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Prophylactic Effect of Misoprostol Versus Tranexamic Acid in Conjunction with Oxytocin in Reduction of Post-Partum Hemorrhage After LSCS: A Prospective Randomized Study

Presenting Author: Dr. Aradhana Mishra
Junior Resident, Rama Medical College, Hospital & Research Center, Hapur, UP
Co-Authors: Dr. Sunita Bansod *(Assistant Professor, Dept. of Obstetrics & Gynecology)*, Dr. **Sunita Gulati** *(Professor & Head, Dept. of Obstetrics & Gynecology)*
Rama Medical College HoP.spital & Research Centre, Hapur, UP

ABSTRACT:

*Postpartum hemorrhage (**PPH**) continues to be one of the major causes of maternal morbidity and mortality globally, responsible for approximately one-quarter of all maternal deaths. Uterine atony is the most common underlying cause, especially after lower segment cesarean section (**LSCS**). Although **Oxytocin** remains the first-line uterotonic agent recommended for the prevention of PPH, the addition of adjunctive therapies such as **Misoprostol**, a prostaglandin-E1 analogue, and **Tranexamic Acid (TXA)**, an antifibrinolytic drug, has been shown to significantly enhance hemostatic control. Misoprostol induces powerful uterine contractions, whereas TXA stabilizes clots by inhibiting fibrinolysis. When used together with Oxytocin, both agents may provide improved protection from excessive blood loss following cesarean delivery. This prospective randomized study compares the prophylactic efficacy of sublingual Misoprostol (800 μg) versus intravenous TXA (1 g), each administered at cord clamping along with Oxytocin, in reducing intraoperative and postoperative blood loss during LSCS. A total of 100 pregnant women aged 18–45 years undergoing elective or emergency LSCS were randomly allocated into two equal groups. Blood loss was assessed intraoperatively through suction and gauze quantification and postoperatively using pad scoring methods. Hemoglobin drop within 48 hours of surgery was used as an objective measure of blood loss. Both Misoprostol and TXA significantly reduced total blood loss compared to standard Oxytocin alone; however, TXA demonstrated slightly superior efficacy with a lower mean blood loss and reduced hemoglobin decline. Misoprostol was associated with predictable side effects such as shivering and pyrexia, while TXA showed minimal adverse reactions. This study highlights that while both medications are effective adjuncts, **Tranexamic Acid** may offer better prophylactic control with fewer side effects. These findings support its use as a preferred adjunctive prophylactic therapy in the prevention of PPH following LSCS.*

KEYWORDS:

Postpartum Hemorrhage**, **Misoprostol**, **Tranexamic Acid**, **Oxytocin**, **LSCS**, **Uterine Atony**, **Maternal Morbidity

INTRODUCTION:

Postpartum hemorrhage (**PPH**) remains one of the most critical obstetric emergencies and a leading cause of maternal mortality worldwide, contributing to nearly 25% of maternal deaths. PPH is defined clinically as blood loss exceeding 500 mL after vaginal delivery or more than 1000 mL after cesarean section. The condition is particularly associated with **uterine atony**, a failure of the uterus to contract adequately, making it the predominant cause of PPH after **lower segment cesarean section (LSCS)**. Effective prevention strategies are essential to reduce maternal morbidity, the need for blood transfusion, and prolonged hospitalization. **Oxytocin**, the most widely used and recommended first-line uterotonic, plays a central role in PPH prophylaxis; however, additional interventions are often necessary, especially in high-risk cases. **Misoprostol**, a synthetic prostaglandin E1 analogue, is inexpensive, stable at room temperature, and capable of inducing strong uterine contractions. It has been extensively used both for induction of labor and PPH prevention. **Tranexamic Acid (TXA)**, on the other hand, is an antifibrinolytic agent that prevents clot breakdown by inhibiting the conversion of plasminogen to plasmin. Clinical trials have demonstrated its beneficial role in reducing blood loss in various surgical specialties, and recent studies have shown its importance in obstetric hemorrhage as well. When combined with Oxytocin, both Misoprostol and TXA may offer additional hemostatic advantages. Numerous guidelines, including WHO recommendations, now support the early use of TXA in PPH management. Despite these advancements, comparative research evaluating prophylactic Misoprostol versus TXA specifically in women undergoing LSCS remains limited. This study seeks to address this gap by comparing the **prophylactic efficacy** of sublingual Misoprostol and intravenous TXA, both used alongside Oxytocin, in reducing blood loss during and after LSCS. By analyzing intraoperative and postoperative blood loss, hemoglobin drop, need for additional uterotonics, and adverse effects, this study aims to determine the superior adjunctive therapy. The findings will contribute to improving perioperative obstetric care and guide clinicians in selecting the optimal drug regimen for preventing PPH in cesarean deliveries.

MATERIALS AND METHODS:

This prospective randomized study was conducted in the Department of Obstetrics & Gynecology, Rama Medical College, Hospital and Research Center, Hapur, Uttar Pradesh, from **February 2025 to June 2025**. A sample size of 100 pregnant women aged between 18 and 45 years undergoing elective or emergency lower segment cesarean section (**LSCS**) was selected. All participants had singleton pregnancies and met the inclusion criteria. Women with coagulation disorders, history of thromboembolic events, hypersensitivity to study medications, or severe medical disorders were excluded. After obtaining informed consent, subjects were randomized into **two equal groups (n=50 each)** using computer-generated allocation.

Group A (Misoprostol Group): Received **800 µg sublingual Misoprostol** administered immediately at cord clamping, along with **10 units of Oxytocin diluted in 500 mL of normal saline** infused intravenously.
Group B (Tranexamic Acid Group): Received **1 g intravenous Tranexamic Acid (TXA)** slowly over 5–10 minutes at cord clamping, in conjunction with the same Oxytocin regimen as Group A.
All LSCS procedures were conducted under standard aseptic conditions using spinal or general anesthesia based on maternal and fetal status. Intraoperative blood loss was measured using combined methods: suction apparatus quantification (after excluding amniotic fluid volume) and pre-weighed surgical gauze estimation. Postoperative blood loss was measured using pad scoring at 2-hour intervals for the first 12 hours and then every 6 hours for 48 hours. **Hemoglobin levels** were measured preoperatively and repeated at 48 hours postpartum to assess perioperative hemoglobin drop. Vital signs, uterine tone, and postoperative complications were closely monitored. Adverse effects such as shivering, pyrexia, nausea, vomiting, and gastrointestinal discomfort in the Misoprostol group, and nausea, dizziness, or thromboembolic events in the TXA group were recorded.
Primary outcome measures included total intraoperative and postoperative blood loss. Secondary outcomes included hemoglobin change, need for additional uterotonics (e.g., methylergometrine), requirement of blood transfusion, and incidence of side effects. Data analysis was performed using **SPSS version 25.0**. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables as percentages. The **chi-square test** and **independent t-test** were used for statistical comparisons. A **p-value < 0.05** was considered statistically significant for all analyses.

RESULTS:

Both study groups showed a significant reduction in blood loss compared with standard Oxytocin prophylaxis alone. The **Tranexamic Acid (TXA) group** demonstrated a lower mean intraoperative blood loss compared to the Misoprostol group, with an average reduction of 80–100 mL. Postoperative blood loss over the first 48 hours was also lesser in the TXA group. The mean hemoglobin drop in Group B was markedly lower (0.6–0.8 g/dL) compared to Group A (1.1–1.3 g/dL), indicating better overall hemostasis. While both groups required minimal additional uterotonics, the need was slightly higher among women receiving Misoprostol. Adverse effects were more frequent in Group A, with **shivering** observed in 22% of cases and **pyrexia** in 14%. In contrast, the TXA group had minimal side effects, primarily mild nausea in 6% of participants. No thromboembolic events were reported in either group. The overall efficacy of TXA appeared superior, with statistically significant differences in blood loss reduction and hemoglobin preservation. Both medications, however, proved effective in preventing severe PPH and minimizing perioperative complications.

DISCUSSION:

This study demonstrates that while both **Misoprostol** and **Tranexamic Acid** significantly reduce blood loss when combined with Oxytocin, TXA offers superior hemostatic effectiveness with fewer adverse effects. Misoprostol's uterotonic action is beneficial, but its side effects may be uncomfortable. TXA's antifibrinolytic effect provides a more stable reduction in bleeding. Both remain useful adjuncts to Oxytocin in LSCS, particularly in high-risk women.

CONCLUSION:

Both Misoprostol and Tranexamic Acid effectively reduce blood loss after LSCS when used with Oxytocin; however, TXA provides slightly better control and fewer side effects. It may be considered the preferred agent for PPH prophylaxis, especially in women at increased risk of excessive bleeding.

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