Research Article

Prevention of hypotension during spinal anesthesia using mephenteramine

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Abstract

Introduction: Among the various complications occurring due to spinal anesthesia, Hypotension is the immediate most common complication. It occurs due to various degree of sympathetic blockade, which may lead to cerebral hypoxia associated with bradycardia, nausea and vomiting. Hypotension occurs with spinal anesthesia during first 15 to 20 minutes after block for this reasons first half hour of spinal anesthesia is considered to be most dangerous period to develop hypotension. Mephenteramine due to its action of increase in cardiac output and subsequent increase in peripheral resistant is being used for treatment of hypotension during spinal anesthesia. It has direct positive inotrophic action on myocardium; positive chronotrophic action, stimulation of central nervous system; and increase active venous constriction. **Aims and Objective:** to study the efficacy of mephenteramine in prevention of hypotension during spinal anesthesia. **Materials and Method:** In the present study two groups were formed containing 40 patients each. In group I all the patients received injection mephenteramine 15mg intramuscularly 10 minute before giving spinal anaesthesia. Intravenous line was maintained for emergency drug administration. Pulse rate, blood pressure arrhythemias, headache, hypertension were noted (If hypotension develops was treated with injection mephenteramine 7.5mg intravenously repeated if necessary). In control group (group II) balanced electrolyte solution was effused intravenously in quantities and rate sufficient to maintain the blood pressure within 25% of pre-anesthesia reading. All the patients were monitored meticulously and findings were recorded. **Results:** It was observed that agewise, sexwise, weightwise and level of analgiawise difference in both the groups was not statistically significant and thus both the groups were comparable with each other. The incidence of hypotension was observed in group I (20%) was much less as compared to group II (47.5%) and the difference was also statically significant. No major change in pulse rate was observed in majority of the patients in both the groups there was. Intraoperatively nausea was observed 10% patients of group I whereas only 2.5% patients of group II reported nausea. Post operatively headache was seen in 5% patients in group I and retention of urine was seen in 10 patients of group II. **Conclusion:** Mephenteramine is an effective drug for prevention of hypotension during spinal anesthesia.

Keywords: Mephenteramine, spinal anesthesia, hypotension.

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INTRODUCTION

In India still spinal anesthesia is commonly used at most of the centers because of economic reasons, lack of sophisticated equipments, drugs and compressed gases required for general anesthesia. In rural areas, remote from well-equipped medical centers, spinal anesthesia has definite and useful role; because of lack of professional anesthetists and problems associated with general anesthesia. Though the spinal anesthesia has many advantages and disadvantages it is preferred by many anesthetists and surgeons. Among the various complications occurring due to spinal anesthesia, Hypotension is the immediate most common complication. It occurs due to various degree of

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sympathetic blockade, which may lead to cerebral hypoxia associated with bradycardia, nausea and vomiting. The incidence of hypotension vary from 30-60%, depending upon level of analgesia, age of patient, type of operation, general conditions of the patient and preanaesthetic blood volume. Moya and Smith[1] found 50% incidence of hypotension with systolic pressure less than 100mm Hg. It is now generally accepted that hypotension secondary to spinal anesthesia is due to paralysis of preganglionic sympathetic fibers transmitting motor impulses to peripheral vasculature with production of arterial, arteriolar; post arteriolar and venous dilatation. Hypotension occurs with spinal anesthesia during first 15 to 20 minutes after block for this reasons first half hour of spinal anesthesia is considered to be most dangerous period to develop hypotension. After the blood pressure fall to its lowest point the systolic blood pressure will often spontaneously rise 5-10 mm Hg over the next 10-15 minutes and then levels remains fixed until the effect of anaesthetic on nerves has worn off. This small increase in a manifestation of compensatory circulatory activity mediated reflexly by those portions of sympathetic outflow which has not been blocked. Hypotension of spinal anaesthesia is completely different from hypotension due to blood loss. The only feature common to two blood pressures. The oligamic, hypotensive patient is cold, sweating, apprehensive, restless and thirsty. A patient equally hypotensive but with a normal blood volume during spinal anesthesia is warm and dry because of vasodilatation. The usual management of hypotension due to spinal anesthesia has been directed towards two factors. One is cardiac output and other is peripheral vascular resistance. The vasopressors have definite but limited value in management of spinal hypotension. The use of prophylactic peripheral vasopressors to increase the total peripheral restance or the use of drugs with an inotrophic or chronotrophic cardiac action to augment the output of heart.[2] Mephenteramine due to its action of increase in cardiac output and subsequent increase in peripheral resistant was used for treatment of hypotension during spinal anesthesia by Tusng-han-Li *et al* 1963. It has direct positive inotrophic action on myocardium; positive chronotrophic action, stimulation of central nervous system; and increase active venous constriction.[3] A Smessaert *et al*[4], Dripps *et al*[5], Anderson B.M. *et al*[6], all have successfully used mephenteramine for treatment of spinal hypotension. Use of vasopressors is not the best way to improve inadequate venous return and correct the accompaning fall in cardiac output. Unwanted side effect is potentially possible following the use of sympathomimetic amines. Arrhythmias due to irritability of heart and uncontrolled overshoot of blood pressure occur frequently. The combined decrease in cardiac output with increase in marked peripheral vasoconstriction decreases microcirculation with inadequate tissue perfusion, particularly with coronary and renal vasculature. Hypertension disturbs the body's homeostasis.[7] Vasopressors decrease uterine blood flow, leading to foetal acidosis when used to correct hypotension in pregnant parturients.[1]

Thus the present study was undertaken to study the effect of mephenteramine in prevention of hypotension during spinal anaesthesia.

AIMS AND OBJECTIVE

To study the efficacy of mephenteramine in prevention of hypotension during spinal anesthesia.

MATERIALS AND METHOD

The present study was conducted in department of anesthesiology at Swami Ramanand Teerth Rural Medical College, Ambajoigai. Eighty patients of either sex posted for routine operative procedure below the level of umbilicus were included. The patients with spinal deformity, local skin infection on back, cardiovascular diseases, Hypovolmia, hypertension, acute respiratory diseases and neurological diseases were excluded from study. Preanesthetic evaluation was done in the all the patients and informed consent was taken. Routine investigation such as Hb, urine, blood grouping and Rh typing were done. Special investigations were carried out whenever necessary. No premedication was administered in any patient. Prior to administration of anesthesia control reading of pulse rate, blood pressure recorded.

All the patients were divided in two group conation 40 patients each.

- **Group I:** mephenteramine group.
- **Group II:** control group.

In group I all the patients received injection mephenteramine 15mg intramuscularly 10 minute before giving spinal anaesthesia. Intravenous line was maintained for emergency drug administration. Pulse rate, blood pressure arrhythemias, headache, hypertension were noted (If hypotension develops was treated with injection mephenteramine 7.5mg intravenously repeated if necessary). In control group balanced electrolyte solution was effused intravenously in quantities and rate sufficient to maintain the blood pressure within 25% of pre-anesthesia reading. Pre-anesthetic pulse rate, blood pressure were noted. Spinal anesthesia was given in left lateral position on a horizontal table with spinal needle No. 21 G at L_3-L_4 interspace, beveled end directed towards caudally. The anesthetic agent in all cases was xylocain 5%, 2cc administered after Lumbar dural puncture. Following spinal anesthesia all patients were placed in supine position, level of analgesia was

determined by pin prick method. Arterial pulse, blood pressure was monitored and recorded immediately after spinal anesthesia and then every 5 minutes for first ½ hour. Total amount and rate of fluid administration and mephenteramine was noted. Patient's complaints and mendicants given were noted. Hypotension was defined as a fall systolic blood pressure of 25% from the pre-anesthesia level. Any patient who had hypotension was not satisfactorily treated by above mentioned methods in group I and II they were treated at discretion of anesthesiologist. Total amount of fluid to treat hypotension was noted. Bradycardia (less than 60/minute) was treated with injection atropine 0.5mg intravenously. All patients monitored intraoperatively for changes in pulse rate, blood pressure, nausea, vomiting etc. Postoperatively all patients were followed for any complications such as nausea, vomiting, headache, urinary retention and neurological complications. All the observations were statistically analyzed by using unpaired 't' test, for statistical significance.

Table 1: Demographic distribution of study patients

		Group I		Group II		P value
		No of patients	Percentage	No of patients	Percentage	
Age group	16-25	14	35.00%	7	17.50%	0.073
	26-30	9	22.50%	8	20.00%	
	36-45	8	20.00%	4	10.00%	
	46-55	5	12.50%	12	30.00%	
	>55	4	10.00%	9	22.50%	
Sex	Male	29	72.50%	25	62.50%	0.339
	Female	11	27.50%	15	37.50%	
Weight	35-45	8	20.00%	9	22.50%	0.959
	46-55	22	55.00%	21	52.50%	
	>55	10	25.00%	10	25.00%	
Level of analgia	T4-T5	3	7.50%	6	15.00%	0.318
	T6-T8	32	80.00%	32	80.00%	
	T9- T10	5	12.50%	2	5.00%	

It was observed that agewise, sexwise, weightwise and level of analgiawise difference in both the groups was not statistically significant and thus both the groups were comparable with each other.

Table 2: Distribution of patients according to Change in blood pressure and pulse rate

		Group I		Group II		P value
		No of patients	Percentage	No of patients	Percentage	
BP	No change	7	17.50%	2	5.00%	0.009*
	0-10	19	47.50%	9	22.50%	
	11-20	3	7.50%	8	20.00%	
	21-25	3	7.50%	2	5.00%	
	>25	8	20.00%	19	47.50%	
Pulse rate	Increased by 11-20	0	0.00%	0	0.00%	0.635
	Increased by 0-10	2	5.00%	5	12.50%	
	No change	25	62.50%	25	62.50%	
	Decreased by 0-10	10	25.00%	8	20.00%	
	Decreased by 11-20	3	7.50%	2	5.00%	

* Significant

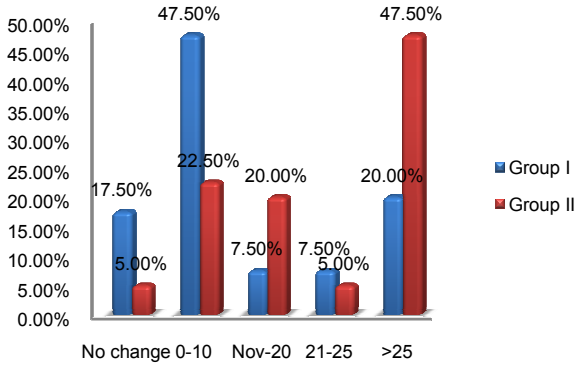

Figure 1: Distribution of patients according to Change in blood pressure

The incidence of hypotension was observed in group I (20%) was much less as compared to group II (47.5%) and the difference was also statically significant. No major change in pulse rate was observed in majority of the patients in both the groups there was.

Table 3: Intra operative and post operative complication

Complication		Group I		Group II	
		No of patients	Percentage	No of patients	Percentage
Intra operative	Nausea	4	10%	1	2.5%
	Vomiting	1	2.5%	1	2.5%
	Arrhythmia	0	0%	0	0%
	Tachyponea	0	0%	0	0%
	Dysponea	0	0%	0	0%
	Hypotension	8	20%	19	47.5%
Post operative	Nausea	0	0%	0	0%
	Vomiting	0	0%	0	0%
	Headache	2	5%	0	0%
	Retention of urine	0	0%	4	10%
	Neurological complication	0	0%	0	0%

Intraoperatively nausea was observed 10% patients of group I whereas only 2.5% patients of group II reported nausea. Post operatively headache was seen in 5% patients in group I and retention of urine was seen in 10 patients of group II.

DISCUSSION

The present study was conducted to study effect of intramuscular mephenteramine for prevention of hypotension during spinal anesthesia. For this purpose one group was given injection mephenteramine intramuscularly (group I) and effect was compared with the control group (group II). It was seen that majority of the patients in the group I and II were comapable with respect to age, sex, weight and level of analgia and the difference observed in the both the groups was statistically insignificant and thus both the groups were comparable. A. smessaert *et al*[4] had suggested that if mepheteramine sulfate is injected intramuscularly the side effect are minimal as compared to intravenous route. When mephenteramine was injected intravenously the side effect like ventricular arrhythemia overshoot of blood pressure and interference in the tissue perfusion due to extreme vaso-constriction has been recorded by S. Underwood *et al*.[7] Thus in the present study In group I, inj. Mepheteramine sulfate was injected intramuscularly in the dose of 15mg given 10 min before administration of spinal block. As Smessaert *et al*[4] have claimed that the onset of action after intramuscular injection of mephenteramine is between 5 and 8 minutes. Considering this and to obtain best results the drug was injected 10 minutes before the spinal block. Whenever there was hypotension, in spite of the above measures, it was treated by injecting incremental doses of injection mephenteramine 7.5 mg intravenously. The side effect due to pretreatment of mephenteramine such as ventricular arrhythmias, overshoot of blood pressure and signs of cerebral stimulation were not observed. Also there were no significant changes in blood pressure and pulse rate after giving pretreatment with vasopressors before administration of spinal anaesthesia. A. Smessaert *et al*[4], B. Chhabra *et al*[8] and V. Askrog *ET AL*[9] had also

found no change in blood pressure and pulse rate and no side effect prophylactic vasopressors therapy.

The incidence of hypotension in group I was 20% whereas in group II was 47.5%. The difference observed in fall in blood pressure in group I and II was statistically significant. Thus when patients were treated with vasopressors before giving spinal anesthesia had less percentage of fall in blood pressure than the patients who were not pretreated. Cucchiara *et al*[4] observed hypotension in 24% of their patients, who were pretreated with mephenteramine. Smessaert *et al*[4] in 1955 observed the incidence of 17% in patients who were pretreated with injection mephenteramine intramuscularly. In the present study the incidence of hypotension is found to be in 20% of patients who were pretreated with 15 mg injection mephenteramine intramuscularly. Thus the finding was comparable with the finding of these authors. There were no significant changes in pulse rate in any of the groups after giving anesthesia in the present study. Our results were comparable with B. Chhabra[8], A. Smessaert *et al*[4], S.M. Shinder[10] 1970 and C.L. Graves[11]. The incidence of intraoperative and postoperative complications was negligible. No patients had cardiac arrhythmias or overshoot of blood pressure in group I due to injection mephenteramine. Post- operatively the incidence of nausea and vomiting, retention of urine and neurological complications was not found. Only 2 patients (5%) from group II, had headache postoperatively which might be due to curtailing of fluids in this group. Our findings correlate with findings of A. Smessaert *et al*[4], B. Chhabra*et al*[8], S. Underwood*et al*[7], and C.L. Graves *et al*[11].

CONCLUSION

Thus from the above results and dissuasion we states that incidence of hypotension was reduced when prophylactic use of injection mephenteramine 15mg intramuscularly was. Therefore mephenteramine is an effective drug for prevention of hypotension during spinal anesthesia.

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