

A prospective Study Comparing Pre-Emptive Intramuscular Ephedrine Versus Intravenous Ephedrine to Prevent Hypotension During Spinal Anaesthesia in Caesarean Section

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ABSTRACT

Introduction: Prevention of spinal anaesthesia induced hypotension is very important. Both intravenous (IV) and intramuscular (IM) ephedrine are being used during caesarean section to prevent hypotension. The present study was done to compare the efficacy and safety of ephedrine administered via IV and IM route.

Material and Methods: A prospective randomised double blind study was done on 60 parturients aged between 20-30 years, divided into Group A (intramuscular ephedrine 30 mg given 10 min prior to spinal anaesthesia, 30 patients) and Group B (intravenous ephedrine 12 mg given at the time of spinal anaesthesia, 30 patients). After intravenous preloading, spinal anaesthesia was given, baseline maternal heart rate and arterial blood pressure was recorded before induction and every 3 min for 15 min and thereafter every 5 min for 45 min. Next reading was taken at 1 hour and finally at 2 hours in recovery.

Results: Mean age of patients in group A and Group B was 24.26±2.71 and 24.23±2.31 years respectively ($p>0.05$). Significant difference was found in maximum and minimum diastolic blood pressure (DBP) and mean arterial pressure (MAP) between both the groups. Nausea and vomiting was less in group A in which ephedrine was given via IM route ($p<0.05$).

Conclusion: Prophylactic use of IM ephedrine was associated with lower incidence of hypotension, nausea and vomiting as compared to intravenous ephedrine.

Keywords: ephedrine, spinal anaesthesia, caesarean section

INTRODUCTION

Intra operative hypotension induced by spinal anaesthesia during C-section is still a challenge for many anesthetists. Many complications are associated with intra-operative hypotension like reduced uteroplacental blood flow and fetal acidosis in neonates or nausea, vomiting and decreased consciousness in parturient.¹

Many treatment options like prehydration, vasopressor agents (ephedrine) and compression of lower leg have been suggested for hypotension prevention of hypotension during spinal anaesthesia.²

Ephedrine is the drug of choice as vasopressor agents in obstetric anaesthesia. A study done by Magalha et al showed that ephedrine was more effective in controlling hypotension as compared to other vasopressor agents.³ Moreover, vasopressor drugs used as prophylaxis is a reasonable option to prevent spinal anaesthesia induced hypotension.

Ephedrine can be administered via both intramuscular and intravenous route.⁴ But best to our knowledge, efficacy of both the route was not compared yet.

Hence, present study was done to evaluate the role of in-

tramuscular and intravenous ephedrine in post spinal hypotension along with its effect on maternal blood pressure and heart rate following spinal anaesthesia in caesarean delivery.

MATERIAL AND METHODS

The present prospective randomised double blind study was done on 60 females patients undergoing emergency caesarean section under spinal anaesthesia.

A written informed consent from all the patients and Ethical Committee approval was obtained before starting the study. Female patients with age between 20-30 years, height 150 cm having ASA grade I and II, having full term pregnancy and undergoing emergency caesarean section were included in the study.

Patients with contraindications for spinal block, coagulopathies, pregnancy induced hypertension, chronic hypertension; cardiac disease and renal disease were excluded from the study.

Patients were divided in to two groups, Group A (intramuscular ephedrine 30 mg given 10 min prior to spinal anaesthesia, 30 patients) and Group B (intravenous ephedrine 12 mg given at the time of spinal anaesthesia, 30 patients)

ECG, NIBP, urine output and SpO₂ were monitored. Baseline maternal hemodynamic variables were recorded.

Intravenous preloading was done with 15ml/kg Ringer's lactate solution. Spinal anaesthesia was administered at L3-L4 interspinous space with Quinke's spinal needle 23G in left lateral position under full asepsis. A dose of 2.2ml of hyperbaric 0.5% bupivacaine was given.

Baseline maternal heart rate and arterial blood pressure was recorded before induction and every 3 min for 15 min and thereafter every 5 min for 45 min. Next reading was taken at 1 hour and finally at 2 hours in recovery. Further rescue boluses of ephedrine 6 mg were given if fall in systolic blood pressure was more than 20 % from baseline value. Presence of any complications intraoperatively was noted.

STATISTICAL ANALYSIS

The quantitative data was analyzed using IBM SPSS- ver.20

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Parameters	Group A (IM)	Group B (IV)	P value
Maximum HR (beats/min)	112.8±12.56	113.4± 13.4	NS
Minimum HR (beats/min)	93.31± 12.64	94.2±12.54	NS
Maximum SBP (mmHg)	124.4±8.1	119.2±8.32	NS
Minimum SBP (mmHg)	98.72±19.78	94.5±20.3	NS
Maximum DBP (mmHg)	80.1±12.4	75.2±11.9	0.05
Minimum DBP (mmHg)	64.9± 9.8	63.2±9.10	0.041
Maximum MAP (mmHg)	85.2±12.93	85.7±11.09	0.013
Minimum MAP (mmHg)	68.3±13.54	65.2±12.12	0.042

HR; heart rate, SBP; systolic blood pressure, DBP; diastolic blood pressure, MAP; mean arterial pressure, IM; intra muscular, IV; intra venous, NS; not significant

Table-1: Comparison of both the Groups after vasopressor administration

software and expressed as mean± standard deviation (SD) and difference compared using one-factor analysis of variance. The qualitative data was compared with chi-square analysis. $P < 0.05$ was considered significant.

RESULTS

In present study most of the patients in Group A [21(70%)] belong to age group of 20-25 years followed by 9 (30%) patients who were between 26-30 years of age. In Group B, most of the patients belong to [20 (66.66%)] age group of 20-25 years followed by 10 (33.33%) patients who belong to age group of 26-30 years. Mean age of patients in group A and Group B was 24.26±2.71 and 24.23±2.31 years respectively ($p > 0.05$).

In Group A nausea, vomiting, decline in heart rate and tachycardia was found in 5 (16.6%), 4(13.33%), 2(6.6%) and 6(20%) patients respectively whereas in Group B nausea, vomiting, decline in heart rate and tachycardia was found in 6 (20%), 5(16.6%), 1(3.33%) and 8(33.3%) patients respectively.

DISCUSSION

Hypotension should be prevented in all patients receiving spinal anaesthesia. As a first line treatment option, intravenous hydration was used, but now most of the researchers are questioning regarding place of preloading.⁴ The choice of option should be vasopressors agent in hypertensive patients. In Asian countries, ephedrine is still a choice by many physicians because of its affordability.⁵

There are very limited studies which had compared efficacy and safety of ephedrine given by two different routes, present study has tried to evaluate the role of IM ephedrine compared to IV ephedrine in preventing hypotension during spinal anaesthesia in caesarean section.

Raskaran et al did a study on 90 patients and reported that in IM ephedrine group 26.66% patients were observed to have hypotension and only 7% patients complained about nausea and vomiting and 10 patients required rescue ephedrine.⁶ The findings of the present study are similar to them.

The mechanism by which ephedrine causes blood pressure restoration is by raising heart rate and heart contractility via β -agonist activity. Ephedrine as an indirect effect also produces vasoconstriction.⁷

Spinal anaesthesia induced hypotension is often associated with vomiting and nausea, the possible reason for this may be due to decrease in medullary blood flow to chemoreceptor

trigger zone (CTZ). Ephedrine which is a vasopressor drug recues these side effects by increasing MAP and by reasonable assumption medullary blood flow also.⁶ In present study there was a significant difference between maximum and minimum MAP between both the groups ($p < 0.05$) which indicate that MAP was increased with IM ephedrine more as compared to IV ephedrine. Also side effects like nausea and vomiting were less in Group A (IM ephedrine) compared to Group B (IV ephedrine).

Varathan S et al did a similar study on 49 patients and concluded that 15 mg of IM ephedrine when given 10 min before decreased hypotension and provided more haemodynamic stability. They also reported that IM ephedrine was not associated with any maternal and fetal side effects.⁵

Lin et al did a meta-analysis for effectiveness of intravenous and intramuscular route of administration of vasopressor agents and found that there was a similar incidence of hypotension between IV (RR = 1.08; 95% CI, 0.66–1.75) and IM (RR = 1.24; 95% CI, 0.71–2.18) administration.⁸

The present study had few limitations such as there were less no of patients enrolled; a large randomized clinical trial is required to confirm the results of present study.

CONCLUSION

The study shows that prophylactic administration of intramuscular ephedrine had lower incidence of hypotension as compared to intravenous ephedrine following spinal anaesthesia for emergency caesarean section.

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