

EFFECT OF GLYCOPYRROLATE ON THE INCIDENCE OF HYPOTENSION AND VASOPRESSOR REQUIREMENT DURING SPINAL ANESTHESIA FOR CESAREAN DELIVERY

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Abstract

Background: The study aimed to investigate whether prophylactic use of glycopyrrolate decreases the vasopressor requirements to prevent hypotension.

Materials and Methods: This study was conducted in the Department of Anaesthesia, Great Eastern Medical School and Hospital, Srikakulam. A total of 60 participants were included in the study and were grouped into group A and group B. Group A was receiving 0.2 mg glycopyrrolate and Group B was receiving normal saline. Before the patient was placed in a sitting position for Spinal anesthesia, the attending anaesthesiologist administered glycopyrrolate 1 ml in group A patients and normal saline 1 ml in group B patients. Phenylephrine equivalent to the primary outcome and secondary outcomes like incidence of hypotension, bradycardia, intraoperative nausea/vomiting, shivering, pruritis, dry mouth, dizziness, and APGAR score was noted. **Result:** From the study results, it was noted that the need for vasopressor required was 3.9 mg in group A and group B 8.6 which showed a significant result with $p < 0.05$. The incidence of dry mouth was observed in 16 participants of group A and 2 participants in group B which also showed significance at $P < 0.05$. **Conclusion:** To conclude, Group A individuals could not require vasopressor much more than Group B participants who received normal saline.

INTRODUCTION

Neuraxial anesthesia techniques are the most common method of choice for cesarean section deliveries. The use of neuraxial anesthesia is widely recommended to avoid risks of aspiration or failed intubation associated with general anesthesia. Spinal anesthesia or spinal block is the preferred technique due to its quick, safe, and definitive option which offers postoperative analgesia.^[1] However hemodynamic changes such as hypotension and bradycardia remain common complications associated with spinal anaesthesia in the obstetric population. Spinal-induced hypotension occurs due to a reduction in systemic resistance with the effect being more pronounced in the obstetric population due to increased local anesthetic sensitivity and aortocaval compression.^[2] If left untreated, spinal-induced hypotension can have adverse effects on both mother and fetus. Therefore, minimizing spinal-induced hemodynamic changes with anticholinergic drugs is recommended. Glycopyrrolate is an atropine

anticholinergic drug that possesses amine structures that cross the blood-brain barrier and placenta and help in overcoming complications.^[3] The use of glycopyrrolate for reduced hemodynamic changes after spinal anesthesia for cesarean delivery has been investigated in various studies but the results are conflicting.^[4] Hence the study is designed to determine if glycopyrrolate reduces the incidence of hypotension and the total vasopressor dose required during elective cesarean delivery under spinal anesthesia.

MATERIALS AND METHODS

This study was conducted from December 2022 to May 2023, in the Department of Anaesthesia, Great Eastern Medical School and Hospital, Srikakulam. A total of 60 LSCS-undergoing pregnant women were included in the present study. A written informed consent was obtained from all the participants. The patients were divided into two groups of which, Group A received 0.2 mg glycopyrrolate before

spinal anesthesia, and Group B with normal saline. Patients with tachycardia, bradycardia, hypertensive disorders, and other abnormalities were excluded from the study. Standard anesthesia monitoring like 3-lead electrocardiography, heart rate, non-invasive blood pressure, and pulse oximetry was done. A mean of systolic blood pressure and heart rate (HR) were recorded. Before the patient was placed in a sitting position for Spinal Anaesthesia (SA), the attending anaesthesiologist administered glycopyrrolate 1 ml in group A patients and normal saline 1 ml in group B patients.

The remaining procedures were followed as usual and at the end, the total amount of phenylephrine equivalent was used to maintain blood pressure intraoperatively which was the primary outcome. Secondary outcomes like maternal hypotension were also recorded. The sample size was calculated using the formula $1+Z^2 \times P(1-P)/e^2N$. Where N= Population

size; e= margin of error; z= z score; P= standard deviation. All the data was collected and entered in an Excel sheet and was analyzed using SPSS software 22.0. Mean and standard deviation were calculated for all the parameters. The chi-square test was used to find the statistical significance. P value <0.05 was considered statistically significant. The obtained results were tabulated in MS Excel and graphs were plotted.

RESULTS

The basic characteristics of the study participants are listed in Table 1. From the observed characteristics, the maternal heart rate and diastolic blood pressure were significantly higher in the glycopyrrolate-treated group than in the control group.

Table 1: Baseline characteristics of the study participants

Basic characteristics	Group A	Group B	P value
Mean Age	28 ± 2.10	29 ± 2.12	0.34
Mean Height (cm)	151	152	0.13
Mean Weight (kg)	67±6.2	65± 6.12	0.53
Baseline Haemodynamic characteristics before surgery			
Mean Systolic blood pressure (mm Hg)	121.83± 10.56	120.21±8.02	0.41
Mean Diastolic blood pressure (mm Hg)	75.4 ±13	78.6 ± 11.2	0.19
Mean Hear rate (beats/min)	104± 18	100 ±16.8	0.45
Hemodynamic changes during surgery			
Highest Heart rate	129.3±12.3	120.3±23.2	0.011*
Lowest Heart rate	83±15.2	78±10	0.32
Highest SBP	140 ±13.2	139±12.9	0.07
Lowest SBP	95±14	93±12	0.49
Highest DBP	81±14	87±8.7	0.029*
Lowest DBP	47±8.8	47±8.9	0.93

Note: SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure

Table 2: Surgical profile and spinal block height characteristics

Variables	Group A	Group B	P value
Induction to skin incision (min)	5	5	0.89
Induction to delivery time (min)	11.23	11.56	0.75
Uterine incision to delivery time (sec)	45	50	0.23
Maximum spread of block height (min)	4	4	0.47
Time to reach block height T6 (min)	3	2	0.17
Total duration of Surgery (min)	48.76	48.68	0.42

Table 3: Symptoms noted in the study population

Variables	Group A	Group B	P value
Nausea (n)	3	6	0.39
Vomiting	0	2	0.000*
Dry mouth	16	2	0.002*

Symptom of dry mouth was statistically significant between the groups with p<0.05 (P=0.002)

Table 4: Comparison of total dose of vasopressor (mg) used between groups

	Group A	Group B	P value
Mean	3.9	8.6	0.007*
Median	0	5	

The requirement of vasopressor was less in group A compared to group B.

Table 5: Complications noted in the study population

Complications	Group A (%)	Group B(%)	P value
Bradycardia Yes	- (0%)	1 (3.33%)	0.92
No	30 (100%)	29 (96.6%)	
Tachycardia Yes	6 (20%)	7 (23%)	0.62
No	24 (80%)	23 (76%)	

Reactive Hypertension	1 (3.33 %)	0 (0%)	0.31
Yes	29 (96.6%)	30 (100%)	
No			
	Group A	Group B	P value
Percentage change MAP	22.7 (mean)	25.4 (mean)	0.56
	8.8 (SD)	8.7 (SD)	

Table 6: Incidence of Hypotension in the Study Groups

Incidence of Hypotension	Count (%)		P value
	Yes	No	
Group A	11 (36%)	19 (63%)	0.001*
Group B	23 (76%)	7 (23%)	

The incidence of hypotension noted in the study population was less in group A i.e., with those treated with glycopyrrolate than in the control group treated with normal saline i.e.; group B which is significant at $P < 0.05$.

DISCUSSION

In the present study, we found that prophylactic use of IV glycopyrrolate in the non-elective cesarean section showed a significant difference in the vasopressor requirement compared to the normal saline group. Similarly, the use of IV glycopyrrolate resulted in a significant difference in the incidence of post-spinal hypotension. The prophylactic vasopressor, pretreatment with glycopyrrolate offered protection against post-spinal hypotension.

A meta-analysis displayed a mild decrease in the phenylephrine equivalent required with glycopyrrolate compared to the control. Various studies in the meta-analyses had reported the vasopressor requirement as a secondary outcome measure.^[5-7] In our study, we found similar results compared to previous studies in the vasopressor requirement. A study by Yoon HJ administered glycopyrrolate IV 0.2 mg immediately after spinal anesthesia for the elective cesarean section. They have reported differences in total phenylephrine requirement⁸. In their study, phenylephrine was infused at a rate of 50 µg/min for 15 min in our study phenylephrine infusion was initiated at a rate of 25 µg/min and we continued it till the end of surgery. The continuous fixed infusion of phenylephrine may have masked the blood pressure fluctuation. As a result, no difference was noted in the total phenylephrine equivalent requirement. Finally, all previous studies were conducted in elective cesarean section and therefore similar outcomes cannot be extrapolated in emergency cesarean section due to differences in hemodynamics.

From previous studies, it is recommended that, whether the prophylactic vasopressor was used or not, pretreatment with glycopyrrolate did not offer any protection against post-spinal hypotension. These reports were contrary to our study, where we observed a significant reduction in post-spinal hypotension when a combination of glycopyrrolate and phenylephrine was used prophylactically against phenylephrine alone. Interestingly, we could not find

a significant difference in the lowest systolic blood pressure (SBP) recorded.

In our study, the maternal heart rate was significantly higher in the glycopyrrolate group as glycopyrrolate is reported to have an anti-cholinergic effect on increased heart rate. This was supported by other studies where the administration of glycopyrrolate significantly increased the heart rate.^[9] Hence, the effect of heart rate is influenced by the choice of vasopressor.

In a few studies, it was reported that prophylactic vasopressors were not used for reducing post-spinal hypotension. Whereas when prophylactic vasopressors were used, pretreatment with glycopyrrolate did not offer any advantage in terms of IONV.^[10] In the current scenario, prophylactic administration of vasopressors especially phenylephrine is recommended for cesarean delivery under neuraxial anesthesia. This strategy not only reduces the incidence and severity of post-spinal hypotension but also prevents the occurrence of IONV.^[11]

Glycopyrrolate has ant-sialagogue properties and dry mouth as a common side effect. Previous studies have reported an increased incidence of dry mouth in the glycopyrrolate group compared with the control group.^[12] As in our study, more number of parturients who received glycopyrrolate complained of dry mouth, and the difference was found statistically significant.

CONCLUSION

To conclude, prophylactic intravenous glycopyrrolate in spinal anesthesia for cesarean section reduced the incidence and severity of hypotension and the need for vasopressor.

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