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EFFECT OF CO-ADMINISTRATION OF PHENYLEPHRINE WITH OXYTOCIN ON THE PREVENTION OF OXYTOCIN-INDUCED HYPOTENSION IN CAESAREAN SECTION UNDER SUBARACHNOID BLOCK

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KEYWORDS :

INTRODUCTION

Postpartum haemorrhage (PPH) is one of the leading causes of maternal mortality with uterine atony being the cause in about 50% cases. It can be reduced by proper use of uterotonic agents. Among the various uterotonics, oxytocin is most commonly used. Prophylactic routine use of oxytocin has been shown to reduce the incidence of PPH by up to 40%.However, oxytocin causes hypotension and reflex tachycardia as an adverse effect due to action on oxytocin receptors found in the heart and large vessels.To treat this hypotension, various vasopressors such as ephedrine, mephentermine and phenylephrine can be used. Among this phenylephrine is shown to have a quicker control of blood pressure (BP) during spinal anaesthesia-induced hypotension phenylephrine, a short-acting alpha agonist, can be administered by bolus as well as by infusion,in titrated doses to treat oxytocin-induced hypotension.Studies recommending a minimum effective dose of phenylephrine required for co-administration with oxytocin to obtund cardiovascular effects of oxytocin are sparse.

The primary objective of the study was to compare the effects of co-administration of oxytocin with phenylephrine 75 µg on the incidence of oxytocin-induced hypotension during caesarean section under subarachnoid block ,Rescue vasopressor requirement, magnitude of haemodynamic changes and the incidence of side effects were the secondary objective.

MATERIAL AND METHODS :

This prospective , randomized, hospital based study was carried out after obtaining Ethical Committee approval. The study was conducted from july to August 2018.

Parturients posted for elective and emergency lower segment caesarean section (LSCS) and all parturients with uncomplicated singleton pregnancy were included in the study. Parturients with an increased risk of atony or excessive bleeding (known placenta praevia, multiple gestation, abnormal presentations, prolonged labour, more than 2 previous LSCS, PPH), cardiovascular instability, pre-eclampsia, essential hypertension, gestational diabetes, those with systemic illnesses such as severe anaemia, bleeding diathesis and cardiovascular disease, parturients with height <150 cm were excluded from the study. We also excluded those parturients who had a fall in BP >20% of basal mean arterial pressure (MAP) following spinal anaesthesia but before oxytocin infusion.

A total of 70 parturients were randomised into two Groups, allocation concealment was made by envelope method. Group A patients received oxytocin 5U and phenylephrine 75 µg diluted to 10cc with normal saline and given slowly over 10 min, Group B patients received oxytocin 5U and normal saline diluted to 10cc and given slowly over 10 min.

The SAB was performed at L -L /L -L interspace using 25G Quincke Babcock needle in the left lateral decubitus position and bupivacaine hyperbaric (0.5%) 10 mg was administered Immediately after the SAB. Heart rate (HR), systolic BP (SBP), diastolic BP (DBP), MAP and peripheral oxygen saturation was monitored every 2 min till baby extraction and up to 10 min after administration of the test drug solution, then every 5 min till the end of surgery. After baby extraction, test drug solutions (10 mL) were administered slowly based on group allocation over a period of 10 min through a separate IV line.

The initial power analysis assumed that 70% of patients require a vasopressor, based on previous studies.To detect a minimum of 50% reduction in the incidence of hypotension between the groups, a minimum of 30 parturients would be required in each group, to attain a power of 80% at alpha error of 0.05, assuming normal distribution of values in all the groups and using Chi-square test for comparison of proportions.

Statistical analysis was done by using:-
IBM SPSS (statistics package for socialistic sciences). Haemodynamic values recorded just before extraction of the baby was considered as baseline value for assessing the effect of oxytocin on haemodynamic parameters.

Shapiro Wilk test was done to assess for the normality of the distribution of continuous variables.

For values showing normal distribution, Analysis of variance (ANOVA) was used to find the significance between two groups of parturients for continuous variables and paired *t*-test was used for intragroup comparison.

Post hoc analysis with Bonferroni correction was applied for intergroup comparison of continuous variables.

Kruskal–Wallis test was done for intergroup comparison when values showed skewed distribution.

Chi-square/Fisher's exact test was used to find the significance of study parameters on categorical scale. $P < 0.05$ was considered statistically significant.

RESULTS:

A total of 70 parturients were enrolled and randomly allocated into two groups (Group A n = 35, Group B n =35. However,10 parturients (Group A n = 5, Group B n = 5) did not receive intervention as they developed hypotension after SAB but before oxytocin infusion and hence were not included for the analysis. A total number of 60 parturients included for the final analysis.

Demographic parameters such as age, height, weight, level of sensory block at 20 min and duration of surgery were comparable in both two groups as shown in the chart.

Chart 1

PARAMETER	GROUP A	GROUP B
AGE(years) [MEDIAN(IQR)]	22(23-26)	23(22-24)
HEIGHT(cm),(mean±SD)	154.5±5.1	155.4±4.2
WEIGHT(kg),(mean±SD)	50.4±12.8	52.2±11.5
SENSORY BLOCK[median(IQR)]	T6(T6-T8)	T6(T6-T8)
Duration of surgery(m±in)[MEAN±SD]	48.5±6.5	48.0±5.5

extraction time og baby from induction (min) [mean±SD]	11.5±3.5	10.5±.5
extraction time of baby from skin incision(min) [mean±SD]	(6.5±1.5)	6.0±2.5)

SD : standard deviation , IQR: interquartile range

The average time of extraction of the baby was comparable in both two groups.

The incidence of hypotension was more in Groups B compared to Group A. The rescue vasopressor requirement was significantly lower in Group A as compared to group B.Intergroup comparison using Mann–Whitney U-test showed statistically significant difference between Groups A and B ($P < 0.001$)

Incidence and magnitude of hypotension and vasopressor requirement shown in the table.

OUTCOME and HAEMODYNAMICS		GROUP A	GROUP B	P -Value
inidence of hypotention (%)		3	92.5	<0.001
number of episodes of hypotention	0	27	4	<0.001
	1	3	7	
	2	0	19	
Dose of rescue vasopressor given(mg) (mean±SD)				
			06±03	12+_06
baseline MAP before oxytocin as a bolus over 10 min [median(IQR)]		80(75-85)	76(75-80)	0.2
lowest MAP after oxytocin as a bolus over 10 min [median(IQR)]		72(66-76)	62(60-65)	<0.001
time at which lowest MAP was recorded after oxytocin as a bolus over 10 min [median (IQR)]		6(3-9)	8(5-15)	0.054

Log transformation was done for basal MAP before oxytocin infusion, lowest MAP after oxytocin infusion, the magnitude of change in MAP and the time for maximum fall in MAP after oxytocin infusion to assess for normality of distribution as these parameters showed skewed distribution on initial analysis. Final analysis was done for these parameters after log transformation.

The magnitude of fall in MAP after oxytocin infusion was more in group B as compared to group A. The time at which lowest MAP recorded after oxytocin infusion was between 6 and 9 min . Heart rate showed statistically significant difference between Groups A and B from 12thto 40thmin but there was no incidence of bradycardia.

comparison of SBP between both groups using one way ANOVA test showed statistically significant difference at 12th–20th min (P < 0.001). Post hoc analysis with Bonferroni correction showed statistically significant difference between Groups A and B from 12th to 40th min .Comparison of DBP between two groups showed a statistically significant difference at 14th–30th min (P < 0.001).

Comparison of trends of systolic blood pressure and diastolic blood pressure between the two groups

Comparison of MAP between two groups showed a statistically significant difference at 12th–35thmin ($P < 0.001$).

Uterine tone was adequate in both groups.

The incidence of nausea and vomiting was highest in Group B(40%) compared to Group A (13.5%) . We did not observe any other side effects.

DISCUSSION:

In the present study, it was observed that co-administration of 75 µg phenylephrine with oxytocin reduced the incidence of oxytocin induced hypotention and vasopressor requirement compared to control.

There is no uniformity in the dose of oxytocin that is given for adequate uterine contraction. The routine use of 5U to 10U oxytocin during elective caesarean delivery can no longer be recommended, as adequate uterine tone can occur with lower doses of oxytocin (0.5–3 units).

However, there are no studies suggesting the optimal dose for co-administration with oxytocin, but studies done to compare co-administration of two lower doses in an effort to minimise phenylephrine-induced side effects.

Phenylephrine causes a significant reduction in heart rate after the bolus dose.There was no incidence of bradycardia in the present study which may be attributed to the administration of phenylephrine as bolus over 10 min. in other studies There is evidence that phenylephrine delivered as an infusion is the most effective method for preventing maternal hypotension and intraoperative nausea or vomiting.

CONCLUSION:

Co-administration of phenylephrine 75 µg with oxytocin after baby extraction reduces the incidence of oxytocin-induced hypotension and rescue vasopressor requirement as compared to oxytocin with normal saline during caesarean section under subarachnoid block.

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Conflicts of interest:
There are no conflicts of interest.

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