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Haemodynamic Effects of Oxytocin Given As IV Infusion or Bolus-Infusion Dose during Caesarean Section -A Cross-Sectional Study

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ABSTRACT: Adequate uterine contraction is an indispensable factor during a caesarean section. Oxytocin is the drug which is very effective for the same. But oxytocin is not without adverse effects. They can cause tachycardia, hypotension and in severe cases, arrythmias. The effects and adverse effects can be balanced by the mode of administration of the drug, that is via infusion alone or as bolus-infusion doses.In this study, three regimens of oxytocin are compared for its effectiveness in uterine contraction and in limiting the haemodynamic adverse effects. In this study 100 patients who received a total of 20 IU of oxytocin as 17U infusion with 3 U bolus(group 1) ,18 U infusion with 2 U bolus (group 2) and 20U infusion alone(group 3) were observed before and after administration of oxytocin. Group 1 had significantly greater increase in heart rate and decrease in systolic and diastolic blood pressure values at various time intervals.Group 1 had 2 had better and comparable uterine tone and group 3 had the least uterine contraction.

KEYWORDS:- arrythmia, caesarean section, hypotension, oxytocin, tachycardia, uterine contraction

I. INTRODUCTION

Adequate contraction of uterus immediately after the delivery of the baby is an indispensablefactor during a caesarean section which has to be made sure by the anaesthesiologist. Oxytocinis the most commonly used uterotonic agent in obstetrics. It is routinely administered after bothnormal and operative delivery to initiate and maintain adequate uterine contractility forminimizing blood loss and preventing postpartum hemorrhage.Even though oxytocin can give the desirable uterotonicity, it can cause several deleteriousadverse effects(1,2) Oxytocin increases the permeability of the uterusmyofibrils to sodium andstimulates the contraction of the smooth muscle of the uterus indirectly and it inducesperipheral vasodilation along with decrease in arterial pressure after delivery and hence reduceshaemorrhage(3,4)

Inappropriate dose of this compound may cause a wide range of complications, includingcardiovascular system disorders. The use of high bolus doses (e.g., 10 IU of oxytocin) candetermine deleterious cardiovascular changes for the patient, especially in situations ofhypovolemia or low cardiac reserve.Furthermore, high doses of oxytocin for prolonged periods may lead to desensitization ofoxytocin receptors in myometrium, resulting in clinical inefficiency. Adverse effects includehypotension, tachycardia[1,2] or even cardiovascular collapse and death in severe cases(5,6)

Moreover, various other side effects have been recorded including fluid pooling or pulmonaryedema by antidiuretic effect of oxytocin.(7–9)However ,these effects are not widelyappreciated by clinicians.(10)

Hence , adequate dosing of oxytocin which has to be given during the caesarean section is veryessential. Studies have shown that bolus doses are very effective in providing adequate uterinecontraction, but more prone to haemodynamic side effects [1,2]

And that, continuous infusion prevents the haemodynamic variations but less effective inproviding adequate uterine contraction. Therefore research is necessary on the method ofoxytocin injection and the effective minimum concentration for caesarean section to induceuterine contraction without side effects.

In this study, continuous intravenous injection of oxytocin and bolus-continous intravenousinjection of oxytocin is studied and haemodynamic changes and uterine tone were comparedin both instances , when given after the delivery of anterior shoulder of baby during caesareansection under spinal anaesthesia.

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II. STUDY PROCEDURE

Consent was obtained from the 100 patients and their care giver. Brief history of thepatient was enquired from the patient as well as the bystander. The patients who receivedoxytocin as 20U infusion , 2U bolus with 18U infusion and 3U bolus with 17U infusion were observed for a time period of 30 minutes.The heart rate and mean arterial pressure anduterine tone at 1 minute, 5minutes, 10minutes and 30minutes after starting of oxytocin wererecorded for all patients.

The uterine tone was assessed by the obstetrician by using a 5 point scale.

1- Atonic
2- Partial but inadequate contraction
3- Adequate contraction
4- Well contracted
5- Very well contracted

The results were calculated as the mean change in blood pressure and pulse rates with the standard deviation. The p value was calculated to confirm whether the change is significant.

III. RESULTS AND OBSERVATIONS

The patients were distributed between the three groups of intervention.

Group 1- Those who received 17U IV infusion with 3U bolus Group 2- Those who received 18 U IV infusion with 2U IV bolus Group3- Those who received a 20U IV infusion alone Group 1 has significantly higher heart rates at 1 minute, 5minutes, 10 minutes and 30 minutes after oxytocin administration than other two groups. Whereas group 3 had the least rise in heart rate at these intervals. The baseline heart rate was found to be significant with p value of 0.005, but the values at at 1 minute,5minutes, 10 minutes and 30 minutes are found to bemore significant with p value< 0.001 for 1 minute, 5minutes, 10 minutes and 0.002 for 30 minutes.

Table 1. Pairwise comparisons of Heart rate between the groups

Variables	Groups	Mean	S.D	p value
HR.baseline	Group1 (n=36)	78.67	4.44	*0.005
	Group 2 (n=34)	75.88	4.624	
	Group 3 (n=30)	75.23	4.329	
HR.1min	Group1 (n=36)	87.78	5.026	*<0.001
	Group 2 (n=34)	82.65	4.625	
	Group 3 (n=30)	78.1	4.766	
HR.5min	Group1 (n=36)	83.89	4.909	*<0.001
	Group 2 (n=34)	79.41	4.704	
	Group 3 (n=30)	77	4.771	
HR.10min	Group1 (n=36)	81.69	4.88	*<0.001
	Group 2 (n=34)	77.41	4.626	
	Group 3 (n=30)	76.27	4.586	
HR.30min	Group1 (n=36)	79.39	4.704	*0.002
	Group 2 (n=34)	76.12	4.695	
	Group 3 (n=30)	75.63	4.484	

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Group 1 has statistically higher fall in systolic blood pressure values at 1minute, 5 minutes and 10 minutes after oxytocin administration than the other two groups, while group 3 has statistically the least fall in systolic blood pressure values at 1minute, 5 minutes and 10minutes after oxytocin administration.

Table 2- Comparison of systolic blood pressure (mm Hg) between groups

Variables	Groups	Mean	S.D	p value
SBP.baseline	Group1 (n=36)	127.42	5.598	0.785
	Group 2 (n=34)	127.91	3.621	
	Group 3 (n=30)	127.07	4.441	
SBP.1min	Group1 (n=36)	111.17	6.176	*<0.001
	Group 2 (n=34)	120.18	3.664	
	Group 3 (n=30)	124.13	4.345	
SBP.5min	Group1 (n=36)	118	6.234	*<0.001
	Group 2 (n=34)	123.62	3.701	
	Group 3 (n=30)	125.33	4.163	
SBP.10min	Group1 (n=36)	122.44	5.342	*0.004
	Group 2 (n=34)	125.85	3.686	
	Group 3 (n=30)	125.83	4.348	
SBP.30min	Group1 (n=36)	124.92	5.704	0.086
	Group 2 (n=34)	127.44	3.526	
	Group 3 (n=30)	126.27	4.548	

Group 1 has statistically higher fall in diastolic blood pressure values at 1minute and 5minutes than the other two groups, while group 3 has statistically the least fall in systolicblood pressure values at 1minute and 5 minutes. Thebaseline diastolic blood pressure wasfound to be statistically significant with p value of 0.020. But the values at 1minute and 5 minutes are statistically more significant with p value of <0.001 and 0.006 respectively

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Table 3- Comparison of Diastolic Blood Pressure (mm Hg) between groups

Variables	Groups	Mean	S.D	p value
DBP.baseline	Group1 (n=36)	76.06	4.745	*0.020
	Group 2 (n=34)	75.68	4.021	
	Group 3 (n=30)	73.2	4.147	
DBP.1min	Group1 (n=36)	64.33	4.323	*<0.001
	Group 2 (n=34)	67.97	4.101	
	Group 3 (n=30)	70.63	4.287	
DBP.5min	Group1 (n=36)	68.14	4.441	*0.006
	Group 2 (n=34)	70.71	4.182	
	Group 3 (n=30)	71.37	4.23	
DBP.10min	Group1 (n=36)	70.61	3.995	0.055
	Group 2 (n=34)	72.91	4.122	
	Group 3 (n=30)	71.83	4.292	
DBP.30min	Group1 (n=36)	73.44	4.693	0.083
	Group 2 (n=34)	74.68	4.283	
	Group 3 (n=30)	72.27	4.143	

Uterine tone assessment after 30 minutes of oxytocin administration revealed that the score was highest for group 1 and least for group 3 and this was found to be statistically significant. On pairwise comparison using Post Hoc test, there were no significant difference in uterine tone assessment score between groups 1 and 2.

Table 4-Comparison of uterine tone assessment score between groups

Variables	Groups	Mean±S.D	Median (IQR)	p value
Uterine tone assessment score	Group1 (n=36)	4.86±0.35	5 (5-5)	*<0.001
	Group 2 (n=34)	4.71±0.46	5 (4-5)	
	Group 3 (n=30)	4.1±0.55	4 (4-4)	

Table 5-Pairwise comparison of uterine tone between groups

Variables	Significant Pairwise comparisons	p value
Uterine tone assessment score	Group1 &3	<0.001
	Group2 &3	<0.001

IV.CONCLUSION

In our study, we compared the hemodynamic response and uterine contractions in patients who received 3 regimens of oxytocin (20U infusion , 2U bolus with 18U infusion and 3Ubolus with 17U infusion) during caesarean section after delivery of baby.

It was observed that hemodynamic parameters HR, SBP and DBP all did change in all the threegroups but it was maximum in the group which received maximum bolus dosage and wasminimum in the group which received only infusion.The uterine contraction was adequate andcomparable in those who received 3U and 2U

bolus along with infusion , but it was lessadequate and delayed in those who received infusion dose alone.

Hence, it is concluded that lower bolus doses of oxytocin are efficient in causing comparableuterine contractions as that with high bolus doses with added advantage of lesserhaemodynamic variations. So the oxytocin regimen of 2U IV bolus with 18U IV infusion ofoxytocin can be considered superior to the other two regimens.

REFERENCES

[1]. Thomas JS, Koh SH, Cooper GM. Haemodynamic effects of oxytocin given as i.v.bolusor infusion on women undergoing Caesarean section. Br J Anaesth. 2007 Jan;98(1):116–9.

[2]. Pinder AJ, Dresner M, Calow C, Shorten GD, O'Riordan J, Johnson R. Haemodynamic changes caused by oxytocin during caesarean section under spinal anaesthesia. Int J Obstet Anesth. 2002 Jul;11(3):156–9.

[3]. Shyken JM, Petrie RH. The use of oxytocin. Clin Perinatol. 1995 Dec;22(4):907–31.

[4]. Petersson M. Cardiovascular effects of oxytocin. Prog Brain Res. 2002;139:281–8.

[5]. Cooper G, Lewis G, Neilson J. Editorial I: Confidential enquiries into maternal deaths, 1997-1999. Br J Anaesth. 2002 Oct 1;89:369–72.

[6]. Svanström MC, Biber B, Hanes M, Johansson G, Näslund U, Bålfors EM. Signs ofmyocardial ischaemia after injection of oxytocin: a randomized double-blind comparison of oxytocin and methylergometrine during Caesarean section. Br J Anaesth. 2008 May;100(5):683–9.

[7]. Edwards BR, LaRochelle FT. Antidiuretic effect of endogenous oxytocin in dehydrated Brattleboro homozygous rats. Am J Physiol. 1984 Sep;247(3 Pt 2):F453-465.

[8]. Heytens L, Camu F. Pulmonary edema during cesarean section related to the use of oxytocic drugs. Acta Anaesthesiol Belg. 1984 Jun;35(2):155–64.

[9]. Shahin J, Guharoy SR. Pulmonary edema possibly developing secondary to the intravenous administration of oxytocin. Vet Hum Toxicol. 1991 Dec;33(6):587–8.

[10]. Ngan Kee WD. Confidential Enquiries into Maternal Deaths: 50 years of closing the loop. BJA Br J Anaesth. 2005 Apr 1;94(4):413–6.