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To Compare Block Characteristics (Sensory And Motor) Of Bupivacaine Lain Vs. Bupivacaine With Low Dose Dexmedtomidine As Adjuvant In Spinal Anesthesia.

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ABSTRACT

This study was carried out in 60 adult ASA 1 & ASA 11 patients .to compare the sensory and motor blockade using plain Bupivacaine with normal saline(placebo) versus Plain Bupivacaine with dexmedetomidine .It was found that dexmedetomidine with bupivacaine in spinal anesthesia prolongs to the duration of sensory and motor bloc kade also the time interval required for supplemental analgesia.

Keywords : dexmedtomidine , blockade , lower abdominal surgery

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INTRODUCTION

Spinal anesthesia is the most commonly used technique for lower abdominal and lower limb surgeries as it is very economical and easy to administer.

Intrathecal α_2 agonist when used as adjunct potentiates the effect of local anesthetics and allows a decrease in required doses..

Dexmedetomidine is new highly selective $\acute{\alpha}_2$ adrenoceptor agonist and has been approved by Food and Drug Administration (FDA) as intravenous sedative and coanalgesic drug. Its $\acute{\alpha}_2/\acute{\alpha}_1$ selectivity is eight times higher than clonidine.

On the basis of previous studies, our hypothesis was that intrathecal dexmedetomidine would produce a similar effect on the characteristics of bupivacaine spinal anesthesia. The purpose of this study was to compare the onset and duration of sensory and motor block, as well as the hemodynamic changes following intrathecal bupivacaine supplemented with low dose of dexmedetomidine vs intrathecal bupivacaine with placebo [1-12].

Aims and Objectives

- To compare the onset and duration of motor and sensory block,following intrathecal bupivacaine with placebo vs intrathecal bupivacaine with dexmedetomidine in lower abdominal or lower limb surgeries

- To compare the time taken for rescue analgesia , following intrathecal bupivacaine with placebo vs. intrathecal bupivacaine with dexmedetomidine in lower abdominal or lower limb surgeries.

MATERIALS AND METHODS

Source of data collection

The study group (60) will comprise of patients admitted in our institution, for elective lower abdominal or lower limb surgeries.

Method of data collection

Inclusion Criteria

- Patients aged between 18-60 years
- ASA I-II
- Scheduled for elective lower abdominal or lower limb surgeries

Exclusion Criteria

- Patients using α_2-adrenergic receptors antagonists, calcium channel blockers, angiotensin converting enzyme inhibitors
- Dysrhythmia
- Body weight more than 120 Kg
- Height less than 140 cm,
- Post spinal surgeries, spinal deformity,
- History of allergy to study drugs,
- Pregnancy
- Coagulopathy
- Neurological disorder

Pre-operative Preparation

Routine Pre operative assessment was done to all the patients . prior to surgery urea , serum creatinine ,serum electrolytes , chest X ray , Electrocardiogram .

GROUP A: Received Inj . 0.5 % Bupivacaine 2 cc + normal saline 0.5cc =2.5 cc

GROUP B: Received Inj 0.5% Bupivacaine 2 cc + Inj Dexmedetomidine (5µg)

On the day of surgery, preoperative baseline parameters like Pulse rate , Blood Pressure , were recorded. Intravenous line with 18 gauge was started. all patients were preloaded with 20ml/kg .ringer lactate solution.

All emergency drugs and equipments were kept ready. Inj Dexmedetomidine diluted to 10 cc with sterile normal saline and made into 10 µ/ml. it was then loaded by a third party as per randomization in a 1 ml insulin syringe .spinal anesthesia was given in right lateral position using 25 G spinal needle in all patients at L3-L4 interspinous space. following the injection they were put in supine position .

During surgery patients received Oxygen @ 4lts through face mask .The level of sensory block was assessed by pin prick sensation using the 25 G spinal needle in the mid – clavicular line.The level of motor blockage was assessed using bromage scale.

*Bromage scale

1- Free movement of legs / feet
2- Just able to flex knees with free movement of feet
3- Unable to flex knees, but with free movement of feet
4- unable to move legs/ feet

The intraoperative parameters were all measured every 2 mins for first 10 mins , then every 5 mins for the 1st hour .then every 15 mins for 2nd hour then every 30 mins till the 1st dose of rescue analgesia .

Hypotension was defined as a decrease in systolic blood pressure by 20 % from baseline.was treated with inj ephedrine 6 mg intravenously. . Bradycardia defined as a pulse rate of < 50 beat/ min will be treated with boluses of 0.3- 0.6 mg atropine. Respiratory depression (RR <8 or SpO2<95%) will treated with oxygen supplementation and respiratory support if required. All data collection will be performed by a blinded observer.

Level of sedation was evaluated introperatively and post operatively every 15 mins for 1st 3 hours then for next 8 hours using Ramsay Sedation Score:

1 – Anxious and agitated or restless or both
2 – Co-operative , oriented and calm
3- Responsive to commands only
4 – Exhibiting brisk response to light glabellar tap or loud auditory stimulus
5- Exhibiting a sluggish response to light glabellar tap or loud auditory stimulus
6- Unresponsive

Pain was assessed by the verbal rating score .

Verbal rating score

0 – No pain
1- Mild Pain
2- Moderate Pain
3- Severe Pain

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All durations will be calculated in relation to the time of spinal injection. Duration of pain relief ,defined as the time from spinal injection to the first request for rescue analgesics which will consist of intravenous infusion of diclofenac 75 mg that could be repeated after 12 h if needed with a maximum daily dose of 150 mg. Rescue doses of diclofenac will be recorded. If satisfactory pain relief not achieved with diclofenac,

OBSERVATION AND RESULTS

In this randomized double blinded study conducted in 60 patients, the subjects were allocated in to two groups.

Group A (Bupi+Placebo)

- Inj.0.5% Bupivacaine 2.0 cc+
- 0.5 cc normal saline

Group B (Bupi+ Dex)

- Inj. 05 % Bupivacaine 2.0 cc +
- 0.5 cc Inj.Dexmedetomidine (5ug)

Statistical Tools

The information collected from the study was documented in a Master Chart . Data Analysis was done with the help of computer using Epidemiological Information Package (EPI 2008).Using this software range, frequencies, percentages, means, standard deviation and 'p' values were calculated.

Annova test was used to test:

The significance of difference between quantitative variables. A 'p' value of less than 0.05 is taken to denote significant relation ship

Patients demographics:

Table 1: Age distribution

Age Group	Cases			
	Group-A (Bupi+placebo)		Group-B (Bupi+Dex)	
	No.	%	No.	%
50-60 Years	8	40	8	40
61-70 Years	12	60	12	60
Total	20	100	20	100
Mean SD	67.25 9.6		66.6 6.8	

Group A & B	0.897	P > 0.05 not significant

Age distrubtion in Group A (Bupivacaine + Placebo) mean age was 67.2 years and standard deviation with 9.6 yrs . In Group B (Bupivacaine with dexem) mean age is 66.6 and standard deviation is 6.8 years.The p values for the two groups are identical and is not significant.

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Table 2: ASA Status

ASA	Cases			
	Group-A (Bupi+placebo)		Group-B (Bupi+Dex)	
	No.	%	No.	%
I	17	85%	16	80%
II	3	15%	4	20%
Total	20	100%	20	100%

In Group A 85% belongs to ASA I and 15% ASA II
In Group B 80% belongs to ASA I and 20% ASA II
Clinically there is no significant difference in ASA distribution in all two groups.

Efficacy of Two Groups:

Table 3: Time to reach Peak Sensory Level in Minutes

Group A (Bupi+Placebo)		Group B (Bupi+Dex)	
Mean	S.D.	Mean	S.D.
4.5	0.2	2.1	0.5

Group A & B	0.001	P < 0.05 significant

(Time to teak sensory level is the time taken to reach the sensory level to T10 dermatome) In group A mean time to reach peak sensory level is 4.5 minutes with standard deviation of 0.2 minutes .In Group B mean time to reach peak sensory level is 2.1 minutes with Standard deviation of 0.5 minutes.P value shows there is significant change in the time for peak sensory level in the two groups.

Table 5: Time for modified bromage 3 motor block in minutes

Group A (Bupi+Placebo)		Group B (Bupi+Dex)	
Mean	S.D.	Mean	S.D.
5.3	0.3	2.9	0.4

Group A & B	0.001	P < 0.05 significant

(In modified Bromage 3 motor block, patients will be unable to move the hip, knee and ankle)
IN GROUP A mean time to reach the motor block to bromage 3 is 5.3 mins .with a standard deviation of 0.3 mins .In Group B mean time to reach for the motor block is 2.9 mins with standard deviation of 0.4 minsP value shows there is significant change in the time for motor block to bromage 3 among the two groups.

Table 6: Duration for requirements of rescue analgesia in minutes

Group A (Bupi+Placebo)		Group B (Bupi+Dex)	
Mean	S.D.	Mean	S.D.
180.5	10.0	544.5	17.6

Group A & B	0.001	P < 0.05 significant

In Group A mean time requirement of analgesia is 180.5 minutes with standard deviation of 10. In Group B time requirement of analgesia is 544.5 mins with standard deviation of 17 .6 mins.P value shows there is a significant change for time requriment of analgesia among the two groups.

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DISCUSSION

Dexmedetomidine has more α2A selective agonist property. The study was performed to compare the effects of Dexmedetomidine with spinal Bupivacaine Vs. Plain Spinal Bupivacaine.

In our study, dose of Dexmedetomidine chosen as 5μg as additive to spinal Bupivacaine. Eisenach et al had done animal studies with spinal Dexmedetomidine in the dose of 100 μg. Kanzai et al did an early human study with 3 μg of Dexmedetomidine. Subhi et al chose 5μg of Dexmedetomidine as spinal additive in his studies. In both the above studies low dose of 3μg and 5 μg of Dexmedetomidine were effective as an additive to spinal anaesthesia with least complication. This is the reason why we chose 5μg (low dose) Dexmedetomidine as a spinal additive.

Subhi et al they had sample size of 38 people and they derived significant statistical results. Khalifa et al had sample size of 25 in each group and in Mustafa et al each group was allocated with 22, 21, 21 persons. They also derived significant statistic results. Kanzai et al they studied 60 subjects in three groups. They arrived reliable statistics with that. So we also decided to conduct the study with sample size of 20 subjects in each group.

The results in our study showed that the supplementation of spinal Bupivacaine with 5 μg of Dexmedetomidine significantly hastens the onset of sensory and motor block and also prolongs the both sensory and motor blockade when compared with spinal Bupivacaine alone.

Subhi et al they used Dexmedetomidine and Fentanyl as an additive to spinal anaesthesia in different groups and found Fentanyl group to have more faster onset of peak sensory and motor level.

In Mustafa et al they had three groups. Bupivacaine + placebo, Bupivacaine +5μg Dexmedetomidine and Bupivacaine +10μg Dexmedetomidine. In this study, they found that 10 μg Dexmedetomidine group had the fastest onset of peak sensory and peak motor block compare with lower dose of Dexmedetomidine.

We infer from the above studies that higher the dose of Dexmedetomidine as spinal, faster the onset of peak sensory and motor blockade as compared to plain Bupivacaine.

CONCLUSION

Adding 5μg Dexmedetomidine to 10 mg of Bupivacaine significantly prolongs the duration of post operative analgesia when compare to Bupivacaine alone in lower abdominal surgeries.Bupivacaine with Dexmedetomidine prolongs significantly the duration of post operative analgesia .Bupivacaine when used alone or with adjutants Dexmedetomidine (5μg) does not produce any appreciable side effects.

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