

ORIGINAL ARTICLE

Effect of phenylephrine with oxytocin on the prevention of oxytocin induced hypotension in caesarean section under spinal anaesthesia

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ABSTRACT:

Background: Postpartum haemorrhage (PPH) is one of the leading causes of maternal mortality with uterine atony being the cause in about 50% cases. The present study was conducted to evaluate effect of phenylephrine with oxytocin on the prevention of oxytocin induced hypotension in caesarean section under spinal anaesthesia.

Materials & Methods: 60 females in age ranged 18- 50 years with elective and emergency lowersegment caesarean section (LSCS) were divided into 3 groups of 20 each. Group I patients received oxytocin 3U and phenylephrine 50 µg diluted to 10cc with normal saline as an infusion over 5 minutes, group II patients received oxytocin 3U and phenylephrine 75 µg diluted to 10cc infusion over 5 minutes and group III patients received oxytocin 3U and normal saline diluted to 10cc infusion over 5 minutes. **Results:** The mean age in group I was 26.2 years, in group II was 27.4 years and in group III was 27.1 years. The mean height was 160.2 cm in group I, 159.5 cm in group II and 161.1 cm in group III. The mean weight was 64.4 kgs in group I, 63.2 kgs in group II and 65.5 kgs in group III. The difference was non- significant ($P > 0.05$). The duration of surgery was 51.3 minutes in group I, 54.2 minutes in group II and 53.8 minutes in group III. Extraction time of baby from induction was 11.8 minutes, 10.4 minutes and 11.8 minutes and extraction time of baby from skin incision was 6.2 minutes, 7.5 minutes and 7.2 minutes in group I, II and III respectively. Dose of rescue vasopressor given (µg) was 44.3, 5.4 and 90.4. Incidence of hypotension was seen in 12 in group I, 3 in group II and 15 in group III. The difference was non-significant ($P > 0.05$). Episodes of hypotension was 0 seen in 8 in group I, 17 in group II and 5 in group III. 1 seen in 10 in group I, 3 in group II and 13 in group III. 2 seen in 2, 0 and 2 respectively. MAP before oxytocin infusion was 80.2, 81.4 and 76.8 and MAP after oxytocin infusion was 64.2, 75.9 and 65.4 in group I, II and III respectively. The difference was non-significant ($P > 0.05$) **Conclusion:** Co-administration of phenylephrine 75 µg with oxytocin 3U reduces the incidence of oxytocin-induced hypotension compared to phenylephrine 50 µg with oxytocin 3U during caesarean section under spinal anaesthesia.

Key words: hypotension, oxytocin, rescue vasopressor

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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.¹ 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.²

This SA and oxytocin induced hypotension can be inhibited by the use of phenylephrine, mephentermine, crystalloids and ephedrine.³ The main effect on control of blood pressure is obtained with phenylephrine. The main administration of phenylephrine is via infusion and as a bolus dose. Increase in cardiac output, heart rate and decrease in systemic vascular resistance are effects of phenylephrine on body. The incidence of nausea, vomiting and hypotension decreases significantly with

the use of phenylephrine. Other effect is improvement of fetal arterial perfusion as compared to ephedrine.⁴ Phenylephrine, a short-acting alpha agonist, can be administered by bolus as well as by infusion, in titrated doses to treat oxytocin-induced hypotension.⁵ It has been observed that co-administration of phenylephrine obtunds oxytocin-induced decrease in systemic vascular resistance (SVR) and increase in heart rate and cardiac output. However, phenylephrine at higher doses is known to cause reflex bradycardia with decreased cardiac output.⁶ The present study was conducted to evaluate effect of phenylephrine with oxytocin on the prevention of oxytocin induced hypotension in caesarean section under spinal anaesthesia.

MATERIALS & METHODS

The present study comprised of 60 females in age ranged 18- 50 years with elective and emergency lowersegment caesarean section (LSCS). All gave their written consent for participation in the study.

Data such as name, age etc. was recorded. Patients were divided into 3 groups of 20 each. Group I

patients received oxytocin 3U and phenylephrine 50 µg diluted to 10cc with normal saline as an infusion over 5 minutes, group II patients received oxytocin 3U and phenylephrine 75 µg diluted to 10cc infusion over 5 minutes and group III patients received oxytocin 3U and normal saline diluted to 10cc infusion over 5 minutes. Parameters such as height,

weight, sensory block, duration of surgery, extraction time of baby from induction and extraction time of baby from skin incision, incidence of hypotension and dose of rescue vasopressor given was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I: Table I Baseline demographics

Parameters	Group I	Group II	Group III	P value
Age (years)	26.2	27.4	27.1	0.92
Height (cm)	160.2	159.5	161.1	0.85
Weight (Kgs)	64.4	63.2	65.5	0.78

Table I shows that the mean age in group I was 26.2 years, in group II was 27.4 years and in group III was 27.1 years. The mean height was 160.2 cm in group I, 159.5 cm in group II and 161.1 cm in group III. The

mean weight was 64.4 kgs in group I, 63.2 kgs in group II and 65.5 kgs in group III. The difference was non- significant (P> 0.05).

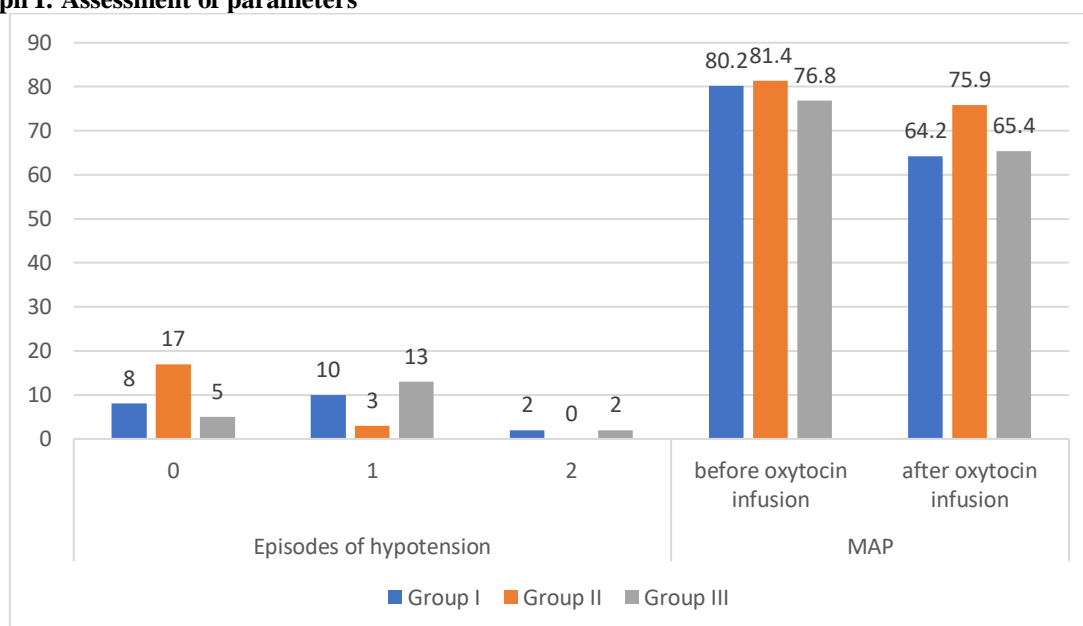
Table II: Assessment of parameters

Parameters	Group I	Group II	Group III	P value
Duration of surgery (min)	51.3	54.2	53.8	0.83
Extraction time of baby from induction (min)	11.8	10.4	11.8	0.62
Extraction time of baby from skin incision (min)	6.2	7.5	7.2	0.35
Dose of rescue vasopressor given (µg)	44.3	5.4	90.4	0.09
Incidence of hypotension	12	3	15	0.05

Table II, graph I shows that the duration of surgery was 51.3 minutes in group I, 54.2 minutes in group II and 53.8 minutes in group III. Extraction time of baby from induction was 11.8 minutes, 10.4 minutes and 11.8 minutes and extraction time of baby from skin incision was 6.2 minutes, 7.5 minutes and 7.2 minutes

in group I, II and III respectively. Dose of rescue vasopressor given (µg) was 44.3, 5.4 and 90.4. Incidence of hypotension was seen in 12 in group I, 3 in group II and 15 in group III. The difference was non- significant (P> 0.05).

Graph I: Assessment of parameters



Graph I shows that episodes of hypotension was 0 seen in 8 in group I, 17 in group II and 5 in group III. 1 seen in 10 in group I, 3 in group II and 13 in group

III. 2 seen in 2, 0 and 2 respectively. MAP before oxytocin infusion was 80.2, 81.4 and 76.8 and MAP after oxytocin infusion was 64.2, 75.9 and 65.4 in

group I, II and III respectively. The difference was non-significant ($P > 0.05$)

DISCUSSION

Endogenous oxytocin is a 9-amino acid polypeptide produced in the posterior pituitary. The exogenous form of the drug is a synthetic preparation.^{7,8} The uterotonic effect of oxytocin is important in reducing blood loss from the site of placental attachment and decreasing the risk of postpartum haemorrhage, thus making it the primary choice among uterotonic.⁹ Oxytocin causes hypotension and reflex tachycardia as an adverse effect because oxytocin receptors are also found in the heart and large vessels.¹⁰ The present study was conducted to evaluate effect of phenylephrine with oxytocin on the prevention of oxytocin induced hypotension in caesarean section under spinal anaesthesia.

We found that mean age in group I was 26.2 years, in group II was 27.4 years and in group III was 27.1 years. The mean height was 160.2 cm in group I, 159.5 cm in group II and 161.1 cm in group III. The mean weight was 64.4 kgs in group I, 63.2 kgs in group II and 65.5 kgs in group III. Dyer et al¹¹ in their study forty-three patients were randomized to receive 80 µg of phenylephrine or 10 mg of ephedrine. Both pulse wave form analysis and transthoracic bioimpedance changes were used to estimate stroke volume in each patient. Hemodynamic responses to spinal anaesthesia and oxytocin were also recorded. A subgroup of 20 patients was randomized to receive oxytocin compared with oxytocin plus 80 µg of phenylephrine after delivery. Mean CO and maximum absolute response in CO were significantly lower during the 150 s after phenylephrine administration than after ephedrine (6.2 vs. 8.1 l/min, $P < 0.001$, and 5.2 vs. 9.0 l/min, $P < 0.0001$, respectively for pulse wave form analysis, and 5.2 vs. 6.3 l/min, $P < 0.01$ and 4.5 vs. 6.7 l/min, $P < 0.0001$, respectively for bioimpedance changes). CO changes correlated with heart rate changes. Co-administration of phenylephrine obtunded oxytocin-induced decreases in systemic vascular resistance and increases in heart rate and CO. Trends in CO change were similar using either monitor.

We found that the duration of surgery was 51.3 minutes in group I, 54.2 minutes in group II and 53.8 minutes in group III. Extraction time of baby from induction was 11.8 minutes, 10.4 minutes and 11.8 minutes and extraction time of baby from skin incision was 6.2 minutes, 7.5 minutes and 7.2 minutes in group I, II and III respectively. Dose of rescue vasopressor given (µg) was 44.3, 5.4 and 90.4. Incidence of hypotension was seen in 12 in group I, 3 in group II and 15 in group III. We found that episodes of hypotension was 0 seen in 8 in group I, 17 in group II and 5 in group III. 1 seen in 10 in group I, 3 in group II and 13 in group III. 2 seen in 2, 0 and 2 respectively. MAP before oxytocin infusion was 80.2, 81.4 and 76.8 and MAP after oxytocin infusion was

64.2, 75.9 and 65.4 in group I, II and III respectively. Thomas et al¹² recruited 30 women undergoing elective caesarean section. They were randomly allocated to receive 5 u of oxytocin either as a bolus injection (bolus group) or an infusion over 5 min (infusion group). These women had their heart rate and intra-arterial blood pressure recorded every 5 s throughout the procedure. The haemodynamic data, along with the estimated blood loss, were compared between the groups. Marked cardiovascular changes occurred in the bolus group; the heart rate increased by 17 (10.7) beats min⁻¹ [mean (sd)] compared with 10 (9.7) beats min⁻¹ in the infusion group. The mean arterial pressure decreased by 27 (7.6) mm Hg in the bolus group compared with 8 (8.7) mm Hg in the infusion group. There were no differences in the estimated blood loss between the two groups. The limitation of the study is small sample size.

CONCLUSION

Authors found that co-administration of phenylephrine 75 µg with oxytocin 3U reduces the incidence of oxytocin-induced hypotension compared to phenylephrine 50 µg with oxytocin 3U during caesarean section under spinal anaesthesia.

REFERENCES

- Gutkowska J, Jankowski M, Mukaddam-Daher S, McCann SM. Oxytocin is a cardiovascular hormone. *Braz J Med Biol Res* 2000;33:625-33.
- Anilkumar G, Ambi Uday S, Shettar AE, Koppal R, Ravi R. Maintenance of arterial pressure during spinal anaesthesia in caesarean section. *J Clin Diagn Res* 2011;5:948-52.
- Miller RD. *Miller's B Anaesthesia*. 7th ed. Philadelphia: Churchill Livingstone; 2010.
- Thomas DG, Robson SC, Redfern N, Hughes D, Boys RJ. Randomized trial of bolus phenylephrine or ephedrine for maintenance of arterial pressure during spinal anaesthesia for caesarean section. *Br J Anaesth* 1996;76:61-5.
- Yalcin S, Aydoğan H, Kucuk A, Yuce HH, Altay N, Karahan MA, et al. Supplemental oxygen in elective caesarean section under spinal anaesthesia: Handle the sword with care. *Braz J Anesthesiol* 2013;63:393-7.
- Barbara MS. Antepartum and postpartum hemorrhage. In: David HC, Cynthia AW, Lawrence CT, Warwick DN, Yaakov B, Hill MM, editors. *Chestnut's Obstetric Anaesthesia Principles and Practice*. 5th ed. Philadelphia: Mosby; 2014. p. 890.
- Butwick AJ, Coleman L, Cohen SE, Riley ET, Carvalho B. Minimum effective bolus dose of oxytocin during elective caesarean delivery. *Br J Anaesth* 2010;104:338-43.
- Susmita B, Sarmila G, Debanjali R, Suchismita M, Arpita L. Bolus oxytocin vs. infusion oxytocin in caesarean delivery. *J Anaesthesiol Clin Pharmacol* 2013;29:32-5.
- Sahu D, Kothari D, Mehrotra A. Comparison of bolus phenylephrine, ephedrine, and mephentermine for maintenance of arterial pressure during spinal anaesthesia in caesarean section – A clinical study. *Indian J Anaesth* 2003;47:125-8.

10. Kate ED, Edward M. Minimally invasive cardiac output monitors. *Br J Anaesth* 2012;12:5-10.
11. Dyer RA, Reed AR, van Dyk D, Arcache MJ, Hodges O, Lombard CJ, Greenwood J, James MF. Hemodynamic effects of ephedrine, phenylephrine and the coadministration of phenylephrine with oxytocin during spinal anesthesia for elective caesarean delivery. *Anesthesiology*. 2009 Oct; 111(4):753-65.
12. Thomas JS, Koh SH, Cooper GM. Haemodynamic effects of oxytocin given as i.v. Bolus or infusion on women undergoing caesarean section. *Br J Anaesth* 2007;98:116-9.