

Comparison between Oxytocin Bolus Versus Bolus Plus Infusion in Prevention of Postpartum Hemorrhage During Elective Cesarean Section

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ABSTRACT

Background: The risk of postpartum hemorrhage, anemia, blood transfusions, hysterectomy, and even maternal mortality increases with a caesarean section. Hemorrhage control during and after Caesarean operation helps to reduce maternal mortality and morbidity. In most situations, uterine atony is linked to fatal obstetric hemorrhage. After a vaginal birth, oxytocin is commonly administered to reduce postpartum bleeding. Its usefulness in caesarean sections is still debatable.

Objectives: This study aimed to evaluate the effectiveness of ten IU Intravenous oxytocin bolus in comparison with ten IU oxytocin bolus plus thirty IU oxytocin infusion on postpartum hemorrhage during elective cesarean section.

Material and Method: At Maternity Hospital in Zagazig University Hospital. This study included 180 singleton pregnant women admitted for elective cesarean section in two groups. Patients in group A: received ten IU oxytocin intravenous bolus over one min and infusion of thirty IU oxytocin in 500 ml of 0.9 saline over four hours. While patients in group B: received ten IU oxytocin intravenous bolus over 1min and 500 ml of 0.9 saline over four hours.

Results: We found that there was an insignificant difference in both groups according to the amount of blood loss. In Group (A) 10 (11.1%) patients needed blood transfusion while in Group (B) 11 (12.2%) patients needed blood transfusion, and this difference was insignificant $P=0.6$.

Conclusion: After a caesarean delivery, an oxytocin infusion lowers the requirement for additional uterotonic drugs but has little effect on the overall incidence of significant obstetric haemorrhage.

Keywords: Obstetric, Caesarian section, Postpartum, Hemorrhage, Oxytocin.

INTRODUCTION

Cesarean section has been one of the most common surgeries performed on women in the previous four decades ⁽¹⁾. Cesarean section is now the preferred method of delivery in many countries, accounting for almost 25% of all births ⁽²⁾. Cesarean section increases the risk of postpartum hemorrhage, anemia, blood transfusion, hysterectomy, and even maternal death ⁽³⁾.

Hemorrhage control during and after Caesarean section reduces maternal mortality and morbidity. In the majority of instances, uterine atony is linked to fatal obstetric hemorrhage ⁽⁴⁾. After a vaginal birth, oxytocin is commonly administered to reduce postpartum bleeding. Its usefulness in caesarean sections is still debatable ⁽⁵⁾.

When oxytocin bolus is used regularly, an extra oxytocin infusion is frequently given in the event of bleeding. Some obstetricians give an extra oxytocin injection in high-risk scenarios ⁽⁶⁾. Intravenous oxytocin infusion maintains uterine contractility. However, it has a very short half-life (4-10 min). So, the potential effect of intravenous oxytocin infusion is during the surgery and immediate postpartum period ⁽⁷⁾. Despite research comparing the use of a bolus vs an oxytocin infusion during a caesarean operation, there is inadequate evidence to recommend IV oxytocin bolus with infusion over IV oxytocin bolus alone. We aimed to evaluate the effectiveness of ten IU Intravenous oxytocin bolus in comparison with ten IU oxytocin bolus plus thirty IU oxytocin infusion on postpartum hemorrhage during elective cesarean section.

METHODS

Study design and sample

This randomized control double center trial was carried out at Maternity Hospital in Zagazig University Hospital through the period from March 2020 to Nov 2020. The study included 180 pregnant women who were scheduled for an elective caesarean section. Women having a bleeding condition or anticoagulant therapy, placenta previa or abruption, known fibroid or chorioamnionitis, and women older than 40 or younger than 20 years old were excluded from the study.

Procedures:

We divided patients into two groups: group A for patients with odds number and group B for patients with even number.

Patients in group A (bolus and infusion): received ten IU oxytocin intravenous bolus over one min and infusion of thirty IU oxytocin in 500 ml of 0.9 saline over four hours. While patients in group B (bolus only): received ten IU oxytocin intravenous bolus over one min and 500 ml of 0.9 saline's over four hours.

A comprehensive medical and obstetric history, a general, abdominal, and local examination, a transabdominal ultrasound to determine viability, placental position, presenting portion, and gestational age, as well as a stander pre-operative evaluation were all given to each participant.

Before spinal anaesthesia, all patients received a 500 mL intravenous bolus of normal saline via an intravenous bolus. Both groups underwent a normal caesarian section.

Both groups received identical postpartum care since they were treated in the same postnatal unit by the same staff.

We used the following equation to estimate blood loss. Estimated blood loss = $EBV \times ((\text{pre-Hematocrit} - \text{post Hematocrit}) / \text{pre-Hematocrit})$; Estimated blood volume in ml was estimated by multiplying the woman's weight in kilograms x85⁽⁸⁾.

Statistical analysis

We collected and coded data from the history, clinical examination, laboratory testing, and outcome measures using Excel software.

Data were entered to the computer and analyzed using IBM SPSS software package version 23.0. The significance of the obtained results was judged at the 5% level.

Ethical considerations:

Permission was obtained from the Institutional Review Board "IRB" (NO. 5919-23-3-2020) and Ethical Committee in the Faculty of Medicine, Zagazig University. All participants give verbal and written consent after explaining the aim, safety of the study, and confidentiality of their data.

RESULTS

In the present study, we enrolled 180 pregnant women scheduled for elective CS in two groups. The mean age in group (A) ranged between 20-45 years with a mean of 32.2 ± 7.7 years. While in group (B), the age ranged between 21-44 years with a mean of 34 ± 7.3 years. Gestational age in group (A) ranged between 36-40 weeks with a mean of 37.9 ± 1.4 weeks. While, in group (B) gestational age ranged between 36-41 weeks with a mean of 38 ± 1.5 weeks. (Table I).

We found that operation time in group (A) ranged between 25-40 min with a mean of 35.1 ± 4.3 min, while in group (B) ranged between 25-40 min with a mean of 34.8 ± 4.5 min without significance between both groups ($P=0.72$). Patient's length of stay in theatre/recovery in group (A) ranged between 120-160 min with a mean of 142.4 ± 16.9 min while in group (B) it ranged between 125-150 min with a mean of 137 ± 9 min without statistical significance ($p=0.67$). Also, there was an insignificant difference in both groups regarding the amount of blood loss (Table II). Table II illustrated that in group (A) 10 (11.1%) patients needed blood transfusion, while in group (B), 11 (12.2%) patients needed blood transfusion, and this difference was insignificant ($P=0.6$).

Table (I): Demographic characters

	Group A	Group B
	Mean \pm SD	Mean \pm SD
Age (Years)	32.2 ± 7.7	34.0 ± 7.3
BMI	29.7 ± 0.7	29.7 ± 0.7
Gestational Age (weeks)	37.9 ± 1.4	38.0 ± 1.5

Table (II): Operative and postoperative data

	Group A	Group B	P-Value
	Mean \pm SD	Mean \pm SD	
Operative time (Min)	35.1 ± 4.5	34.8 ± 4.5	0.72
Length of Stay in theatre/recovery (Min)	142.4 ± 16.9	137.0 ± 9	0.67
Blood Loss (Ml)	436.9 ± 51.0	461.3 ± 50.7	0.07
Blood Transfused	10 (11.1%)	11 (12.2%)	0.6

DISCUSSION

Postpartum hemorrhage after Caesarean section increases the risk of maternal morbidity and mortality⁽³⁾. Postpartum hemorrhage mainly is due to uterine atony⁽⁴⁾. The risk of maternal morbidity and death is reduced when blood loss is controlled during and immediately after Caesarean section. Preventative uterine atony medications are frequently associated with a host of side effects and a large price tag. Oxytocin is the drug of choice for avoiding uterine atony since it has fewer adverse effects and is less expensive⁽⁹⁾. Use of Oxytocin in Prevention of uterine atony and postpartum hemorrhage after normal delivery is well established but it is still doubtful for Caesarean section⁽¹⁰⁾. The current practices of oxytocin administration are not uniform⁽¹¹⁾.

In our study, we used ten IU oxytocin intravenous bolus over one min and infusion of thirty IU oxytocin in 500 ml of 0.9 saline over four hours in the intervention group. While, ten IU oxytocin intravenous bolus over one min and 500 ml of 0.9 saline over four hours were used in the placebo group. There was no significant change in blood loss between both groups. Also, in the study of Sheehan *et al.*⁽⁴⁾, the postpartum hemorrhage didn't change by an additional forty IU of intravenous oxytocin infusion. Unlike our finding Munn *et al.*⁽¹²⁾ concluded that the women group of low dose oxytocin infusion needed an additional dose of oxytocin more than the high dose group (39% vs 19%, $P < 0.001$) and is associated with a significant change in hematocrit. In 2009, Murphy *et al.*,⁽¹³⁾ studied the effects of additional thirty IU of oxytocin infusion versus placebo infusion in 110 women admitted for elective Caesarean section. They found that women in placebo group significantly required an additional uterotonic agent and suffered from postpartum hemorrhage with lower estimated blood loss than oxytocin infusion group.

Another double-blind, placebo-controlled study of Güngördük *et al.*⁽⁹⁾ was done on 720 women comparing the effects of a five IU oxytocin bolus and placebo infusion versus a five IU oxytocin bolus and thirty IU infusion on blood loss management during elective cesarean section. The mean of estimated blood loss and the proportion of women with blood loss estimated to be greater than 1000 ml was significantly lower in the oxytocin infusion group. They used lactated

Ringer's solution as a placebo and caesarian sections were performed by different surgeons.

Meanwhile, the current study demonstrated that the patient's length of stay in theatre/recovery in group (A) ranged between 120-160 min with a mean of 142.4 ± 16.9 min, while in group (B) it ranged between 125-150 min with mean 137 ± 9 min. There were no statistically significant differences between groups ($P=0.67$). In agreement with our study, the study of **Kajendran et al.** ⁽¹⁴⁾ reported that there was no significant difference in mean length of stay in theatre and recovery in the intervention group (116.6 ± 56.0 minutes) and the control group 112.6 ± 46.8 minutes ($p=0.08$).

Regarding blood transfusions, in group (A) ten (11.1%) needed blood transfusion, while in group (B), eleven (12.2%) needed blood transfusion, and there were no statistically significant differences between groups ($P=0.62$).

Kovacheva et al. ⁽¹⁵⁾ reported that use of three IU oxytocin bolus over 15s was found to be as successful as a normal 'wide open' infusion thirteen IU in 500 ml, repeated twice, if necessary, and accompanied by maintenance infusions of three IU per hour. The rhythm of the uterus, the blood flow, or other adverse effects or alternate uterotonic criteria did not discriminate. The reported advantages of bolus oxytocin infusion are: decreased expected blood loss, decreased postpartum hemorrhage, needed fewer blood transfusions and lower uterotonics requirement ⁽⁴⁾.

Conclusion: The addition of an oxytocin infusion following caesarean birth minimizes the requirement for further uterotonic drugs but has no effect on the overall occurrence of significant obstetric haemorrhage, according to our findings.

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