Original Research Article

A Study to Assess the Effect of Clonidine Administration in Three Different Routes as an Adjuvantive to Bupivacaine in Spinal Anaesthesia

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Abstract

Aim: The present study was undertaken to observe and compare the effectiveness of clonidine administration in three different routes as an adjuvantive to bupivacaine in spinal anaesthesia.**Material and Methods**: The study recruited 40 male and female patients with ASA grade score of 1 and 2 and undergoing lower abdomen surgery. Patients within the age group of 20 to 60 years were included in the study. The selected participants were randomly assigned to four groups with 10 participants in each group. All the participants underwent thorough physical examination. Demographic data of the patients were collected. Block characteristics was assessed using standard methods. Incidence of side effects also noted.**Results**:Weight of the participants was significantly different. Height and age of the participants was not significantly different. Block characteristics of the participants was presented in table no 2. There was a significant difference observed in sensory onset, motor onset and demand for analgesia.**Conclusion**: The study results confirm that all the three routes administration of clonidine was effective to cause early onset of blockage of sensory and motor conduction also causes prolonged analgesia effect. The study recommends further detailed studies in this area.

Keywords:Spinal Anaesthesia, Clonidine, Analgesia.

Introduction

Spinal anesthesia is one of the common anesthesias used in the clinical setting. It is a regional anesthesia where the anesthesia is administered using a fine needle into the sub-arachnoid space. The drug clonidine is an agonist to alpha two adrenergic receptors [1]. It is very effective sedative as well as analgesic agent. It can cross the blood brain barrier and act on hypothalamus where it acts on the alpha receptors and decreases the blood pressure[2,3].

It acts as sympatholytic agent and decreases the secretion of both epinephrine and nor epinephrine. It acts at the level of spinal cord dorsal horn cells and also at the level of hypothalamus and modulates pain signals [4]. It was reported that there was sensory and motor nerve blockage followed by administration of clonidine [5]. This nerve blockage was predominantly observed in the c fibers and delta fibers which are predominant fibers that carry the pain signals [6]. Clonidine also has ability to cause potent vasoconstriction to local blood vessels and contribute to reduce pain. Clonidine can be administered orally, intrathecal and intra venously. The present study was undertaken to observe and compare the effectiveness of clonidine administration in three different routes as an adjuvantive to bupivacaine in spinal anaesthesia.

Material and Methods

Study design: Observational study

Sampling method: Convenient sampling

Study population: The study recruited 40 male and female patients with ASA grade score of 1 and 2 and undergoing lower abdomen surgery. Patients within the age group of 20 to 60 years were included in the study.

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Participants who were willing voluntarily were included in the study with proper informed consent. Those unwilling were not recruited in the study. Those with severe complications were also not included in the study. The selected participants were randomly assigned to four groups with 10 participants in each group. All the participants underwent thorough physical examination.

Group 1 (control) (n=10): Spinal anaesthesia with 0.5% heavy bupivacaine 3ml (15 mg)

Group 2 (oral) (n=10): Spinal anaesthesia with 0.5% heavy bupivacaine 3 ml (15 mg) + oral clonidine 3µg/kg

Group 3 (intrathecal) (n=10): Spinal anaesthesia with 0.5% heavy bupivacaine 3 ml (15 mg) + inrathecal clonidine 75 µg

Group 4 (intra venous) (n=10): Spinal anaesthesia with 0.5% heavy bupivacaine 3 ml (15 mg) + intravenous clonidine 3µg/kg.

Data collection: Demographic data of the patients were collected. Block characteristics was assessed using standard methods. Incidence of side effects was noted [7].

Ethical considerations: The study proposal was approved by the institutional ethics committee after satisfying the queries adequately. The study followed all the guidelines as per the ICMR guidelines. Written informed consent was obtained from all the participants before the commencement of the study. Information related to the patients was kept confidential.

Data analysis: The statistical software SPSS 18.0 version was used to analyze the data. The significance of difference was tested using the one way Anova. The probability value less than 0.05 were considered significant.

Results

Demographic data of participants was presented in Table 1. Weight of the participants was significantly different. Height and age of the participants was not significantly different. Block characteristics of the participants was presented in Table 2. There was a significant difference observed in sensory onset, motor onset and demand for analgesia. Table 3 presents the incidence of side effects in the participants.

Table 1: Demographic data of participants

Parameter	Group-1	Group -2	Group-3	Group-4	P value
Age (years)	34±13	32±14	36±12	39±14	0.681
Gender (M:F)	3:7	4:6	3:7	5:5	
Height (cm)	155±9	150±7	156±11	161±14	0.161
Weight (kg)	62±5	59±7	55±4	61±6	0.041*

Data was presented as mean and SD. (*P<0.05 was considered significant)

Table 2: Block characteristics of the participants

Parameter (min)	Group-1	Group -2	Group-3	Group-4	P value
Sensory onset	6.33±0.5	5.21±0.33	4.55±0.32	3.54±0.4	<0.001***
Motor onset	11.02±2.6	8.12±0.22	7.02±0.12	6.26±0.6	<0.001***
Demand for analgesia	155±24	398±42	522±54	646±34	<0.001***

Data was presented as mean and SD. (***P<0.001 was considered significant)

Table 3: Incidence of side effects in the participants

	Group-1	Group -2	Group-3	Group-4
Bradycardia	2	3	4	3
Dry mouth	1	1	2	1
Hypotension	4	2	3	0
Sedation	2	3	1	4
Shivering	1	1	0	2

Data was presented as frequency

Discussion

The present study was undertaken to observe and compare the effectiveness of clonidine administration in three different routes as an adjuvantive to bupivacaine in spinal anaesthesia. Demographic data of participants was presented in [Table 1]. Weight of the participants was significantly different. Height and age of the participants was not significantly different. Block characteristics of the participants was presented in [Table 2]. There was a significant difference observed in sensory onset, motor onset and demand for analgesia. [Table 3] presents the incidence of side effects in the participants.

Clonidine is most commonly used as an adjunct along with the anesthesia because it has less side effects and more advantages [8]. Further the action of the clonidine is long lasting. It blocks the sensory and motor conduction. It acts through the A delta as well as C fibers and inhibit the conduction through them [9]. It also acts at the level of spinal cord and hypothalamus. There were few studies that reported that there was no effect of clonidine on sensory block [10]. Whereas other studies reported that the action was very effective. The present study support the views of earlier studies as there was significant action observed followed by administration of clonidine.

It was reported that clonidine has its effects on systemic blood vessels and blood pressure. It causes fall in the blood pressure by acting on the centers of hypothalamus [11-14]. It was reported that administration of large doses causes fall in blood pressure drastically and causes hypotension [15]. The present study did not support this view as there was not significant fall in the blood pressure observed in the patients after administration of clonidine. There is a strong need to undertake detailed studies in this area.

Conclusion

The study results confirm that all the three routes administration of clonidine was effective to cause early onset of blockage of sensory and motor conduction also causes prolonged analgesia effect. The study recommends further detailed studies in this area.

References

1. Current Population Reports. Washington D.C: Government Printing Office; 1993. Bureau of Census. Sixty-five plus in America.
2. Racle JP, Benkhadra A, Poy JY, Gleizal B. Spinal analgesia with hyperbaric bupivacaine: Influence of age. Br J Anaesth. 1988;60:508–14
3. Veering BT, Burm AG, Spierdijk J. Spinal anesthesia with hyperbaric bupivacaine. Effects of age on neural blockade and pharmacokinetics. Br J Anaesth. 1988;60:187–94.
4. Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology. 1992;76:906–16.
5. Dobrydnjov I, Holmström B, et al. Clonidine combined with small-dose bupivacaine during spinal anesthesia for inguinal herniorrhaphy:A randomized double-blinded study. Anesth Analg. 2003;96:1496–503.
6. Eisenach JC, Klimscha W. Alpha(2)-adrenergic agonists for regional anesthesia. A clinical review of clonidine (1984-1995) Anesthesiology. 1996;85:655–74.
7. Smith C, Lublin FD. Tizanidine treatment of spasticity caused by multiple sclerosis: Results of a double-blind, placebo-controlled trial. US tizanidine study group. Neurology. 1994;44:S34–42.
8. Baker A, Klimscha W, Eisenach JC, Li XH, Wildling E, Menth-Chiari WA, et al. Intrathecal clonidine for postoperative analgesia in elderly patients: The influence of baricity on hemodynamic and analgesic effects. Anesth Analg. 2004;99:128–34.
9. Dobrydnjov I, Axelsson K, Gupta A, Lundin A, Holmström B, Granath B. Improved analgesia with clonidine when added to local anesthetic during combined spinal-epidural anesthesia for hip arthroplasty: A double-blind, randomized and placebo-controlled study. Acta Anaesthesiol Scand. 2005;49:538–45.
10. Erturk E,Gokben M. Clinical comparison of 12 mg ropivacaine and 8 mg bupivacaine, both with 20 microg fentanyl, in spinal anesthesia for major orthopaedic surgery in geriatric patients. Med Princ Pract. 2010;19:142–7.
11. Elia N, Tramèr MR. Clonidine as an adjuvant to intrathecal local anesthetics for surgery: Systematic review of randomized trials. Reg Anesth Pain Med. 2008;33:159–67.
12. Klimscha W, Taslimi R, Mayer N, et al. Hemodynamic and analgesic effects of clonidine added repetitively to continuous epidural and spinal blocks. Anesth Analg. 1995;80:322–7.
13. Niemi L. Effects of intrathecal clonidine on duration of bupivacaine spinal anesthesia, haemodynamics, and postoperative analgesia in patients undergoing knee arthroscopy. Acta Anaesthesiol Scand. 1994;38:724–8.
14. Mark JB, Steele SM. Cardiovascular effects of spinal anesthesia. Int Anesthesiol Clin. 1989;27:31–9.
15. Riesmeier A, Schellhaass A, Boldt J, Suttner S. Crystalloid/colloid versus crystalloid intravascular volume administration before spinal anesthesia in elderly patients: The influence on cardiac output and stroke volume. Anesth Analg. 2009;108:650.

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