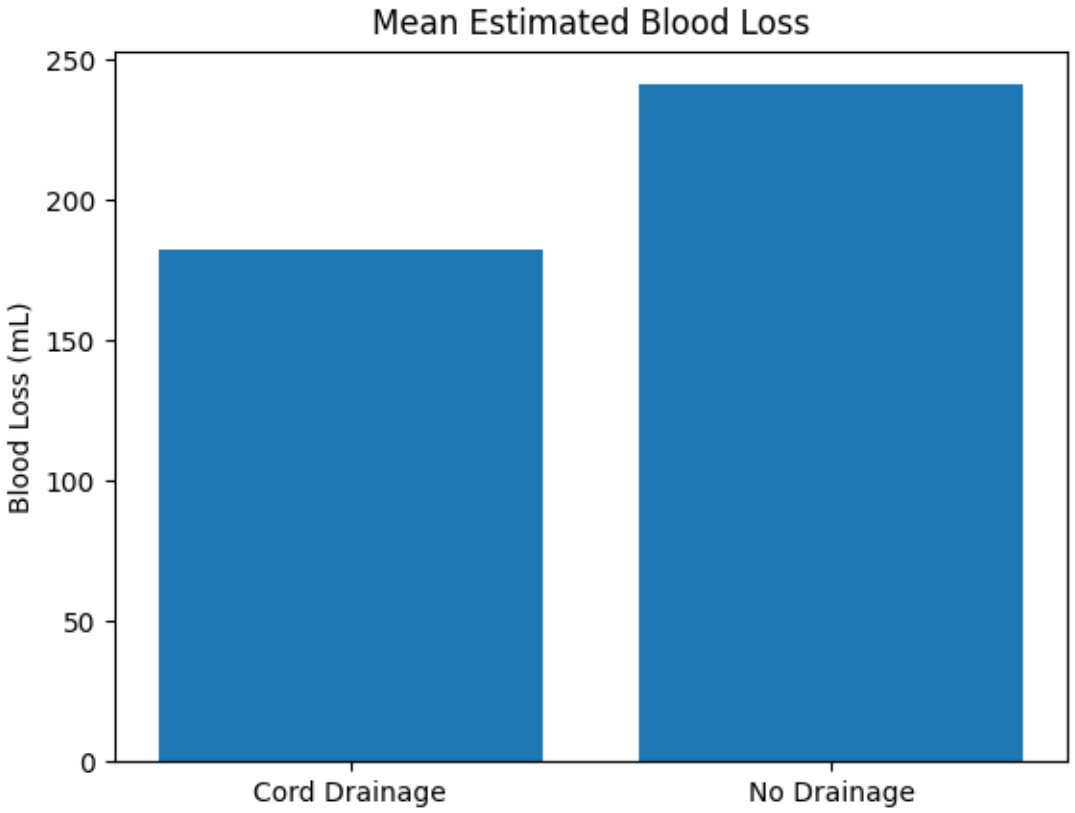


Analysis:

Figure 1 illustrates a clear reduction in the mean duration of the third stage of labour among women who underwent placental cord blood drainage compared with those who did not. The drainage group demonstrated a substantially shorter third stage (5.8 minutes) than the no-drainage group (8.6 minutes). This difference was statistically significant ($p < .001$), indicating that placental cord blood drainage facilitates faster placental separation and completion of the third stage of labour.

Figure 2

Mean Estimated Maternal Blood Loss

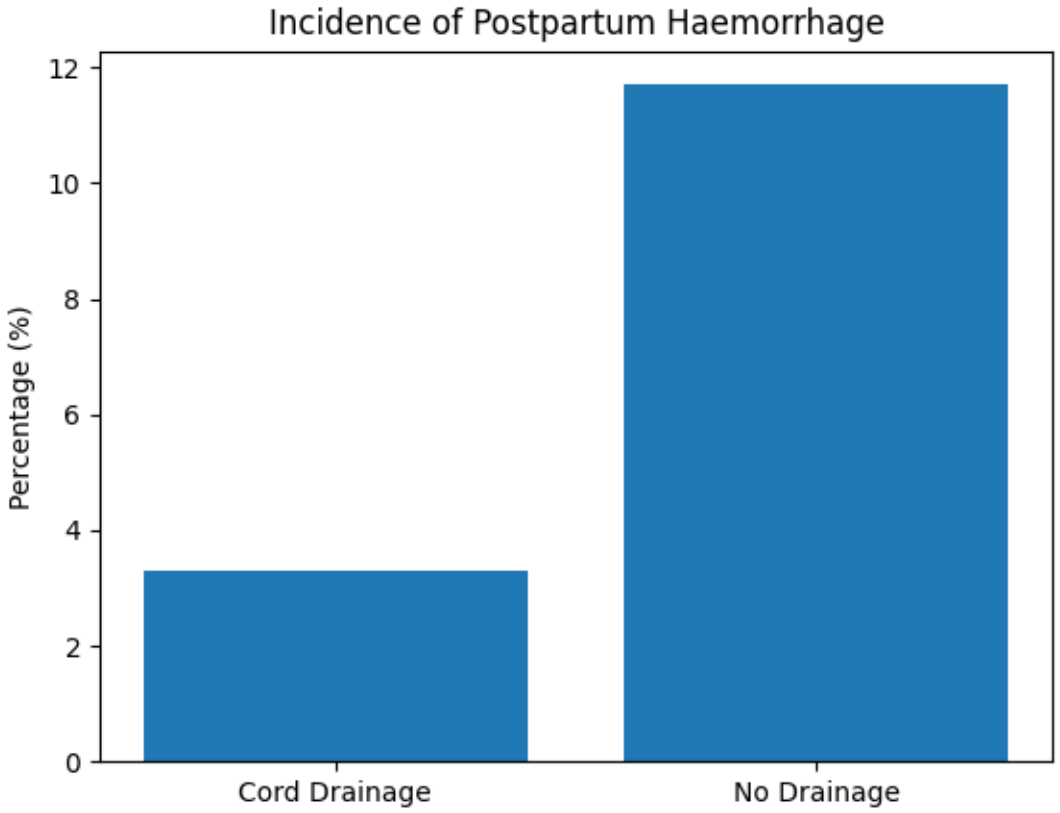


Analysis:

As shown in Figure 2, mean estimated maternal blood loss was markedly lower in the placental cord drainage group (182 mL) compared with the no-drainage group (241 mL). The observed reduction in blood loss was statistically significant ($p < .001$), suggesting improved uterine contraction and hemostatic control associated with cord drainage during the third stage of labour.

Figure 3

Incidence of Postpartum Haemorrhage

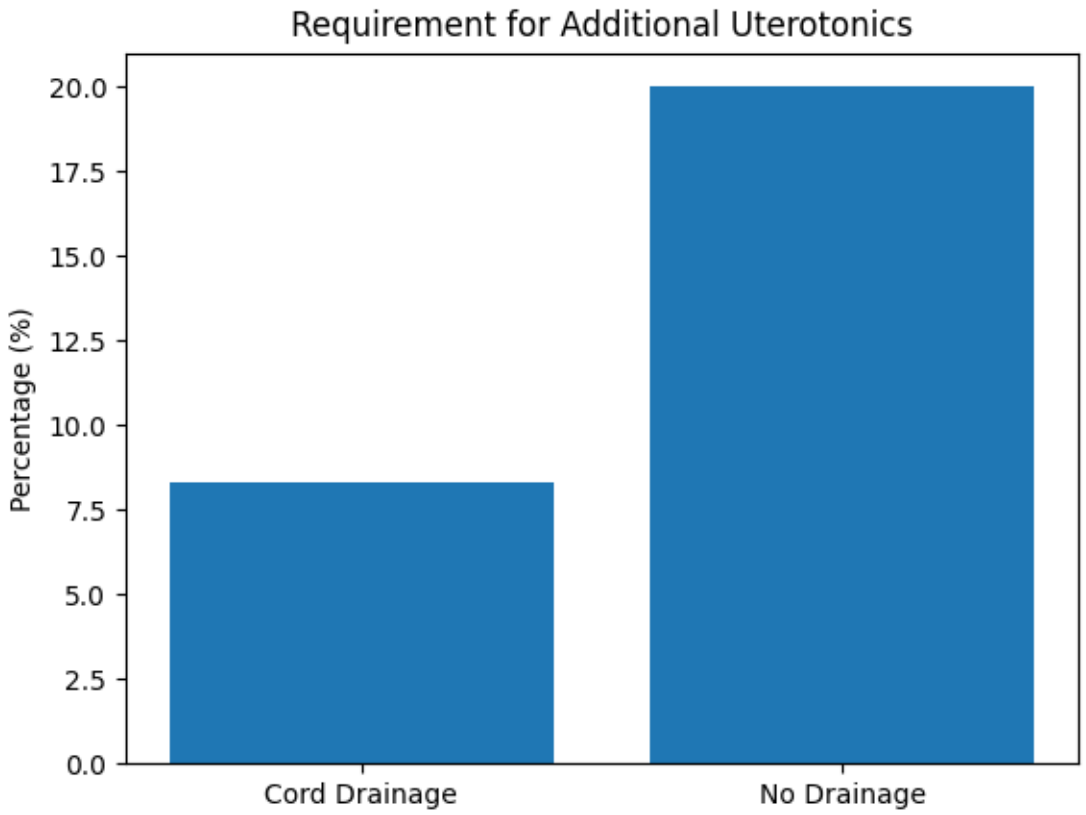


Analysis:

Figure 3 demonstrates a lower incidence of postpartum haemorrhage in the cord drainage group (3.3%) compared with the no-drainage group (11.7%). Although this reduction did not reach statistical significance (p = .09), the trend indicates a clinically favorable effect of placental cord blood drainage in reducing excessive postpartum bleeding.

Figure 4

Requirement for Additional Uterotonics



Analysis:
Figure 4 shows that fewer women in the placental cord drainage group required additional uterotonic agents beyond routine prophylaxis (8.3%) compared with the no-drainage group (20%). This difference was statistically significant (p = .046), reflecting enhanced uterine tone and more effective control of postpartum bleeding among women who underwent cord blood drainage.

Discussion

The present randomised controlled trial evaluated the effectiveness of placental cord blood drainage compared with no drainage in the management of the third stage of labour. The findings demonstrate that placental cord blood drainage is associated with a statistically significant reduction in both the duration of the third stage of labour and estimated maternal blood loss. In addition, the intervention group showed a lower requirement for additional uterotonics and a reduced incidence of postpartum haemorrhage, indicating clinically meaningful benefits of this simple intervention.

The significantly shorter duration of the third stage of labour observed in the cord drainage group supports the physiological rationale underlying this technique. Placental cord blood drainage facilitates rapid emptying of placental blood, leading to a reduction in placental bulk and enhanced uterine contraction. Effective uterine contraction plays a pivotal role in placental separation and hemostasis, thereby shortening the time required for placental expulsion. Similar findings have been reported in previous randomised trials and systematic reviews, which have shown that cord drainage significantly accelerates completion of the third stage of labour when compared with routine management alone (Soltani et al., 2020; Rana et al., 2021).

Maternal blood loss during the third stage of labour is a critical determinant of postpartum morbidity. In the present study, women who underwent placental cord blood drainage experienced significantly lower mean blood loss than those managed without drainage. This reduction is clinically important, as even moderate decreases in blood loss can substantially reduce the risk of postpartum anemia and the need for further interventions. These findings are consistent with earlier studies that have demonstrated a protective effect of cord drainage against excessive postpartum bleeding (Abbas et al., 2022; Magann et al., 2021).

The incidence of postpartum haemorrhage was lower in the cord drainage group compared with the no-drainage group, although this difference did not reach statistical significance. This may be attributed to the relatively low overall incidence of PPH in the study population and the moderate sample size. Nevertheless, the observed trend towards reduced PPH aligns with the reductions in blood loss and uterotonic requirement, suggesting a clinically beneficial effect of cord drainage. Similar trends have been reported in previous trials, where cord drainage reduced the frequency of PPH without always achieving statistical significance due to sample size limitations (Soltani et al., 2020).

An important finding of this study was the significantly lower requirement for additional uterotonics in the cord drainage group. The need for supplementary uterotonic agents often reflects inadequate uterine contraction and ongoing bleeding. The reduced reliance on additional uterotonics observed in this study suggests improved uterine tone and more effective hemostasis among women who underwent placental cord blood drainage. This outcome is particularly relevant in resource-limited settings, where availability of uterotonic drugs may be constrained and minimizing pharmacological interventions is desirable.

From a clinical perspective, placental cord blood drainage offers several advantages. It is a simple, low-cost, and non-invasive technique that can be easily integrated into routine labour management without the need for additional equipment or specialized training. Unlike pharmacological interventions, cord drainage does not carry the risk of drug-related adverse effects and does not interfere with neonatal care. These characteristics make it especially suitable for implementation in low- and middle-income countries, where maternal mortality

from postpartum haemorrhage remains unacceptably high (World Health Organization [WHO], 2022).

Despite the widespread adoption of active management of the third stage of labour, postpartum haemorrhage continues to occur, indicating that current strategies may not be sufficient in all cases. The findings of this study suggest that placental cord blood drainage may serve as a valuable adjunct to standard AMTSL rather than a replacement. By complementing uterotonic administration and controlled cord traction, cord drainage may further enhance the effectiveness of third-stage management and contribute to improved maternal outcomes.

The results of this study also contribute to the existing body of evidence by providing contemporary data from a tertiary care teaching hospital. Variations in maternal characteristics, obstetric practices, and healthcare infrastructure can influence third-stage outcomes, underscoring the importance of locally generated evidence. The comparability of baseline characteristics between the two groups in this study strengthens the validity of the findings and supports the conclusion that observed differences are attributable to the intervention itself rather than confounding factors.

Nevertheless, certain limitations should be acknowledged. The study was conducted at a single center, which may limit the generalizability of the findings to other settings with different patient populations or labour management protocols. Additionally, although the sample size was sufficient to detect significant differences in primary outcomes, it may not have been large enough to demonstrate statistically significant differences in less frequent outcomes such as postpartum haemorrhage. Future multicentre studies with larger sample sizes are recommended to further evaluate the impact of placental cord blood drainage on severe maternal outcomes.

Another limitation relates to the estimation of blood loss, which was based on visual assessment combined with routine clinical measurement. Although this method reflects real-world practice, it may be subject to observer variability. More objective measurement techniques could be employed in future studies to enhance accuracy. Despite this, the consistent direction of effect across multiple outcomes in the present study strengthens confidence in the findings.

In summary, the present study provides robust evidence that placental cord blood drainage is an effective adjunct to active management of the third stage of labour. The intervention significantly reduces the duration of the third stage and maternal blood loss, decreases the need for additional uterotonics, and demonstrates a favorable trend towards reduced postpartum haemorrhage. Given its simplicity, safety, and cost-effectiveness, placental cord blood drainage should be considered for routine incorporation into third-stage labour

management protocols, particularly in settings where reducing maternal morbidity and mortality is a public health priority.

Conclusion and Clinical Implications

Conclusion

This randomised controlled trial demonstrates that placental cord blood drainage is an effective adjunct to the active management of the third stage of labour. The intervention was associated with a significant reduction in the duration of the third stage of labour and estimated maternal blood loss, alongside a lower requirement for additional uterotonics. Although the reduction in postpartum haemorrhage did not reach statistical significance, the observed trend favored the cord drainage group and was clinically meaningful.

The findings suggest that facilitating placental blood drainage enhances uterine contraction and expedites placental separation, thereby improving hemostatic control during a critical phase of childbirth. Importantly, the intervention achieved these benefits without introducing additional risk, cost, or complexity to routine obstetric care.

Clinical Implications

From a clinical standpoint, placental cord blood drainage represents a simple, safe, and cost-effective intervention that can be readily incorporated into standard labour room practice. As it requires no additional equipment, medication, or specialized training, it is particularly well suited to low-resource and high-volume obstetric settings, where postpartum haemorrhage remains a leading cause of maternal morbidity and mortality.

The reduced need for additional uterotonics observed in this study has practical implications for clinical practice, as it may decrease drug exposure, lower healthcare costs, and minimize the risk of uterotonic-related adverse effects. Furthermore, shortening the duration of the third stage of labour may reduce provider workload and improve overall efficiency within busy maternity units.

Given its favorable safety profile and demonstrable benefits, placental cord blood drainage should be considered as a routine adjunct to active management of the third stage of labour, rather than an optional or selective practice. Incorporation of this technique into institutional protocols and clinical guidelines may contribute to improved maternal outcomes, particularly in settings with limited access to advanced obstetric interventions.

Implications for Policy and Future Practice

The results of this study support the inclusion of placental cord blood drainage in evidence-based obstetric guidelines and training programmes. Policymakers and healthcare administrators should consider promoting this intervention as part of standard third-stage labour management to enhance maternal safety and reduce preventable complications.

Future research should focus on large-scale, multicentre trials to further validate these findings, assess long-term maternal outcomes, and explore the effectiveness of placental cord blood drainage across diverse healthcare settings. Such evidence would strengthen the case for widespread adoption of this low-cost intervention in global maternal health strategies.

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