## **Original article:**

## **Comparative study of two different regimens of maintenance dose of intramuscular and intravenous oxytocin in preventing postpartum haemorrhage in patients undergoing elective caesarean section**

**Dr. Soujanya Halemath, Dr. Jaya Dighe, Dr Abhinav Shrivastav**

Department of Anesthesia, Shri Bhausaheb Hire Government Medical College & Hospital, Dhule.

Corresponding author: Dr. Soujanya Halemath

****This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Date of submission: 05 January 2023

Date of Final acceptance: 22 March 2023

Date of Publication: 30 March 2023

Source of support: Nil

Conflict of interest: Nil

**Abstract
Introduction:** Oxytocin is routinely administered after both normal and operative delivery to initiate and maintain adequate uterine contractility for minimizing blood loss and preventing postpartum hemorrhage.

**Material and methods:** A hospital based prospective, randomised, controlled study was conducted with 120 patients to determine the effective maintenance route of oxytocin by IM or IV infusion in elective caesarean section to prevent postpartum haemorrhage by estimating the changes in hemodynamics and uterine contraction. The patients were randomly allocated into following two groups of 60 patients.

**Results:** The uterine tone at the interval of 5 mins (2.92±0.28 vs. 2.95±0.22), 10 mins (3.53±0.54 vs. 3.67±0.51), 15 mins (3.82±0.54 vs. 3.88±0.45) and 20 mins (3.92±0.28 vs. 3.90±0.40) was comparable between the groups and statistically not significant as per Student t-test (p>0.05). The mean blood loss was comparable between the groups and statistically not significant as per Student t-test (550.50±21.43 ml vs. 555.33±18.91 ml; p>0.05).

**Conclusion**: In our study, the uterine tone following bolus dose of 3U oxytocin was found to be adequate and it was maintained well and equally in both the groups. Hence both 10U IM and 10U IV infusion route was found to be equally efficient in maintenance of uterine tone and prevention of Postpartum haemorrhage following 3U bolus dose of oxytocin.

**Keywords:** Oxytocin, caesarean section, postpartum haemorrhage

**Introduction:**

Oxytocin is routinely administered after both normal and operative delivery to initiate and maintain adequate uterine contractility for minimizing blood loss and preventing postpartum hemorrhage.1 Several regimens of oxytocin have been tested during cesarean delivery with variable wanted (uterotonic) and unwanted (cardiovascular) effects.2 It is a common practice to administer oxytocin as an intravenous (IV) bolus followed by IV infusion for adequate uterine contraction. Oxytocin is the preferred choice because it has fewer side effects than other uterotonic agents of similar efficacy, and it is the most commonly used agent. It can be administered intravenously or intramuscularly. The intramuscular route has a uterotonic effect within 3-7 minutes, which persists for 30-60 minutes, whereas the response to the intravenous route is almost instantaneous, reaching a plateau concentration at 30 minutes. The rapid effect of the intravenous route may lower the risk of PPH, but it has been associated with cardiovascular side effects, including tachycardia and hypotension.3

Hence the present study was done at our tertiary care centre to determine the effective maintenance route of oxytocin by I.M or I.V infusion in elective caesarean section to prevent postpartum haemorrhage by estimating the changes in hemodynamic and uterine contraction and evaluate the effective maintenance route of oxytocin following cord clamping in elective caesarean section in two groups (3 U oxytocin I.V bolus followed by infusion at 2 U/h, and 3U oxytocin I.V bolus followed by 10U I.M)

**Material and methods:**

A hospital based prospective, randomised, controlled study was conducted with 120 patients to determine the effective maintenance route of oxytocin by IM or IV infusion in elective caesarean section to prevent postpartum haemorrhage by estimating the changes in hemodynamics and uterine contraction. The patients were randomly allocated into following two groups of 60 patients:

* **Group I:** 60 patients were given 3U I.V. oxytocin bolus + 10U RL@2U/hour via piggyback infusion technique.
* **Group II:**60 patients were given 3U I.V. oxytocin bolus + 10U I.M.

**Study design:**A hospital based prospective, randomised, controlled study

**Study Duration:** 18months

**Study area:** The study was done at our tertiary care centre in the department of Anaesthesiology.

**Study population:** All Pregnant females 21-35 years undergoing elective caesarean section at Tertiary care Hospital who fulfilled the inclusion criteria.

**Sample size**: 120 patients

**Inclusion criteria**

* ASA II
* Pregnant females 21-35 years
* All caesarean sections excluding those in exclusion criteria

**Exclusion criteria:**

* Blood dyscariasis
* Uterine atony
* Cardiovascular diseases
* History of postpartum haemorrhage
* Multiple pregnancy
* Preeclampsia and Eclampsia patients
* Patient in obstructed labour
* Known case of Placenta Praevia and Accreta

Twin pregnancy and polyhydramnios

**Results:**

Majority of the patients (61.7%) in Group I were in the age group of 21-25 years followed by 30% in the age group of 26-30 years and 8.3% in the age group of 31-35 years. The mean age of patients in Group I was 25.43 ± 3.47 years.

**Comparison of Uterine Tone at various time intervals**

The uterine tone at the interval of 5 mins (2.92±0.28 vs. 2.95±0.22), 10 mins (3.53±0.54 vs. 3.67±0.51), 15 mins (3.82±0.54 vs. 3.88±0.45) and 20 mins (3.92±0.28 vs. 3.90±0.40) was comparable between the groups and statistically not significant as per Student t-test (p>0.05).

**Table 1: Comparison of Uterine Tone at various time intervals**

|  |  |  |  |
| --- | --- | --- | --- |
| **Adequate Uterine Tone** | **Group I** | **Group II** | **p Value** |
| **Mean** | **SD** | **Mean** | **SD** |
| **5 mins** | 2.92 | 0.28 | 2.95 | 0.22 | >0.05 |
| **10 mins** | 3.53 | 0.54 | 3.67 | 0.51 | >0.05 |
| **15 mins** | 3.82 | 0.54 | 3.88 | 0.45 | >0.05 |
| **20 mins** | 3.92 | 0.28 | 3.90 | 0.40 | >0.05 |

**Comparison of Blood Loss between groups**

The mean blood loss was comparable between the groups and statistically not significant as per Student t-test (550.50±21.43 ml vs. 555.33±18.91 ml; p>0.05).

**Table 2: Comparison of Blood Loss between groups**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Group I** | **Group II** | **p Value** |
| **Mean** | **SD** | **Mean** | **SD** |
| **Blood Loss (ml)** | 550.50 | 21.43 | 555.33 | 18.91 | >0.05 |

**Distribution of patients according to Requirement of Additional Uterotonic Agent**

4 (6.7%) and 5 (8.3%) patients in Group I and Group II respectively required additional uterotonic agent. There was no significant difference between the groups as per Chi-Square test (p>0.05).

**Table 3: Distribution of patients according to Requirement of Additional Uterotonic Agent**

|  |  |  |  |
| --- | --- | --- | --- |
| **Additional Uterotonic Agent** | **Group I** | **Group II** | **p Value** |
| **N** | **%** | **N** | **%** |
| **Yes** | 4 | 6.7% | 5 | 8.3% | >0.05 |
| **No** | 56 | 93.3% | 55 | 91.7% |
| **Total** | 60 | 100% | 60 | 100% |

**Distribution of patients according to Requirement of Rescue Drug**

4 (6.7%) and 6 (10%) patients in Group I and Group II respectively required rescue drug. There was no significant difference between the groups as per Chi-Square test (p>0.05).

**Table 4: Distribution of patients according to Rescue Drug**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rescue Drug** | **Group I** | **Group II** | **p Value** |
| **N** | **%** | **N** | **%** |
| **Yes** | 4 | 6.7% | 6 | 10% | >0.05 |

**Discussion:**

Oxytocin is used prophylactically in most obstetric patients along with uterine massage in the prevention and treatment of PPH. Apart from the uterus, Oxytocin receptors are present in the heart and large vessels. 4,5,6 Synthetic Oxytocin used clinically is identical to the hormone normally released from the posterior pituitary but is devoid of by other polypeptide hormones and proteins7. Vasodilatation is the primary cardiovascular effect after the use of Oxytocin. Tachycardia, increased stroke volume and cardiac output (CO) occur as compensatory effects to vasodilatation. 8 It was observed in the present study that the uterine tone at the interval of 5 mins (2.92±0.28 vs. 2.95±0.22), 10 mins (3.53±0.54 vs. 3.67±0.51), 15 mins (3.82±0.54 vs. 3.88±0.45) and 20 mins (3.92±0.28 vs. 3.90±0.40) was comparable between the groups and statistically not significant as per Student t-test (p>0.05). An adequate tone of the uterus would prevent the inadvertent use of additional oxytocics. Hediye D et al122, Joseph J et al9, Butwick AJ et al10, Yaliwal RG et al115 and Mohta M et al116 noted similar observations in their studies. Hediye D et al11 randomised control study showed no statistically significant difference was noted between the two groups in terms of the mean duration of labor, duration of third stage of labor, manual removal of the placenta, need for instrumental delivery.

 Butwick AJ et al10 in a randomised controlled trial assessing minimum effective bolus dose of Oxytocin ranging from 0 to 5 IU, indicated that doses up to 3 IU were needed to produce a high prevalence of adequate uterine tone and additional rescue doses of Oxytocin were sometimes needed in 5 IU group. Yaliwal RG et al12 randomized control trial showed tone of the uterus as assessed at 1, 3, 5 and 10 minutes after administration of the drug and showed significance in Group I at 5 minutes. One patient in Group II had atonic PPH.

 Mohta M et al13 randomised, double blind study showed Uterine tone was comparable at all time points in all the groups except at nine minutes, when the tone was inadequate in seven patients in group 1.25 compared to one patient each in the other two groups.

It was observed in our study that the mean blood loss was comparable between the groups and statistically not significant as per Student t-test (550.50±21.43 ml vs. 555.33±18.91 ml; p>0.05).. Hediye D et al14 randomised control study observed estimated blood loss during the third stage of labour was similar between the two groups and were no statistically significant difference was noted in need for blood transfusion, PPH ≥500 mL, PPH ≥1000 mL, or length of hospital stay.

**Conclusion**:

In our study, the uterine tone following bolus dose of 3U oxytocin was found to be adequate and it was maintained well and equally in both the groups. Hence both 10U IM and 10U IV infusion route was found to be equally efficient in maintenance of uterine tone and prevention of Postpartum haemorrhage following 3U bolus dose of oxytocin.

**References:**

1. Grant TR. Risk-stratification, resource availability, and choice of surgical location for the management of parturients with abnormal placentation: a survey of United States-based obstetric anesthesiologists. Int J Obstet Anesth. 2018.
2. Carroli G, Cuesta C, Abalos E et al. Epidemiology of postpartum haemorrhage: a systematic review. Best Pract Res Clin Obstet Gynaecol. 2008;22(6):999–1012.
3. WHO recommendations: Uterotonics for the prevention of postpartum haemorrhage. World Health Organization; 2018.
4. Souza JP, Gulmezoglu AM, Vogel J et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. Lancet. 2013;381(9879):1747-1755.
5. Oyelese Y, Ananth CV. Postpartum hemorrhage: epidemiology, risk factors, and causes. Clin Obstet Gynecol. 2010;53(1):147–156.
6. Daru J, Zamora J, Fernandez-Felix BM et al. Risk of maternal mortality in women with severe anaemia during pregnancy and post partum: a multilevel analysis. Lancet Glob Health. 2018;6(5):e548–54.
7. Combs CA, Murphy EL, Laros RK. Factors associated with postpartum hemorrhage with vaginal birth. Obstet Gynecol. 1991;77:69-76.
8. Stones RW, Paterson CM, Saunders NJ. Risk factors for major obstetric haemorrhage. Eur J Obstet Gynecol Reprod Biol. 1993;48:15-18.
9. Joseph J, George SK, Daniel Met al. A randomised double-blind trial of minimal bolus doses of oxytocin for elective caesarean section under spinal anaesthesia: Optimal or not? Indian J Anaesth 2020;64:960-964.
10. Butwick AJ, Coleman L, Cohen SEet al. Minimum effective bolus dose of Oxytocin during elective caesarean delivery. Br J Anaesth 2010;104:338-343.
11. Hediye D, CenigzH, HeydarovaUet al. Intramuscular versus intravenous prophylactic oxytocin for postpartum haemorrhage after vaginal delivery: a randomised control study. Archives of Gynecology and Obstetrics. 2016;294:911–916
12. Yaliwal RG, Biradar AM, Dharmara PS et al. A Randomized Control Trial of 3 IU IV Oxytocin Bolus with 7 IU Oxytocin Infusion versus 10 IU Oxytocin Infusion During Cesarean Section for Prevention of Postpartum Hemorrhage. International Journal of Women’s Health. 2020;12:1091–1097.
13. Mohta M, Chowdhury RB, Tyagi A et al. Efficacy of different infusion rates of oxytocin for maintaining uterine tone during elective caesarean section: A randomised double blind trial. Anaesth Intensive Care. 2021;49(3):183-189.
14. Hediye D, CenigzH, HeydarovaUet al. Intramuscular versus intravenous prophylactic oxytocin for postpartum haemorrhage after vaginal delivery: a randomised control study. Archives of Gynecology and Obstetrics. 2016;294:911–916.