



Anaesthesiology

PROSPECTIVE COMPARATIVE STUDY OF EFFECTS OF PREOPERATIVE INTRAMUSCULAR GLYCOPYRROLATE ON INCIDENCE OF HYPOTENSION DURING SPINAL ANAESTHESIA IN ELDER PATIENTS (AGE 60-90 YEARS) IN TERTIARY CARE HOSPITAL.

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ABSTRACT **Introduction:** Hypotension during spinal anesthesia is one of the serious complications in elderly patients. Aging and comorbid diseases make elderly patient more susceptible to postspinal hypotension. Some studies show that glycopyrrolate prevents spinal anesthesia induced hypotension in pregnant women who underwent cesarean section. However, the studies of effect of glycopyrrolate on hypotension in elder patients undergoing spinal anesthesia are scarce in literature. Methods: In this prospective comparative double blind study, 76 patients having age 60-90 years, posted for elective surgery under spinal anaesthesia were divided into two equal groups. They received intramuscular injection of either glycopyrrolate 0.2mg (Group A) or 1 ml normal saline (0.9%) (Group B) 15 min before giving spinal anaesthesia. Evaluation of incidence of hypotension, bradycardia, nausea and vomiting, ephedrine requirement, blood pressure & heart rate was done. Results: Both groups were comparable in terms of age, gender, BMI and ASA grading. When mean SBP and mean DBP was compared, group A had less episodes of hypotension and more stable BP throughout surgery and the difference was statistically significant at all events of time except at baseline. ($P < 0.05$) Patients in group A had fewer side effects (nausea, vomiting and bradycardia) ($p < 0.05$). Conclusion:-Preoperative intramuscular glycopyrrolate effectively reduced the incidence and severity of hypotension, patients requirement of ephedrine and the incidence of nausea and vomiting in elder patients (60-90 years) undergoing spinal anaesthesia.

KEYWORDS : Elder patient, Glycopyrrolate, Postspinal hypotension, subarachnoid anaesthesia

Introduction:

Hypotension after spinal anaesthesia results from sympathetic blockade which decreases systemic vascular resistance and cardiac output. [1] It is more common in elderly patients. [2-4] It may be combined with bradycardia caused by blockade of sympathetic cardiac accelerator fibers arising from T1-T4. Hemodynamic changes induced by spinal anaesthesia can be deleterious in elderly patients with decreased cardiovascular reserve and other comorbidities due to risk of organ ischemia [5].

Intravenous fluid administration and vasopressors are beneficial to prevent occurrence of hypotension after induction of spinal anaesthesia.[2-4] Preloading or prehydration in elderly patients may not always be effective. It can be deleterious in patients with cardiopulmonary dysfunctions. But use of prophylactic vasopressor may not always be effective to prevent hypotension during spinal anaesthesia and could cause excessive hypertension and tachycardia. Preoperative intramuscular Inj. Glycopyrrolate, an anticholinergic is expected to attenuate hemodynamic changes during spinal anaesthesia.[6-10] Some study shows that glycopyrrolate prevents spinal anaesthesia induced hypotension in pregnant women who underwent cesarean section. [8, 10] However, the studies of effect of glycopyrrolate on hemodynamic changes in elderly patients undergoing spinal anaesthesia are scarce in literature.

Hence, we conducted a study to evaluate the effects of preoperative intramuscular glycopyrrolate on occurrence of hypotension during spinal anaesthesia in 76 elder patients (Age 60-90 years).

Subjects and Methods: This prospective comparative double blind study was done after institutional ethical committee approval, including 76 patients of 60-90 years of age, posted for elective surgery under spinal anaesthesia of maximum duration of 2 hours in tertiary care hospital. The study was conducted between 1st Jan 2022 to 30th June 2022. The aim of the study was to evaluate the effects of preoperative use of intramuscular glycopyrrolate on occurrence and severity of post spinal hypotension in elderly patients of age 60-90 years. The primary objective of the study was to evaluate the incidence of hypotension. The secondary objectives were to study hemodynamic parameters, to study the amount of ephedrine required and to study adverse effects if any.

Inclusion criteria were elder patients with age 60-90 years, both

male/female gender, ASA grade I/II, undergoing elective surgery of maximum 2 hours of duration under spinal anaesthesia. They were scheduled for surgeries like elective hip surgery (total hip replacement, femur nailing, femur plating), hernia repair, below-knee amputation, lower limb debridement, total abdominal hysterectomy, appendectomy. Exclusion criteria were Age <60 years, ASA grade III/IV, patients with major systemic illness, glaucoma, prostatic hypertrophy, thyroid disease, any contraindication to spinal anaesthesia. After obtaining written informed consent from patients, patients were randomly divided in two equal groups (Group A, Group B) using computer generated random numbers (38 in each group). Patients in Group A received Inj. Glycopyrrolate (0.2mg) IM and Group B received inj. normal saline 0.9% (1ml) IM 15 min before giving spinal anaesthesia. All patients were kept NBM preoperatively for 6 hrs. In Operation Theatre, intravenous line was secured using 20G cannula. The multipara monitor was connected. Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Heart rate (HR), Electrocardiogram (ECG) and oxygen saturation (SpO₂) were observed and recorded prior to induction of spinal anaesthesia and intraoperatively. All the patients were preloaded with 10 ml/kg of lactated Ringer's solution. Subarachnoid block was performed at L3-L4, L4-L5 interspace with Quinke's 25 G needle in sitting position under full aseptic precautions by trained anesthesiologist, 15mg of 0.5% hyperbaric bupivacaine was injected intrathecally. Supine position was given after administration of spinal anaesthesia. Sensory block assessment was done using pinprick method and achieved at T10 dermatome level.

Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Oxygen Saturation (SpO₂) was recorded at baseline, immediately after subarachnoid block and repeated every 3 min in first 30 min followed by repeat measurements every 5 min till the end of surgery. Total dose of Inj. Ephedrine if injected was noted. Side effects like vomiting, nausea or any other were also noted.

Sample size of 76 was calculated by using formula;

$$N = [P1(1-p1) + p2(1-p2)] / (z/E)^2$$

Where, Z=standard normal variate, P=Efficacy, E=Absolute Precision.

Statistical evaluation: Demographic data (Age, BMI) and blood pressure, heart rate, distribution of patients according to requirement of ephedrine was expressed as Mean and standard deviation.

Independent t test was used to compare if the difference between the two groups was significant. Episodes of bradycardia, hypotension, nausea and vomiting were expressed as frequency & compared using Chi square test.

Results:

Table 1: Demographic Data:

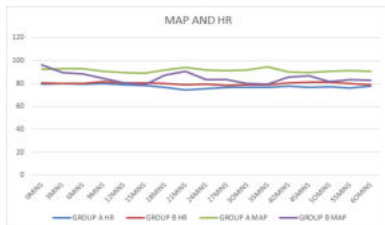
Variable	Group A N= 38	Group B N= 38	P value	Statistical significance	Statistical Test
AGE (yrs) Mean + SD	69.13 + 5.82	69.29 + 5.42	0.903	P>0.05, Not significant	Unpaired t Test
GENDER (male/Female)	23/15	24/14	0.813	P>0.05, Not Significant	Chi square Test
ASA GRADE (I/II)	25/13	25/13	0.999	P>0.05, Not Significant	Chi square Test
BMI (Kg/m2) Mean + SD	26.86 + 4.72	25.58 + 4.13	0.211	P>0.05, Not Significant	Unpaired t Test

Table no. 2: Comparison of episodes of Hypotension, Patient Distribution as per Requirement of Ephedrine & Side effects

Variable	Group A	Group B	Total	p-value
Hypotension episodes Yes/No	10/28	25/13	35/41	0.001*
Patients Distribution as per Requirement of Ephedrine (n) Mean + SD	3.30 + 1.01	4.91 + 1.47	-	< 0.05*
Vomiting	1	7	8	< 0.001*
Bradycardia	1	10	11	
Nausea	2	5	7	

*Significant (p-value < 0.05)

Graph 1: Comparison of mean Heart Rate & mean MAP in Group A & Group B



Graph 2: Comparison of Mean SBP & Mean DBP in Group A & Group B



Discussion:-

Glycopyrrolate is a quaternary amine with antimuscarinic effects. In contrast to atropine, a tertiary amine, glycopyrrolate does not cross blood-brain barrier and cannot affect central nervous system. Its chronotropic effect is less than that of atropine. [6, 9] In anesthetic practice, glycopyrrolate has been commonly used to reverse nondepolarizing muscle relaxants and to reduce oral secretions. Considering that hypotension induced by spinal anesthesia is related to sympathetic blockade accompanied by bradycardia, administration of glycopyrrolate could affect hemodynamic changes during spinal anesthesia.[8,11] When glycopyrrolate is administered intravenously, heart rate increases within one minute. This abrupt tachycardia could be serious in elderly patients. On the other hand, use of an intramuscular injection of glycopyrrolate can be an alternative approach to prevent the occurrence of abrupt tachycardia and can gradually counteract the hypotensive responses following spinal anesthesia.

Demographic data analysis: - Both groups were comparable and there was no significant statistical difference in respect to age, sex, BMI and ASA grade. (p>0.05)(Table 1)

Nausea and vomiting is an uncomfortable complication following spinal anesthesia. In present study it was found that preoperative glycopyrrolate reduced the incidence of nausea and vomiting. (Table 2) As glycopyrrolate does not cross blood-brain barrier, it might not affect the cholinergic pathways at central nervous system. Nevertheless, nausea and vomiting is usually accompanied by hypotensive responses through organ hypoperfusion, and thus it could be reduced by preventing the occurrence of hypotension. [6, 9, 12]

Group A patients had less number of episodes of hypotension compared to group B with significant statistical difference. (P < 0.05) (Table 2) The distribution of patients for requirement of ephedrine was significantly greater in Group B compared to Group A as per Student-t-test (p<0.05) (Table 2) Patients in group A had less side effects -nausea, vomiting and bradycardia as compared to group B with significant statistical difference. (P<0.05) (Table 2)

When mean HR was compared in both groups, there was not much statistically significant difference except at 50 min and 55 min after spinal anaesthesia. (P< 0.05) (Graph 1) When mean SBP was compared, group A had less episodes of hypotension and more stable SBP throughout the surgery and the difference was statistically significant at all events of time except at baseline. (P < 0.05) (Graph 2) Group A had more stable DBP & MAP throughout the surgery and the difference was statistically significant at all events of time except at baseline. (P<0.05) (Graph 1, Graph 2)

Limitations and Future scope of study: This study was limited to include elders in age group 60-90 years with ASA grade I and II and surgery maximum 2 hrs duration. Further can study in higher ASA grades, <60 or > 90 yrs age groups & surgery exceeding 2hrs duration. Conclusion: Preoperative intramuscular glycopyrrolate was effective to reduce, the occurrence of hypotension response, the patient distribution for requirement for ephedrine, and the incidence of nausea and vomiting in elder patients (60-90 years) during spinal anesthesia.

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