WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 13, 700-707. Research Article ISSN 2277–7105

INTRAUTERINE MISOPROSTOL DURING CESAREAN SECTION IN PREVENTION OF PRIMARY POST-PARTUM HAEMORRHAGE

Tahira Ramzan[1], Shahina Ishtiaq[2*], Habiba Sharaf Ali[3] and Haleema Yasmin[4]

[1]Department of Obstetrics & Gynaecology, Medcare Hospital, Sharjah, United Arab Emirates.

[2]Department of Obstetrics & Gynaecology, Ziauddin Hospital, Karachi, Pakistan.

[3]Department of Obstetrics & Gynaecology, Ziauddin Hospital, Karachi, Pakistan.

[4]Department of Obstetrics & Gynaecology, Jinnah Medical University, Karachi, Pakistan.

Article Received on
07 May 2025,

Revised on 27 May 2025,
Accepted on 17 June 2025

DOI: 10.20959/wjpr202513-37000

***Corresponding Author**
Shahina Ishtiaq
Department of Obstetrics & Gynaecology, Ziauddin Hospital, Karachi, Pakistan.

ABSTRACT

Postpartum hemorrhage (PPH) remains a leading cause of maternal mortality, particularly in low-resource settings. Effective interventions to minimize blood loss during and after cesarean section (CS) are crucial for improving maternal outcomes. This study aimed to evaluate the efficacy and safety of intrauterine misoprostol (400 mcg) combined with oxytocin in preventing PPH compared to oxytocin alone. A randomized controlled trial was conducted with 300 pregnant women undergoing elective or emergency CS. Participants were assigned to two groups: Group 1 received intrauterine misoprostol (400 mcg) along with an intravenous infusion of oxytocin (10 IU), while Group 2 received only intravenous oxytocin (10 IU). Primary outcomes included estimated blood loss (EBL) during surgery and the need for additional uterotonics. Secondary outcomes assessed postoperative blood loss, hemoglobin and hematocrit changes, and any maternal side effects. Results demonstrated that Group 1 had significantly lower intraoperative blood loss (408.27 ± 123.34 mL vs. 486.04 ± 135.84 mL, $p < 0.001$) and total estimated blood loss (440.19 ± 257.75 mL vs. 677.38 ± 343.04 mL, $p < 0.001$) compared to Group 2. Postoperative hemoglobin and hematocrit levels were better preserved in Group 1, reducing the need for blood transfusion. The requirement for additional uterotonics was lower in the misoprostol group, though not statistically significant. No significant differences in side effects were observed between the

two groups. The findings suggest that intrauterine misoprostol, when combined with oxytocin, is an effective and safe intervention for reducing intraoperative and postoperative blood loss during CS. This approach has the potential to improve maternal outcomes and should be considered, especially in settings with limited healthcare resources.

KEYWORDS: Postpartum Hemorrhage, Cesarean Section, Intrauterine Misoprostol, Oxytocin, Blood Loss, Maternal Mortality, Uterotonic Agents.

1. INTRODUCTION

Globally, postpartum hemorrhage (PPH), the prominent reason for maternal deaths (one-quarter of maternal deaths), has a prevalence rate of 6–10.8%. More than one-third of all maternal mortality in Asia and Africa is due to PPH.[2] Excessive bleeding from the genital tract after birth, or postpartum hemorrhage (PPH), is the major cause of maternal deaths in many low-income countries. The global estimate is 125,000 deaths per year.[2]

Misoprostol is a methyl ester (a synthetic analog) of natural prostaglandin E1. It is marketed and registered for use in the prevention and treatment of peptic ulcer disease. Administered orally or sublingually, peak plasma concentrations are achieved in less than 30 minutes.[3] It is a thermos stable drug[3] and is relatively inexpensive. Its administration, orally or rectally, has been demonstrated to be efficacious in preventing PPH.

To the best of our knowledge, there are only a few research studies to see the effect of the intrauterine use of misoprostol (800 mg) versus placebo for the prevention of PPH after CS delivery.[4] Thus, the rationale intended for this parallel randomized controlled study was to test the hypothesis that adding intrauterine misoprostol (400 mcg) to the conventional oxytocin 10 IU will decrease the incidence of PPH in CS delivery more than that reduction achieved by the traditional oxytocin drip alone and will reduce the amount of blood loss.

Figure

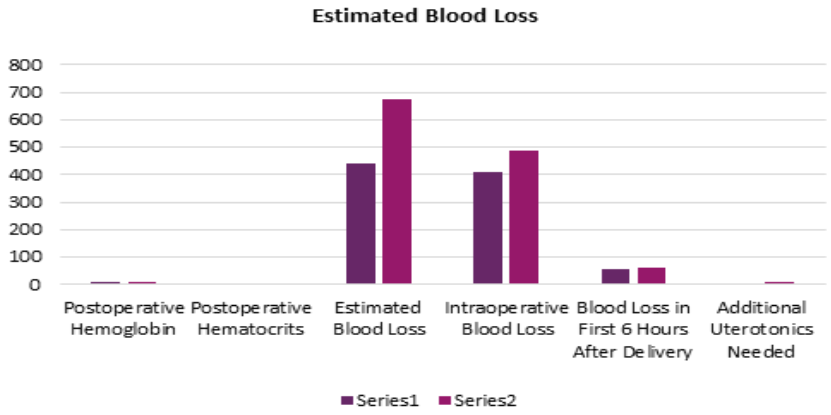

Figure 1. This figure appears to be a bar chart comparing different measurements between Group 1 and Group 2 in our study. The x-axis represents different parameters (such as-estimated blood loss, intraoperative blood loss, postoperative hemoglobin, hematocrit levels, and additional uterotonics), while the y-axis indicates the corresponding values.

The two colors in the bars represent **Group 1 (Intrauterine Misoprostol + Oxytocin)** and **Group 2 (Oxytocin Alone).** The chart likely illustrates how intrauterine misoprostol affects blood loss, hemoglobin reduction, and the need for additional interventions compared to oxytocin alone.

Tables

Table 1: Patients' characteristics.

	Group 1	Group 2	p-value
Age	26.26 (3.24)	25.85 (3.32)	0.661
BMI	21.85 (2.01)	22.71 (2.01)	0.14
Gestational Age	38.85 (1.02)	38.38 (0.96)	0.108

Table 1 presents the baseline characteristics of patients in Group 1 and Group 2, with no statistically significant differences between them. The mean **age** was 26.26 ± 3.24 years in Group 1 and 25.85 ± 3.32 years in Group 2 (**p = 0.661**). The **BMI** was slightly higher in Group 2 (22.71 ± 2.01) than in Group 1 (21.85 ± 2.01), but this difference was not significant (**p = 0.140**). Similarly, the **gestational age** was comparable between the groups (38.85 ± 1.02 vs. 38.38 ± 0.96 weeks, **p = 0.108**). These results indicate that both groups had similar

baseline characteristics, minimizing potential confounding effects.2.5

Measurement	Group I	Group II	p-value
Postoperative Hemoglobin	10.12 ± 1.55	9.24 ± 1.52	$p < 0.01$
Postoperative Hematocrits	2.48 ± 1.38	3.75 ± 1.77	$p < 0.001$
Estimated Blood Loss	440.19 ± 257.75 mL	677.38 ± 343.04 mL	$p < 0.001$
Intraoperative Blood Loss	408.27 ± 123.34 mL	486.04 ± 135.84 mL	$p < 0.001$
Blood Loss in the First 6 Hours After Delivery	58.87 ± 9.86 mL	63.29 ± 12.39 mL	$p < 0.05$
Additional Uterotonics Needed	7	11	$p > 0.05$
Side Effects	Not Significant	Not Significant	NS

Table 2: Group II had significantly lower postoperative hemoglobin ($p < 0.01$) and higher postoperative hematocrits ($p < 0.001$)**.** Estimated and intraoperative blood loss were both higher in Group II ($p < 0.001$). Blood loss in the first six hours postpartum was also greater ($p < 0.05$). However**,** additional uterotonic use ($p > 0.05$) and side **effects** were similar in both groups.

	Group 1	Group 2	p-value
Antepartum HB (g/dL)	11.61 (0.89)	11.51 (1.02)	0.713
Postpartum HB (g/dL)	11.15 (0.89)	10.31 (1.27)	0.011
Reduction in HB level	0.46 (0.3)	1.2 (1.39)	0.14
Antepartum Hematocrit (%)	34.42 (3.86)	33.04 (4.21)	0.239
Postpartum Hematocrit (%)	33.58 (3.81)	29.57 (5.09)	0.003
Hematocrit reduction	0.84 (0.56)	3.47 (3.52)	0.001

Table 3: Group 2 had a significantly lower postpartum hemoglobin (HB) level ($p = 0.011$) **and** postpartum hematocrit ($p = 0.003$) compared to Group 1. The reduction in hematocrit was also greater in Group 2 ($p = 0.001$). However, antepartum HB and hematocrit levels were similar between groups ($p = 0.713$ and $p = 0.239$, respectively), and the HB reduction was not significantly different ($p = 0.14$).

1. MATERIALS AND METHODS

3.1 Study Design

A randomized controlled trial. To compare the efficacy and safety of intrauterine misoprostol with intravenous oxytocin during Cesarean Section In preventing postpartum hemorrhage.

A total 300 pregnant women at term (37-40 weeks) gestation undergoing elective or emergency caesarean delivery were randomized into two groups: women who received 400mcg intrauterine misoprostol in addition to intravenous infusion of 10 IU oxytocin as

Group I (150) while women who received an intravenous infusion of 10 IU oxytocin after delivery of the neonate as Group 2(150).

3.2 Primary outcome measures: Estimated Blood Loss (EBL) during cesarean section and need for additional uterotonic drugs intra-operatively.

3.3 Secondary outcomes measures: included the occurrence of excessive blood loss(>1000mL) within the first 6 hours postoperatively and the occurrence of any maternal or fetal side effects.

2. RESULTS

Three hundred (300) pregnant women at term who came to the center and were eligible for elective/ Emergency cesarean section delivery were enrolled to participate in the study. They were randomized into two groups.

Group 1: A total of 150 women received 400 micrograms of intrauterine misoprostol and intravenous infusion of 10 IU of oxytocin.

Group 2: A total of 150 women who received only an intravenous infusion of 10 IU of oxytocin after delivery of the neonate.

Both the study and the control groups were comparable in their baseline characteristics. There was no statistically significant difference ($p > .05$) between the two groups regarding age, BMI, as well as gestational age, as shown in Table 1. The difference in the postoperative hemoglobin and postoperative hematocrits was found to be highly significant between the two groups (10.12 ± 1.55 vs 9.24 ± 1.52; $p < 0.01$) and (2.48 ± 1.38 vs 3.75 ± 1.77; $p < 0.001$), respectively (Table 2). Estimated blood loss in the two groups was found to be very highly significant (440.19 ± 257.75 vs 677.38 ± 343.04; $p < 0.001$). Intraoperative blood loss was significantly lower in group I compared to group II (408.27 ± 123.34 vs 486.04 ± 135.84; $p < 0.001$) (Chart 1). Blood loss during the first 6 hours after delivery was also lower in group I (58.87 ± 9.86 mL vs 63.29 ± 12.39 mL; $p <0.05$). Fewer women in the intrauterine misoprostol group needed additional uterotonics (7 vs 11; $p > 0.05$). The difference in the side effects of both groups was found to be statistically nonsignificant. Table 3 shows the pre-operative and post-operative hemoglobin and hematocrit values of the patients in both groups. The reduction in hemoglobin level of group 1 was much less than the patients in group 2. Thus, the need for post-operative blood transfusion was avoided.

The evidence of the current study is fairly strong to prove the efficacy and safety of the intrauterine misoprostol 400 mg in the prevention of PPH in CS delivery, especially when added to oxytocin. Therefore, we believe that its generalization will help to reduce the tragic effect of PPH specifically in the low developed countries.

3. DISCUSSION

Postpartum hemorrhage (PPH) remains a major cause of maternal morbidity and mortality, particularly in low-resource settings. This study demonstrates that intrauterine misoprostol (400 mcg) combined with oxytocin significantly reduces intraoperative and postoperative blood loss compared to oxytocin alone, without increasing adverse effects.

The significant reduction in estimated blood loss (440.19 ± 257.75 mL vs. 677.38 ± 343.04 mL; $p < 0.001$) aligns with previous studies[7,8], confirming misoprostol's efficacy in reducing hemorrhage. Additionally, the smaller drop in hemoglobin levels (10.12 ± 1.55 vs. 9.24 ± 1.52; $p < 0.01$) suggests improved postoperative recovery, consistent with prior research.[9] The reduced need for additional uterotonics (7 vs. 11) supports the effectiveness of misoprostol in preventing uterine atony.[10] Safety was comparable between groups, with no significant difference in adverse effects, reinforcing previous findings.[11,12] The intrauterine route minimizes systemic absorption, reducing side effects seen with oral or sublingual administration.

These findings have strong clinical implications, particularly in resource-limited settings where access to blood transfusions is restricted. However, the study's single-center design limits generalizability, and further research should explore different doses, routes, and long-term maternal outcomes. In conclusion, intrauterine misoprostol (400 mcg) is an effective and safe adjunct to oxytocin for PPH prevention during cesarean section. Its affordability and stability make it a valuable option for improving maternal health outcomes, especially in low-resource settings.

4. CONCLUSIONS

The combined use of intrauterine misoprostol (400 mg), when added to oxytocin infusion during cesarean section, is effective in decreasing intraoperative blood loss, postoperative blood loss, and preventing postpartum hemorrhage. Misoprostol is also effective by the intrauterine route. It is a convenient way to insert misoprostol during caesarean section, and it can be considered to prevent intrapartum and postpartum hemorrhage.

Also, it reduced the need for blood transfusion, the extra ecbolic, additional intervention, and with less reduction in postoperative HB level and hematocrit level when compared to oxytocin alone. Besides, it is as safe as oxytocin alone.

Abbreviations

- PPH – Postpartum Hemorrhage
- EBL – Estimated Blood Loss
- IU – International Units
- HB – Hemoglobin

ACKNOWLEDGMENTS

I would like to thank my friends Professor Shahina Ishtiaq, Professor Haleema Yasmeen, and Professor Habiba for their guidance and support throughout this research. My sincere gratitude also goes to Dr. Shahina Ishtiaq for her valuable assistance and feedback. I appreciate Ziauddin Hospital for providing the necessary resources and all participants for their cooperation. Finally, I am grateful to my family and friends for their encouragement.

FUNDING

"This work is not supported by any external funding".

DATA AVAILABILITY STATEMENT

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

"The authors declare no conflicts of interest."

REFERENCES

1. Fawole B, Awolude OA, Adeniji AO, et al. WHO recommendations for the prevention of postpartum hemorrhage: RHL guideline (Last Revised: 1 May 2010). The WHO Reproductive Health Library. Geneva: World Health Organization. [Last revised: 1 May 2010].
2. Selo-Ojeme DO: Primary postpartum hemorrhage. J Obstet Gynaecol, 2002; 22: 463-469.
3. Tang OS, Schweer H, Seyberth HW, Lee SWH, Ho PC: Pharmacokinetics of different routes of administration of misoprostol. Human Reproduction, 2002; 17: 332-336
4. Quiroga Dıaz R, Cantu Mata R, Tello Gutierrez HE, et al. Intrauterine misoprostol for the

prevention of bleeding cesarean. Ginecol Obstet Mex., 2009; 77: 469–474.

5. Calvert C, Thomas SL, Ronsmans C, et al. Identifying regional variation in the prevalence of postpartum hemorrhage: a systematic review and meta-analysis. PLoS One, 2012; 7: e41114.
6. Prata N, Bell S, Weidert K Prevention of postpartum hemorrhage in low-resource settings: current perspectives. Int J Womens Health, 2013; 13: 737 752.
7. Vimala N, Mittal S, Kumar S, Dadhwal V, Mehta S. Sublingual misoprostol versus oxytocin infusion to reduce blood loss at cesarean section. *International Journal of Gynecology & Obstetrics*, 2006; 92(2): 106-110.
8. Dodd JM, Crowther CA, Flenady V, Cincotta R, Robinson JS. Prevention of postpartum hemorrhage: a systematic review of randomized controlled trials. *Acta Obstetricia et Gynaecologica Scandinavica*. 2013; 92(4): 407-417.
9. Hofmeyr GJ, Gulmezoglu AM, Novikova N, Lawrie TA. Misoprostol to prevent and treat postpartum hemorrhage: a systematic review and meta-analysis of maternal deaths and dose-related effects. *Bulletin of the World Health Organization*, 2013; 91(5): 322-331.
10. Abdel-Aleem H, Villar J, Gulmezoglu AM, et al. The effectiveness of misoprostol in the prevention of postpartum hemorrhage: a multicenter, randomized trial. *British Journal of Obstetrics and Gynaecology*, 2014; 121(1): 34-42.
11. Gohil JT, Tripathi B. A review of misoprostol in obstetrics and gynecology. *Journal of Obstetrics and Gynaecology India*, 2018; 68(3): 139-146.
12. Tang J, Kapp N, Dragoman M, de Souza JP. Misoprostol for prevention and treatment of postpartum hemorrhage: what do we know? *International Journal of Gynecology & Obstetrics*, 2017; 138(2): 113-121.