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A Comparative Randomized Study On The Hemodynamic Effects Of Oxytocin Iv Bolus Versus Infusion In Caesarean Section

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ABSTRACT

Objective: *To compare the hemodynamic effects of oxytocin IV bolus versus infusion during caesarean section, and to analyze the occurrence of side effects with either method.*

Methods: *60 ASA II pregnant patients posted for elective Lower Segment Cesarean Section were randomly assigned to receive either IV Bolus 5 units of oxytocin (Group B) or IV Infusion of 40 units of oxytocin in 500 ml of normal saline (Group I) following delivery of the fetus. All patients included in the study received spinal anesthesia. Hemodynamic parameters were measured preoperatively, intraoperatively and post operatively. Any side effects were watched for throughout this period.*

Results: *The systolic blood pressure, diastolic blood pressure and mean arterial pressure were significantly lower in the bolus group compared to the infusion group during the first 10 min following administration of the drug. Pulse rates were significantly higher in the bolus group. The adverse effects like chest discomfort, vomiting and ECG changes were reported in bolus group. Need for additional oxytocin doses and other uterotonics were higher in the infusion group compared to the bolus group.*

Conclusion: *Bolus doses of oxytocin produce significant hypotension and tachycardia, and other adverse effects compared to infusion but produce better uterine contractility.*

KEYWORDS : Oxytocin bolus, Oxytocin infusion, Caesarean Section

INTRODUCTION:

Oxytocin is most commonly used as an uterotonic agent in normal labour and caesarean section for uterine contractility and thereby prevention of blood loss and post partum haemorrhage. Oxytocin has adverse effects like **hypotension, nausea, vomiting, chest pain, headache, flushing, myocardial ischemia, ST-T segment changes, pulmonary edema, severe water intoxication, and convulsion.** While the cardiovascular side effects of oxytocin are widely known there is little agreement as to the mechanism by which they occur. The side effects of oxytocin are largely dose – related. We compared the hemodynamic effects of oxytocin IV bolus versus infusion during caesarean section. Occurrence of any adverse effects in either group was also noted.

METHODOLOGY:

This is a prospective, randomized, analytical comparative study, conducted at the Department of Anaesthesiology, Kanyakumari Government Medical College, Nagercoil, Tamilnadu.

Ethical committee approval & written informed patient consent were obtained.

The study population of 60 (n-60) patients was randomly assigned to receive either IV Bolus 5 units of oxytocin (Group B) or IV Infusion of 40 units of oxytocin in 500 ml of normal saline (Group I) following delivery of the fetus. Patients belonging to age 20- 35 yrs, BMI-25-30, ASA II, who were posted for Lower Segment Caesarean Section, were included in the study. Patients belonging to ASA III and IV, those with known allergy to oxytocin, coagulopathies, renal disease, liver disease, multiple gestation, cardiovascular disorders, preeclampsia and eclampsia, diabetes mellitus, placenta praevia, were excluded from the study.

All the patients were premedicated with Inj. Metoclopramide 10 mg and Inj. Ranitidine 50 mg slow IV. Baseline mean arterial pressure (MAP), systolic and diastolic blood pressures, heart rate (HR) were recorded before administering spinal anaesthesia and before giving oxytocin. Subarachnoid block was performed in right lateral position in L3-L4 space using 25 G Quinke's spinal needle with 10 mg of 0.5% Hyperbaric Bupivacaine.

Group B - bolus group received 5(IU) of oxytocin diluted to 10ml given over 1 minute using a syringe pump set at 0.16 ml per second (0.08units per second).

Group I - Infusion group received (40 units in 500ml normal saline) at 125ml/hr (0.003 units per second) after delivery of the baby.

Heart Rate, Mean Arterial Pressure, Systolic Blood Pressure and Diastolic Blood Pressure, were measured at 1-minute interval up to 5 minutes, then every 5 minutes up to 1 hour and tabulated. Side effects like hypotension like nausea, vomiting, chest pain, headache, flushing, ST-T segment changes, pulmonary edema, severe water intoxication, and convulsion observed and noted.

RESULTS:

The data were statistically analysed using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 19).

The fall in Mean Arterial Pressure, Systolic Blood Pressure and Diastol-

ic Blood Pressure, and increase in Pulse Rate were statistically significant in bolus group compared to infusion group (p value<0.05).

Fig 1: CHANGES IN SYSTOLIC BLOOD PRESSURE

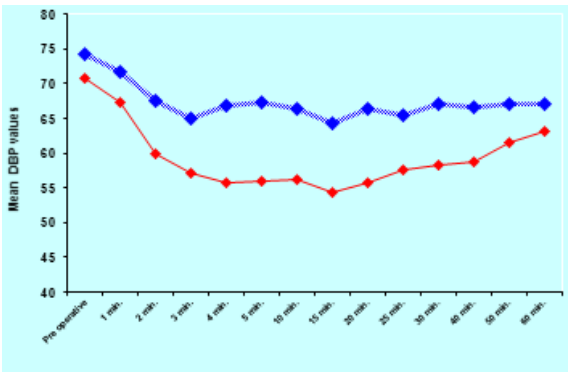


Fig 2: CHANGES IN DIASTOLIC BLOOD PRESSURE

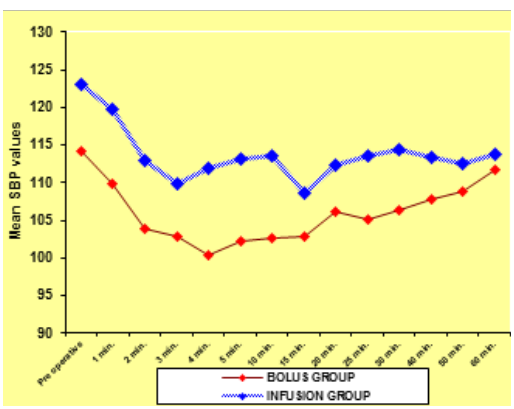


Fig 3: CHANGES IN MEAN ARTERIAL PRESSURE

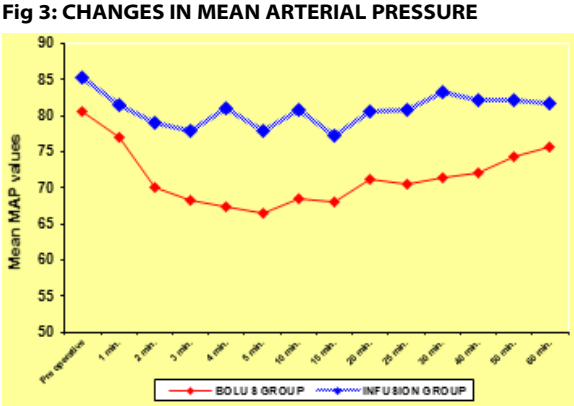
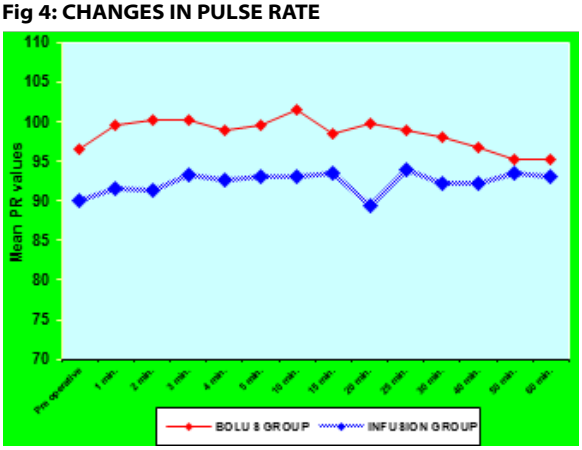


Fig 4: CHANGES IN PULSE RATE



The adverse effects like chest discomfort (in 3 patients), vomiting (in 7 patients), ECG changes (ST depression in one patient) were reported in bolus group. One patient in oxytocin bolus group and 8 patients in infusion group needed additional oxytocin doses and other uterotonics and were excluded from the study.

The fall in systolic blood pressure is maximum within 4-10 minutes in bolus group and is statistically significant. The fall in diastolic blood pressure is maximum at 15 minutes and is statistically significant. Regarding Mean Arterial Pressure, the maximum fall is in 5 minutes in bolus group and at 15 minutes in infusion group and statistically significant. The change in Pulse rate was maximum at 10 minutes in bolus group and 15 minutes in infusion group and was statistically significant.

DISCUSSION:

Pregnant women undergoing caesarean section are at increased risk of obstetric hemorrhage, mainly due to uterine atony[1]. Oxytocin is the mainstay of treatment of uterine atony. Prophylactic routine use of oxytocin has been shown to reduce the incidence of postpartum hemorrhage by up to 40%[2]. Despite widespread use there is limited data to guide the optimal oxytocin dosing in patients undergoing elective caesarean section.

Uterine oxytocin receptors population increases progressively during pregnancy and reaches peak at term. In late pregnancy, before the onset of labor, oxytocin receptors are on average 12 times higher than in early pregnancy and about 80 times higher than in non-pregnant uterus. As the non-laboring uterus at term remains more sensitive to oxytocin, low dose of oxytocin might have an optimum efficacy while not inviting the deleterious effects of high dose of oxytocin[3].

The cardiovascular effects of oxytocin have been described previously but the extent of physiological compromise had not been described. The cardiovascular effects of oxytocin in women undergoing Caesarean section include tachycardia, hypotension and decrease in cardiac output. These can be sufficient to cause significant compromise in high-risk patients.

In a study conducted by Thomas et al[4], comparing bolus and infusion of oxytocin, hemodynamic parameters observed between the two groups were similar to that observed in this current study. There are other studies which show comparable uterotonic effect in bolus compared to infusion[5-9]. In this study, ECG changes and chest discomfort were reported in bolus group in addition to significant hemodynamic changes. Rescue oxytocin and requirement of other uterotonics were more in infusion group in my study**.**

CONCLUSION:

We conclude that bolus doses produce significant hypotension and tachycardia and higher incidence of adverse effects compared to infusion but produce better uterine contractility.

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