5ACOMPARATIVE STUDY OF INTRATHECAL CLONIDINE WITH DEXMEDETOMIDINE IN LOWER ABDOMINAL AND LOWER LIMB SURGERIES

A COMPARATIVE STUDY OF INTRATHECAL CLONIDINE WITH DEXMEDETOMIDINE IN LOWER ABDOMINAL AND LOWER LIMB SURGERIES

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ABSTRACT

Introduction and objectives: Present study was designed to evaluate Efficacy of two different α2 agonists Clonidine (45 µg) and DXM(5µg) as a adjuvant to intrathecal Hyperbaric

Bupivacaine 0.5%.**Aims & objectives** of study:toCompare the onset of sensory and motor block.Compare the duration of sensory and motor block. Assess the duration of effective postop analgesia.Compare haemodynamic changes.Observe adverse effects.
Material &Methods: We have given spinal anaesthesia for lower abdominal & lower limb surgeries with clonidine &DXM as adjuvant.**Observation:**Both clonidine & DXM delays sensory& motor onset, prolongs duration of sensory& motor analgesia, and postoperative analgesia as compare to Bupivacaine group with minimum haemodynamic changes.**CONCLUSION :**Both clonidine & DXM can be used as adjuvant to bupivacaine for prolonged analgesia.

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INTRODUCTION

Multimodal Techniques are available for Lower abdominal and Lower Limb surgeries. These surgeries can be conducted under local, regional (spinal or epidural), peripheral blocks or general anaesthesia, but neuraxial blockage is more preferred mode of anaesthesia.

Spinal anaesthesia is still the first choice because of its advantage like rapid onset, superior blockage, less failure rates and cost effectiveness, but has the drawbacks of shorter duration of blockage and lack of postoperative analgesia. In recent years, use of intrathecal adjuvant along with local anaesthetic agent has gainedpopularity with the aim of prolonging the duration of blockage, better success rate, patient satisfaction and faster recovery.

Bupivacaine is the most commonly used local anaesthetic agent having satisfactory sensory and motor blockade with limited duration of action. Various intrathecal adjuvants have been tried with local anaesthetic agent to prolong its duration of action. Various adjuvants that are added to local anaesthetic agents are adrenaline, phenylephrine, opiods, α_2 agonists, neostigmine, Ketamine, magnesium sulphate.

For the past two decades, the anaesthetic use of adrenergic α_2 agonists has been of considerable interest. Clonidine has been successfully used as an adjuvant with preservation of cardiovascular reflexes, reduced post op analgesic requirement and prolongation of the duration of Bupivacaine induced sensory and motor blockade.

Dexmedetomidine (DXM) is a highly selective α_2 agonist drug. DXM has been used in the epidural space in humans without any reports of neurological deficits.[19,35] Based on earlier human studies, it is hypothesized that intrathecal 5μg DXM would produce more postoperative analgesic effect with Hyperbaric Bupivacaine in spinal anaesthesia with minimal side effects.[1,2]

This study was undertaken to evaluate and compare the efficacy and potency of intrathecally administered Bupivacaine, Bupivacaine with Clonidine and Bupivacaine with DXM for onset and duration of sensory and motor block, hemodynamic stability, duration of effective analgesia, including post op analgesia and any adverse effects with each combination in patients undergoing lower abdominal and lower limb surgeries.

- **MATERIALAND METHODS**

The present study was conducted in 75 patients of ASA grade I and II, aged 20-60yrs, scheduled for elective lower abdominal and lower limb surgeries after taking written informed consent.

The patients were randomly allocated in 3 groups, each having 25 patients.

Group A: 0.5% Hyperbaric Bupivacaine 3ml (15mg) + 0.9% Normal saline 0.3ml.

Group B: 0.5% Hyperbaric Bupivacaine 3ml (15mg) + 0.05ml DXM (5μg) + 0.9% Normal saline 0.25ml.

Group C: 0.5% Hyperbaric Bupivacaine 3ml (15mg) + 0.3ml (45μg) Clonidine . Measured amount of Normal saline, DXM and Clonidine are taken with 1ml tuberculin syringe. In all groups total 3.3 ml volumes given.Detailed preoperative history and physical examination of patient was done.Written inform consent was taken.Patient having history of allergy to any drug or contraindications for spinal anaesthesia is excluded from study.Laboratory investigations like CBC,blood sugar,Renal function tests,serum electrolytes,x ray chest,ECG were reviewed Procedure was explained to the patient and patient was informed to communicate about the perception of any discomfort or pain during surgery.Patient was explained about VAS score with 1 to 10 scales.Written informed consent was taken from the patients and his/her relatives.All patients were Nil by Mouth for 6 hours.

In the operation theatre:

- IV line taken and each patient were preloaded with 10ml/ kg of Ringer's lactate solution before procedure.
- Pulse oximeter, non-invasive blood pressure monitoring and ECG were attached and base line reading taken.

Equipment:

- Cotton swabs with swab holding forceps.
- Disposable 23G lumber puncture needle.
- Disposable 5 cc syringe, tuberculin syringe.

- An ampoule of Hyperbaric Bupivacaine 0.5% , Clonidine, DXM and 0.9% NS

Technique:

- Under all strict aseptic and antiseptic precaution, with patient in left lateral position lumber puncture was performed at L2-L3 or L3-L4 intervertebral space with 23G Quincke needle and selected drug was given slowly. After completion of procedure, patient was immediately turned to supine position. Time of subarachnoid injection of drug was noted. Pulse, BP, SPO_2 and RR were recorded every 1, 5, 10, 15, 20, 25, 30, 45 and 60 minutes after giving spinal anaesthesia and then every 30 minutes till the completion of surgery.

Evaluation:

- The onset and duration of sensory blockade was assessed by using pinprick test every 1 minute till 15 minutes. Then at 20, 30, 45 and 60 minutes and then every 30 minutes till completion of surgery.
- Onset of sensory blockade:Time required to produce loss of pinprick sensation at the level of sensory dermatome T10 were noted.Motor blockade was assessed by modified bromage score.
- Time for onset of grade 3 motor blockade was noted.
- Time for sensory regression to S_2 was noted.
- Time for motor regression to bromage 0 was noted.
- After establishment of adequate level of block, surgery was started and time of beginning of surgery was noted.
- Onset of motor blockade (Time required to produce grade 3 motor block) and duration from grade 3-0 was noted .
- IV fluids were administered depending on the weight of patient and replaced according to loss during surgery.
- Total duration of analgesia: Time to sensory regression up to S2 dermatome(mins).
- Patients were observed for any intraoperative complications like bradycardia, hypotension, sedation, shivering, nausea, vomiting, dryness of mouth and respiratory depression.
- Hypotension was defined as systolic blood pressure <90 mmH_g or > 30% decrease in baseline value.
- Tachycardia was defined as heart rate >100/mins and bradycardia was defined as heart rate < 60/mins.
- After surgery, patients were monitored every hourly for 12 hours.
- Postoperatively pain measurement was assessed by VAS scale. And First rescue analgesic was given in the form of inj. Tramadol(1mg/kg)iv and inj. Ondansatron (0.08mg/kg)iv when VAS was > 3.statistical analysis was done using SPSS software. Data was expressed as mean and standard deviation. Data were compared using analysis of variance (ANOVA). P value < 0.05 considered statistically significant and $P<0.001$ considered highly significant.

OBSERVATION AND RESULTS

The present clinical comparative study included 75 patients, of lower abdominal and lower limb surgery,25 in each group. All the patient belonged to ASA grade I and I: **All**The three groups were comparable with respect to age, height, weight and sex ratio.There was no statistically significant difference between 3 groups with regard to Age,Height,Weight,sex ratio($p>0.05$).

The mean duration of surgery was 90.5±23.5 min in group A , 91.6±21.4 minutes in group B and 91.5±21.1min in group C which was comparable.There was statistically insignificant difference among all 3 groups with regard to duration of surgery($P>0.05$)The mean time to achieve T_{10} sensory level was prolonged in group C(7.15±0.6) min as compared to group A (4.30±0.7) min and group B (6.65±1.2) min, which was statistically significant (P value < 0.05). There was no statistical significance between group B and group C (P value > 0.05). The mean time to achieve modified bromage scale was III prolonged in group C (9.00±0.6) min as compared to group A (5.1±0.8) min and group B (8.35±1.0) min which was statistically significant (P value < 0.05). There was also statistical significance between group B and group C (P value<0.05).

TABLE-1: DURATION OF SENSORY AND MOTOR BLOCKADE

TIME (minutes)	**Group A (Mean± SD)**	**Group B (Mean± SD)**	**Group C (Mean± SD)**	**P value**
Sensory regression to S_2 from highest sensory level	214.5±25.4	319±24.3	330±14.6	A VS B<0.05 A VS C<0.05 B VS C>0.05
Motor regression to bromage scale 0	194.5±26.2	295±22.4	300.2±13.1	A VS B<0.05 A VS C<0.05 B VS C>0.05

The baseline pulse rate was comparable in all 3 groups. The pulse rate in group B was slightly lower as compared to group A and group C from 30 mins to 120 mins after subarachnoid block. There was no statistically significant change in pulse rate between 120mins to 12hrs postoperatively among all three groups. The baseline BP was comparable in the three groups. The mean arterial BP was slightly lower in group B as compared to group A from 25mins to 180mins and group C from 30mins to 120 mins

after subarachnoid block. There was no statistically significant difference thereafter up to 12 hrs post operatively.

TABLE-2: DURATION OF POST OPERATIVE ANALGESIA

	Group A	**Group B**	**Group C**
No. of patients	25	25	25
Duration of analgesia (mins)	100-150	180-230	200-250
Mean ± SD (mins)	125.5±12.5	205±15.3	220.2±15.5

The difference in the duration of effective analgesia between the three groups was statistically highly significant (P value < 0.05). The duration of effective analgesia was significantly lower in Group A compared to group B and C. Also the duration of effective analgesia in group C was significantly higher than in the group B and group A.The incidence of hypotension was 16% in group A,12% in group B and 8% in group C. The incidence of bradycardia was 12% in group A,8 % in group B and 4% in group C and Shivering was noted 8% in group A, 4% in group B and 4% in group C.There was statistically insignificance between all three groups.($p>0.05$) There was no incidence of nausea, vomiting, dryness of mouth, respiratory depression in any of the groups. Time to first rescue analgesic was prolonged in group B (385 ± 12.2) min and Group C (390 ± 8.1) min patients as compare to Group A (260 ± 10.7) min patients.P value (AvsB and AvsC is <0.05).sedation score between three groups. Was measured. In group A 88% patients were awake, 12% patients were sleeping comfortably but easily arousable. While in group B and group C 76% and 72% patients were awake respectively, 16% and 24% were easily arousable, 8% in group B and 4% in group C in deep sleep.

DISCUSSION

Spinal anaesthesia is the preferred anaesthesia technique for lower abdominal and lower limb surgeries. Bupivacaine is the most commonly used local anaesthetic in spinal anaesthesia. The use of adjuvants with local anaesthetics provides prolonged and superior quality of anaesthesia and postoperative analgesia with relatively small doses of individual drugs with less requirement of postoperative analgesia.

We evaluated the time taken for the onset and duration of sensory and motor blockade, hemodynamic stability, duration of analgesia and adverse effects in each study group.

- **Effect on onset of sensory block:**

  Mean time of sensory onset in group A (4.30±0.7) min was significantly lower than group B (6.65±1.2) min and group C (7.15±0.6) min. There was no significant difference between group B and group C.contrary to our study, B.S.Sethi et al[9]in his study with 60 patients evaluated the effect of low dose 1µ/kg, intrathecal Clonidine as faster onset in Clonidine group compared to Bupivacaine groups Shukla D. et al[10]. concluded that the onset time of sensory block upto T10 dermatome was rapid with DXM .

  Effect on onset of motor block:

  Mean time of onset of grade 3 motor block was significantly higher in group B and C than group Awhich was comparable with study of Shukla D. et al[10] for DXM and Gurudatta et al[3] **for clonidine.**

  Effect on duration of sensory and motor block:

  - mean time of duration of sensory block and motor blockade was prolonged in group B and group C.Similar to our study, Kanazi et al[6]. Concluded that intrathecal DXM (3µg) or Clonidine (30µg) when added to intrathecal Bupivacaine produces a similar prolongation in the duration of the motor (250±76) min and sensory block (303±75) min.

- **Hemodynamic changes:**
  - Preoperatively there was no significant difference in mean pulse rate, MAP, RR and SPO_2 between 3 groups.Incidence of hypotension was 16% in group A, 12% in group B and 8% in group Coincidence of bradycardia was 12% in group A, 8% in group B and 4% in group C.The mean arterial blood pressure was significantly lower in group B as compared to group A from 25mins to 180mins and group C from 30mins to 120 mins after subarachnoid block. Al Ghanem et al.[1] studied concluded that small dose of intrathecal DXM did not produce bradycardia and hypotension.
  - L. Neimi et al[7] found that among Clonidine group (3µg/kg) mean arterial pressure and heart rate were significantly lower in the Clonidine group compared to the control group.
  - **Perioperative adverse effects:** No incidence of nausea, vomiting, dryness of mouth or respiratory depression in any group.Incidence of shivering was 8% in Group A,4% in Group B,4% in Group C.
  - R. Verma et al8 compared 5µg DXM vs 25µg Fentanyl with 12.5 mg Hyperbaric Bupivacaine and reported no complications
  - B.S. Sethi et al9, The results of their study showed that addition of 1µg.kg-1of Clonidine to intrathecal Bupivacaine is safe and likely to be as effective as higher dosages minimizing the side

effects.

- **Duration of effective post operative analgesia**
  - duration of analgesia in group B (205±15.3) min and group C (220.2±15.5) min was significantly higher as compared to group A(125.5±12.5) min. Duration was higher in group C as compared to group B.Gurudatta et al[3] in this study demonstrated the duration of complete analgesia with 75 µg of intrathecal Clonidine was 327min compared to 207 minutes in Bupivacaine group which was highly significant.
- **TIME TO FIRST RESCUE ANALGESIC IN MINUTES:**
  - Time to first rescue analgesic was prolonged in group B (385 ± 12.2) min and Group C (390 ± 8.1) min patients as compare to Group A (260 ± 10.7) min patients.P value (AvsB and AvsC is <0.05) Kaabachi O et al[5] in 2007 studied Clonidine (1 µg/kg) as an adjuvant to Bupivacaine in spinal anaesthesia and found that time to first dose of rescue analgesic was longer in the adolescents with Clonidine 461±147 min.
- **SEDATION SCORE:**
  - . In group A 88% patients were awake, 12% patients were sleeping comfortably but easily arousable. While in group B and group C 76% and 72% patients were awake respectively, 16% and 24% were easily arousable, 8% in group B and 4% in group C in deep sleep.B.S. Sethi et al[9] in 2007 studied intrathecal Clonidine and observed that 16 out of 30 patients were sleeping comfortably and were easily arousable.

CONCLUSION

In nut shell, DXM (5µg) or Clonidine(45µg) seems to be an attractive, alternative as adjuvant to intrathecal Bupivacaine, markedly prolongs duration of sensory and motor blockage, provides excellent quality of postoperative analgesia with minimum haemodynamic changes and adverse effect

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