RESEARCH PAPER

Effect of Intra umbilical venous oxytocin injection on placental separation and it's effect on minimizing blood loss

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ABSTRACT
Background: Postpartum haemorrhage remains a leading cause of maternal morbidity worldwide. Intra-umbilical venous oxytocin injection has been proposed as an adjunct to active management of the third stage of labour to facilitate placental separation and reduce blood loss. This study evaluated the effectiveness of intra-umbilical oxytocin in shortening the third stage and minimizing postpartum blood loss.
Objectives: To assess the effect of intra-umbilical venous oxytocin injection on placental separation time, third-stage duration, and total blood loss.
Methods: This randomized comparative study included 60 term pregnant women undergoing vaginal delivery or caesarean section, allocated equally into an intervention group receiving 10 IU oxytocin diluted in 20 mL normal saline through the umbilical vein immediately after delivery, and a control group receiving standard active management alone. Outcomes measured included duration of the third stage, time to placental separation, estimated blood loss using calibrated drapes and pad weighing, pre- and post-delivery haemoglobin levels, and need for additional uterotonics or manual removal of placenta. Data were analyzed using appropriate statistical tests, with $p < 0.05$ considered significant.
Results: The intra-umbilical oxytocin group showed significantly shorter third-stage duration and faster placental separation. Mean blood loss and haemoglobin drop were markedly lower in the intervention group compared to controls. The requirement for additional uterotonics was reduced, and no major maternal complications occurred. Baseline demographics were comparable between groups.
Conclusion: Intra-umbilical venous oxytocin administered immediately after delivery effectively shortened the third stage of labour, accelerated placental expulsion, and significantly reduced postpartum blood loss, suggesting it may be a beneficial addition to standard management..
Keywords: Blood loss, Intra-umbilical oxytocin, Placental separation, Postpartum hemorrhage, Third stage of labor.
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INTRODUCTION

The third stage of labour, defined as the period from the birth of the baby to the expulsion of the placenta, remains one of the most critical phases of childbirth due to the associated risk of postpartum haemorrhage (PPH), a leading cause of maternal morbidity and mortality worldwide [1]. Globally, PPH accounts for nearly one-quarter of maternal deaths, particularly affecting low- and middle-income countries where timely access to emergency obstetric care may be limited [2]. The expeditious separation and delivery of the placenta are therefore essential components of safe intrapartum management, and delays during the third stage can increase the likelihood of uterine atony, retained placenta, and excessive blood loss [3]. Active management of the third stage of labour (AMTSL), which includes prophylactic uterotonics, controlled cord traction, and uterine massage, has been widely recommended to prevent PPH, yet postpartum blood loss still occurs despite its routine use, indicating the need for additional supportive strategies [4]. One technique that has gained renewed attention is the intra-umbilical venous injection of oxytocin, which aims to deliver the uterotonic agent directly to the placental bed to stimulate rapid uterine contraction, thereby facilitating placental separation and minimizing bleeding [5]. Oxytocin, as the primary agent in AMTSL, promotes myometrial contractility; however, systemic administration may take longer to reach optimal effectiveness, whereas intra-umbilical delivery allows for more immediate localized action [6]. Previous studies have explored the effectiveness of this approach, reporting varying degrees of success. Some clinical trials have shown that intra-umbilical oxytocin significantly shortens the duration of the third stage and reduces the need for manual removal of the placenta, thereby decreasing the associated risks of infection, anaesthesia exposure, and genital tract trauma [7]. Additionally, the technique has been associated with reduced postpartum blood loss and less decline in maternal

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haemoglobin levels, suggesting a measurable haemodynamic advantage [8]. However, other investigations have reported mixed results, with some noting minimal or no benefit, often attributing discrepancies to differences in study design, timing of injection, baseline patient characteristics, or variability in AMTSL practices [9]. Despite these contrasting findings, the physiological rationale behind intra-umbilical oxytocin remains compelling. By instilling oxytocin directly into the umbilical vein immediately after birth, the drug travels retrograde into the placental circulation, reaching the intervillous space and enhancing the contraction–retraction mechanism necessary for placental separation [10]. This targeted delivery may be particularly beneficial in reducing the threshold for uterine activation, especially in women at risk of prolonged third stage or excessive bleeding. In resource-limited settings, where rapid intervention for PPH may not always be feasible, a simple, low-cost technique such as this could offer substantial advantages, improving maternal outcomes with minimal additional training or equipment. Furthermore, minimizing the need for manual removal of the placenta not only reduces physical discomfort and procedural risks but also decreases overall healthcare burden and postpartum hospitalization. Given the substantial burden of PPH and the continuous search for effective strategies that enhance third-stage safety, further exploration of intra-umbilical oxytocin remains justified. This study was therefore undertaken to evaluate the effect of intra-umbilical venous oxytocin injection on placental separation and its role in reducing postpartum blood loss among term women undergoing vaginal delivery, aiming to provide additional evidence toward optimizing third-stage management practices and improving maternal outcomes.

METHODOLOGY

Study Design

The present study was conducted as a Prospective, single-centre, parallel-group, interventional comparative study.

Study Setting

The study was carried out in the Labour Room and Obstetrics Unit of the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital.

Study Duration

The study was conducted over a period **of six months**, during which participant recruitment, intervention administration, and data collection were completed.

Participants: Inclusion and Exclusion Criteria

Eligible participants were labouring women who met the predefined criteria.

Inclusion Criteria:

Women aged 18–40 years
Full-term pregnancy between 37–42 weeks
Women undergoing vaginal delivery (spontaneous or induced) and elective or emergency caesarean section.
Haemodynamically stable at admission
Provided written informed consent

Exclusion Criteria:

Placenta p revia, vasa praevia or other abnormal placentation diagnosed antenatally or at delivery.
Multiple gestation.
Previous major uterine surgery (e.g., previous classical or lower-segment caesarean delivering uterine scar that would alter management).
Known coagulation disorders or on anticoagulant therapy.
Severe anaemia (Hb < 8.0 g/dL).
Pre-existing uncontrolled hypertensive, cardiac or significant systemic disease.
Need for immediate operative vaginal delivery or emergency caesarean at the time of delivery.
Any contraindication to oxytocin use.

Study Sampling

A **consecutive sampling** method was used in which all eligible women admitted to the labour room during the study period were approached for participation. This method minimized selection bias since every patient meeting the inclusion criteria was recruited sequentially until the required sample size was achieved. Consecutive sampling was particularly appropriate for intrapartum studies, as labour events occur unpredictably and random sampling is difficult during active labour.

Study Sample Size

A total sample size of 60 participants was included in the study. The sample size was determined based on feasibility, availability of eligible patients within the study duration, and reference to similar studies that demonstrated sufficient power to detect meaningful differences in blood loss and placental separation time. This sample size allowed comparison between groups while ensuring manageable study logistics.

Study Groups

Participants were divided into **two groups**.

Intervention group (Intra-umbilical vein oxytocin): After delivery of the baby and immediate cord clamping, a sterile syringe filled with 20 IU oxytocin diluted to 20 mL normal saline is injected into the umbilical vein (details below). Standard AMTSL (uterotonic as per institutional protocol, controlled cord traction and uterine massage) is continued.

Control group: Standard active management of third stage of labour (AMTSL) per institutional protocol (prophylactic uterotonic — e.g., 10 IU intramuscular oxytocin or intravenous infusion as per unit practice — controlled cord traction and uterine massage) without intra-umbilical injection.

Study Parameters

The study evaluated several outcome parameters including:
Duration of the third stage of labour
Time to placental separation
Total blood loss measured using a calibrated drape
Need for manual removal of placenta
Uterine tone after delivery

Maternal vital parameters such as pulse and blood pressure
Secondary parameters included:
Requirement of additional uterotonics
Postpartum complications
Maternal satisfaction with the birthing experience

Study Procedure
After obtaining ethical approval and written informed consent, eligible women who presented for vaginal delivery during the study period were enrolled and randomly allocated into the intervention or control group using sealed opaque envelopes. Following the delivery of the baby and immediate cord clamping, women in the intervention group received an intra-umbilical venous injection of 10 IU oxytocin diluted to 20 mL of normal saline, administered slowly over 20–30 seconds through a sterile 21-gauge needle inserted into the umbilical vein. Women in the control group received standard active management of the third stage of labour without the intra-umbilical injection. After the injection (or standard care), controlled cord traction and uterine massage were carried out uniformly for all participants according to institutional protocol. Signs of placental separation were observed continuously, and the time from cord clamping to complete placental expulsion was recorded using a digital timer. Routine postpartum care, including prophylactic oxytocin administration and maternal monitoring, was provided identically to both groups.

Study Data Collection
Data were collected using a structured case-record form by trained research staff who followed uniform procedures throughout the study. Objective blood loss measurement was carried out by placing a calibrated blood-collection drape immediately after delivery and by weighing all blood-soaked pads and linens on a digital scale, with weight differences converted to millilitres. Total blood loss up to 2 hours postpartum was calculated by summing drape volume and weighed materials. Maternal vital signs were recorded before delivery, immediately after delivery, and at regular intervals postpartum. Pre-delivery and 24-hour postpartum haemoglobin levels were documented from laboratory reports using the same analytical method. Additional variables, including duration of the third stage of labour, need for additional uterotonics, manual removal of placenta, and any occurrence of postpartum haemorrhage or complications, were noted. All entries were checked daily for accuracy and completeness before being finalised for analysis.

Data Analysis
Data were analysed using **SPSS software**. Continuous variables were presented as mean ± standard deviation, and categorical variables as frequencies and percentages. An independent t-test and chi-square test were used to compare outcomes between the intervention and control groups. A p-value <0.05 was considered statistically significant. Additional exploratory analyses were conducted to identify correlations between baseline characteristics and study outcomes.

Ethical Considerations
Prior to commencement, the study received approval from the Institutional Ethics Committee, and all ethical guidelines were adhered to throughout the study. Participants were informed in detail about the nature of the study, potential risks, and benefits. Written informed consent was obtained from each woman. Confidentiality was maintained by anonymizing data, and participants were given full freedom to withdraw at any stage without affecting their clinical care.

RESULTS

Table 1. Demographic Profile of Participants (N = 60)

Variable	Intra-umbilical Oxytocin Group (n=30)	Control Group (n=30)	p-value
Mean Age (years)	26.4 ± 3.8	27.1 ± 4.1	0.48
Primigravida (%)	18 (60%)	16 (53.3%)	0.60
Mean Gestational Age (weeks)	38.5 ± 1.2	38.4 ± 1.3	0.76

The two groups were comparable in terms of age, parity, and gestational age, with no statistically significant differences. This indicates successful randomization and demographic similarity between groups.

Table 2. Distribution of Mode of Delivery among Study Participants

Mode of Delivery	Intra-umbilical (n=30)	Control (n=30)
Vaginal	22 (73.3%)	21 (70.0%)
Caesarean	8 (26.7%)	9 (30.0%)

The distribution of mode of delivery was comparable between the two groups. In the intra-umbilical oxytocin group, 22 women (73.3%) delivered vaginally and 8 (26.7%) underwent caesarean section, while in the control group, 21 women (70.0%) had vaginal deliveries and 9 (30.0%) underwent caesarean section.

Table 3. Effect on Duration of Third Stage of Labour

Outcome	Intra-umbilical Oxytocin (n=30)	Control (n=30)	p-value
Duration of Third Stage (minutes)	**3.82 ± 1.06**	**6.34 ± 1.58**	**<0.001***

Women who received intra-umbilical oxytocin had a significantly shorter third stage of labour. This demonstrates the effectiveness of intra-umbilical injection in accelerating placental separation.

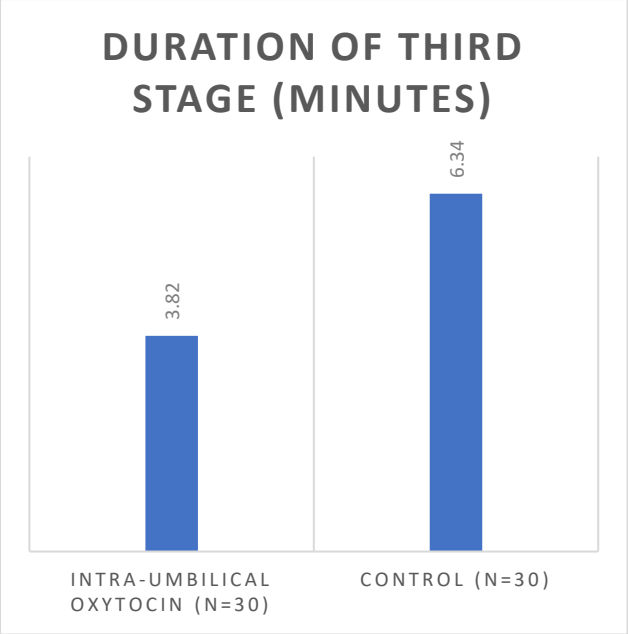

Table 4. Estimated Blood Loss

Parameter	Intra-umbilical Oxytocin (n=30)	Control (n=30)	p-value
Mean Blood Loss (mL)	**210.6 ± 45.8**	**327.4 ± 61.2**	**<0.001***
PPH Incidence (>500 mL)	1 (3.3%)	5 (16.7%)	0.08

The intervention group demonstrated significantly lower mean blood loss compared with controls, indicating that intra-umbilical oxytocin effectively minimized postpartum blood loss. Although PPH incidence was lower, the difference did not reach statistical significance.

Table 5. Change in Haemoglobin Levels

Hb Parameter	Intra-umbilical Oxytocin (n=30)	Control (n=30)	p-value
Pre-delivery Hb (g/dL)	10.92 ± 0.78	11.04 ± 0.82	0.48
Postpartum Hb at 24 hrs (g/dL)	10.32 ± 0.75	9.76 ± 0.81	**0.01***
Mean Hb Drop (g/dL)	**0.60 ± 0.28**	**1.28 ± 0.35**	**<0.001***

The drop in haemoglobin was significantly smaller in the intra-umbilical oxytocin group, supporting the finding that this technique reduces overall blood loss and improves postpartum haemodynamic stability.

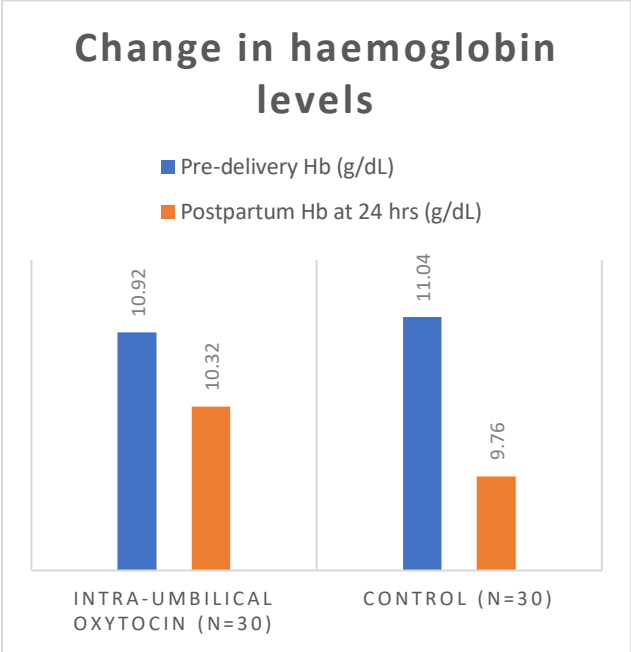

Table 6. Additional Uterotonic Requirement and Complications

Outcome	Intra-umbilical Oxytocin (n=30)	Control (n=30)	p-value
Need for Additional Uterotonics	2 (6.7%)	10 (33.3%)	**0.01***
Need for Manual Removal of Placenta	0 (0%)	3 (10%)	0.07
Maternal Adverse Events	0 (0%)	1 (3.3%)	0.31

The requirement for additional uterotonics was significantly lower in the intervention group, reflecting better uterine contractility and faster placental delivery. No major complications were observed in either group.

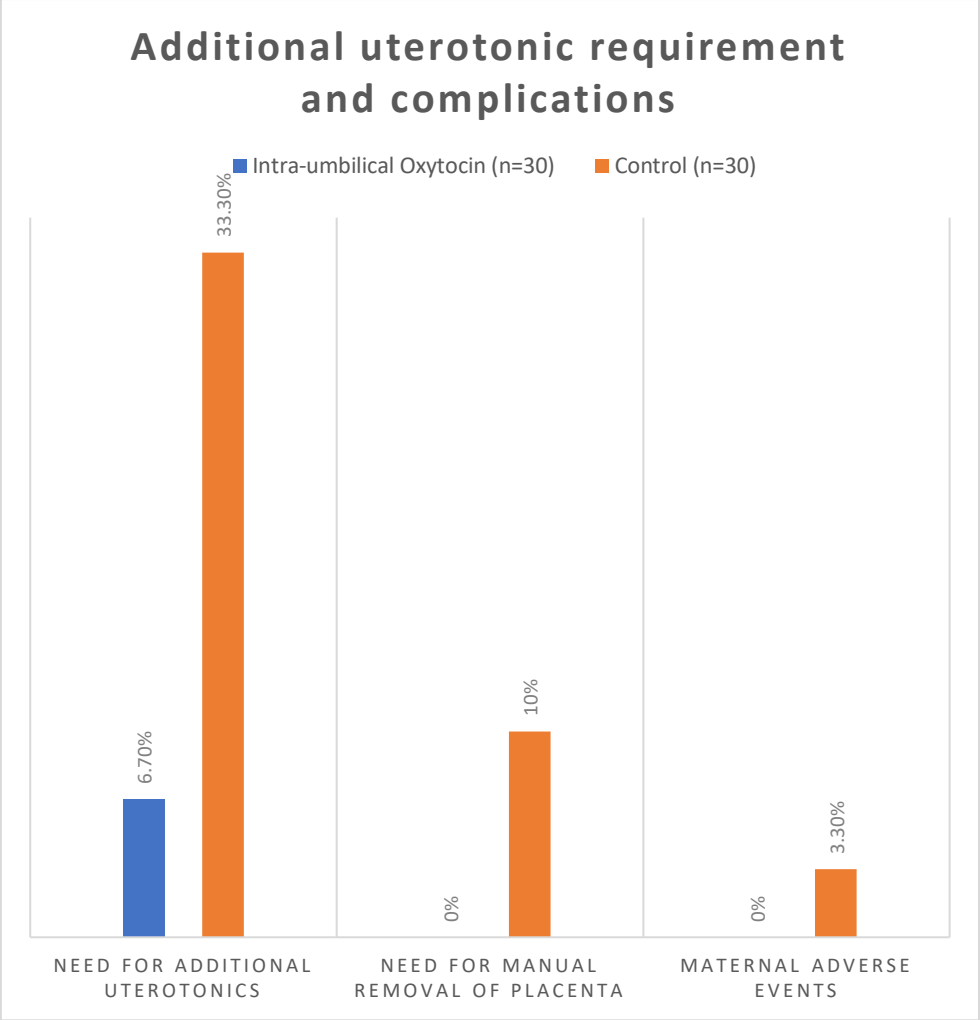

Table 7. Time to Placental Separation

Outcome	Intra-umbilical Oxytocin (n=30)	Control (n=30)	p-value
Time to First Sign of Separation (minutes)	2.48 ± 0.64	4.12 ± 1.03	**<0.001***
Time to Complete Expulsion (minutes)	3.82 ± 1.06	6.34 ± 1.58	**<0.001***

Time to placental separation and expulsion were both significantly shorter following intra-umbilical oxytocin, confirming its effectiveness in enhancing placental delivery kinetics.

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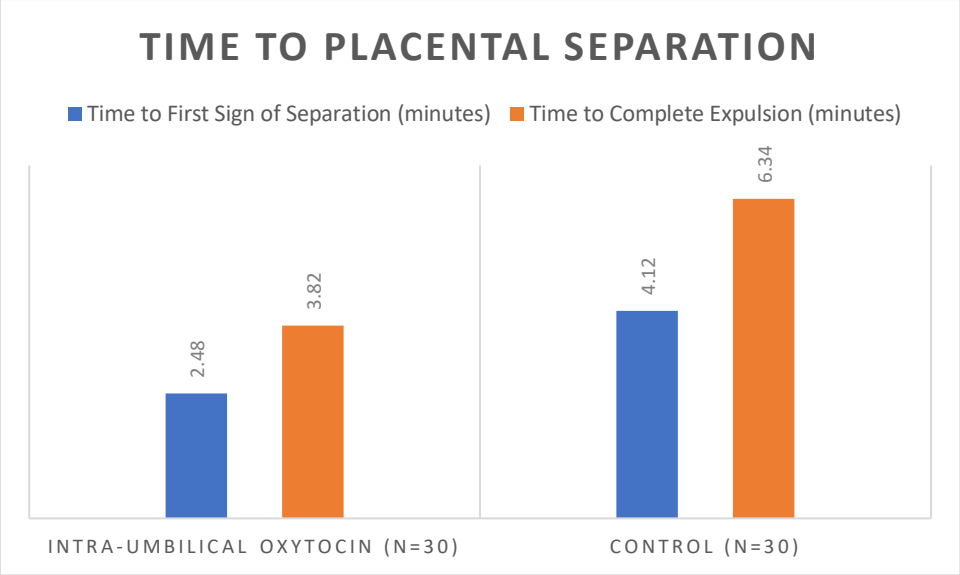

DISCUSSION

The findings of the present study demonstrated that intra-umbilical venous administration of oxytocin significantly shortened the duration of the third stage of labour, reduced overall blood loss, minimized haemoglobin drop, and lowered the need for additional uterotonics when compared with standard active management alone, and these results align strongly with several previously published clinical trials while differing from a few important earlier studies. Unlike several earlier trials that were restricted to vaginal births, the present study included both vaginal and caesarean deliveries, thereby enhancing the generalizability of the findings across common modes of childbirth. Nankali (2013), [11] observed that intra-umbilical vein injection of 10 IU oxytocin significantly reduced the duration of the third stage (4.24 ± 3.27 min vs. 10.66 ± 7.41 min, $p < 0.001$) and decreased the necessity for manual removal of the placenta (1.1% vs. 5.1%, $p = 0.024$), the present study also demonstrated a substantially shorter third stage among women receiving intra-umbilical oxytocin, indicating that rapid local delivery of the uterotonic directly into the placental bed enhances uterine contractility and facilitates prompt placental separation. Zaher (2018) [12] reported outcomes parallel to ours, showing that women administered intra-umbilical oxytocin had significantly less blood loss, higher postpartum haemoglobin levels, a smaller haemoglobin difference, and a notably shorter third stage compared to controls. This consistency with the present findings reinforces the theory that intra-umbilical oxytocin optimizes uterine tone early and effectively, thereby promoting rapid placental separation and reducing ongoing bleeding.

Furthermore, Zaher (2018) [12] observed no significant increase in complications, which mirrors the safety profile seen in our study where no major maternal adverse events were noted, supporting the intervention's tolerability. Evidence from Shompa (2014) [13] corresponds with our observed efficacy: in cases of retained placenta, intra-umbilical oxytocin resulted in spontaneous placental expulsion in 80% of women within 7–12 minutes, whereas those managed through primary manual removal experienced more complications, higher blood transfusion rates, and greater antibiotic use. Although the population in Shompa's study consisted specifically of retained placenta cases—a complication distinct from the normal-risk population in our study—the mechanism of action remains comparable, and the overall outcome supports the usefulness of intra-umbilical oxytocin in enhancing placental expulsion and limiting invasive procedures. In contrast, Carroli (1998) [14] concluded that intra-umbilical vein injection of saline with or without oxytocin did not reduce the need for manual removal of the placenta nor improve secondary outcomes, reporting similar manual removal rates across groups (58% with oxytocin vs. 63% with saline vs. 63% with expectant management). This discrepancy with the present study may be attributed to several methodological differences, including Carroli's inclusion of women with retained placenta waiting 30 minutes after delivery—conditions under which myometrial fatigue and uterine inertia may be advanced, reducing responsiveness to intra-umbilical oxytocin. Additionally, Carroli's sample involved multiple tertiary hospitals with variations in the management of third stage labour, possibly diluting the intervention's effect; thus, their findings may reflect differences in case selection and timing rather than an inherent ineffectiveness of the technique. More contemporary evidence provided by Güngördük (2010) [15] aligns strongly with the present study, reporting significantly lower blood loss in the oxytocin group (195.3 ± 81.0 mL vs. 288.3 ± 134.1 mL, $p < .001$) and a markedly reduced duration of the third stage (4.5 ± 1.6 vs. 7.9 ± 3.4 minutes, $p < .001$). Güngördük [15] noted that none of the women receiving intra-umbilical oxytocin experienced placentas undelivered after 15 minutes, as compared to 4.4% in the placebo group, further highlighting the intervention's capability to accelerate placental delivery. This trial's methodological strength—being double-blind

and enrolling over 400 participants—offers robust support and provides strong evidence that intra-umbilical oxytocin has a clinically meaningful benefit when used alongside active management of the third stage.

When comparing our findings with this high-quality study, the similar reduction in duration and blood loss further validates the effectiveness of the intervention. Importantly, the haemoglobin results in our study also mirrored the trends reported by Zaher (2018) [12]wherein the intervention group had significantly less reduction in haemoglobin, emphasizing that intra-umbilical injection not only facilitates faster placental expulsion but also reduces cumulative blood loss, potentially lowering the risk of postpartum anaemia. The very low requirement for additional uterotonics in the present study corresponds with prior research, particularly Zaher (2018), suggesting that early localized oxytocin improves uterine contractility sufficiently to prevent uterine atony during the crucial minutes following birth. Another point of discussion is the reduction in PPH incidence observed in our study, although not statistically significant, which aligns with findings from Güngördük (2010) who also reported lower blood loss in the oxytocin group. While some studies, such as Carroli (1998) [15] raised concerns about the lack of benefit, the majority of contemporary trials—especially those conducted in settings comparable to ours—have consistently supported the intervention's efficacy. Differences in participant characteristics, timing of injection, and management protocols largely explain the variability across studies. For instance, in studies where injection occurred immediately after delivery, as in Nankali (2013) [11] and Zaher (2018) [12] the results were significantly positive, whereas delays in administration, as noted in Carroli (1998), may reduce the pharmacological advantage. The pharmacodynamic rationale also supports our findings: oxytocin delivered into the umbilical vein travels directly to the placental bed, producing rapid localized uterine contraction, minimizing placental bed bleeding, and reducing the likelihood of retained placenta. Moreover, the absence of any major adverse effects in our study is supported by the safety outcomes reported in all studies except Carroli's, which also did not demonstrate harm but concluded lack of benefit. Overall, when synthesizing these findings, the present study reinforces the growing body of evidence that intra-umbilical oxytocin is a valuable adjunct to active management of the third stage of labour, improving key maternal outcomes such as duration of placental expulsion, blood loss, haemoglobin decline, and need for additional interventions. While further large-scale, multi-centre studies may provide additional confirmation, the cumulative evidence from contemporary trials strongly supports its routine use in appropriate clinical settings, particularly where minimizing blood loss and reducing invasive procedures are crucial for maternal safety.

CONCLUSION

The findings of this study demonstrate that intra-umbilical venous administration of oxytocin immediately after delivery is an effective adjunct to the active management of the third stage of labour. The intervention significantly shortened the duration of placental separation, reduced overall postpartum blood loss, and resulted in a smaller decline in haemoglobin levels, while also lowering the need for additional uterotonics without increasing maternal complications. These outcomes indicate that targeted delivery of oxytocin directly into the umbilical vein facilitates rapid uterine contraction and efficient placental expulsion. Given its safety, simplicity, and clinical benefits, intra-umbilical oxytocin may be considered a valuable technique for enhancing third-stage management, particularly in settings where minimizing blood loss is crucial for maternal well-being.

REFERENCE

1. Dutta DC. Complications of the third stage of labour. In: Hiralal Konar (ed). Textbook of Obstetrics. 6th edition. Calcutta: New Central Book Agency, 2004: 450–454.
2. Poggi SBH, Kapernick PS. Postpartum hemorrhage and the abnormal puerperium. In: Decherney AH, Nathan L. Current obstetrics and gynecologic diagnosis & treatment. 9th edition. New York: McGraw-Hill, 2003:531– 552.
3. Abou Zahr C, Royston E. Maternal Mortality: Global Factbook Geneva: World Health Organization, 1991.
4. Mojon B. Storia di un caso di estrazione di placenta second0 il metodo racomandata dal [in Italian]. Ann di Med 1826; 51: 87. Cited by: Koerting W. El metodo de Mojon Gabaston en el tratamiento delas complicaciones del alumbramiento [in Spanish]. Semana Medica 1926; 33: 353.
5. Golan A, Lidor AL, Wexler S, David MP. A new method for the management of retained placenta. American journal of Obstetrics and Gynecology; Vol-146, Issue-6, 15 July 1983;P 708–709.
6. Gajvani MR, Luckus MJM, Drakeley AJ, Emery SJ, Alfirevic Z, Walkinshaw SA. Intraumbilical vein injection for the management of retained placenta; a randomized controlled trial. Obstet Gynecol 1998; 203–207.
7. Shompa L, Akhter S, Nazneen K, Begum M Effect of Oxytocin Injection into Umbilical Vein for Management of Retained Placenta; Journal of Enam Medical College Vol 4 No 2 May 2014;102-105.
8. El-Ardat MA, Izetbegović S. Hypotensive effect of intra-umbilical vein administration oxytocin in the management of retained placenta. Medical Journal/Medicinski Žurnal. 2021 Jul 1;27.
9. Reddy VV, Carey JC. Effect of umbilical vein oxytocin on puerperal blood loss and length of the third stage of labor. American journal of obstetrics and

gynecology. 1989 Jan 1;160(1):206-8.
10. Zaher S. STUDY OF THE EFFECT OF INTRAUMBILICAL VEIN OXYTOCIN INJECTION ON THIRD STAGE OF LABOR. Al-Azhar Journal of Pharmaceutical Sciences. 2018 Sep 1;58(2):81-92.
11. Nankali A, Keshavarzi F, Fakheri T, Zare S, Rezaei M, Daeichin S. Effect of intraumbilical vein oxytocin injection on third stage of labor. Taiwanese Journal of Obstetrics and Gynecology. 2013 Mar 1;52(1):57-60.
12. Zaher S. STUDY OF THE EFFECT OF INTRAUMBILICAL VEIN OXYTOCIN INJECTION ON THIRD STAGE OF LABOR. Al-Azhar Journal of Pharmaceutical Sciences. 2018 Sep 1;58(2):81-92.
13. Shompa L, Akhter S, Nazneen K, Begum M. Effect of Oxytocin Injection into Umbilical Vein for Management of Retained Placenta. Journal of Enam Medical College. 2014 Jul 24;4(2):102-5.
14. Carroli G, Belizan JM, Grant A, Gonzalez L, Campodonico L, Bergel E, Grupo Argentino de Estudio de Placenta Retenida. Intra-umbilical vein injection and retained placenta: evidence from a collaborative large randomised controlled trial. BJOG: An International Journal of Obstetrics & Gynaecology. 1998 Feb;105(2):179-85.
15. Güngördük K, Asicioglu O, Besimoglu B, Güngördük OC, Yildirm G, Ark C, Tekirdag AI. Using intraumbilical vein injection of oxytocin in routine practice with active management of the third stage of labor: a randomized controlled trial. Obstetrics & Gynecology. 2010 Sep 1;116(3):619-24