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CLONIDINE AS AN ADDITIVE TO HY PERBARIC BUPIVACAINE IN SPINAL ANAESTHESIA – A STUDY

Anaesthesiology

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ABSTRACT

Background: The purpose of this study was to compare the onset and duration of sensory & motor block, as well as the hemodynamic changes and level of sedation following intrathecal bupivacaine supplemented with clonidine vs intrathecal bupivacaine alone

Methods: In a prospective, double-blind study, 66 patients undergoing infra- umblical surgeries under spinal anesthesia were randomly allocated to one of 2 groups. Group B received 12.5 mg of hyperbaric bupivacaine and group C received 12.5 mg of bupivacaine supplemented with 50 µg of clonidine. The time to attain peak sensory& motor blockade as well as the sensory& motor regression time was recorded. Hemodynamic changes and the level of sedation were also recorded.

Results: Patients in group C had a significantly shorter onset time for sensory and motor block in addition to time for significantly prolonged sensory and motor regression time than control group. The mean time of sensory regression to the S1 segment was 265 min in group C and 179 min in group B (B vs. C, $P < 0.001$). The regression of motor block to bromage 0 was 205.9 min in group C and 148.55 min in group B (B vs. C, $P < 0.0001$). Clonidine lowered the pulse rate, systolic BP, diastolic BP significantly and the lowering of SBP was sustained for a prolonged period. Similarly clonidine produced a much deeper and prolonged plane of sedation.

Conclusions: In comparison to intrathecal bupivacaine alone, clonidine (50 µg) when added to intrathecal bupivacaine, produced a prolonged duration of the motor and sensory blockade hence the longer duration of analgesia but at a manageable cost of hemodynamic instability.

KEYWORDS

α2 adrenergic agonist, Clonidine, hyperbaric bupivacaine, Spinal anaesthesia.

1.INTRODUCTION

Spinal anaesthesia is commonly used for abdominal, perineal, gynaecological and lower limb surgeries. It offers excellent anaesthesia and fewer side effects than general anaesthesia. It is easy to perform and provides faster onset and effective sensory and motor block. Bupivacaine produces long lasting spinal anaesthesia without transient neurological symptoms. Recently there has been a surge of interest in using additives to intrathecal bupivacaine to prolong the duration of intraoperative and post-operative analgesia as well as to decrease the total dosage of bupivacaine.

Clonidine is an α2-adrenergic agonist that is often administered intrathecally in humans. It has been given in dosage of upto 450 µg in various studies. The duration of sensory and motor blockade plateaued at 150 µg itself. The potency of an epidurally administered α2-adrenergic agonist was well correlated with their binding affinity to the spinal α2-adrenergic receptor and its role in pain gate mechanism. Therefore, we used larger doses of Clonidine (50 µg) combined with Bupivacaine in spinal anaesthesia. We investigated the effect of this additive on the onset and regression times of sensory and motor blockade, together with hemodynamic and sedation changes.

2.AIM OF THE STUDY

To compare the onset and duration of sensory and motor blockade as well as the changes inhemodynamics and levels of sedation following intrathecal bupivacaine supplemented with clonidine vs intrathecal bupivacaine alone

3.MATERIALS AND METHODS

This study was a prospective double blinded randomized study conducted at Madurai Medical College Hospital between March 2011 to August 2011 on 66 patients of ASA physical status I, II and III undergoing infra umbilical surgeries. This study was done after Ethical Committee approval and written informed consent obtained from all patients.

SELECTION OF CASES

INCLUSION CRITERIA:

All Patients undergoing in infra umbilical surgeries between the age of 18 to 70 yrs with ASA - PS <= III

EXCLUSION CRITERIA

Patients currently on anti hypertensive therapy, Renal/ hepatic dysfunction and any Contra indication to subarachnoid block were excluded from the study.

Thus 66 patients satisfying the above criteria were enrolled and allocated to either group B or group C. Patients in group B received 2.5ml of 0.5% hyperbaric bupivacaine plus 0.5ml preservative free normal saline. Patients in group C received 2.5ml of hyperbaric bupivacaine with 50 µg of clonidine in 0.5 ml preservative free normal saline.

Preoperative baseline systolic and diastolic BP, PR, Sp02 and RR were recorded. SAB was done and observations were made in all the patients involved in the study. Under strict aseptic precautions, a midline lumbar puncture was performed using a 25G Quincke needle in right lateral decubitus position. The patient was then immediately placed in supine position.Vital signs were recorded at 5 mins interval intraoperatively until the end of surgery. In the recovery room, vital signs were recorded every 15 mins. The sensory blockade level was assessed by pinprick sensation using a 25 guage needle along the midclavicular line bilaterally. The motor blockade was assessed according to the modified Bromage scale[1] Ramsay Sedation Score[2] was used to assess the depth of sedation. The time to reach T10 dermatome sensory blockade was taken as the time to reach the peak sensory level. The times to reach Bromage 3 motor blockade is considered as the time for onset of motor blockade. The maximum level of sensory blockade attained was also recorded during the time of surgery. The regression time for sensory and motor blockade (sensory regression to S1 dermatome and Bromage 0) were recorded in recovery room. All durations were calculated considering the time of spinal injection as time zero. Duration of analgesia was assessed using visual analogue pain scale [3] Time to reach VAS score of >=4 was considered as the duration of analgesia. Patients were monitored for 24 hrs to detect the occurence of side effects - nausea, vomiting,pruritis and respiratory depression. Patients were also enquired about the occurence of Transient neurological symptoms which was described as pain / paresthesia in the neck, buttocks, legs or pain radiating to lower extremities after initial recovery from SAB within 72 hrs.

4.RESULTS

There was no significant difference in the distribution of baseline demographic variables like age, sex,height, weight and ASA status and types of surgeries done. (Table 1).

DISTRIBUTION OF MEAN ONSET OF SENSORY BLOCK (Mins) BY GROUPS

Group C showed a significant early onset of sensory blockade than group B (mean 4.03 min Vs 6.35 min). (Table 2).

Similarly, there is a shorter time to onset of motor blockade in Clonidine group which was statistically significant. (Table 3).3.88 mins in Group C vs 7.38 mins in Group B.

The median and the range of peak sensory levels reached during surgery were T7 (T5 to T10) in group B and T5 (T3-T7) in Group C. This was statistically significant (Table 4).

There was a significant statistical difference in the mean 2 segmental regression time(99.5 +/- 16.6 mins in Group C and 77+/- 8.24 mins in Group B (Table 5).

Cloniodine significantly prolonged the total duration of motor blockade in comparision to bupivacaine alone. 205.9 mins (Group C) vs 148.6 min (Group B) respectively. (Table 6).

It took 306 mins to reach a VAS score of 4 in clonidine group vs 116 mins in bupivacaine group. (Table 7)

Similarly, the time for sensory regression to S1 level (total duration of sensory blockade) was 265.5 mins in clonidine group vs 180 mins in bupivacaine group. (Table 8)

Table 1:Demographic parameters

Parameters		Bupivacaine		Clonidine		Significance
		Mean	Std. deviation	Mean	Std. deviation	
Age (yrs)		42.9	9.85	41.2	8.7	P<0.70
Weight(kg)		55.7	8.1	54	7.3	P<0.65
Height(cms)		160.7	5.8	158	7	P<0.12
Sex	M	25		26		P<0.83
	F	8		7		

5.DISCUSSION

Alpha 2 agonist clonidine when added to local anaesthetics in SAB has shown to provide excellent surgical anaesthesia.

ONSET OF SENSORY BLOCK:

Our study showed a significant early onset of sensory blockade in group C compared to group B.

Our findings were similar to those of the study conducted by Manisha Sapate,et al [4] as 4.7 mins in group C vs 6.3 min in group B.

ONSET OF MOTOR BLOCK:

The mean time to the onset of motor block was 7.3min in group B vs 3.9 min group C.. The addition of clonidine has significantly shortened the time to onset of motor blockade in our study.

Manisha Sapate et al. [4] demonstrated similar findings in her study (Group B 8.6min vs group C-6min).

MAXIMUM LEVEL OF SENSORY BLOCK:

There was a statistically significant difference among the groups in maximum level of sensory block. Median and range of Highest Sensory blockade attained were; Group B- T7 (T5-T1O), Group C- T5 (T3-T7). In our study, addition of clonidine has significantly increased the highest level of sensory blockade (T3-T7). Hence, the usage of clonidine for supra umbilical abdominal surgeries should be explored. Kanazi et al [5] in his study found that addition of intrathecal Clonidine 30 microgms and Dexmedetomidine 3 microgms to 0.75% Bupivacaine resulted in a much lower peak sensory levels in comparison to our study.(Group B T6(T4-10),group C T6.5(T3-9),group D T6(T 10)). This could be due to lower dosage of Clonidine and lower volume of the drug administered.

MAXIMUM MOTOR BLOCK ATTAINED:

The median of maximum grade of motor block attained was grade 3 in all the groups measured using modified bromage scale. There is no statistically significant difference among the groups.

Klimscha et al [6] showed that intrathecal clonidine 150 microgms added to 0.5% bupivacaine significantly increased the intensity of motor block. Bonnet et al in his study found that intensity and duration of motor block was prolonged with increasing the dose of clonidine from 75 mics to 150 mics added to 0.5% tetracaine 15mg.

TIME FOR TWO SEGMENTAL REGRESSION:

The mean time taken for two segmental regression was 99.53 mins in group C compared to 77 mins in group B.

This correlated well with the studies of Kanazi et al.[5]

MEAN DURATION OF MOTOR BLOCK:

The mean duration of motor block was 148.5mins in group B, compared to 205.9mins in group C. Clonidine has a prolonged motor blockade, hence a longer post-operative care unit admission hence a late discharge.

Kanazi et al [5] shows similar results (163, 216,250mins) respectively, Which correlates with our study if we take the dosage and volume of the drugs in to consideration.

MEAN DURATION OF SENSORY BLOCKADE

The mean duration of sensory regression to first sacral dermatome was 180 mins in group B compared to 266 mins in group C, which were statisticaly significant. Hence is produces prolonged periods of pain relief which correlates well with duration of analgesia. This correlated with study by kanazi et al [5] where there was significant prolongation of sensory blockade (190, 272, 303 mins in Group B,C,D respectively)

Dobrydnjov et al [7] also showed in his study that clonidine added to small dose bupivacaine for inguinal hernioraphy had prolonged analgesia compared to control group.

Study by Mercier et al [8] showed addition of clonidine to intrathecal sufentanil for labour significantly prolonged analgesia.

Hemodynamic Characteristics

Clonidine lowered the pulse rate, systolic BP, diastolic BP. But in clonidine lowering of Systolic BP was significant and sustained for a prolonged period. Hence higher dosages of clonidine should be used with caution in SAB. 10% of cases had significant hypotension and bradycardia requiring ephedrine/Atropine.

Study by Chiari Astrid et al [9] on analgesic and hemodynamic effects of intrathecal clonidine as a sole analgesic agent during first stage of labour showed hypotension was produced by increasing doses of clonidine.

Study by Fibs kriton et al [10] found that hypotension is the main side effect.

Sedation

Clonidine group had deeper levels of sedation with a RSS score of 3.3 , which did not require any active intervention.

CONCLUSION

The addition of Clonidine as an adjuvant to bupivacaine in SAB shortens the onset and prolongs the duration of both sensory and motor blockade.

We conclude that 50microgm of clonidine in subarachnoid block is more potent with respect to both onset and duration of sensory and motor blockade in comparison to bupivacaine alone. Though clonidine produced a lowering of heart rate and blood pressure which were severe enough to warrant active intervention in some of the cases, hence clonidine needs to be used with caution particularly in geriatric and patients on anti hypertensives.

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