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Research Article

A Comparative Study on Therapeutic modalities in the Management of Spinal Anesthesia-Induced Hypotension in Parturient in Cesarean Delivery

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ABSRACT:

Objective: was to compare the two therapeutic modalities, fluid preloading and ephedrine, in the management of spinal anesthesia-induced hypotension in patients undergoing elective cesarean delivery.

Methodology: Following ethical approval from Mayo hospital ethical committee and informed consent from patients study was started in Department of Anaesthesia. Duration of study was one year from November 2016 to October 2017. A total of 90 patients were enrolled through non probability consecutive sampling and randomly divided into two equal groups 45 patients in each. Group F for fluid preload patients and group E for ephedrine receiving patients. Required data was collected on preformed performa. Data information was entered in SPSS version 24 and analyzed for variables. Continuous variables were presented as mean and SD and categorical data was presented as numbers and percentages (%). Independent t-test was applied to see significance of results. P value equal or less than 0.05 was considered as significance.

Results: Overall, 90 women were included in this study. The study consisted of two equal groups, 50% in each, i.e. F group and E group respectively. Mean trend of systolic blood pressure was shown in table 2. Higher means were observed in E group than in F group. The difference was statistically significant with regards to groups ($P < 0.05$). The mean trend of heart rate was shown in table 3. Higher means heart rates were observed in the E group as compare to the F group. The differences were statistically significant with regards to groups ($P < 0.05$).

Conclusion: Results of our study revealed that use of ephedrine is superior to that of fluid preloading in managing hypotension after spinal anesthesia in cesarean section deliveries.

Keywords: spinal anesthesia, cesarean section, fluid preloading, ephedrine, hypotension.

INTRODUCTION

Cesarean section delivery usually performed under spinal anesthesia because it is more rapid in Onset, less risk of local anesthetic toxicity, achievement of dense neuraxial block and minimum transformation of drug to fetus[1,2]. With all these benefits a major side effect of this technique is hypotension. Incidence rate of hypotension after spinal anesthesia vary from 70 to 80%.Some techniques were adopted in different times to overcome this event[3]; fluids administration of colloids and crystalloids through intravenous route, prophylactic use of ephedrine after fluid administration, position tilt towards left laterally, wraping of legs and expose areas of

patients and close monitoring of blood pressure[4,5]. Among these all techniques no one can be labeled as 100% perfect. Intra vascular volume depletion exaggeratesthe spinal induced hypotension through blocking sympathetic tone[6]. In early days of medical profession preloading with intravenous fluids after spinal anesthesia was recommended for prevention of hypotension. Along with hypotension, nausea vomiting during cesarean section surgery is also major complications of spinal anesthesia[7,8]. Mechanism of vomiting after spinal is well defined ascerebralhypo perfusion and brainstem ischemia stimulates the center of nausea and vomiting[9,10]. In this study we compared use of 5 mg ephedrine over 15 ml/kg normal saline with only normal saline as fluid therapy to overcome spinal induced hypotension which is an enigma for anesthesiologists before cesarean section surgeries.

METHODOLOGY:

Following ethical approval from Mayo hospital ethical committee and informed consent from patients study was started in Department of Anaesthesia. Duration of study was one year from November 2016 to October 2017. A total of 90 patients were enrolled through non probability consecutive sampling and randomly divided into two equal groups 45 patients in each. Group F for fluid preload patients and group E for ephedrine receiving patients. Ninety patients of ASA status I, II, age limit 18 to 40 years and who were selected for c-section under spinal anesthesia were enrolled in the study. Non probability consecutive sampling technique was used. Patients with history of cardiac disease, renal disease, hepatic disease, use of antihypertensive and allergy to any drug used in procedure were excluded from the study. Two large bore cannulas of 18-g were inserted on limbs in preparation room, and patients was putted on close monitoring of ECG, blood pressure (noninvasive), heart rate and saturation. Premedication was not given. Enrolled patients were divided into two groups by using computer automated random number generator. Each group contains 45 patients. First group was preloaded with ringer lactate (15ml/kg) before fifteen minutes of procedure and this group was labeled as “F” group. Second group was given 5 mg ephedrine as prophylactic after one or two minutes and repeated every minute 1 mg of ephedrine till fifteen minutes and group labeled as “E”. Patients were lifted left laterally.

Spinal anesthesia was given bupivacaine 0.5%, 2 ml in sitting position. Fentanyl 25 µg was given with spinal anesthesia. Patients were tilted left lateral and monitored for sensory and motor block and conscious level. Blood pressure and heart rate was monitored and recorded one minute after spinal anesthesia and after every three minutes for 30 minutes and later on every five minutes. Any incidence of hypotension (20% decrease in blood pressure from baseline) which were treated with 5 mg ephedrine were recorded. Incidence of vomiting and nausea was treated with Metaclopramide 10 mg iv. Patients in both groups were given 10 IU of oxytocin in Ringer lactate 500 ml. close monitoring for all study related variables was done and recorded on predesigned performa.Data information was entered in SPSS version 24 and analyzed for possible variables. Continuous variables were presented as mean and SD and categorical data was presented as numbers and percentages (%). Independent t-test was applied to see significance of results. P value equal or less than 0.05 was considered as significance.

RESULTS:

Overall, 90 women were included in this study. The study consisted of two equal groups, 50% in each, i.e. F group and E group respectively. The mean age, BMI, height and parity of F group was 25.37±2.80 years, 31±2.41 kg/m^2, 159.93±3.40 cm and 2±1.15 respectively. While, the mean age, BMI, height and parity of E group was 24.02±3.45 years, 32.71±2.59 kg/m^2, 160.73±3.66 cm and 2.17±1.17 respectively. Nausea & vomiting noted in 22.2% (n=10) and 11.1% (n=5) patients for F and E group respectively. While, hypertension noted in 48.9% (n=22) and 35.6% (n=16) patients for F and E group respectively. The differences between the two groups were statistically insignificant with regards to demographic data.

(Table. 1).Mean trend of systolic blood pressure was shown in table 2. Higher means were observed in E group than in F group. The difference was statistically significant with regards to groups ($P < 0.05$). The mean trend of heart rate was shown in table 3. Higher means heart rates were observed in the E group as compare to the F group. The differences were statistically significant with regards to groups ($P < 0.05$).

Table. 1 Demographic characteristics in the study groups

Characteristics	F Group (n=45)	E Group (n=45)	Test of Sig.
Age (years)	25.37±2.80	24.02±3.45	t=0.25, p=0.801
BMI (kg/m^2)	31±2.41	32.71±2.59	t=0.71, p=0.479
Height	159.93±3.40	160.73±3.66	t=0.84, p=0.402
Parity	2±1.15	2.17±1.17	t=-0.726,p=0.469
Nausea & vomiting	22.2% (n=10)	11.1% (n=5)	χ^2 =2.00,p=0.157
Hypotension	48.9% (n=22)	35.6% (n=16)	χ^2 =1.64,p=0.200

Body mass index; P<0.05 is considered as significant

Table. 2 Mean trend of systolic blood pressure of both groups

Time	F Group (n=45)	E Group (n=45)	Test of Sig.
Baseline	124.45±2.31	119.24±2.56	t=10.14, p=0.000
1 minute	115.21±1.23	101.85±3.25	t=25.79, p=0.000
4 minutes	101.15±1.54	110.29±4.10	t=-12.71, p=0.000
7 minutes	110.12±2.85	112.28±4.6	t=-3.53, p=0.001
10 minutes	115.23±4.23	118.24±2.38	t=-3.12, p=0.000
13 minutes	108.47±3.21	113.45±6.32	t=-6.2, p=0.000
16 minutes	111.25±1.21	112.54±2.45	t=-1.83, p=0.071
19 minutes	113.58±4.65	116.54±2.87	t=-5.50, p=0.000
22 minutes	114.89±4.87	118.12±5.65	t=-7.33,p=0.000
25 minutes	115.87±2.58	119.85±2.54	t=-7.20,p=0.000
28 minutes	116.45±2.87	120.54±2.89	t=-6.61,p=0.000
31 minutes	117.12.2.41	121.56±4.58	t=-5.29,p=0.000
36 minutes	115.45±4.52	122.56±5.20	t=-5.40,p=0.000
41 minutes	114.25±6.50	123.54±2.51	t=-11.73,p=0.000
46 minutes	116.21±3.58	123.61±3.68	t=-8.89,p=0.000
51 minutes	117.46.2.21	122.84±3.65	t=-9.18,p=0.000
56 minutes	118.24±3.24	123.45±2.20	t=-9.02,p=0.000
61 minutes	118.85±2.98	124.12±3.20	t=-9.97,p=0.000
90 minutes	119.24±4.50	124.56±2.18	t=-6.10,p=0.000

P<0.05 is considered as significant

Table. 3 Mean trend of Heart rate in both groups

Time	F Group (n=45)	E Group (n=45)	Test of Sig.
Baseline	91.23±5.41	90.24±2.20	t=-4.1, p=0.000
1 minute	92.45±2.56	94.20±2.36	t=-10.11, p=0.000
4 minutes	90.32±2.45	93.12±2.58	t=-5.55, p=0.000
7 minutes	91.28±2.52	92.11±3.21	t=-28.63, p=0.000
10 minutes	90.10±3.51	94.28±3.55	t=-2.56, p=0.013
13 minutes	89.21±3.12	95.18±4.25	t=3.54,p=0.000
16 minutes	89.01±2.10	96.47±3.20	t=4.21,p=0.000
19 minutes	88.12±3.21	95.14±3.22	t=5.58,p=0.000
22 minutes	88.11±5.12	94.19±1.26	t=6.47,p=0.000
25 minutes	87.89±2.14	95.16±4.20	t=2.89,p=0.000
28 minutes	86.85±2.87	98.29±2.30	t=7.15,p=0.000
31 minutes	85.48±5.49	98.89±3.33	t=4.18,p=0.000
36 minutes	82.12±2.47	93.15±3.97	t=4.24,p=0.000
41 minutes	81.27±2.13	96.84±1.22	t=4.87,p=0.000
46 minutes	80.15±1.42	96.45±2.54	t=2.47,p=0.000
51 minutes	79.17±2.11	93.15±3.20	t=7.58,p=0.000
56 minutes	78.21±2.33	90.84±3.01	t=5.46,p=0.000
61 minutes	77.11±3.24	91.20±3.25	t=8.25,p=0.000
90 minutes	75.22±3.28	92.16±4.20	t=4.29,p=0.000

P<0.05 is considered as significant

DISCUSSION:

In literature and clinical trials it was reported that spinal anesthesia is safe and effective as compared to general anesthesia especially for cesarean section deliveries. Mortality rate of general anesthesia is higher as compared to regional blocks[11]. Spinal anesthesia also has some complications such as hypotension which may cause some serious complications for fetus and mother. To overcome this event preloading with intravenous fluid is common technique. Use of low dose ephedrine is also a usefull technique in this aspect.

Gunusen et al [12]conducted a study test hypothesis that ephedrine with preloading fluid is more effective as compared to fluid preloading during c-section deliveries to overcome hypotension and reported that ephedrine use is a safe and useful method to control hypotension like complications. In our study we also found a significant decrease in incidence of hypotension in group of ephedrine use. Our study is comparable with our results.A study was conducted by Rout et al[13] on intramuscular ephedrine to control hypotension. Limitations of intramuscular use of ephedrine are its absorption capability and duration of peak flow which is unknown. It was observed that some cases go into hypertension specifically those cases in which attempt of spinal anesthesia are not successful. Findings of this study are also comparable with ours. From many years intravenous infusion or boluses were in use to control spinal induced hypotension and considered as gold standard treatment. Ephedrine has transient effect on arterial pressure which lasts in 10-15 minutes time period from its onset[14]. Another study was conducted by Bhoviet al[15] to compare the ephedrine and fluid therapy to control

hypotension in cesarean section deliveries under spinal block. He conducted this study on 100 patients of age 18-40 years and observed that incidence of hypotension in fluid group is 60% and in ephedrine group it was 12%. Results of his revealed that ephedrine is safe and more effective as compared to fluid treatment method.Another study was conucted by Thiangthamet al[16] on this topic. He conducted this study 96 patients and administered 18 mg intravenous ephedrine with normal saline in one group and 103 ml normal saline in control group. He observed hypotension in 93.8% of contro group and 85.4% in case group but this difference was not significant statistically may be due to smaller doses of ephedrine. This study is comparable with our study.

In a study conducted by Atef K. et al[17] it was reported that ephedrine is a superior drug as compared to fluid therapy for the treatment of spnal induced hypotension during surgery of cesarean section. He concluded similar finding as in our study. A local study also available in favor of our study, this study was conducted by SajidM et al[18] in 2013 and reported that use of prophylactic ephedrine is superior to crystalloid therapy of intravenous fluids to control spinal induced hypotension.

In another study conducted by Salama AK[19] et al on this topic and concluded that use of ephedrine is more effective that fluid therapy in patients of cesarean section deliveries for the treatment of hypotension after spinal anesthesia. This study also strengthens our study exactly and be a reference for our significant results.

CONCLUSION:

Results of our study revealed that use of ephedrine is superior to that of fluid preloading in maintaining hypotension after spinal anesthesia in cesarean section deliveries.

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