A study to compare the effects of single dose intravenous dexmedetomidine and clonidine on bupivacaine spinal anaesthesia

P Ramadevi¹, T Nirmaladevi^{2*}

¹Assistant Professor, Department of Anaesthesiology, Velammal Medical College Hospital and Research Institute Madurai, INDIA. ²Professor, Department of Anaesthesiology, VMCH and RI Madurai, INDIA **Email:** <u>thirmalaroja@rediffmail.com</u>

Abstract

Background: Dexmedetomidine, also an α2-adrenergic agonist, used for pre-medication and as additive to general anesthesia. Dexmedetomidine when given intravenously decreases the inhalational anesthetic and opioid requirements during general anesthesia. This study has been undertaken as the hypothesis that dexmedetomidine and clonidine when given intravenously might prolong the duration of spinal analgesia. This technique may be helpful for increasing the duration of spinal anesthesia. **Aim and objective:** The aim of this study is to evaluate the effects of intravenous dexmedetomidine and clonidine on duration of spinal anesthesia and to assess the hemodynamic changes and the level of sedation. **Materials and methods:** It is a prospective Randomised study conducted at Government Rajaji hospital Madurai. A total of 90 patients were randomly allotted into three groups of 30 each. Group A received dexmedetomidine through intravenous route and Group B received clonidine through intravenous route and Group B received clonidine through intravenous route and Group B received clonidine through intravenous route. **Results:** The average time taken for onset of sensory block is 57 seconds for dexmedetomidine group ,74 seconds for clonidine group and 93 seconds for control group. Thus dexmeditomidine has faster onset of sensory blockade. Mean duration time for two segmental regression in groupA is prolonged and was statistically significant than group B and group C. **Conclusions:** From our study it is concluded that dexmedetomidine can be safely used as preoperative sedation to hasten the onset of subarachnoid block and to prolong the sensory blockade without side effects. **Key Word:** clonidin, Dexmedetomidine, spinal anesthesia

*Address for Correspondence:

Dr. T Nirmaladevi Professor, Department of Anaesthesiology, VMCH and RI Madurai, INDIA. **Email:** <u>tnirmalaroja@rediffmail.com</u> Received Date: 15/11/2018 Revised Date: 24/12/2018 Accepted Date: 02/01/2019 DOI: <u>https://doi.org/10.26611/10159112</u>

Access this article online			
Quick Response Code:	Wobsito		
	www.medpulse.in		
	Accessed Date: 13 January 2019		

INTRODUCTION

Dexmedetomidine is used commonly in intensive care unit sedation and for any ambulatory procedural sedation. Like clonidine, it is an agonist of α_2 adrenergic receptor. Spinal anesthesia is commonly performed for infraumbilical surgeries. Additives are added to spinal anesthesia in order

to prolong the duration of blockade and to reduce adverse effects due to local anesthetics. Thus procedures of longer duration can be done comfortably as block regression is slower. Agents starting from neostigmine, fentanyl to magnesium sulfate have been used as adjuncts to local anesthesia for prolonging the duration of spinal blockade. Small doses of dexmedetomidine (3 μ g) used in combination with bupivacaine in spinal anesthesia resulted in shorter onset of motor block and prolongation in the duration of motor and sensory block with well preserved hemodynamics and minimal sedation. Clonidine an α 2agonists, has been used generally in the intrathecal route But when used intravenously within one hour after spinal block it extends the duration of spinal blockade for roughly one hour without undesirable effect.

How to site this article: P Ramadevi, T Nirmaladevi. A study to compare the effects of single dose intravenous dexmedetomidine and clonidine on bupivacaine spinal anaesthesia. *MedPulse International Journal of Anesthesiology*. January 2019; 9(1): 52-55. http://medpulse.in/Anesthesiology/index.php

AIM OF THE STUDY

To assess the efficacy and to compare the effects of single dose intravenous dexmedetomidine and clonidine effects on spinal anesthesia. Efficacy is assessed by, Onset of Sensory block, Onset of Motor block, Time for two segment level regression, Time for rescue analgesia, Intra operative sedation score, Hemodynamic stability.

MATERIALS AND METHOD

It is a prospective Randomised study conducted at Government Rajaji hospital Madurai. This study was proceeded after

getting ethical committee's approval and informed written consent from the patients, who were included in this study. **Inclusion Criteria:**

- 1. Age between 35to 65 years
- 2. Belonging to ASA I and II patients
- 3. Either sexes
- 4. Patients posted for lower abdominal surgeries.

METHODOLOGY

After securing good intravenous access all the patients were preloaded with 10 ml/kg of normal saline monitors: the monitors connected included spo2, ecg and nibp. Recording of baseline values: the baseline parameters were recorded (pulse rate, blood pressure, spo2, respiratory rate). Patient randomly receives either intravenous dexmedetomidine 0.5 µg/kg infusion over 10 minute or intravenous clonidine 0.8 µg/kg infusion over 10 minute or intravenous norml saline infusion over 10 minutes before spinal anesthesia. Performance of subarachanoid block: patient was placed in right lateral position and with strict asepsis and antisepsis of the region, subarachanoid block was performed at L3-L4 space using 23G quickes needle and injection Bupivacaine 0.5 % 15 mg given. Patient was then turned to supine position. Following parameters are noted:

- a. Time taken for sensory blockade at T10.
- b. Level of maximum sensory block.
- c. Time of onset of complete motor block
- d. Time for two segmental regression
- e. Duration of surgery.
- f. Time for rescue analgesia.
- g. Intraoperative sedation score.
- h. Hemodynamic parameters, Blood pressure, Puls e rate, Spo2, Respiratory rate.
- i. Complications if any.

The pin prick technique was used to locate sensory blockade level and Bromage score was used to asses the motor blockade. Score 0 for no block, Score 1 unable to raise extended knee Score 2 for not able to flex the knee, Score 3 for not able to flex ankle. Sedation was assessed with Ramsay sedation score Score 1 for patient frightened, nervous, restless Score 2 for patient is cooperative and tranquil, Score 3 for patient responds to oral commands only, Score 4 for exhibits brisk response to loud auditory or light glabellar tap, Score 5 for sluggish response to glabellar or auditory stimulus, 6 for patient exhibit no response. Vitals monitoring included

pulse rate, Blood pressure, Spo2, respiratory rate for every^{2,5,10,15,30,45,60,75,90,105,120} minutes interval Fall in blood pressure more less than 25% from baseline was considered as hypotension and treated with 6 mg ephedrine and fall in pulse rate less than 50/min was considered as bradycardia and treated with Inj. Atropine.

STATISTICAL ANALYSIS

Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's chi square test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.



Figure 1: Onset time for sensory block

Croup	Onset time for sensory block		
Gloup	Range	Mean	SD
Group A	40-90	57.7	11.9
Group B	50-140	74.3	23.3
Group C	60-140	93.5	23.0
'p' value between			
3 groups	<0.0001 Significant		
Group A and B	0.	0009 Sign	ificant
Group A and C	< 0.0001 Significant		
Group B and C	0.0007 Significant		

Mean duration of two segment regression in A group was 102.2 minutes and in Group B it was 93.8 minutes and in group C was 66.7. There was statistically significant prolongation of time for two segment regression in Group A than Group BandC. There was statistically significant

prolongation of time for two segment regression in group B than group C.

Group	Range	Mean	SD
Group A	90-150	116.7	17.2
Group B	110-220	136.2	27.2
Group C	110-220	142.0	31.8

Table 2: time for first rescue analgesic (minutes)

Range	Mean	SD
120-125	195	46.4
120-220	168.3	30.3
90-200	141.3	26.5

Table 3: Time for 2 segment regression (minutes)

range	Mean	SD
90-140	102.2	18.4
60-120	93.8	16.1
50-90	66.7	15.8

Duration of motor blockade in group A is 205 minutes when compared with group B and C which was about 194.5and 190.2 minutes respectively. There was statistically insignificant difference in duration of motor blockade in group A, B and C. Dexmedetomidine has extensive uses in the field of anaesthesia and intensive care medicine. It has analgesic, sedative properties without causing respiratory depression and hence can be used as an opioid. alternative to Following administration of clonidine and dexmedetomidine through intravenous route, both effectively inhibit the transmission of nociceptive impulse at spinal cord level from peripheral surgical stimulation and also has supraspinal effect at locus ceruleus, thereby acting as an additive to spinal anesthetic blockade. But dexmedetomidine is more potent alpha2 agonist with 8 time greater affinity for alpha 2 adrenoceptor than clonidine.

Demographic profile: The mean age, sex distribution, the BMI, ASA classification were comparable in all the three groups and there was no statistical difference between these groups.

Onset of sensory block: According to this study, the average time taken for onset of sensory block is 57 seconds for dexmedetomidine group ,74 seconds for clonidine group and 93 seconds for control group. Thus dexmeditomidine has faster onset of sensory blockade. This results is similar to that found in study conducted by Harsoor and colleagues.

Maximum height of sensory block: Mean higher level of sensory block in all three groups was T6. This shows that level of blockade is not affected by study drugs. This finding is similar to the results of study conducted by A Asada and colleagues.

Two segment regression time: According to this study, the mean two segment regression time is about

102 minutes in group A ,93 minutes in case of group B,66 minutes in Group C. Mean duration time for two segmental regression in group A is prolonged and was statistically significant than group B and group C with the p value of 0.0001. This is similar to that of study conducted by M Islam and colleagues.

Motor blockade: According to this study, onset time for motor blockade is 116 seconds in Group A ,136 seconds in group B and 142 seconds in group C shows early onset time of motor blockade in group A when compared to other groups. The mean duration of motor blockade is about 205 minutes in case of group A,194 minutes in case of Group B and 190 minutes in case of Group C shows duration of motor blockade is not affected by study drugs. Though motor blockade onset time in Group Α has significant earlier onset with p value of 0.0008, duration of motor blockade were comparable between three groups and was statistically insignificant with p value of >0.05. This could be attributed to the fact that the conduction of sensory fibre may be more inhibited than motor fibre. The noradrenergic innervation of the spinal cord arise from the noradrenergic nuclei present in the brain stem. So, the disinhibition of the noradrenergic nuclei lead to descending inhibitory effect on spinal cord thereby prolonging the sensory block duration rather than motor block. This is similar to study conducted by those of Kaya and colleagues showed that the duration of motor blockade was not affected. parameters: Intraoperatively Hemodynamic although the fall in systolic blood pressure was more in group A and group B compared to control group, the results were not statistically significant. Bradycardia occurred 6 % in group A ,3% in group B and nil in control group which was statistically insignificant. This is similar to study conducted by Jung and colleagues

Sedation score: The sedation score of most of the patients were between 2 and 3 grade i.e easily arosable with oral commands in group A and B when compared to control group where patients were anxious and restless. This is similar to study conducted by P Bansal and colleagues.

CONCLUSION

Dexmedetomidine or clonidine when administered as an infusion 10 minutes prior to the conduct of subarachnoid block using bupivacine, decreased the sensory and motor onset time, prolonged the two sensory regression time and increased the duration of sensory blockade without actually increasing the motor blockade duration. When compared to clonidine, dexmedetomidine had a statistically significant faster onset of sensory blockade, prolonged two segment regression time and duration of analgesia. MedPulse International Journal of Anesthesiology, Print ISSN: 2579-0900, Online ISSN: 2636-4654, Volume 9, Issue 1, January 2019 pp 52-55

REFERENCES

- 1. Jung SH, Lee SK, Lee JM, Lee JJ, Hwang SM, Hong SJ. The effects of single-dose intravenous dexmedetomidine on hyperbaric bupivacaine spinal anesthesia. J Anesthesia. 2013 Jan 10.
- Effect of supplementation of low dose intravenous dexmeditomidine on characteristics of spinal anesthesia with hyperbaric bupivacaine. Indian journal of anesthesia may-june 2013
- Mahmoud M Al-MustafaAl-Barazangi, Isalm M Massad and Subhi M. Al-Ghanem Intravenous dexmedetomidine prolongs bupivacaine spinal analgesia. M.E.J. ANESTH ESIA 20 (2), 2009.
- F. N. Kaya *et al.* Intravenous dexmedetomidine, but not midazolam, prolongs bupivacaine spinal anesthesia Can J Anesth/J Can Anesth (2010) 57:39–45
- Patel CR, Engineer SR, Shah BJ, Madhu S.Effect of intravenous infusion of dexmedetomidine on perioperative haemodynamic changes and postoperative recovery: A study with entropy analysis. Indian J Anaesthesia.2012 Nov;56(6):542-6.

- Rhee K, Kang K, Kim J, Jeon Y.Intravenous clonidine prolongs bupivacaine spinal anesthesia. Acta Anaesthesiol Scand 2003.
- Jain G, Bansal P, Ahmad B, Singh DK, Effect of the perioperative infusion of dexmedetomidine on chronic pain after breast surgery. Indian J Palliat Care. 2012. 18(1):45-51.
- Wiad Lek. 2003;56(11-12):520-6.Prolongation of Bupivacaine spinal anaesthesia by oral and intramuscular Clonidine Techanivate A, Dusitkasem S, Anuwattanavit C. Dexmedetomidine compare with fentanyl for postoperative analgesia in outpatient gynecologic laparoscopy: a randomized controlled trial. J Med Assoc Thai. 2012 Mar;95(3):383
- Xu YY, Song XR, Lin ZM, Zhang GQ, Zhang N.Effect of dexmedetomidine on postoperative analgesia and sedation in pediatric patients undergoing cleft lip and palate repair Zhonghua Yi Xue Za Zhi. 2012 Apr 3;92(13):878-81.
- Iwakiri H, Oda Y, Asada A, Ozaki M.The efficacy of continuous infusion of low dose dexmedetomidine for postoperative patients recovering in general wards.Eur J Anaesthesiol. 2012 May;29(5):251-4.

Source of Support: None Declared Conflict of Interest: None Declared