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Use of Intravenous Oxytocin versus Intrauterine Misoprostol in Prevention of Postpartum Hemorrhage

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ABSTRACT

Background: Postpartum hemorrhage (PPH) is considered the most common cause of mortality in cesarean section (CS), and vaginal deliveries and to intercept the uterine bleeding and atony in CS there is need for oxytocin. **Objective:** This study aimed to reduce the incidence of primary postpartum hemorrhage after cesarean section (CS) by using either intravenous oxytocin or intrauterine misoprostol. **Patients and methods:** This study was conducted on 76 cases full term pregnant female patients with no risk factors for postpartum hemorrhage. They were admitted for elective caesarean section at Zagazig University Hospital. They were divided into two groups regarding the protocol of treatment, oxytocin group (A) was given oxytocin 10 IU in 250 ml of normal saline solution intravenous over 10 minutes directly after delivery of the fetus. Group (B) included 38 cases that were administered 400 mcg misoprostol intrauterine after delivery of placenta. **Results:** There was statistically significant variation between the groups of the present study concerning blood loss with higher blood loss either intraoperative, postoperative and overall blood loss in intrauterine misoprostol group than in intravenous oxytocin group. There was a significant difference between the two studied groups concerning side effects of drugs with higher shivering among intrauterine misoprostol group, while headache, and vomiting were reported in the group of oxytocin. **Conclusion:** Intravenous oxytocin infusion considered more potential than intrauterine misoprostol in blood loss reduction in CS.

Keywords: Cesarean section, Oxytocin, Hemorrhage, Postpartum.

INTRODUCTION

Postpartum hemorrhage (PPH) is considered significant cause of mortality in cesarean section (CS), and vaginal deliveries. Recently, CS is comply used in developing and also developed countries [(1)].

For interception of the uterine bleeding and atony in CS there is need for oxytocin. Despite, the potential effect of extra uterotonics that are required in 10-40 % of cases to confirm the wellness of uterine contraction [(2)], among prostaglandin E1, misoprostol comes with less side effects and preferred uterotonic characteristics. The route of administration includes intrauterine, rectal, buccal, oral, and sublingual. In cases of incomplete or missed miscarriage, misoprostol is recommended for pregnancy termination [(3)]. Misoprostol possesses many advantages like its stability at room temperature, and being inexpensive, these characteristics make misoprostol the first choice in developed countries for the management, and prevention of PPH [(4)]. Misoprostol has a significant role in cervical ripening induction before procedures resulting in reduced pain caused by instruments' transcervical passage [(5)].

The present study aimed to investigate the efficacy and safety of either intravenous oxytocin or intrauterine misoprostol in reduction of the incidence of primary PPH after CS.

PATIENTS AND METHODS

The present study was an open randomized clinical trial that conducted at Zagazig University Hospital. 76 pregnant females were recruited for this study at term (37-40 weeks) gestation scheduled for elective CS. All Clinical assessments were applied on all cases including full history taking and physical examination. Assessment using ultrasonography was offered to cases for delivery date expectation, and for cases with special emphasis on placental localization.

Inclusion criteria:

Acceptance to participate in the study, had no hypersensitivity or contraindications to prostaglandins, un-complicated pregnancy, gestational age of 37-40 completed weeks, had no history of coagulopathy, elective cesarean sections (indications for elective sections were previous history of Cesarean delivery), contracted pelvis, and abnormal presentation.

Exclusion criteria:

Women with anemia, abnormal placenta, history of complications at previous pregnancy especially PPH, hypertensive cases, previous or current history of cardiac, renal, and hepatic disorders, emergency cesarean sections and multiple pregnancy, macrosomic baby, or polyhydramnios.

Group (A): 38 cases administered IV infusion of 10 IU oxytocin diluted in 250 ml of normal saline after fetus delivery. Group (B): 38 cases administered 400 mcg misoprostol intrauterine after delivery of placenta.

In case of the uterus still atonic after the trial intervention, extra IV oxytocin was administered by anesthetist or obstetrician.

All cases were subjected to full history taking to exclude any heart, liver, or kidney problems, obstetric history, history of chronic diseases, history of blood transfusion, and general examination (abdominal examination, laboratory investigation, and ultrasonography).

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Ethical consent:

An approval of the study was obtained from Zagazig University Academic and Ethical Committee. Every patient signed an informed written consent for acceptance of the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical Analysis

Data entry and analysis were performed using SPSS version 28 for data processing. Data were expressed as number and percentage for qualitative variables and mean ± standard deviation (SD) for quantitative one. The student "t" test was used for comparison of means of two independent groups. Chi-square test (X^2) was used to find the association between row and column variables. P value ≤ 0.05 indicates significant results.

RESULTS

Regarding age, BMI, gravidity, parity and gestational age, the groups showed no significant difference (Table 1).

Table (1): Basic data of the studied groups (NO=76)

Variable	Group (A) No. (38)	Group (B) No. (38)	t-test	P
Age (years) mean ± SD (range)	 29.7±4.9 (19-38)	 31.3±6.1 (20-41)	0.5	0.6
BMI (kg/m^2) mean ± SD (range)	 28.4±4.6 (20-34)	 28.6±5.7 (19-36)	0.4	0.7
Gravidity mean ± SD (range)	 2.8±1.3 (1-4)	 2.6±1.2 (1-5)	0.3	0.6
Parity Nulliparous Multiparous	 12 (31.6 %) 26 (68.4 %)	 10 (26.3 %) 28 (73.7 %)	0.7	0.9
Gestational age (weeks) mean ± SD (range)	 38.7±2.2 (37-40)	 38.1±2.1 (37-40)	0.5	0.6

The current results did not show significant variation between the two studied groups regarding indications of cesarean section (Table 2).

Table (2): Comparing the CS indications between the groups

Indications of cesarean section	Group (A) No. (38) NO. (%)	Group (B) No. (38) NO. (%)	χ^2	P-value
Mal presentation	15 (39.4%)	13 (34.2%)	1.2	0.06
Previous Cesarean delivery	9 (23.6%)	10 (26.3%)		
CPD	9 (23.6%)	9 (23.6%)		
Past date	5 (13.1%)	6 (15.7%)		

A significant difference was revealed between the two studied groups regarding blood loss with higher blood loss (intraoperative, postoperative and overall blood loss) in intrauterine misoprostol group than in intravenous oxytocin (Table 3).

Table (3): Blood loss intraoperative and post-operative in the two studied groups

Blood loss	Group (A) No. (38)	Group (B) No. (38)	t-test	P
Intraoperative blood loss (ml) mean ± SD (range)	395.1±4.1 (365-415)	426.5±6.2 (380-450)	16.7	**0.001****
Postoperative blood loss 2hours mean ± SD (range)	62.3±9.1 (40-75.8)	85.4±8.6 (67-100.2)	12.3	**0.001****
Approximate total blood loss (ml) mean ± SD (range)	457.4±21.5 (405-490.2)	511.9±23.7 (447-550.5)	14.9	**0.001****
**Statistically highly significant difference ($P \leq 0.001$).				

There was statistically significant decrease in both hemoglobin and HCT postoperatively in the two studied group but this decrease was more among intrauterine misoprostol group than among intravenous oxytocin group (Table 4).

Table (4): Hemoglobin and HCT pre and post-operative in the groups

Mean haemoglobin	Group (A) No. (38)	Group (B) No. (38)	t-test	P
Preoperative haemoglobin (gm/dl) mean ± SD	11.8±2.1	12.1±2.5	1.4	0.6
Postoperative haemoglobin 2h (gm/dl) mean ± SD	10.1±0.8	9.9±0.7	2.5	**0.04***
Preoperative HCT (%) mean ± SD	33.67±2.8	33.86±2.3	1.6	0.5
Postoperative HCT 2h (%) mean ± SD	31.38±2.3	30.14±3.73	2.6	**0.04***
* Statistically significant difference ($P \leq 0.05$)				

Table 5 revealed that there was highly significant difference between the two groups concerning need for additional ecbolic that was more in group B.

Table (5): Comparison between groups considering the need for additional ecbolic

Need for additional ecbolic	Group (A) No (38) %	Group (B) No (38) %	test χ^2	P
No	36 94.7	15 39.5	1.7	0.06
Yes	2 5.2	23 60.5		

There was no statistical significantly differences between the two groups concerning pre-operative and 24 hours postoperative pulse rate and systolic and diastolic blood pressure (Table 6).

Table (6): Vital signs pre and post-operative in the groups

Vital signs	Group (A) No. (38)	Group (B) No. (38)	t-test	P
Preoperative Pulse rate mean ± SD	76.1±3.6	74.5±4.5	0.9	0.1
Postoperative Pulse rate mean ± SD	85.6±5	87.2±8.1	1.1	0.2
Preoperative systolic blood pressure mean ± SD	102.3±10.1	100.7±12.6	1.4	0.08
Postoperative Systolic blood pressure mean ± SD	133±1.7	134.5±1.6	1.7	0.06
Preoperative diastolic blood pressure mean ± SD	74.9±0.7	75.1±0.6	1.1	0.3
Postoperative diastolic blood pressure mean ± SD	86.4±0.5	87.1±0.8	1.2	0.07

There was a significant difference between the two groups concerning side effects of drugs with higher shivering among intrauterine misoprostol group, while headache, and vomiting were reported in the group of oxytocin (Table 7).

Table (7): Comparison between the two studied groups as regards side effects of drugs

Side effects of drugs	Group (A) No (38) %	Group (B) No (38) %	Test χ^2	P
No	18 47.3	16 42.1	3.8	**0.03***
Shivering	5 13.1	9 23.6		
Vomiting	7 18.4	6 15.7		
Headache	6 15.7	5 13.1		
Dizziness	2 5.2	2 5.2		
* Statistically significant difference (P ≤ 0.05).				

DISCUSSION

In our results the statistical comparison between the groups showed non-significant differences concerning maternal age, gravidity, parity, gestational age, and maternal BMI. This is in agreement with the results of **Vimala *et al.* [6],** and **Owonikoko *et al.* [7]** where they showed that there were no significant variation in age, gestation, parity, neonatal birth weight, and history of previous CS. In addition our data are supported with another study found that there were no significant variation in age, parity, history of previous CS, gestation [8].

The present findings revealed that there was no significant difference between the two studied groups considering indications of CS and that was in keeping with the study done by **Vimala *et al.* [6].**

A significant variation has been recorded between the two studied groups concerning blood loss with higher blood loss (intraoperative, postoperative and overall blood loss) in intrauterine misoprostol than in intravenous oxytocin. The intraoperative blood loss volume in oxytocin group was 395.1 ± 4.1 ml vs 426.5 ± 6.2 ml in misoprostol group, 2 h postoperative blood loss was 62.3 ± 91ml vs 85.4 ± 8.6 ml respectively. In **Abdelaleem *et al.* [1]** study, misoprostol intrauterine compared to intravenous oxytocin found the same result of reduction of blood loss.

When compared with 20 IU oxytocin drip, (200µg) Sublingual misoprostol was found to be as potential as intravenous oxytocin (20 IU) in prevention of PPH following cesarean delivery with less side effects [9]. Unlike in **Vimala *et al.* [6],** after fetus delivery the blood mean loss in CS was significantly lower in cases received misoprostol 400 mcg sublingually than cases received oxytocin with 20 IU.

The current study found that there was statistically significant decrease in both hemoglobin and HCT postoperatively in the two studied group but this decrease was more among intrauterine misoprostol than in intravenous oxytocin. There were more decrease in postoperative hematocrit values of misoprostol group 30.14 ± 3.7 than oxytocin group 31.38±2.8 (p≤0.05). Our study is in agreement with **Abdelaleem *et al.* [1]** with statistical significance between the two groups. **Vimala *et al.* [6]** reported that regarding postoperative and preoperative hemoglobin, there was no variation between the oxytocin and misoprostol. In **Owonikoko *et al.* [7], and Alalfy *et al.* [8],** there was no significant variation between groups concerning post- and pre-operative hematocrit.

The present study reported that there was significant difference between the two groups concerning need for additional ecbolic. Similar significant difference are also reported by the study done in Assiut, Egypt by **Abdelaleem *et al.* [1]. Acharya *et al.* [10],** found that in the misoprostol group 6.7% needed extra ecbolics, while in the oxytocin group they were 10% (p= 0.64), with no statistical significance between the 2 groups.

In our study, no patients needed blood transfusion and comparison of MAP and PR changes during surgery and intradural block did not show any significant variation between all groups.

The present results found a significant variation between the groups concerning side effects of drugs with higher shivering among intrauterine misoprostol than in intravenous oxytocin (23.6% versus 13.1%), while headache and vomiting were more common among intravenous oxytocin than among intrauterine misoprostol (15.7% and 18.4% versus 13.1% and 15.7% respectively). According to **Hofmeyr *et al.* [11],** the incidence of side effects with misoprostol was dose-dependent and that efforts are needed to assess the lower effective and safe dose of the drug. There were recorded side effects of misoprostol in 30-70 % of cases including pyrexia and shivering [12]. **Vimala *et al.* [6]** and **Owonikoko *et al.* [7]** revealed that cases with misoprostol complained of shivering, metallic taste, and pyrexia more than cases received oxytocin.

Our results did not find statistically significant variation between the two groups as regards intraoperative complications, and there was no any major complication, such as need for blood transfusion, PPH, surgical involvement and mortality between groups.

Misoprostol was the most common medication for control and prophylaxis of PPH for over decade. Many studies were done worldwide to compare between

oxytocin and misoprostol as regards their role in prevention and management of PPH and many studies were done to evaluate the potentiality of the different application of misoprostol for prevention and control of PPH [13].

CONCLUSION

Intravenous oxytocin infusion is considered more potential than intrauterine misoprostol in blood loss reduction during and after CS.

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