

EFFICACY OF PHENYLEPHRINE OVER EPHEDRINE IN CONTROLLING FALL OF BLOOD PRESSURE: A CROSS SECTIONAL STUDY IN PATIENTS UNDERGOING LOWER SEGMENT CAESAREAN SECTION

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Abstract

Background: most of the lower segment caesarean sections are done under spinal anesthesia and in more that 80% of the cases, maternal fall in blood pressure can be observed intraoperatively. Throughout history many vasopressor drugs have been evaluated for the treatment. Aim: our research was conducted to compare the effect of phenylephrine with ephedrine given for the prophylaxis of prevention of intraoperative fall in blood pressure in females who are undergoing LSCS. Materials and Methods: a total of 100 cases were considered for our study and were randomly distributed in two groups. Group A cases were administered Phenylephrine while ephedrine was given to group B cases just after spinal anesthesia. Results: most of our study subjects were in the age group of 21-25 years who were in the range of 51-55 kgs. Spinal anesthesia was given by using bupivacaine & block level was checked at 2 & 5 mins. Phenylephrine was found to be superior in control of fall in blood pressure as more than 90% of the cases were brought back to their preoperative levels in less than 4 mins after spinal anesthesia. Whereas in group B, ephedrine took much more time of around 10 mins for control of BP. Conclusion: with proper monitoring of heart rate, phenylephrine is superior to ephedrine in controlling the fall in blood pressure.

Keywords: Ephedrine, Phenylephrine, Hypotension, Bradycardia.

Introduction

Caesarean section is very commonly performed procedure in a tertiary care setup and the type of anesthesia required for it depends on many of the factors. Some of them are like its indication, urgency & desire of the patient. Each anesthetic technique has its own advantages & disadvantages^{1,2}. But regional or local spinal technique is getting more emphasis as it causes minimal biochemical changes & most important is that its onset is rapid. This is very important in cases undergoing cesarean section as there is very little chance of maternal toxicity & very less chance of placental transfer. It is a well known fact that in more than 80% of cases undergoing lower segment cesarean section, there is fall in blood pressure. If this maternal hypotension is sustained for longer duration then it may result in fetal acidemia^{3,4}. To prevent such thing many measures are undertaken like use of vasopressors. There is a long list of vasopressors but our study will concentrate on the effects of phenylephrine and ephedrine⁵.

Aims & objectives:

To compare the efficacy of Phenylephrine over ephedrine in controlling fall of blood pressure in patients undergoing lower segment caesarean section.

Materials and Methods

After taking approval from institutional ethics committee and taking written informed consent, we have selected 100 patients randomly who are undergoing elective caesarean section. Females who were suffering from eclampsia, anemia, coagulopathies etc were excluded from our study. They were randomly divided into two groups:

Group A: Phenylephrine 100 µg/min in infusion

Group B: Ephedrine 1 mg/min in infusion

Procedure: Lumber puncture was done in left lateral position under full aseptic precaution at L3, L4 interspace. Once free flow of cerebrospinal fluid is obtained 2ml (10mg) of 0.5% bupivacaine is administered. Soon after the spinal was given and patient made supine, the drip of phenylephrine 100ug/minute in group A and ephedrine 1mg/minute in group B in intravenous was started. Vitals were monitored. Statistical analysis: Data obtained were tabulated and analyzed using Statistical Package for Social Science (SPSS) software.

Results

The group were demographically and haemodynamically similar in all aspects. Maximum cases were in the age group of 21-25 years & were in between the 51-55 kgs.

Table 1: Mean \pm SD value of systolic & diastolic BP and pulse rate in group A and group B

Time after drug given (min)	Group A			Group B		
	Systolic BP	Diastolic BP	Pulse rate	Systolic BP	Diastolic BP	Pulse rate
0	120 \pm 8.17	80.02 \pm 7.18	92 \pm 13	116.7 \pm 8.17	78.56 \pm 7.32	83 \pm 8.4
2	116 \pm 7.145	77.66 \pm 10.13	91 \pm 28	114 \pm 11.62	76.32 \pm 8.14	85 \pm 9.6
4	104.1 \pm 18.58	70.14 \pm 9.04	93.06 \pm 14	103.8 \pm 14.34	71.64 \pm 6.32	89 \pm 11.3
6	107.8 \pm 15.76	72.12 \pm 6.03	87 \pm 14	104.3 \pm 14.12	73.65 \pm 6.76	93 \pm 13
8	116.32 \pm 16.13	76.06 \pm 9.62	84.6 \pm 13.3	107.54 \pm 10.28	72.34 \pm 6.98	97 \pm 9.28
10	118.34 \pm 17.03	75.12 \pm 12	80.28 \pm 11.37	110.54 \pm 9.18	73.24 \pm 6.86	96.08 \pm 6.54
15	119.72 \pm 13.15	76.64 \pm 10.12	77.12 \pm 12.03	112.14 \pm 9.30	73.6 \pm 5.98	73.72 \pm 6.36
20	124.6 \pm 10.14	81.52 \pm 12.42	71.6 \pm 14	116.12 \pm 12.32	74.34 \pm 7.65	98.2 \pm 5.68
25	126.24 \pm 11.26	86.12 \pm 8.4	68.26 \pm 11.09	115.68 \pm 10.35	75.6 \pm 9.28	99.6 \pm 9.6
30	129 \pm 10.04	86.46 \pm 8.09	69 \pm 10.48	115.34 \pm 9.76	76.34 \pm 9.22	96.44 \pm 12
40	128 \pm 8.46	86.4 \pm 8.19	74 \pm 6.42	117.56 \pm 8.86	79.4 \pm 7.34	94.2 \pm 20.12

It is evident from our study that, when phenylephrine infusion was given, there was rapid onset of action of analgesia as compared to ephedrine. So in group A when infusion of phenylephrine was given at 100mcg/min, the blood pressure was maintained after 2-4 mins at the same level as it was before surgical intervention. In more than 90% of the cases, systolic (at 120 mmHg) & diastolic were both maintained. There was no initial fall in the diastolic pressure. In more than 85% of the cases, heart rate was stable throughout. In group B cases, ephedrine was given at 1 mg/min just after spinal anesthesia, where we noticed initial fall in the BP but it was got stabilized after 8-10 mins. In around 80% of the cases, systolic BP was brought back to preoperative level. There no abrupt deviation in diastolic pressure. Now when we compared heart rate, it remained a little bit on higher side.

Discussion

When we analyze in detail the post anesthetic complications in mothers after cesarean section we find that low blood pressure in mothers is a very frequently encountered complication. Hence early & effective treatment is of prime importance to control the resulting risks to the both mother & her child^{5,6}. Our study clearly suggests that both phenylephrine & ephedrine are extremely effective in controlling the postoperative hypotension in mothers. But when we compare both these agents, we come to conclusion that, phenylephrine is more effective than ephedrine for early control of hypotension which is approximately 4 mins earlier. When systolic BP fall is more than 20% from the baseline value⁷. Sahu et al⁶ did the similar study in the past and it is in agreement with our study. They concluded that the peak effect of phenylephrine is within one minute. Similarly Kansal et al⁷ conducted the study with 4 infusions in different dosage regimens & reported that both mephentermine & ephedrine are effective & equally safe for the management of maternal hypotension. Also in our study we found out that cases in phenylephrine group responded well to atropine therapy. Cooper et al⁸ compared four infusions of phenylephrine, ephedrine 3mg/ml and combination of

phenylephrine + ephedrine during spinal anesthesia for elective caesarean section and demonstrated that pulse was phenomenally lower in the phenylephrine group. Phenylephrine is a selective α 1 agonist activates β receptors only at a much higher dose. Hence, it can restore arterial pressure without causing tachycardia which is associated with the action on the β receptors. Ephedrine stimulate both α and β receptors and cause cardiac stimulation with little change in peripheral resistance^{9,10}.

Conclusion

In group A where Phenylephrine 100 mcg/min infusion was found to be better in preventing and controlling the hypotension, as >90% of cases the fall of blood pressure was prevented and it was brought back to normal at preoperative levels within 2-4minutes. In group B where ephedrine 1mg/min infusion, it took 8-10 minutes for the control of blood pressure clearly indicating that phenylephrine has faster onset of action and better control. Further phenylephrine because of lack of action on beta receptors it has been observed that in few cases bradycardia was observed where we used atropine. Bradycardia was not a significant finding in ephedrine group. Because of these findings we conclude that prophylactic phenylephrine infusion is preferable over ephedrine for control of fall in blood pressure with meticulous monitoring of heart rate.

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