Study of Dosage of Prophylactic Intravenous Ephedrine for Spinal-Induced Hypotension During Caesarean Section in Andhra Pradesh Population: Retrospective Study

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Abstract

Background: Spinal anaesthesia is widely used for caesarean surgery because it provides a fast and profound sensory and motor block, on the other hand Hypotension is very common complication of spinal anaesthesia. Hence Ephedrine infusion has to be used to control hypotension.

Method: Out of 60 (sixty), 30 were administrated with ephedrine 30 controlled group was administrated same quantity of normal saline during spinal anaesthesias. Hemodynamic and neonatal outcomes were noted and compared.

Results: In comparison of systolic BP time interval between both group at 1, 3, 4, 5 had significant values ($p<0.001$). Moreover rescue Ephedrine dosage in group-A 3.02 (± 0.2), 4.05 (± 0.3) t test 15.6 and $p<0.001$ (p value was highly significant) but agar score at different interval and umbilical cord blood PH remained the same value.

Conclusion: The present has proved that, IV infusion Ephedrine after spinal was more effective than crystalloid preloading in prevention of hypotension in parturient undergoing caesarean section with causing hemodynamic complications.

Keywords: Caesarean section, Ephedrine, hypotension, spinal anaesthesia, apgar score

Introduction

Anaesthesia of caesarean delivery should take in consideration safety of the mother and foetus Regional anaesthesia used for 95% of planned caesarean deliveries globally(1). Spinal anaesthesia has many advantages as it provides fast, profound sensory and motor block and adequate muscle relaxation(2), better air way control with obstruction or aspiration of gastric contents. Post-operative vein thrombosis and pulmonary emboli are less common following spinal anaesthesia due to earlier ambulation and discharge.

However spinal anaesthesia has its complications. The most common complications of spinal anaesthesia is hypotension(3), which can cause significant morbidity and mortality as it may cause serious complication for the mother as nausea, vomiting un-consciousness and pulmonary aspiration and for the baby as hypoxia acidosis and

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neurological injuries[4]. Hypotension occurs due to the sympathetic nervous system blockade leading to decreased vascular resistance and peripheral pooling of blood which reduces cardiac output[5].

Different technique have been tried to reduce hypotension incidence and severity. This includes the routine use of lateral decubitous position, infusion of up to 2 litres of fluids for intra vascular volume expansion, which may reduce the risk of hypotension but does not eliminate and use of vasopressors such as ephedrine which may be effective alternative for hypotension prevention. Ephedrine is a sympathomimetic agent, non-catecholamine mediated which directly stimulates alpha and Beta adrenergic receptors and predominantly indirectly produces its effects through releasing nor-epinephrine from nerve endings in the autonomous nervous system. Hence intravenous Ephedrine was used in spinal anaesthesia to control hypotension and evaluated the outcomes in both mother and foetus.

Material and Methods

60 (sixty) female patients admitted at obstetrics and gynaecology department of GSL medical college hospital rajahmundry-533296 Andhra Pradesh were studied.

Inclusive Criteria: The age between 20-48 years old, with Body Mass Index (BMI) between 25 to 45 years. As A grade-I and II were selected for caesarean study.

Exclusion Criteria: Patients refused spinal anaesthesia patients having allergic reaction to local anaesthetics and opoids patients with coagulopathy (due to blood disease liver diseases or on anticoagulants) patients with severe cardiac respiratory hepatic or renal disease and patients with pre-eclampsia and eclampsia were excluded from the study.

Method: Out of sixty (60) patients Group-I was received 1 ml of 5mg injection Ephedrine intravenously. Group-II (controlled group) received on equal volume of normal saline intravenously immediately after the sub-arachnoids block with 10 mg of 0.5 % injection Bupivacaine.

A through pre-anaesthetic evaluation was done a day before the scheduled operation to all patients and tablet PPI (Ranitidine 150 Mg) orally was advised let night before surgery.

On the day of operation injection Metaclopromide 10 mg and injection Ranitidine 50 mg was given intravenously, 20 minutes before the induction of spinal anaesthesia.

Upon arrival of the patients at the operation theatre, baseline parameters were recorded with the help of multichannel cardiac monitor pre loading was done with injection ringer lactate solution 15 mg / Kg body weight about 15 Minutes before the intended time of intrathecal drug administration.

Under strict asceptic and antiseptic precautions, lumbar puncture was performed at L3-L4 inter vertebral space using midline approach with a 25 gauge quinke spinal needle in the lateral decubitus position and 10 mg of 0.5% injection bupicaine was administrated intrathecally. Immediately, either 1ml of 5mg injection Ephedrine or an equal volume of normal saline was given intravenously on the parturient according to the computer generated randomization method.

The hemodynamic parameters such as heart rate systolic BP, percentage saturation of oxygen (SPO^2) and electogram were recorded at 1 minute interval till delivery of the baby and thereafter 5 min. intervals until. The end of surgery I.V fluid was administrated in the form of Ringer lactate at the rate of 10 mg / kg body weight per hour. A decrease in systolic BP of more than 20% from baseline was considered as "hypotension" and treated with rapid infusion of ringer lactate and 5 mg intravenous Ephedrine and heart rate < 60 beats per minute or bradycardia was also treated with intravenous 0-6mg Atropine sulphate. Apgar scores of babies were recorded at 1 and 5 minutes.

Duration of study was August-2013 to Novembe-2016

Statistical analysis: Various parameters e.g. demographic hemodynamic, agar score in both groups were compared with z test and noted. The statistical analysis was carried out in SPSS software.

Observation and Results

Table-1: Age groups (in years)

- 26.10 (± 3.33) in group-A, 25.8 (± 2.80) in group-B, t test was 0.35 and p value was insignificant (p>0.72)
- Height (cm) – 158.2 (± 3.30) group-A, 158.5 (± 4.30) in group-B, t test level was 0.36 and p value was insignificant (p>0.71)
- Weight (Kg) – 62.03 (± 6.80) group-A, 64.50 (± 6.80) in group-B, t test level was 1.5 and p value was significant

Table-2: Comparison of systolic Blood pressure at different interval at 1, 2, 3, 4, 6, 10, 15, 20, 25, 30, 35, 40, 45 in both groups and p values was insignificant

Table-3: Comparison of hemodynamic profile and clinical manifestation

- Hypertension – 18 (60 %) group-A, 22 (73.3%) in group-B
- Rescue Ephidrine in – 18 (60 %) group-A, 22 (73.3%) in group-B
- Rescue Ephidrine dosage – 3.02 (± 0.2) group-A, 4.05 (± 0.3) in group-B, t test level 15.6 and p value was highly significant (p<0.001)
- Average time for delivery – 4.90 (± 0.6) group-A, 4.87 (± 0.7) in group-B, t test level was 0.17 and p value was insignificant (p>0.85)

Table-4: Comparison of Neonatal outcome

- Agar score 1 minutes – 8.95 (± 0.95) group-A, 8.86 (± 0.31) in group-B, t test level was 1.35 and p value was insignificant (p>0.18)
- Agar score 5 minutes – 9.94 (± 0.81) group-A, 9.84 (± 0.31) in group-B, t test level was 1.52 and p value was insignificant (p>0.13)
- Umbilical cord PH – 7.32 (± 0.03) group-A, 7.31 (± 0.02) in group-B, t test level was 1.51 and p value was insignificant (p>0.93).

Table 1: Comparison of demographic variables parameters both group

Sl. No	Parameters	Group-A Study group (30)	Group-B Controlled (30)	t test	p value
1	Age (years)	26.10 (± 3.33)	25.82 (± 2.80)	0.35	p>0.72
2	Height (cm)	158.22 (± 3.30)	158.58 (± 4.30)	0.36	p>0.71
3	Weight (kg)	62.03 (± 5.19)	64.50 (± 6.80)	1.5	p>0.12

Table 2: Comparison of systolic Blood pressure in both groups

Time Interval	Group-A(30)	Group-B(30)	t test	p value
0	123(± 5.98)	121.22(± 4.30)	1.48	p>0.14
1	120.79(± 15.60)	100.03(± 22.30)	2.97	P<0.005
2	119.15(± 16.2)	88.79(± 13.60)	7.86	P<0.001
3	119.26(± 10.80)	87.3(± 8.89)	12.5	P<0.001
4	118.30(± 5.50)	114.40(± 7.30)	2.33	P<0.002
5	112.40(± 7.40)	114.22(± 7.81)	0.92	p>0.35
6	114.80(± 5.10)	115.10(± 7.30)	0.18	p>0.85
10	110.40(± 6.02)	109.42(± 3.70)	0.76	p>0.77
15	112.10(± 6.72)	108.78(± 3.30)	2.42	P<0.02
20	111.08(± 5.40)	109.40(± 3.90)	1.38	P>0.91
25	110.02(± 5.11)	110.38(± 5.30)	0.26	p>0.78
30	11.10(± 6.12)	110.18(± 3.09)	0.16	p>0.87
35	110.38(± 6.12)	110.36(± 3.19)	0.016	p>0.98
40	111.18(± 6.79)	111.25(± 3.90)	0.056	p>0.95
45	113.18(± 8.00)	111.42(± 3.66)	1.09	p>0.27

Table 3: Comparison of Hemodynamic data and clinical manifestations

Parameter	Group-A (30)	Group-B (30)	t test	p value
Hypotension	17 (60%)	22 (73.3%)	--	-
Reactive Hypertension	--	--	--	--
Rescue Ephedrine	18 (60%)	22 (73.3%)	--	--
Rescue Ephedrine dose (mg)	3.02 (± 0.2)	4.05 (± 0.3)	15.6	P<0.001
Bradycardia	--	--	--	--
Nausea and vomiting	--	--	--	--
Average time for Baby Delivery	4.90 (± 06)	4.87 (± 0.7)	0.17	p>0.85

Table 4: Comparison of Neonatal outcome in both groups

Parameter	Group-A	Group-B	t test	p value
Agar Score at 1 min	8.95 (± 0.19)	8.86 (± 0.31)	1.35	p>0.18
Agar Score at 5 min	9.94 (± 0.18)	9.84 (± 0.31)	1.52	p>0.13
Umbilical cord blood PH	7.32 (± 0.03)	7.31 (± 0.02)	1.51	p>0.93

All the parameters are more or less in agreement with each other

Discussion

Present study of dosage of prophylactic IV Ephedrine for spinal induced hypotension during caesarean section in AP population. 30 parturient were administrated IV Ephedrine and 30 parturient was controlled group administrated same quantity of normal saline. Both groups had more or less same demographic variables (E.g., age, height and weight) (Table-1). In systolic blood pressure comparison in both groups at different internal 1, 2, 3, 4 minutes had significant variables in both groups (p<0.001) p value was highly significant (Table-2). In comparison of hemodynamic study hypotension was observed in 18 (60%) in group-A, 22 (77%) in group-B. Rescue ephedrine dose (mg) had significant p value (p<0.01) (Table-3), but neonatal outcomes parameters agar scores at different intervals and umbilical cord blood PH were more or less in agreement with each other (Table-4). These findings are more or less in agreement with previous studies [6][7][8].

The incidence of hypotension is higher in caesarean section due to cardiac changes of the parturient. Compression of inferior venacava by hypertrophic uterus and developing collateral venous plexus circulation in the epidural space, leading to decrease in the amount of CSF (cerebro spinal fluid) in the lumbo-sacral area and higher cephalad spread of local anaesthesia [9].

Since the storage of endogenous norephinephrine is depleted in patients under long term treatment with ACE inhibitors (or angiotension II receptor antagonists). This leads to the proposal that these patients would benefit from use of a direct acting sympathomemitic drug such as ephedrine. Ephedrine is the vasopressor of choice for hypotension prevention after spinal anaesthesia during caesarean section because of its ability to keep utero placental blood flow maintained as ephedrine's action is mainly indirect, through Stimulating norephinephrine release from sympathetic nerve endings and the

utero placental circulation is largely devoid of direct sympathetic innervations, so it is considered resistant to the vaso-constrictive effects of ephedrine [10].

It is also reported that Ephedrine was injected intramuscularly and observed hypertension whenever spinal anaesthesia was not successful [11] hence prophylactic IV ephedrine administrated either by infusion or multiple bolus has been considered as gold standard method for preventing hypotension. Moreover the effect of IV bolus of ephedrine on arterial pressure is transient and it lasts for only 10-15 minutes [12]. Hypotension after the delivery of foetus usually ignored, as it may be related to excessive blood loss during c-section.

Summary and Conclusion

A short period of hypotension (less than 2 minutes) frequently associated with spinal anaesthesia for caesarean section. Prophylatic IV Ephedrine infusion is more effective than fluid preload in prevention of hypotension due to spinal anaesthesia without causing significant tachycardia (or) hypertension.

Limitation of Study: Owing to tertiary location of research centre, small number of patients and lack of latest techniques we have limited findings and results.

This researchpaper was approved by Ethical committee of GSL Medical college Rajahmundry-533296 Andhra Pradesh.

Conflict of Interest: No

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