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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

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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 proteins[7]. 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 al[122], Joseph J et al[9], Butwick AJ et al[10], Yaliwal RG et al[115] and Mohta M et al[116] noted similar observations in their studies. Hediye D et al[11] 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 al[10] 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 al[12] 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 al[13] 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 al[14] 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.

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