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Original Research Article.

To Compare the Incidence of Side Effects Like Giddiness, Nausea and Vomiting of Preloading Using Crystalloid or Colloid with Co-Loading Using Crystalloid or Colloid in Preventing Spinal Hypotension

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ABSTRACT

Background: Spinal anesthesia technique has dense sensory and motor blockade. The most common side effect after administration of spinal anesthesia is hypotension. The present study was conducted to compare the the incidence of side effects like giddiness, nausea and vomiting of preloading using crystalloid or colloid with co-loading using crystalloid or colloid in preventing spinal hypotension.

Materials and Methods: This prospective, comparative, randomized study was conducted in Department of Anaesthesia, B.K.L. Walawalkar Rural Medical College, Kasarwadi, Ratnagiri, Maharashtra, India. A total of 120 patients were enrolled into study. Patients were randomized into 4 groups i.e. Group A-preloading with ringer lactate, Group B -co-loading with ringer lactate, Group C-preloading with 6% hydroxyethyl starch, Group D-co-loading with 6% hydroxyethyl starch. Baseline arterial pressure, mean arterial pressure and heart rate were recorded. Spinal anesthesia was administered. After induction of spinal anesthesia HR, SBP, DBP, MAP was recorded every two mins till first ten minutes and every 5 min thereafter till 45 minutes from administration of spinal anesthesia. The number of clinically significant hypotension and bradycardia were recorded along with total dosage of ephedrine used over a period of 45 minutes to treat these episodes. After this incidence of side effects like giddiness, nausea and vomiting of preloading using crystalloid or colloid with co-loading using crystalloid or colloid in preventing spinal hypotension were compared.

Results: The results showed that Demographic variables like age, weight, sex, ASA status, duration of surgery were comparable in both the groups, Preoperative vital parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure were comparable in all 4 groups, Pre-operative medical history was comparable in all 4 groups, Maximum patients sensory level achieved was T6, comparable in all 4 groups, Maximum motor level achieved was bromage III, similar in all 4 groups, Fall in intraoperative heart rate was significant in all 4 groups, Maximum fall was noted in group B. Fall in blood pressure was comparable in all 4 groups. Incidence of hypotension noted in 79 patients, Maximum fall in blood pressure is noted in group B and minimum in group C, Fall in MAP was comparable in all 4 groups. Mean values are higher in group C as compared to other groups. Out of 120 patients, 40 patients required ephedrine. 2 patients in group A and B reported nausea. None of patients in group C and D reported nausea. Giddiness was not reported by any patient.

Conclusion: Our study concludes that fluid infusion is an effective method for treatment of spinal hypotension. Both colloid and crystalloid can be used for preventing spinal hypotension. None of the patients reported any allergic side effects of colloids. Hence, we conclude that preloading using 6% HES is an effective method for preventing spinal hypotension.

Keywords: Colloid, Crystalloid, Spinal Hypotension, Spial Anaesthesia.

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INTRODUCTION

Hypotension is the most common cardiovascular response with spinal anaesthesia leading to nausea, vomiting and dizziness in parturient.[1] Even with the use of various preventive measures, the incidence of hypotension following spinal anesthesia has been reported as 53%[2] to 80%.[3] Volume preloading with crystalloid solutions for the prevention of spinal-induced hypotension received rapid acceptance since it was first introduced by Griess et al. [4] As for colloids, the preload group had lower

incidence of hypotension than the coload group[5], but the administration of additional 0.5 L offered no added benefits.[6] The timing of crystalloid infusion is of great importance because it distributes rapidly into the extracellular space and the volume expanding effect is maximal at the early stage. Traditionally, preload of fluids is used to prevent hypotension in spinal anesthesia, but the efficacy has been questioned. Studies found that fluid co-load at the time of actual block during spinal anesthesia was more effective.[7,8] Short intravascular half-life of 15-20 min of crystalloids due to rapid redistribution into interstitial space may be the reason. Recently rapid fluid administration at the time of spinal block have been advocated because it expands intravascular volume at the time of maximum vasodilatation.[9,10] The present study was conducted to compare the incidence of side effects like giddiness, nausea and vomiting of preloading using crystalloid or colloid with co-loading using crystalloid or colloid in preventing spinal hypotension.

MATERIALS AND METHODS

This prospective, comparative, randomized study was conducted in Department of Anaesthesia, B.K.L. Walawalkar Rural Medical College, Kasarwadi, Ratnagiri, Maharashtra (India) after obtaining approval from institutional review board. A total of 120 patients were enrolled into our study after obtaining their written informed consent. Patients with ASA physical status 1 or 2, Age between 18-60yrs, Weight 50-90 kgs, Height >150cm, Lower abdominal, gynecological and orthopedic surgery were included in the study.

Patients with height less than 150 cm, ASA Grade 3&4, Contraindication to spinal like patient refusal, coagulation disorders, local infection and allergy to drugs used in the study., All patients were premedicated with tab. Ranitidine 150 mg at night & morning 8 am and Tab. Alprazolam 0.5 mg at night, Standard NPO guidelines were followed. In the operating room, standard monitoring including ECG, Pulse oximetry, and NIBP was instituted and intravenous access was secured with 18 G cannula were excluded from the study. Patients were randomized into 4 groups i.e. Group A -preloading with ringer lactate, Group B -co-loading with ringer lactate, Group C-preloading with 6% hydroxyethyl starch, Group D-co-loading with 6% hydroxyethyl starch. Baseline arterial pressure (by non-invasive arterial pressure monitor), mean arterial pressure and heart rate were recorded. Patients in preloading group (group A & C) were loaded with either ringer lactate or hydroxyethyl starch 6% at the rate of 15 ml/kg 20 minutes before procedure. Patients in co-loading group (group B & D) received ringer lactate or hydroxyethyl starch 6% at the rate of 15 ml/kg, initiated at the time of identification of cerebrospinal fluid. Intravenous administration set, pressurized to 250 mm Hg was used in all patients to administer the fluid at the maximum possible rate. Spinal anesthesia was administered under aseptic precautions after explaining the procedure to the patient. Patient in left lateral position, 2cc of local anaesthetic 2% lignocaine infiltrated in L3-L4 interspace. Spinal anesthesia was administered with 3- 3.5 cc of 0.5 % heavy bupivacaine as per procedure, using 25 G Quinkes needle. The local anesthetic was injected over 30 seconds. The level of spinal block was assessed by using a ether soaked cotton swab. After induction of spinal anesthesia HR, SBP, DBP, MAP was recorded every two mins till first ten minutes and every 5 min thereafter till 45 minutes from administration of spinal anesthesia. Spinal induced hypotension was defined as decrease in systolic arterial pressure > 30 % of baseline which was treated with bolus of 6 mg ephedrine repeated every five minutes as per requirement. Decrease in heart rate >20 % from baseline value was considered significant and was treated with 0.6 mg of IV atropine. The number of clinically significant hypotension and bradycardia were recorded along with total dosage of ephedrine used over a period of 45 minutes to treat these episodes. Observations were completed 45 minutes after administration of spinal anesthesia though patient management was continued thereafter as per requirement. After this incidence of side effects like giddiness, nausea and vomiting of preloading using crystalloid or colloid with co-loading using crystalloid or colloid in preventing spinal hypotension were compared. The data was statistically analyzed using software SPSS (Statistical Package for Social Sciences Software Version 15)

Table 1: Demographic data-I

GROUP		AGE	HEIGHT	WEIGHT
A	**Mean**	49.37	165.60	62.63
	Std. Deviation	9.908	7.582	8.079
B	**Mean**	46.30	163.50	64.43
	Std. Deviation	10.590	8.382	10.345
C	**Mean**	50.10	167.80	61.50
	Std. Deviation	11.318	8.899	8.764
D	**Mean**	49.57	164.30	70.43
	Std. Deviation	11.224	7.349	11.443
All	**Mean**	48.83	165.30	64.75
	Std. Deviation	10.742	8.140	10.226
F value		0.762	1.622	4.993
df		3	3	3
P value		**0.518**	**0.188**	**0.030**

Table 2: **Demographic Data-II**

Group		Female	Male	Total
A	**Number**	9	21	30
	Percentage	30.0	70.0	100.0
B	**Number**	8	22	30
	Percentage	26.7	73.3	100.0
C	**Number**	7	23	30
	Percentage	23.3	76.7	100.0
D	**Number**	9	21	30
	Percentage	30.0	70.0	100.0
ALL	**Number**	33	87	120
	Percentage	27.5	72.5	100.0

Chi square (X^2) value – 0.460; degree of freedom(df) – 3; 'P' value – 0.9

Table 3: Showing distribution of cases based on ASA status

Group		ASA STATUS		Total
		I	II	
A	**Number**	16	14	30
	Percentage	51.1	48.9	100.0
B	**Number**	15	15	30
	Percentage	50.0	50.0	100.0
C	**Number**	17	13	30
	Percentage	52.3	47.7	100.0
D	**Number**	15	15	30
	Percentage	50.0	50.0	100.0
ALL	**Number**	73	57	120
	Percentage	55.9	44.1	100.0

Chi square (X^2) value – 15.227; degree of freedom (df) – 3; 'P' value – 0.027

Table 4: Number of cases having nausea and vomiting

Group		Nausea and vomiting		Total
		Yes	No	
A	**Number**	2	28	30
	Percentage	6.7	93.3	100.0
B	**Number**	2	28	30
	Percentage	6.7	93.3	100.0
C	**Number**	0	30	30
	Percentage	0	100	100.0
D	**Number**	0	30	30
	Percentage	.0	100.0	100.0
ALL	**Number**	4	116	120
	Percentage	3.3	96.7	100.0

Fishers exact test value – 3.516; 'P' value – 0.329

RESULTS

One hundred and twenty patients were enrolled in the study. The demographic data with respect to age, weight and height is comparable in all four groups with a p value being statistically not significant.

Sex distribution is comparable in all 4 groups with p value being statistically not significant.

The ASA grading was also comparable between the four groups. Preoperative vital parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure were comparable in all 4 groups, Pre-operative medical history was comparable in all 4 groups, Maximum patients sensory level achieved was T6, comparable in all 4 groups, Maximum motor

level achieved was bromage III, similar in all 4 groups, Fall in intraoperative heart rate was significant in all 4 groups, Maximum fall was noted in group B, After 45 minutes, mean heart rates in groups A, B, C &D were 69.7, 69.4, 71.6 and 79.5 respectively, Fall in blood pressure was comparable in all 4 groups at 0,2,4,6,8,10,15,20,25,30,35,40,45 mins.

Incidence of hypotension noted in 79 patients, Maximum fall in blood pressure is noted in group B and minimum in group C, Intraoperative MAP-Fall in MAP was comparable in all 4 groups. Mean values at the end of 45 minutes are 84.3,89.8,91.9,90.5 in each group respectively, Mean values are higher in group C as compared to other groups, Out of 120 patients, 40 patients required ephedrine.

2 patients in group A and B reported nausea. None of patients in group C and D reported nausea. Giddiness was not reported by any patient.

DISCUSSION

The most common side effect after administration of spinal anesthesia is hypotension. Therefore, the present study aims to determine the most effective intravenous fluid and timing of fluid infusion to prevent post spinal hypotension.

The ASA grading was also comparable between the four groups. Preoperative vital parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure were comparable in all 4 groups, Pre-operative medical history was comparable in all 4 groups, Maximum patients sensory level achieved was T6, comparable in all 4 groups, Maximum motor level achieved was bromage III, similar in all 4 groups, Fall in intraoperative heart rate was significant in all 4 groups, Maximum fall was noted in group B, After 45 minutes, mean heart rates in groups A, B, C & D were 69.7, 69.4, 71.6 and 79.5 respectively, Fall in blood pressure was comparable in all 4 groups at 0, 2, 4, 6, 8, 10, 15, 20, 25, 30, 35, 40, 45 mins. Incidence of hypotension noted in 79 patients, Maximum fall in blood pressure is noted in group B and minimum in group C, Intraoperative MAP-Fall in MAP was comparable in all 4 groups. Mean values at the end of 45 minutes are 84.3, 89.8, 91.9, 90.5 in each group respectively, Mean values are higher in group C as compared to other groups, Out of 120 patients, 40 patients required ephedrine.

We used ephedrine 6 mg boluses IV to counteract sudden hypotension. Number of patients with ephedrine doses were comparable in all 4 groups. Number of patients who received ephedrine are as follows- A-10 (33.3%), B-14 (46.7%), C-6 (20.0%), D-10 (33.3%). Mean ephedrine dosage (mg) used in groups A, B, C and D were 10.2mg, 11mg, 10 mg, 10.2mg respectively.

Results showed that maximum amount of ephedrine was used in group B and minimum in groups C.

Preloading using 6% HES in group C minimised use of ephedrine. While in group B, co-loading with RL caused maximum use of ephedrine as seen by downward trends in blood pressure seen in RL group.

Hence judicious use of ephedrine and preloading with colloid can be considered in preventing hypotension.

Another study was done by Huang et al.[11] They studied Gelatine combined with ephedrine for spinal anesthesia in prevention of hypotension. They recommended that rapid intravenous infusion of Succinylated Gelatin combined with ephedrine can effectively prevent the hypotension induced by caesarean section. In our study also, we noted effective prevention of hypotension in 6% HES preloading group combined with ephedrine.

In our study 2 patients in group A and 2 patients in group B reported nausea. Giddiness was not reported by any patient. Occurrence of nausea in these patients was due to steep fall in blood pressure. Nausea was not reported by patients in group C and D due to better hemodynamic stability.

A constant observation during earlier similar studies is that the incidence of nausea and vomiting during spinal anesthesia was in close association with hypotension.[12,13]

The findings of Baustita Mojica et al[14], they compared three group, one which received preloading at a dose of 20 ml/kg and second received co-loading with same volume and third group received 1-2 ml/kg of fluid and they termed this group as placebo, but we did not include a placebo group for ethical reason. They also noted cardiovascular side effects. They defined these effects as development of nausea, vomiting and fainting. They found that frequency of hypotension was more in preloading group as compared to placebo, but this difference was not significant. It was similar in co-loading and placebo group. They found co-loading better when they took cardiovascular side effects in consideration.

Jacob JJ et al[15] who compared preloading with 15 ml/kg of ringer lactate and co-loading with same volume and found incidence of hypotension 60% in preloading group and 46% in co-loading group, which was statistically insignificant (p=0.1607). Incidence of nausea was higher in preload group which was statistically significant (p=0.0473). Incidence of vomiting was also higher in preload group (p=0.0455).

CONCLUSION

Our study concludes that fluid infusion is an effective method for treatment of spinal hypotension. Both colloid and crystalloid can be used for preventing spinal hypotension. None of the patients reported any allergic side effects of colloids. Hence, we conclude that preloading using 6% HES is an effective method for preventing spinal hypotension.

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