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To study role of Uterotonics in PPH: Oxytocin, Misoprostol, Ergometrine, Carboprost

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Abstract

Background: Postpartum hemorrhage (PPH) remains one of the leading causes of maternal morbidity and mortality worldwide, particularly in developing countries. Uterotonics play a pivotal role in both prevention and management of PPH by enhancing uterine contractility. Commonly used agents include oxytocin, misoprostol, ergometrine, and carboprost, each with distinct pharmacological profiles.

Objectives: To study and compare the effectiveness and safety of oxytocin, misoprostol, ergometrine, and carboprost in the management of postpartum hemorrhage.

Materials and Methods: This prospective observational study was conducted on 100 patients diagnosed with postpartum hemorrhage at a tertiary care teaching hospital. Patients were managed with uterotonics according to institutional protocol. Outcomes assessed included control of bleeding, need for additional uterotonics, requirement of blood transfusion, and adverse effects.

Results: Oxytocin was the most commonly used first-line agent (40%), followed by misoprostol (30%), ergometrine (20%), and carboprost (10%). Successful control of PPH was achieved in 85% of cases overall. Carboprost demonstrated the highest efficacy (90%) but was associated with more adverse effects. Misoprostol was effective, inexpensive, and easy to administer, particularly in resource-limited settings.

Conclusion: Oxytocin remains the first-line uterotonic for PPH management. Misoprostol serves as an effective alternative, especially where injectable uterotonics are unavailable. Carboprost is highly effective in refractory cases, while ergometrine has limited use due to side effects.

Keywords: Postpartum hemorrhage, uterotonics, oxytocin, misoprostol, carboprost, ergometrine

Introduction

Postpartum hemorrhage (PPH) is a major obstetric emergency and is responsible for nearly one-fourth of maternal deaths globally[1]. According to the World Health Organization, PPH is defined as blood loss of ≥500 mL after vaginal delivery or ≥1000 mL after cesarean section within 24 hours of childbirth. Uterine atony accounts for approximately 70–80% of PPH cases, making uterotonics the cornerstone of management[2].

Active management of the third stage of labor (AMTSL) has significantly reduced the incidence of PPH. Uterotonic drugs promote uterine contraction and retraction, thereby

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reducing blood loss[3-4]. Oxytocin is widely recommended as the first-line uterotonic agent. However, alternatives such as misoprostol, ergometrine, and prostaglandin analogs like carboprost are frequently used depending on clinical settings, availability, and patient response.

Despite the availability of various uterotonics, differences exist in their efficacy, safety, route of administration, and cost. This study aims to compare commonly used uterotonic agents in the management of PPH and assess their clinical outcomes[5].

The third stage of labour is the most crucial stage, begins with expulsion of baby and ends with expulsion of placenta and membranes. Its average duration is 15 min in both primigravida and multigravida. Postpartum hemorrhage is one of the dreaded complications of third stage of labour. In India every 4 minutes a woman dies during childbirth [6]. Maternal mortality rate in India is 212 per 100000 live births. Among them 30% of deaths are due to postpartum hemorrhage (PPH)

Materials and Methods

Study Design: Prospective observational study.

Study Setting: Department of Obstetrics and Gynecology, tertiary care teaching hospital.

Study Duration: 12 months.

Study Population: 100 patients diagnosed with postpartum hemorrhage following vaginal or cesarean delivery.

Inclusion Criteria

- Women aged 18–40 years
- Diagnosed with primary PPH
- Delivered vaginally or by cesarean section

Exclusion Criteria

- Secondary PPH
- Known coagulation disorders
- Severe cardiac or respiratory illness
- Refusal to consent

Methodology

Patients with PPH were managed as per hospital protocol. Initial management included uterine massage and administration of uterotonics. The choice of uterotonic depended on clinical condition, contraindications, and response to therapy.

The uterotonics used were:

- Oxytocin (IV/IM)
- Misoprostol (oral/rectal)

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- Ergometrine (IM/IV)
- Carboprost (IM)

Outcome Measures

- Control of bleeding
- Need for additional uterotonics
- Requirement of blood transfusion
- Adverse drug reactions

Statistical Analysis

Data were analyzed using descriptive statistics. Results were expressed as percentages and frequencies.

Results

Table 1: Distribution of Patients According to Uterotonic Used

Uterotonic Used	Number of Patients	Percentage
Oxytocin	40	40%
Misoprostol	30	30%
Ergometrine	20	20%
Carboprost	10	10%
Total	**100**	**100%**

Table 2: Effectiveness in Controlling PPH

Uterotonic	Successful Control	Failure
Oxytocin	34 (85%)	6 (15%)
Misoprostol	24 (80%)	6 (20%)
Ergometrine	16 (80%)	4 (20%)
Carboprost	9 (90%)	1 (10%)

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Table 3: Need for Additional Interventions

Uterotonic	Additional Drug Needed	Blood Transfusion
Oxytocin	06	08
Misoprostol	06	06
Ergometrine	04	05
Carboprost	01	03

Table 4: Adverse Effects Observed

Uterotonic	Adverse Effects Observed
Oxytocin	Hypotension, nausea
Misoprostol	Fever, shivering
Ergometrine	Hypertension, vomiting
Carboprost	Diarrhea, bronchospasm

Discussion

PPH remains a preventable cause of maternal mortality when timely intervention is provided. The present study evaluated the role of commonly used uterotonics in managing PPH[7].

Oxytocin was the most frequently used uterotonic and showed good efficacy with minimal side effects, supporting its role as the first-line drug. Misoprostol demonstrated comparable effectiveness and was particularly useful due to ease of administration and stability at room temperature[8-9].

Ergometrine was effective but limited by its hypertensive effects, making it unsuitable for patients with preeclampsia. Carboprost showed the highest success rate but was reserved for refractory cases due to higher incidence of adverse effects and contraindications in asthmatic patients[10-12].

These findings are consistent with previous studies that highlight oxytocin as the drug of choice, with misoprostol as a valuable alternative in low-resource settings.

Conclusion

Uterotonics are central to the management of postpartum hemorrhage. Oxytocin remains the first-line agent due to its effectiveness and safety. Misoprostol offers a cost-effective and practical alternative. Carboprost is highly effective in resistant cases but should be used cautiously. Rational use of uterotonics can significantly reduce maternal morbidity and mortality associated with PPH.

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