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Study of Effect of Ondansetron in Preventing Hypotension Following Spinal Anaesthesia in LSCS

Sreelatha B.[1], Sulochana Dash[1]

[1]Associate Professor, Department of Anaesthesiology, Saveetha Medical College, Chennai, Tamilnadu.

Abstract

This randomized double blind study was conducted to know the efficacy of ondansetron as prophylactic agent for reduction in incidence of hypotension and bradycardia in patients undergoing caesarean section under spinal anaesthesia. *Methodology*: 60 ASA 1 & 2 patients were divided randomly into two groups(saline and ondansetron) having 30 in each group. Saline group was administered with 10 ml of saline IV and ondansetrongroup received Ondansetron 4mg(10ml) 5 mins before spinal anaesthesia.Heart rate, systolic, diastolic & mean blood pressures were recorded at the time of spinal drug administration and at 2 mins interval upto 20 mins, followed by 5 mins interval until end of surgery. *Results*: There was significant reduction in systolic, diastolic and mean BP in saline group compared to ondansetron group. But the heart rate in both the groups was comparable. *Conclusion:* Prophylacticondansetron decreases incidences of hypotension after spinal anaesthesia in caesarean section.

Keywords: Hypotension; Bradycardia; Caesarean Section.

Introduction

Spinal subarachnoid block is the most common and popular form of anaesthesia used for lower segment caesarean section (LSCS) because of its advantages over general anaesthesia like avoidance of airway manipulation, decreased risk of gastric aspiration, avoidance of depressant anaesthetic agents. Also it has advantages such as mother can experience the child birth and there is decreased volume of intraoperative blood loss. But spinal anaesthesia is frequently associated with hypotension and bradycardia due to activation of BezoldJarish Reflex(BJR) the incidence of which is 52.6% and 2.5% respectively [1,2].Vassopressors like Phenylephrine and Ephedrine are commonly used to treat hypotension after spinal anaesthesia but these drugs can cause decreased uterine blood flow and fetal acidosis [3]. Preloading before spinal anaesthesia and use of Crawfords wedge are prophylactic measures used to minimise maternal hypotension. Recent literature has shown that ondansetron can reduce hypotension associated with subaracnoid block (SAB) by abolishing BJR [4,5]. This study was conducted to evaluate the effect of prophylactic single dose of ondansetron on haemodynamic parameters and vasopressor use in elective LSCS patients at our institution.

Methodology

This randomised double blind study was conducted at our institution over a period of one year where 60 obstetric patients posted for elective LSCS were included after taking informed consent. Patients

Corresponding Author: Sulochana Dash, At-Vijayashanthi Infinite, Tower-1 -6A., Po-chettipedu,Thandlam,Tamilnadu, Pin- 602105.
E-mail: dr.silu76@gmail.com

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belonging to ASA 1 & 2 category aged between 20 to 40 years and weighing 6were included in the study. Patients having contraindications for SAB, hypersensitive to study drug, suffering from hypertensive disorders of pregnancy and who are shorter than 150cm were excluded from the study.

All patients were kept nil per oral for 8hours and were premedicated with oral ranitidine 150mg and metoclopramide 10mg 2hrs prior to surgery.Patients were randomly divided into two groups by closed envelop technique – Ondansetron group [group O] and saline group [groupS] of 30 each. Anaesthesist not involved in the management of the case opened sealed envelope and loaded and loaded either ondansetron 4mg diluted to 10ml[group O] or saline 10ml [group S]. Principal investigator blinded to the test drug conducted anaesthesia and monitoring. Monitors were connected and baseline pulse rate, ECG, Oxygen saturation, non invasive systolic diastolic and mean blood pressure(SBP, DBP, MAP) were monitored in the operating room(OR). 18 gauge IV cannula was inserted. All patients were preloaded with ringer lactate 20ml/kg/hr over 30mins. The test drug was administered IV and after 5 mins SAB was established with 2ml of 0.5% bupivacaine and 10µgm by using 25G spinal needle in sitting position. Patients were put in supine position with 15° left tilt by Crawford's wedge. All patients received O2 @ 5l/ min by mask. InjOxytocin 20 units was given as infusion after baby delivery.Ringer Lactate infusion was continued @ 15ml/kg/hr in accordance with blood loss and urine output. Heart rate(HR), SpO2, SBP, DBP, and MAP were recorded at the time of spinal drug administration and at 2 mins interval upto 20 mins, followed by 5 mins interval until end of surgery. A fall in SBP of > 30 mmHg from baseline was treated with IV ephedrine 6mg and a drop in HR < 50beats/min was treated with IV Atropine 0.6mg. Rigor and pain were treated with IV tramadol 25mg and Fentanyl 50µgm respectively. When ephedrine or atropine was used values obtained before these medications were analysed. If pain persisted after single dose of fentanyl, it was considered as failed spinal anaesthesia and converted to GA and the case was excluded from study. Data collected and recorded were Demographic parameters(age, height & weight), ASA status, HR, SBP, DBP, MAP, SpO2, presence of rigor and pain, Sensory level, time and doses of Ephedrine used, amount of blood loss, urine output and fluid administered andduration of surgery. Postoperatively all the patients were shifted to recovery for observation. Data wasanalysed by using SPSS for Windows version 19. Quantitative data was expressed as mean ± standard deviation. Student 't' test and Chi-square (χ^2) test were usedto find out statistical significance. $P < 0.05$ was considered significant.

Results

Analysis of data of all 60 patients showed that the demographic parameters (age, height, weight) and distribution of ASA physical status in both the groups were comparable and the difference was not statistically significant (Table 1)(P=0.438). The mean HR in both the groups was comparable and statistically not significant (Table 2).

Table 1: Showing demographic data

	Group O(n=30)	Group S(n=30)	P value
Age	29.5±3.66	30.93±3.48	0.126
Height	156.50±6.12	157.03±5.05	0.714
Weight	72.13±11.05	72.77±10.23	0.819

Table 2: Showing mean heart rate in both the groups.

Time(min) after spinal anaesthesia	Group O	Group S	P value
Baseline	86.17±10.81	88.87±17.24	0.47
0	89.3 ±11.34	88.63±18.55	0.929
2	87.47±11.54	88.83±19.9	0.746
4	86.27±11.94	86.77±22.39	0.914
6	87.37±14.59	84.07±22.23	0.499
8	85.87±13.07	83.8±16.89	0.598
10	82.6±12.55	82.23±15.43	0.92
12	83.37±12.14	83.03±15.61	0.927
14	86.23±13.72	83.5±15.16	0.385
16	83.2±13.80	84.9±14.72	0.935
18	81.9±14.03	86.6±15.75	0.439
20	82.97±13.60	86.8±12.64	0.288
25	83.53±12.77	85.8±13.9	0.347

30	81.87±10.59	86.73±12.19	0.187
35	81.23±9.82	86.93±12.85	0.068
40	82.47±10.02	86.12±12.96	0.141
45	83.1±10.38	86.1±14.45	0.360
50	79.93±8.09	84.3±14.94	0.165

Table 3: Showing mean SBP in both groups

Time(min) after spinal anaesthesia	Group O	Group S	P value
Baseline	125.03±14.48	120.87±13.48	0.254
0	123.27±12.84	119.87±13.77	0.327
2	120.2±15.85	113.8±12.29	0.086
4	117.5±17.85	109.27±17.17	0.074
6	116.77±15.55	101.7±15.84	0.000*
8	116.23±13.41	99.83±15.57	0.000*
10	114±13.08	103.23±15.66	0.005*
12	112.6±313.45	105.43±17.51	0.079
14	112±14.79	104.87±17.84	0.068
15	112.7±313.72	105.57±16.13	0.068
16	112.7±13.36	103.73±15.00	0.070
18	112.73±14.74	101.33±13.11	0.017*
20	111.8±12.01	102.8±13.98	0.005*
25	110.33±14.08	101.93±12.34	0.029*
30	109.73±13.60	101.3±13.06	0.026*
35	108.97±13.04	102.17±11.36	0.030*
40	110.1±12.46	104.8±10.78	0.015*
45	111.67±12.89	106.4±10.76	0.026*
50	111.47±	1.6.3±11.19	0.110

*- statistically significant.

Table 4: Showing mean DBP in both the groups

Time(mins) after spinal anaesthesia	Group O	Group S	P value
Baseline	71.2±11.11	71.13±8.87	0.980
0	68.97±8.79	68.9±8.81	0.977
2	67.8±10.54	63.73±8.97	0.113
4	64.43±11.14	61.07±10.18	0.227
6	64.13±11.65	57.5±7.64	0.012*
8	62.67±9.08	56.6±8.22	0.009*
10	62±8.92	57.67±7.98	0.052
12	62.1±9.83	58.07±9.09	0.104
14	61.23±9.84	59.03±7.27	0.329
16	59.9±9.70	57.3±7.24	0.244
18	60.77±8.61	56.13±6.73	0.024*
20	60.3±9.12	56±7.72	0.053
25	58.87±7.32	54.8±37.22	0.036*
30	59.13±9.81	55.17±8.01	0.092
35	59.9±9.30	54.7±7.72	0.022*
40	60.77±8.19	55.4±6.26	0.006*
45	61.67±8.14	57.83±5.77	0.040*
50	62.6±8.24	60.1±6.26	0.191

*- Statistiaclly significant.

The reduction in SBP, DBP & MAP was significantly less in ondansetron group (Table 3, 4 & 5 respectively) as compared to saline group.

The total amount of IV fluid used, blood loss, urine output, presence of rigor, and the sensory level achieved were comparable in both the groups. None of the patients in Ondansetron group required vassopressure (ephedrine) but in the saline group 15 bolous doses were needed to maintain BP which was statistically significant (P=0.0001).

Table 5: Showing mean MAP in both the groups

Time(mins) after spinal anaesthesia	Group O	Group S	P value
Baseline	90.6±12.18	89.67±9.95	0.746
0	89.7±8.89	88.9±12.12	0.772
2	86.57±11.55	82.1±9.92	0.114
4	83.9±11.35	79.07±12.06	0.115
6	84.13±12.11	74.13±10.77	0.001*
8	82.03±9.88	72.53±11.14	0.001*
10	81.97±9.37	74.6±11.35	0.008*
12	81.83±9.63	76.17±11.29	0.041*
14	81.07±11.01	75.7±11.99	0.076
16	80.5±11.34	74.53±11.09	0.044*
18	82.4±9.15	73.83±10.37	0.001*
20	79.53±10.68	73.53±10.55	0.033*
25	78.23±8.22	71.83±9.81	0.008*
30	77.87±10.18	71.87±10.15	0.026*
35	78.57±10.11	70.6±9.47	0.003*
40	79.27±8.79	71.7±8.21	0.001*
45	80.5±9.59	74.63±7.05	0.009*
50	80.27±8.88	77.13±7.91	0.155

Discussion

Though SAB block is the most preferred method for LSCS, it is associated with higher incidence of hypotension and bradycardia[1,2]. So far many studies have been conducted like crystalloid or colloid preloading and use of drugs to find out the best method of prevention of hypotension.SAB produces sympathetic blockade leading to decreased peripheral vascular resistance, hypotension and bradycardia. Bradycardia may be due to unopposed parasympathetic activity, increased baroreceptor activity or due to cardioinhibitory BJR [6]. Stimulation of mechanoreceptors in heart by circulating volume changes induces BJR resulting in reflex bradycardia, hypotension and vasodilatation [7,8]. Activation of BJR is happens because of stimulation of 5-HT3 receptors which is a G protein coupled ligand-gated fast-ion channel which increases the activity of the vagal nerve [8]. Activation of these receptors (5HT3) due to decreased blood volume results increased vagal activity and bradycardia [9,10]. Although we were unable to find out the direct effect of 5HT3 antagonism on cardiac output, we believed that result of our study indicatedondansetron prevented serotonin induced BJR, supressed venodilatation, augmented venous return and resulted lesser reduction in SBP, DBP & MAP in ondansetron group. Blockade of 5HT3 receptor antagonizes the BJR induced by serotonin [11]. A similar study by Tsikouris et al used Granisetron and observed diminished fluctuations in heart rate and SBP on head- up tilt table test which was likely to be related to BJR [12]. Owczuk et al study found that Ondansetron 8mg decreased the incidence of bradycardia and hypotension after spinal anaesthesia [4]. A study by Sahoo et al in a population undergoingelective LSCS under spinal anaesthesia found that ondansetron 4mg IV 5 minutes prior to spinal anaesthesia reduced hypotension and vassopressure use [5]. In our study none of the patients had documented bradycardia (HR < 50bpm). The HR was comparable in both the groups. However there was statistically significant decrease in SBP, DBP & MAP in saline group at different times. None of the patients in our study had pain or discomfort and there was no requirement for additional fentanyl or conversion to general anaesthesia. Although studies showed that ondansetron acts at serotonin receptors to abolish BJR and its effects, our small sample size was probably not enough to show a definite change in HR. However we were able to show that ondansetron does definitely maintain blood pressure which is in concordance with Sahoo et al, Owczuk et al and Palmeseet al study [5, 4, and 13]. We were able to show that ondansetron can be used to prevent hypotension associated with spinal anaesthesia without use of vassopressures. So maternal & foetal outcome could be improved by using prophylactic ondansetron in spinal anaesthesia and thus side effects of vassopressurescould be avoided.

Conclusion

Addition of a single dose of 4mg Ondansetron before spinal anaesthesia in elective caesarean section caused a definite reduction in incidences of hypotension and vassopressure requirement. But further research is required to determine the effect of

this drug on heart rate and BJR a larger sample size to come out with better result.

Conflicts of Interest: Nil

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