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PROPHYLACTIC ORAL EPHEDRINE IN PREVENTION OF HYPOTENSION FOLLOWING SPINAL ANAESTHESIA

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ABSTRACT: Hypotension is the most dangerous event following spinal anaesthesia. Various measures are being adopted to treat this condition. We studied the efficacy of orally administered ephedrine for the prophylaxis of hypotension following spinal anaesthesia. Around 100 patients belonging to ASA grade I undergoing lower abdominal and scrotal surgeries were randomly allocated equally into two groups (E,C). Group E received 30 mg of oral ephedrine and Group C received a placebo 30 minutes before spinal anaesthesia. We found that the incidence of hypotension and the need for the use of intravenous ephedrine for treatment of hypotension was lower in the patients who received oral ephedrine prophylaxis. There were no significant side effects noticed due to the administration of oral ephedrine prophylaxis.

KEYWORDS: Oral ephedrine, Spinal anaesthesia, Spinal Hypotension.

INTRODUCTION: Spinal anaesthesia is one of the most common techniques of anaesthesia used in practice for more than 100 years. The technique is simple to perform and is relatively safe. The resulting anaesthetic state is excellent and a wide variety of lower abdominal and lower limb surgeries can be performed under spinal anaesthesia. All these factors make the technique quite popular. However, the procedure is not devoid of complications. Hypotension, at times of severe nature, complicates the procedure. Various measures like preloading with intravenous fluids and systemic use of vasopressors are adopted to manage the condition. The present article describes a study undertaken to assess the efficacy of the use of prophylactic orally administered ephedrine for the prevention of hypotension following spinal anaesthesia.

DESCRIPTION OF THE STUDY:

AIM OF THE STUDY: The study aims to determine the efficacy of prophylactic orally administered ephedrine in minimizing the incidence of hypotension following spinal anaesthesia in patients undergoing lower abdominal and scrotal surgeries.

MATERIAL AND METHODS: The study was conducted at Government Mohankumaramangalam Medical College Hospital, Salem. The details of the study were presented before the hospital ethical committee and the approval was obtained. The study included 100 patients belonging to age group 25 to 55 years, male patients, assessed under ASA grade I and undergoing lower abdominal and scrotal surgeries. Patients who were obese (BMI > 30) and those with any known present or past medical illnesses were excluded from the study. Informed consent was taken from the patients.

All the patients were put on preoperative starvation for 6 hours and were premedicated with Tab. Ranitidine 150 mg and Tab. Diazepam 10 mg on the night before surgery. The patients were then randomly allocated into two groups, Group E (Ephedrine Group) and Group C (Control Group). The

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baseline blood pressure (average of 3 readings), pulse rate and oxygen saturation were recorded. Patients in group E received 30 mg of Ephedrine tablets and Patients in group C received a placebo tablet of similar colour and shape with sips of water.

Thirty minutes later the patients were shifted to the operation theatre. Standard monitoring was done. Preloading was done with 10 ml/Kg of Ringer Lactate over 15 minutes. Anaesthetic procedure was standardized in both the groups. Spinal anaesthesia was administered with a 23 G Quincke's needle at the L3 – L4 interspace using 3 ml of 0.5% hyperbaric bupivacaine. Level of sensory block was assessed using pinprick sensation. The level of block was optimized to be around T6 – T8 dermatomal level by suitable adjustment of the operating table till the fixation of the drug. Crystalloid at the rate of 10ml / kg/hr was used for maintenance during the intra operative period. All patients were sedated with 1.5mg of midazolam 5min prior to skin incision.

All the patients were monitored throughout the procedure. Systolic Blood Pressure, Diastolic blood pressure and mean arterial blood pressure were monitored by noninvasive automated oscillatory method and Heart rate was measured by ECG, before spinal and immediately after spinal anaesthesia. During intraoperative period the parameters were monitored at interval of 3minutes upto first 15 minutes, then every 5 minutes till 30th minute, every 10 minutes till 60th minute and every 15minutes till 120 minutes. Other parameters such as SPO₂, urine output, were also monitored.

Hypotension was defined as decrease in systolic BP of more than 20% of Baseline value. Hypotension was treated with IV fluids and inj. Ephedrine IV boluses of 6mg increments. Bradycardia was defined as heart rate less than 60/min and treated with inj. Atropine 0.3 mg increments. The patients were observed in the recovery room. Blood pressure and other vital parameters were monitored every 30 minutes thereafter till the complete regression of the sensory & motor blockade. Occurrence of side effects like dry mouth, headache, palpitations, urinary retention, anxiety, restlessness, tremor, nausea and vomiting were recorded.

RESULTS: The results of the study were tabulated and analysed using the Chi square test and Student "t" test. Both the groups were comparable with respect to age, height and weight of the patients. There was no significant difference in the baseline blood pressure values in both the groups.

The number of patients who had a significant fall in systolic blood pressure following spinal anaesthesia was 19(38%) in the group C and 1(2%) in the group E. This was statistically significant (p value 0.00001).

SL. No	Physical Parameter	Control gp		Ephedrine gp		P value	Significance
		Mean	SD	Mean	SD		
1	Age(Yrs)	37.96	7.93	38.84	8.53	0.498	Not signific.
2	Height(cm)	166.7	3.18	166.3	2.93	0.323	Not signific.
3	Weight(Kg)	58.52	4.19	58.78	4.11	0.632	Not signific.

Table 1: Physical parameters

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SL. No	Group	No. of patient studied	No. of pts requiring vasopressor therapy	Percentage	P Value	Significance
1.	Control-C	50	19	38	.00001	Significant
2.	Ehedrine-E	50	1	2		

Table2: Number and proportion of Patients requiring vasopressor (Inj, Ephedrine i.v) following spinal Hypotension

Graph 1: Systolic Blood Pressure trends.

Graph 1

Graph 2: Diastolic Blood Pressure trends.

Graph 2

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Graph 3: Mean Arterial Pressure trends.

Graph 3

DISCUSSION: Hypotension is one of the most important and significant complications following spinal anesthesia. Sudden and severe hypotension may compromise vital organ perfusion which may result in irreversible insult to the organ functions. Various mechanisms have been postulated as the cause for the hypotension. Pooling of blood in the lower extremities due to the sympathetic blockade following spinal anesthesia and the blockade of sympathetic accelerator fibres to the heart are the major contributors to this phenomenon.

Many methods are being employed for the prevention and treatment of this condition. Preloading the patients with crystalloids or colloids before administration of spinal anesthesia is being adopted in usual practice for the prevention of hypotension. However the efficacy and usefulness of this method have been questioned.^{1,2} Systemic administration of vasopressors has been shown to be effective both as a prophylactic measure and as treatment for hypotension. Ephedrine is one of the most studied and the most common drug used in clinical practice. Various studies have proved the role of prophylactic use of ephedrine administered in different doses via the intravenous and intramuscular route.³⁻¹¹

In the present study, we used ephedrine in a dose of 30 mg by oral route as a prophylaxis administered 30 minutes before spinal anesthesia. We have observed a statistically significant difference in the incidence of hypotension following spinal anesthesia in the ephedrine group compared to the control group where a placebo was used. Subsequently ephedrine had to be administered intravenously with increased incidence following hypotension in the control group. Prophylactic use of ephedrine administered orally thus decreases the incidence of hypotension significantly following spinal anesthesia.

The oral route for ephedrine administrations is easy and simple to practice. No significant complications were observed due to ephedrine use in our study. Previously few studies have showed similar results with the use of oral ephedrine prophylaxis for prevention of hypotension following spinal anaesthesia.^{12,13}

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CONCLUSION: We conclude that prophylactic oral ephedrine in a dose of 30 mg administered 30 minutes before spinal anaesthesia effectively reduces the incidence of significant hypotension and reduces the need for intravenous supplemental use of ephedrine for the management of hypotension following spinal anaesthesia.

REFERENCES:

1. Rout et al "Rapid administration of Crystallized preload does not decrease the incidence of hypotension after spinal Anesthesia for elective caesarian section" British J. Anaesthesia 1992; 68 Page 394-397.
2. Jackson R et al "Volume Preloading is not essential to prevent Spinal induced Hypotension in Caesarean section". British J. Anaesth.1995 Sep 75(3) Pages 257-259; 1996 Feb 76(2); Pages 334-336.
3. Loughrey JP et al. "Prophylactic intravenous bolus ephedrine for elective caesarean section under Spinal Anaesthesia" European Journal of Anaesthesiology 2002 Jan 19(1) pages 63-68.
4. Simon L et al "Dose of prophylactic intravenous ephedrine during Spinal Anaesthesia for Caesarean section". J. Clin. Anaesth. 2001. Aug 13(5); Pages 366-369.
5. Gajaraj N.M. et al "Comparison of ephedrine infusion with crystalloid administration for prevention of hypotension during spinal anaesthesia" Anaesth Analg. 1993; 76 Page 1023- 6.
6. Hemmingsen C Paulsen J.A. and Risbo A. Prophylactic Ephedrine during spinal anaesthesia - Double blind study in patients in ASA groups I to III, British J. Anaesth 1989; 63 Page 340-2.
7. Sternlo JE et al "Prophylactic intramuscular ephedrine in Bupivacaine Spinal Anaesthesia". British J. Anaesth. 1995 May 74(5); Pages 517-520.
8. Web AA et al "Re-evaluation of intramuscular ephedrine as prophylaxis against Hypotension associated with Spinal Anaesthesia for Caesarean section". Canadian J. Anaesth. 1998 Apr 45(4) ; Pages 367-369.
9. Di Roio et al "Prevention of Arterial Hypotension during Spinal Anaesthesia using intramuscular ephedrine in older people". Ann.Fr.Anaesth.Reanim.1997. 16(5); Pages 483-487.
10. Kee WD et al "A dose response study of Prophylactic ephedrine for the prevention of Hypotension during Spinal Anaesthesia for Caesarean section". Anaesthesia Analgesia 2000 Jun 90(6); Pages 1390-1395.
11. Vercauteren MP et al " Prevention of Hypotension by a single 5 mg dose of ephedrine during small dose Spinal Anaesthesia in prehydrated Cesarean delivery patients. Anaesthesia Analgesia 2000 Feb 90(2) Pages 241-242.
12. Kafle S. K. Malla S. M. and Lekhak B. D. "Prophylactic oral ephedrine reduces the incidence of hypotension after subarachnoid block" Can J. Anaesth 1994; 41 11, Page 1091 – 3.
13. Fusun Eroglu et al. "Prophylactic effects of systematic oral Ephedrine in Spinal Anaesthesia induced hypotension during Transurethral Prostatectomy." Scandinavian journal of Urology and Nephrology vol 37, number 2/ April 2003 pages 145-150.

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