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International Journal of Current Research
Vol. 7, Issue, 10, pp.21318-21321, October, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

COMPARISON OF DEXMEDETOMIDINE 5 MCG AND CLONIDINE 75 MCG ADDED TO 12.5 MG OF 0.5% HEAVY BUPIVACAINE FOR SPINAL ANAESTHESIA IN LOWER ABDOMINAL SURGERIES

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ARTICLE INFO

Article History:
Received 21st July, 2015
Received in revised form
07th August, 2015
Accepted 18th September, 2015
Published online 20th October, 2015

Key words:

Alpha2adrenoreceptor Agonist,
Clonidine, Dexmedetomidine,
Spinal Anesthesia.

ABSTRACT

Background: There are many adjuvants in the market which have been successfully used in combination with local anesthetics for intraop and postop analgesia.dexmededetomidine is a recent addition to the area of intensive care.it is a highly selective alpha 2 adrenergic agonist which is now gaining popularity as a new neuraxial adjuvant.

Materials and Methods: sixty adult patients of ASA grade I-II were randomly divided into two groups of thirty each. Groups Clonidine (C), and Dexmeditomidine (D) received hyperbaric bupivacaine 0.5% 2.5 ml intrathecally with clonidine 75µg&dexmedetomidine 5 µg respectively. Hemodynamic data, degree of motor block (modified bromage scale), time to reach sensory block to L1 level, time for two segment regression of sensory block and time to reach modified bromage 0, total duration of analgesia were assessed.

Results: Onset of motor block was delayed with group D as compared to group C .The difference was statistically insignificant (191.23 ± 98.04 sec in group D vs 171.75 ± 57.75sec in group C , p=0.001). Onset of sensory block was delayed with group C as compared to group D (83 ± 32.42 sec in group D Vs 115 ± 39.35 sec in group C, p=0.01). Dexmedetomidine produced significantly longer duration of sensory and motor block as compared to Clonidine. Regression time of sensory block was 374.34 ± 44.54 min for group D as compared to 302.5 ± 29.18 min for group C. Regression time to reach Bromage 1 was 317 ± 32 min for group D as compared to 220 ± 48 min for group C patients remained hemodynamically stable in both Dexmedetomidine and Clonidine groups.

Conclusion: It can be concluded that though both clonidine and dexmedetomidine prolonged duration of sensory and motor block of bupivacaine, dexmedetomidine is better in terms of longer duration of action.

***Citation*:** Prabhavathi. R., Sreenivasulu, A., Chaitanya kumar, G., Narasimha Reddy, P., Vara Prasad, G., Sujit, T.R. 2015. "Comparison of dexmedetomidine 5 mcg and clonidine 75 mcg added to 12.5 mg of 0.5% heavy bupivacaine for spinal anaesthesia in lower abdominal surgeries", *International Journal of Current Research*, 7, (10), 21318-21321.

INTRODUCTION

Local anesthetics are the commonly used agents for neuraxial anesthesia. Their shorter duration of action led to the usage of various additives in combination with them to prolong the intraop as well as post op analgesia. (David, 2005; Collins, 1993; Shetty, 2006) Opiods are the most common intrathecal additives to prolong postop analgesia without significant effect on motor block due to their adverse effects like nausea, vomiting, urinary retention, pruritis, urinary retention and delayed respiratory depression, a search for newer analgesics have come up.(Chaney, 1995) dexmed is a highly selective alpha 2 adrenergic agonist with an affinity of 8 times greater than clonidine. They have both analgesic and sedative properties.

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(Kamibayashi and Maze, 2000; Scafati, 2004; Mauro and Brandão, 2004; Gabriel and Gordin, 2001; Hall *et al*., 2001; Hall *et al*., 2000-10) Dexmed with an enhanced sympathoadrenal stability and an excellent quality of analgesia is now being widely used as an intrathecal adjuvant. (Taittonen *et al*., 1997; Buerkle, 2000)

MATERIALS AND METHODS

After approval of local institutional ethics committee and written informed consent from study participants, this parallel group randomized double blinded study was carried out in 60 ASA I & II patients age between 30-60 years, weight between 35-80 kg, height between 140-170 cm. Patients scheduled for elective lower abdominal surgeries were divided into two groups of thirty each and they were placed in Group C or Group D. Patients excluded from the study were patients with

contraindications for spinal anesthesia, sensitivity to study drugs. Patients were shifted to ot and an iv line was secured and connected to ivfluids. Monitoring included NIBP, spo2, PR, RR. baseline measurements were recorded. Subarachnoid block was given and the above parameters were recorded at 0 min, 5 min, 15 min, 30 min, 60 min and 90 min and at the end of surgery in all the patients. The time for intrathecal injection was taken as 0 and the following parameters were recorded. – on set of sensory blockade was taken as loss of sensation to temperature by spirit swab at l2 level. onset of motor block was taken as bromage scale 1. Respiratory rate, sedation and any other complications were observed.

Hypotension was defined as fall in systolic BP > 30 % from baseline or mean arterial pressure (MAP)<60 mmHg. This was managed with inj. Ephedrine 6mg increments. Bradycardia was defined as HR <50 /min and this was managed with Inj. Atropine 0.01mg/kg i.v. Respiratory depression defined as RR< 8/min and or SpO2 <85%. This was planned to be managed with bag and mask ventilation or intubation and IPPV if necessary. The occurrence of sedation was assessed using Ramsay sedation scale. Patient was shifted to recovery room after completion of surgery, the vital signs were recorded, every 30 mins interval. Sensory and motor block assessments were done every 15 mins till recovery of pin prick sensation to L1 and Bromagescale of 1 respectively. Patients were shifted to post operative ward after complete resolution of motor blockade. In the recovery room pain assessment using visual analogue scale (VAS) were done every15 mins . At the end of surgery, the degree of pain was assessed using VAS scale till VAS score >4 was reached. Whenever the patient complained of pain and rescue analgesic Inj. Diclofenac 75mg i.m was given. Duration of effective analgesia was defined as time interval between onset of SAB and the time to reach VAS >=4.

Patients were monitored for 24 hrs to detect the occurrence of side effects - respiratory depression, nausea, vomiting, dry mouth and pruritis. Patients were also enquired about the occurrence of Transient neurological symptoms which was described as pain / paresthesia in the buttocks, legs or pain radiating to lower extremities after initial recovery from SAB within 72 hrs

Statistical Analysis

The statistical analysis was performed using IBM SPSS Version-20. Categorical data was presented as actual numbers and percentages. Continuous data were expressed as Mean ± SD. For normally distributed data, between group analyses was performed using unpaired t test. Categorical variables were analyzed with "Fischer's exact test". For statistical significance, a two tailed probability value of less than 0.05 was considered.

RESULTS

The demographic data reveals that both groups are comparable in age, height, and sex ratios. There was no statistical significant difference in the duration of surgery(116 ± 64.7 min in group D Vs 161 ± 70 min in group C, p=0.66) and median maximum sensory level achieved (T6) in both the groups. The onset of sensory blockade was shorter in D group than in C group. (83 ± 32.42 sec in group D Vs 115 ± 39.35 sec in group C, p=0.001). (Fig.1). The onset of motor blockade was delayed in D group when compared to C group. (191.23 ± 98.04 sec in group D vs 141.75 ± 57.75sec in group C, p=0.01). (Fig.1) There was significant difference in the duration of analgesia, (374.3± 44.5 min in group D Vs 302.5 ± 29.1 min in group C, p=<0.0001) and duration of motor block (317± 32 min in group D Vs 220 ± 48 min in group C, p=<0.0001) (Fig.3).

Table 1. Comparison of demographic and anesthetic parameters between two groups

Parameters	Group D (n=30)	Group C (n=30)	P Value
Demographic data			
Age (yrs)	40.8 ± 9.1	39.5 ±11.4	0.62
Sex (F/M)	12/18	13/17	1.00
Height (cms)	156.6 ± 4.8	158.4 ± 4.6	0.07
Onset and duration of sensory and motor blockade			
Duration of surgery (min)	116 ± 64.7	161 ± 70	0.66
Onset of sensory blockade (sec)	83 ± 32.4	115± 39.3	<0.0011
Onset of motor blockade (sec)	191.2± 98.0	141.7±51.7	0.01
Duration of analgesia (min)	374.34±44.5	302.5±29.1	<0.0001
Duration of motor block (min)	317 ± 32	220 ± 48	<0.0001
Maximum sensory level achieved.	T6 ± 1.2	T6 ± 1.2	1.00

Table 2. Variations in pulse rate, respiratory rate and mean arterial bp between two groups

Time	Pulse rate			Respiratory rate			Mean arterial BP		
	GROUP-D	GROUP-C	P	GROUP-D	GROUP-C	P	GROUP-D	GROUP-C	P
PRE OP	81.7 ± 18.6	75.3 ± 10.3	0.10	14 ± 1.0	14 ± 1	>0.05	96.1 ± 9.4	93.4 ± 6.4	0.14
0 MIN	85.1 ± 20.9	78.2 ± 12	0.12	14 ± 1.4	14 ± 1.1	>0.05	110.2±11.6	92.3 ± 9.6	<0.0001
5 MIN	77.6 ± 22.7	67.2 ± 9.8	0.02	14 ±0.8	14 ± 1.2	>0.05	84.3±10.56	81.4 ± 9.12	0.22
15 MIN	71.6 ± 17.4	63.3 ± 8.9	0.01	14 ± 0.8	14 ± 1	>0.05	80.1±12.11	77.6 ± 9.23	0.27
30 MIN	69.7 ± 15.7	61.3 ± 8.0	0.009	13 ± 0.8	14 ±1	>0.05	80.8 ± 9.7	78.9 ± 10.4	0.43
60 MIN	66.1 ± 14.2	62.5 ± 7.5	0.16	13 ± 0.6	13 ± 0.9	>0.05	76.4 ± 7.7	80.6 ± 9.67	0.06
90 MIN	65.6 ± 14.5	62.3 ± 7.1	0.22	13 ± 0.8	13 ± 0.9	>0.05	78.6 ± 8.78	80.2 ± 9.9	0.36
EOS	68.9 ± 11.8	63.5 ± 7.4	0.03	13 ± 0.7	13 ± 0.9	>0.05	79.7±11.21	81.3 ± 9.0	0.44

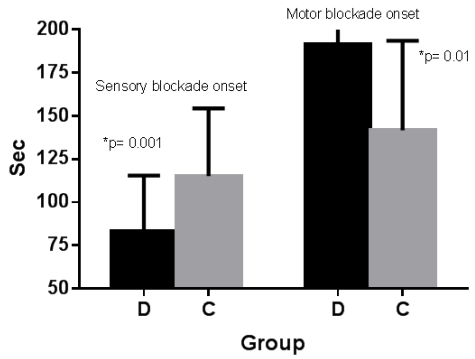

Figure 1. Comparison of onset of sensory and motor blockade

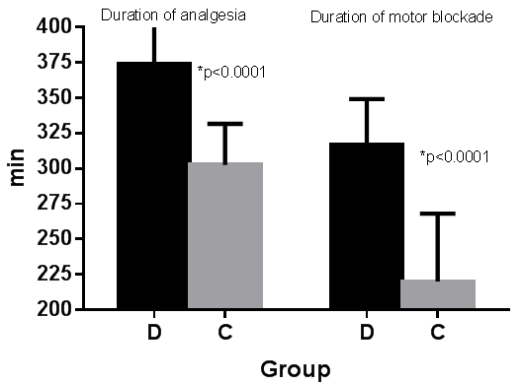

Figure 2. Comparison ofduration of sensory and motor blockade

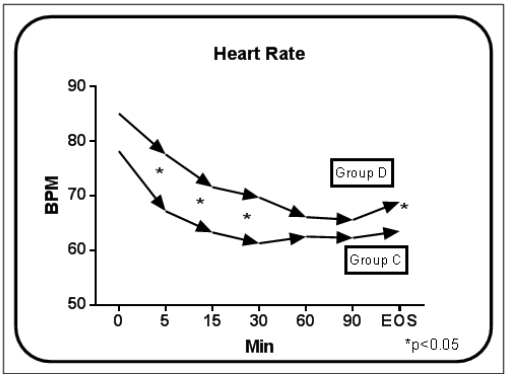

Figure 3. Intra-operative variation in heart rate between group d vs. group c

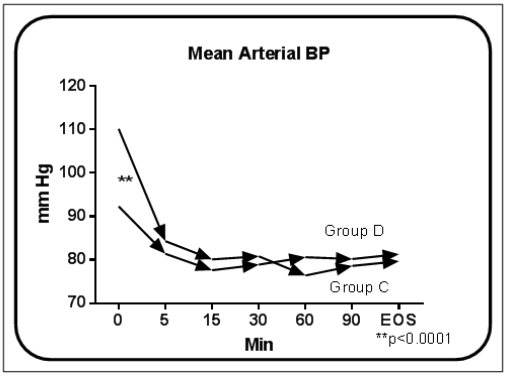

Figure 4. Intra-operative variation in mean arterial blood pressure between group d vs. group c

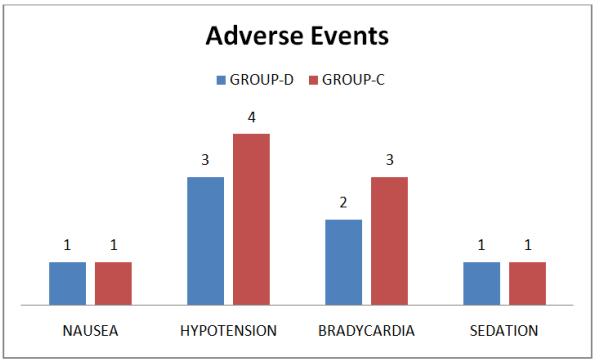

Figure 5. Adverse events between two groups

The duration of analgesia and motor blockade was more for D group than C group. Variation in PR, and mean arterial BP as shown in Fig.3 and 4.

DISCUSSION

Dexmedetomidine and Clonidine, are alpha-2 adrenoceptor agonist agents initially prescribed for hypertension and intravenous sedation. In the process of search for non opioid analgesics their role extended into clinical anesthesia and they have become the best alternatives. Though there are sufficient studies on addition of Clonidine to local anaesthetics both epidurally and intrathecally, intrathecal and epidural characteristics of Dexmedetomidine have been studied mainly in animals and there is scarcity of literature about intrathecal use of Dexmedetomidine in humans. When we compared the Dexmedetomidine and Clonidine with each other, we found that onset of motor block was delayed with Dexmedetomidine as compared to Clonidine. Onset of sensory block was delayed with Clonidine as compared to Dexmedetomidine. Dexmedetomidine produced significantly longer duration of sensory and motor block as compared to Clonidine. Regression time of sensory block was 374.34 ± 44.54 min for Dexmedetomidine as compared to 302.5 ± 29.18 min for Clonidine. Regression time to reach Bromage 1 was 317 ± 32 min for Dexmedetomidine as compared to 220 ± 48 min for Clonidine. When we searched the literature we found that very few authors have compared intrathecal Dexmedetomidine to Clonidine.

Rampal Singh and Aparna Shukla (Singh and Shukla, 2012) compared the effects of intrathecal Clonidine and Dexmedetomidine on sensory analgesia and motor block of hyperbaric Bupivacaine. Regression time of sensory block to S1 dermatome was significantly higher. Regression time to reach bromage 1 was significantly high in group dex and Clonidine groups as compared to bupivacaine. They concluded that though both Clonidine and Dexmedetomidine prolonged duration of sensory and motor block of Bupivacaine, Dexmedetomidine is better in terms of longer duration of action. SukhminderJit Singh Bajwa (2011) compared Dexmedetomidine and Clonidine in epidural anaesthesia. Dexmedetomidine to Ropivacaine as an adjuvant resulted in an earlier onset of sensory analgesia at T10 level as compared to the addition of Clonidine Dexmedetomidine not only provided higher dermatomal spread but also helped in achieving the maximum

sensoryanaesthetic level in a shorter period compared to Clonidine Modified Bromage scale 3 was achieved earlier in patients who were administered Dexmedetomidine as adjuvant Kanazi (2006) studied the effect of low-dose Dexmedetomidine or Clonidine on hyperbaric Bupivacaine They opined that Dexmedetomidine (3 mcg) or Clonidine (30 mcg), when added to intrathecal Bupivacaine, produces a similar prolongation in the duration of the motor and sensory block with preserved hemodynamic stability and lack of sedation. In our study, patients remained hemodynamically stable in both Dexmedetomidine and Clonidine groups. Patients in Clonidine group had a greater in heart rates than in Dexmedetomidine groups, and the difference was statistically significant. There was no much fall in blood pressure and heart rate when compared to the baseline values.

Mahmoud M. Al-Mustafa (2009) added Dexmedetomidine to spinal Bupivacaine for urological procedures. They opined that Dexmedetomidine has dose dependent effect on onset and regression of sensory and motor block. Subhi M. Al-Ghanem, (2009) evaluated the onset and duration of sensory and motor block as well as operative analgesia and adverse effects of Dexmetedomidine (5 µg) or Fentanyl (25 µg) given intrathecally with plain 0.5% Bupivacaine (10mg) for spinal anaesthesia. Patients in Dexmedetomidine group (D) had significant longer sensory and motor block as compared to patients in fentanyl group (F). Hypotension was mild to moderate in both groups except one patient in group F, who had a blood pressure less than 90 mmHg, and required 36 mg ephedrine to restore his blood pressure They concluded that, 10 mg plain Bupivacaine supplemented with 5 µg .Dexmedetomidine produces prolonged motor and sensory block compared with Fentanyl. Van Tuij, (2008) added various doses of Clonidine (0, 15 or 30 µg) to 5 mg hyperbaric Bupivacaine and evaluated their effect on the duration of the motor block, analgesic quality and ability to void. They opined that addition of 15 and 30 µg of Clonidine increased the motor block duration by 25 and 34 min, respectively and also resulted in better analgesic quality. Adverse effects like bradycardia and hypotension are minimal. Bradycardia and hypotension are seen little more in clonidine group than with dexmeditomidine group.

Conclusion

Intrathecal addition of 5µg dexmed to 0.5% heavy bupivacaine is an excellent alternative to other additives. dexmed provides faster onset of sensory block, excellent quality of analgesia, prolonged duration of motor block with stable haemodynamics in comparison with clonidine 75µg.

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