



Effect of Intramuscular Injection Glycopyrrolate in Elderly Patients during Spinal Anaesthesia

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Abstract

Background: Post spinal anaesthesia hypotension is a frequent complication and is deleterious in elderly patients due to associated co-morbid conditions and autonomic dysfunction. Prophylactic intramuscular Glycopyrrolate provides better hemodynamic stability in elderly patients.

Aim: To evaluate the effect of intramuscular injection glycopyrrolate in elderly patients during spinal anaesthesia.

Methods: It was a prospective, single blinded study undertaking 60 patients of ASA I and II including both sexes with age = / > 60 years. After ethical committee approval study groups were administered either I.M glycopyrrolate (Group G) 0.2 mg or I.M Normal saline (Group N) 15 minutes prior to the induction of spinal anaesthesia. Heart rate (HR) and MAP (Mean arterial pressure), requirement of Ephedrine and side effects were noted intraoperatively.

Results: Both the groups were comparable with respect to demographic data and baseline hemodynamic parameters. Average HR and average MAP were significantly higher in Group G in comparison with Group N (p value < 0.05). incidence of hypotension was more in group n 36.7 % in comparison with group g 16.7%.

Conclusion: Glycopyrrolate is a safe drug, it doesn't cross blood brain barrier. Its intramuscular use is a safe alternative method in preventing post spinal hypotension.

Keywords: intramuscular, elderly, hypotension, spinal anaesthesia.

I. Introduction

Spinal anaesthesia is a simple technique that can be used to provide surgical anaesthesia for procedures involving the lower abdomen, pelvis and lower limbs. Most frequent complication during spinal anaesthesia is the systemic hypotension as a result of the sympathetic fibres blockade which decreases systemic vascular resistance by decreasing the vascular tone leading to peripheral venous pooling of blood, which reduces cardiac output (1)

There are multiple effects of spinal anaesthesia, which may be detrimental or fatal if not immediately diagnosed and managed effectively and it may get combined with bradycardia if the cardiac accelerator fibres are involved that is T1- T4(2). Several modalities of management including preloading with electrolyte containing intravenous fluids and use of vasopressors have been considered to prevent the occurrence of hypotension after the induction of spinal anaesthesia. The elderly patients are at risk of organ ischemia due to hemodynamic changes induced by spinal anaesthesia with decreased cardiac output and other co-morbidities(3). Nevertheless, active prehydration in elderly patients is not always effective and advisable. Moreover, the use of prophylactic intravenous vasopressors can sometimes lead to excessive hypertension and tachycardia which cannot be tolerated for elderly age group (2,4). These patients are more susceptible to hypotension due to autonomic dysfunction and exact mechanism for which is still unknown.

Glycopyrrolate an anticholinergic, is a quaternary amine and does not cross blood brain barrier and has chronotropic effect through the antimuscarinic activity. Prophylactic Glycopyrrolate is expected to attenuate hemodynamic changes during spinal anaesthesia. Thus we have decided to conduct the study with intramuscular glycopyrrolate in elderly patients for better hemodynamic stability.

II. Material And Methods

Sixty patients of ASA physical status I and II aged above or equal to 60 years, scheduled for lower abdomen and lower limb in supine position were selected. Thirty patients were randomly allocated to one of the

following groups G and N. GROUP G received – I.M injection Glycopyrrolate 0.2mg 15 minutes prior to spinal anaesthesia (1cc).

GROUP N received- Intramuscular injection Normal saline 15 minutes prior to spinal anaesthesia (1cc).The routine monitors were applied before giving spinal anaesthesia. All patients were preloaded with I.V Ringer Lactate at 10 – 15 ml/ kg before initiation of spinal anaesthesia by 20G I.V cannula. Dural puncture was performed at L3-L4 or L4-L5 level Intervertebral spaces using Quincke’s 25G needle. Bupivacaine 0.5% (Heavy) is used according to weight and height of patients. The height of spinal block was assessed by pin prick after spinal anaesthesia. In all the patients level was fixed at T6. Hypotension was considered as systolic pressure less than 20% from the baseline i.e at 0 mins after giving spinal anaesthesia or decrease in MAP greater than 20% from the baseline value. Bradycardia was considered as fall in H.R > 20 % of the baseline. Observations were performed under baseline hear rate, systolic B.P, diastolic B.P and MAP, heart rate, systolic B.P, diastolic B.P, MAP at 0 minutes then every 3 minutes for first 15 minutes then every 5 minutes for next 15 minutes then every 10 minutes till 60 minutes. For intraoperative hypotension i.e more than 20 % fall from baseline blood pressure 6 mg bolus of drug ephedrine was given. For intraoperative bradycardia i.e more than 20 % fall from baseline heart rate 0.2 mg of glycopyrrolate bolus was used.

III. OBSERVATION AND RESULTS

The demographic data of our study population i.e Age, Gender and ASA grading did not show any significant statistical difference. Maximum patients in our study population belonged to 60 to 74 years of age. In both the study groups male patients were more than female.

Table 1

Variables	Group G (n=30)	Group N (n=30)	P value
Gender (M/F)	22/8	27/3	0.181
ASA grade (I/II)	16/14	16/14	0.999
Age groups (Yrs) 60-74 / 75-94	23/7	23/7	0.578

Table 2 The inter-group comparison of Mean-Arterial pressure at each time interval.

Mean Arterial Pressure (mmHg)	Group G [Glycopyrrolate] (n=30)		Group N [Control] (n=30)		P-value (Group G v Group N)
	Mean	SD	Mean	SD	
0-Min	99.3	8.2	102.3	6.6	0.120
3-Min	96.9	9.2	96.2	6.8	0.698
6-Min	93.6	9.8	90.6	7.3	0.187
9-Min	92.4	9.9	87.2	8.9	0.037
12-Min	90.2	9.5	84.3	11.6	0.036
15-Min	88.7	8.9	81.3	12.4	0.011
20-Min	88.9	7.9	79.9	13.2	0.002
25-Min	89.7	8.6	80.3	11.4	0.002
30-Min	90.0	10.1	81.0	11.1	0.002
40-Min	89.4	9.9	82.6	8.7	0.006
50-Min	90.9	9.8	82.8	8.8	0.003
60-Min	91.4	9.1	84.1	7.7	0.002

Table 3 The inter-group comparison of pulse rate at each time interval.

Pulse rate (Per min)	Group G [Glycopyrrolate] (n=30)		Group N [Control] (n=30)		P-value (Group G v Group N)
	Mean	SD	Mean	SD	
0-Min	83.0	7.4	84.5	7.5	0.451
3-Min	81.9	6.8	81.3	7.7	0.722
6-Min	81.2	7.4	79.3	6.8	0.290
9-Min	79.9	7.5	78.1	6.6	0.319
12-Min	77.7	7.5	76.8	7.8	0.649
15-Min	76.3	8.4	76.1	7.9	0.912
20-Min	76.2	7.9	74.8	7.4	0.481
25-Min	77.0	8.3	74.0	7.4	0.143
30-Min	77.2	8.7	73.4	7.4	0.075
40-Min	77.5	7.8	72.4	7.2	0.012
50-Min	79.2	7.5	72.5	7.6	0.003
60-Min	79.1	6.9	72.6	7.9	0.004

The average mean-arterial pressure after 6-mins is significantly higher in Group G compared to Group N (P-value <0.05 for all) and was statistically significant. There is less fall in mean arterial pressure in Group G as compared with Group N. Similarly the average pulse rate in Group G after 30 minutes of spinal anaesthesia was significantly higher than Group N. This can be attributed to intramuscular use of injection Glycopyrrolate which shows peak action after 30 to 45 minutes of administration and its effect stays for a longer time. The intergroup comparison of mean time of first rescue vasopressor use was Group G- 28.4 minutes and Group N- 24.3 minutes and it is statistically insignificant. None of the patient experienced any major side effects in both the study groups.

IV. Discussion

Systemic hypotension is the most common complication after spinal anaesthesia, with an incidence of 25-82% (5) There is increased risk in elderly population because of reduced physiological reserve and atherosclerosis particularly coronary artery disease as a result of decreased blood pressure. The mechanism of hypotension after spinal anaesthesia relates to decrease in sympathetic tone, vasodilatation, decrease in venous return, decrease in cardiac output, decrease in catecholamine release if spinal level reaches above T6.

A similar study like ours was done in 2015 by Shailendra Sidgel. In their study, they used inj. Atropine 0.6 mg after 1 minute of spinal anaesthesia for Group A and similar amount of normal saline was given to Group N. The baseline heart rate in group A in their study was 73.60 +/- 10.30 and the maximum heart rate attained was 89.30 +/- 14.62 at 5 minutes while heart rate significantly decreased in group N at 30, 40, 50 and 60 minutes with mean heart rate of 65.40 +/- 11.34. Inj. Atropine has faster onset of action, intravenous route starts acting within seconds. It causes abrupt tachycardia which can be deleterious to elderly patients. In comparison with injection atropine, injection glycopyrrolate has slower onset of action and the effect observed after 30 minutes of intramuscular glycopyrrolate and the changes in the pulse rate were minimal which did not affect the hemodynamic stability (6)

A study was done in 2013 by Jinyoung Hwang, Seongwon Min, MD, Chongsoo Kim, Namsu Gil, Eunyoung Kim and by Jin Huh in elderly patients where prophylactic use of intramuscular injection glycopyrrolate was tried in elderly patient. They observed that in test group 9 patients out of 33 and in control group 23 patients out of 33 experienced hypotension. They found that the intramuscular glycopyrrolate to some extent can reduce the hypotensive response during spinal anaesthesia in elderly patients which we could also observe the same (7)

Many studies have been done but nothing has been found to be very effective multiple drugs like phenylephrine (8), ephedrine (9), mephenteramine had been co administered along with intravenous fluid (10) Large volumes of fluid may not be desirable in elderly patients and may cause morbidity in them. In patients with poor cardiac function a risk of pulmonary oedema and cardiac failure is seen. Routine preloading may be unnecessary in these patients unless they are dehydrated.

V. Conclusion

We conclude that

1. Prophylactic use of Intramuscular injection glycopyrrolate causes less fall in pulse rate and MAP in elderly patients undergoing spinal anaesthesia.
2. Intramuscular route is safer than intravenous route as abrupt tachycardia is not associated with it.
3. Does not result in any major adverse effects.

Thus intramuscular 0.2 mg glycopyrrolate provides better hemodynamic stability in elderly patients and not associated with any significant adverse effects. Glycopyrrolate is not a proven drug for prevention of intraoperative spinal hypotension and bradycardia. Multiple studies have not been done with glycopyrrolate in elderly patients. Further research for prevention of intraoperative hypotension with proper drug or other measures specially for elderly patient is needed.

References

- [1]. Hartmann B, Junger A, Klasen J, ET al. The incidence and risk factors for hypotension after spinal anaesthesia induction: an analysis with automated data collection. *Anesth Analg* 2002; 94: 1521-9.
- [2]. Dobson PM, Caldicott LD, Gerrish SP, Cole JR, Channer KS. Changes in hemodynamic variables during transurethral resection of the prostate: comparison of general and spinal anaesthesia. *Br J Anaesth* 1994;72:267-71
- [3]. Juelsgaard P, Sand NP, Felsby S, et al. perioperative myocardial ischemia in patients undergoing surgery for fractured hip randomised to incremental spinal, single dose spinal or general anaesthesia. *Eur J Anaesthesiol* 1998;15:656-63
- [4]. Critchely LA, Stuart JC, Conway F, Short TG. Hypotension during subarachnoid anaesthesia: haemodynamics effect of ephedrine. *Br J Anaesth* 1995; 74:373-8.
- [5]. Moore DC, Bridenbaugh LD. Spinal (subarachnoid) block. A review of 11,574 cases. *Journal of American Medical Association* 1995; 195:123-128

- [6]. Sidgels.. Prophylactic use of IV Atropine for prevention of spinal anesthesia induced hypotension and bradycardia in elderly:a randomized controlled trial. *J AnesthesiolClin Sci*.2015;4:5.1-5
- [7]. Jinyoung Hwang, MD, PhD • Seongwon Min, MD, PhD • Chongsoo Kim, MD, PhD •Namsu Gil, MD • Eunkyoun Kim, MD • Jin Huh, MD, PhD. Prophylactic glycopyrrolate reduces hypotensive responses in elderly patients during spinal anesthesia: a randomized controlled trial. *Can J Anesth/J Can Anesth* (2014) 61:32–38
- [8]. NganKee WD, Khaw KS, Ng FF, Lee BB. Prophylactic phenylephrine infusion for preventing hypotension during spinal anaesthesia for caesarean delivery. *AnaesthAnalg*. 2004Mar;98(3):815-21
- [9]. Lee A, NganKee WD, Gin T. A dose-response meta-analysis of prophylactic intravenous ephedrine for the prevention of hypotension during spinal anesthesia for elective cesarean delivery. *Anesth Analg*.2004;98:483–490
- [10]. MitraJabalmeli, Hassan Ali Soltani, Jalal Hashemi, ShekoofeBehdad, BahramSolemani. Prevention of post-spinal hypotension using crystalloids, colloids and ephedrine with three different combinations: A Double blind study. *Adv Biomed Res* 2012;1:36