

ORIGINAL RESEARCH

A study on addition of 10mcg of dexmedetomidine to bupivacaine heavy intrathecally in infraumbilical surgeries: A Prospective Study

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BACKGROUND

Introduction: Spinal anesthesia is the most commonly performed anesthetic technique for lower limb, abdominal, perineum surgeries. It has been seen that multiple drugs are being added to the local anesthetics in subarachnoid blockade which results in better haemodynamic stability, increased duration of surgical analgesia and even provide post operative analgesia. Here we did a case series of adding intrathecal dexmedetomidine to hyperbaric bupivacaine in cases which were posted for infraumbilical surgery and lasted for more than 2 hours. Even two cases lasted for more than 5 hours were done comfortably with addition of dexmedetomidine. Dexmedetomidine is a selective alpha 2 adrenoceptor agonist which can be used in low doses and it prolongs sensory block in a dose dependent manner without major haemodynamic effects. Patient also had significant post operative analgesia which reduced the requirement of rescue analgesia and also resulted in early recovery of the patient.

Methods and methodology: A prospective study was conducted among 30 cases to study addition of 10mcg of dexmedetomidine to bupivacaine heavy intrathecally in infraumbilical surgeries at a tertiary care hospital. Drug was prepared in 5cc syringe with injection Bupivacaine (H) 0.5% 3cc (15mg) and addition of Dexmedetomidine 10ug = 0.1cc (1ml of ampule contains 100mcg of dexmedetomidine) with insulin syringe as total volume 3.1cc. Preoperative assessment was done one day prior to surgery.

Result: Majority were males. Mean age was 38.4 ± 10.05 years. T6 was the highest level achieved. Mean Time to achieve T8 dermatome was 5.06 ± 2.04 , Time of onset was 0.83 ± 0.23 , Time for complete regression was 6.38 ± 1.05 , and Duration of sensory blockade 6.36 ± 1.17 . Mean Time to achieve grade 3 in Bromage scale was 5.46 ± 2.12 , mean Time of onset of motor block was 0.9 ± 0.38 , Time for complete regression 6.41 ± 1.05 and Duration of motor blockade was 6.38 ± 1.08 . For all vital parameters a decreasing trend was seen till 30 min then after that had increasing trend.

Conclusion: Addition of dexmedetomidine to hyperbaric bupivacaine is beneficial as it decreases to amount of drug required intraoperatively and postoperatively with the expense of lower heart rate and blood pressure, the lower blood pressure at times is beneficial as it decreases blood loss during surgery and provides relatively bloodless surgical field with good post operative analgesia resulting in decreased requirement of rescue analgesia to be administered.

Keywords: Dexmedetomidine, Dexmedetomidine, Haemodynamic.

INTRODUCTION

Spinal anaesthesia is the most commonly used technique for lower limb surgeries as it is very economical and easy to administer. Spinal block has rapid onset, deep block, lower risk of infection and is cost effective. However, postoperative pain control is a major problem because spinal anaesthesia using only local anaesthetics is associated with relatively short duration of action, and thus early analgesic intervention is needed in the postoperative period. A number of adjuvants, such as clonidine and midazolam, and others have been studied to prolong the effect of spinal anaesthesia.¹⁻³

The Food and Drug Administration (FDA) has approved Dexmedetomidine as a short-term sedative for mechanically ventilated intensive care unit (ICU) patients. As per earlier human studies, it has been hypothesized that intrathecal 5 µg dexmedetomidine would, with minimal side effects, produce more postoperative analgesic effect with hyperbaric bupivacaine in spinal anaesthesia.⁴⁻⁶ This drug has sedative, anti-anxiety, analgesic, neuroprotective, and anaesthetic-sparing effects.⁷ Dexmedetomidine along with other drugs have been used to increase the duration of analgesia in subarachnoid, epidural and caudal blocks.⁸⁻⁹

METHODS AND METHODOLOGY

A prospective study was conducted among 30 cases to study addition of 10 mcg of dexmedetomidine to bupivacaine heavy intrathecally in infraumbilical surgeries at a tertiary care hospital.

A) Inclusion criteria

- i. ASA I & ASA II patients.
- ii. 18-65 years age group
- iii. Posted for elective and emergency infra-umbilical surgeries of anticipated duration of more than 2 hours.

DATA COLLECTION PROCEDURE

All patients fulfilling inclusion criteria were invited to participate in the study. They were enrolled after written informed consent. Drug was prepared in 5cc syringe with injection Bupivacaine (H) 0.5% 3cc (15mg) and addition of Dexmedetomidine 10µg = 0.1cc (1ml of ampule contains 100mcg of dexmedetomidine) with insulin syringe as total volume 3.1cc. Preoperative assessment was done one day prior to surgery.

PATIENT PREPARATION

On table vitals were assessed and recorded. All the patients were preloaded or co-loaded with 10ml/kg of Ringer lactate solution intravenously. Patients were not given any premedication. Under all aseptic precautions subarachnoid block was given in sitting position in L3-L4/L2-L3 space via midline approach using 25G Quincke's needle and drug was injected at a speed of 0.2 ml/second. The completion of injection of drug intrathecally was taken as time zero of induction of anaesthesia.

SENSORY BLOCKADE

Sensory level was assessed using 24G hypodermic needle for every 2 minutes for first 20 minutes and then for every 5 minutes interval until no change in level is seen.

Time for onset was taken from the time of injection of drug in intrathecal space till the loss of sensation till T8 dermatome is reached using. The time taken to achieve T8 dermatome blockade after injection of the drug intrathecally to the time of return of pinprick sensation to S1 dermatome (posteromedial aspect of thigh) was considered as duration of sensory blockade. The highest sensory level achieved and time taken to achieve that was noted.

MOTOR BLOCKADE

Time of onset of motor blockade was the time from the injection of drug in subarachnoid space to the time taken to achieve bromage scale grade 3.

Duration of block was considered between the time of injection to complete regression of motor blockade i.e ability to lift the extended leg. (Modified bromage scale 2)

Motor blockade was assessed using Modified Bromage scale.

Grade 0 – No motor block

Grade 1 – Inability to raise extended leg; able to move knees and feet.

Grade 2 – Inability to raise extended leg and move knee; able to move feet.

Grade 3 – Complete block of motor limb.

INTRAOPERATIVE

Heart rate (HR), systolic blood pressure, diastolic blood pressure, mean arterial pressure, oxygen saturation (SpO₂) was monitored every 2 min for initial 30 min and later on every 15 min till the end of surgery.

Duration of surgery was noted.

POST-OPERATIVELY

Regression of sensory and motor level as described above was assessed

We monitored for hypotension, bradycardia, nausea, vomiting, signs of respiratory depression and hypothermia for every 2 hourly for 12 hours and then 4 hourly for next 12 hours.

Hypotension is defined as 15% decrease in blood pressure from the baseline reading.

RESULT

Duration of surgical anesthesia increased significantly with addition of dexmedetomidine to hyperbaric bupivacaine and also resulted in longer post operative pain free period. Majority were males. Mean age was 38.4 ± 10.05 years.

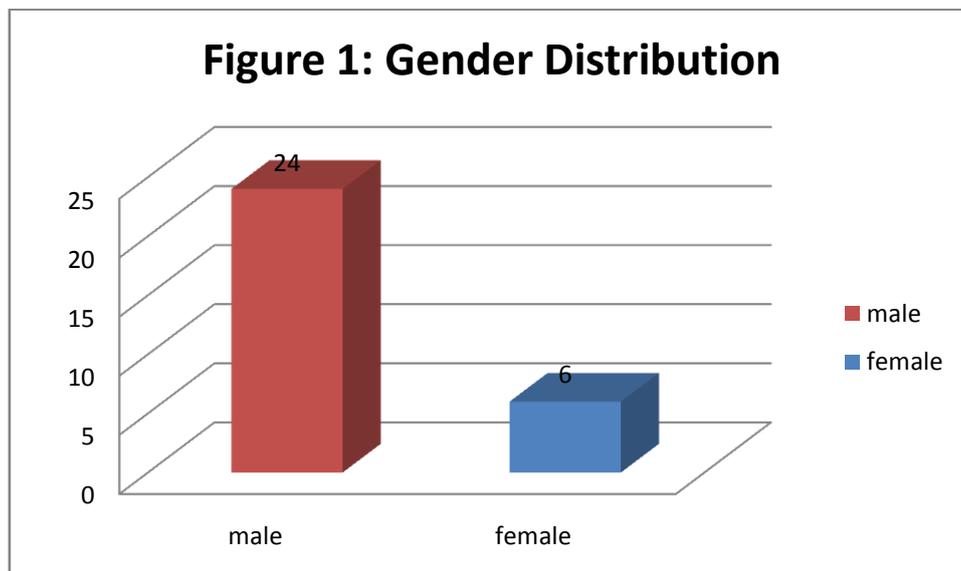
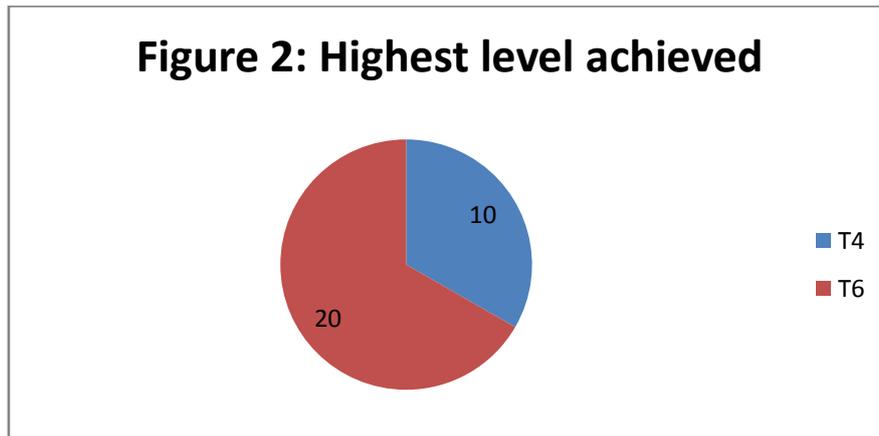


Table 1: Onset of Sensory block

| Parameter | Mean | SD |
|------------------------------|------|------|
| Time to achieve T8 dermatome | 5.06 | 2.04 |
| Time of onset | 0.83 | 0.23 |
| Time for complete regression | 6.38 | 1.05 |
| Duration of sensory blockade | 6.36 | 1.17 |

Mean Time to achieve T8 dermatome was 5.06 ± 2.04 , Time of onset was 0.83 ± 0.23 , Time for complete regression was 6.38 ± 1.05 , and Duration of sensory blockade 6.36 ± 1.17 .

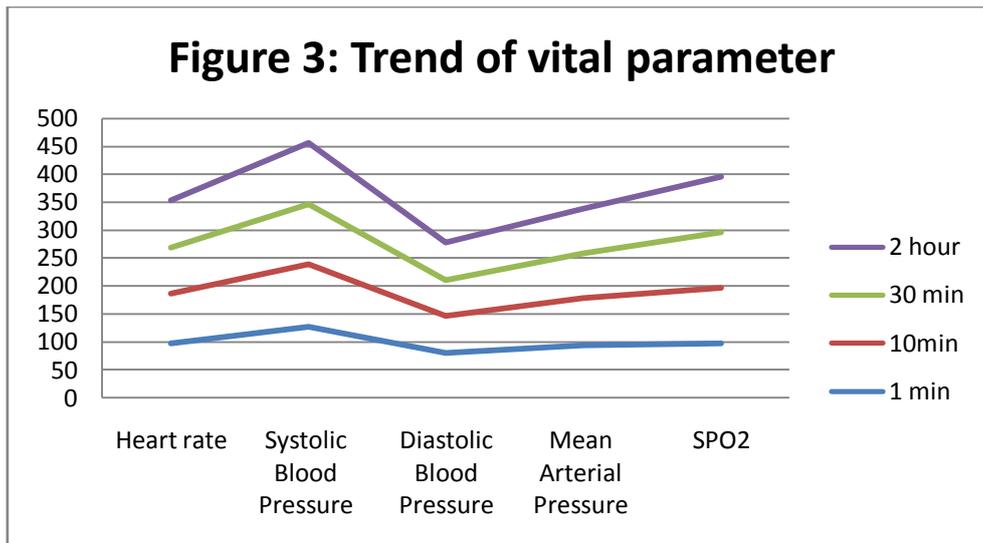
**Table 2: Onset of Motor block**

| Parameter | Mean | SD |
|--|------|------|
| Time to achieve grade 3 in Bromage scale | 5.46 | 2.12 |
| Time of onset | 0.9 | 0.38 |
| Time for complete regression | 6.41 | 1.05 |
| Duration of motor blockade | 6.38 | 1.08 |

Mean Time to achieve grade 3 in Bromage scale was 5.46 ± 2.12 , mean Time of onset of motor block was 0.9 ± 0.38 , Time for complete regression 6.41 ± 1.05 and Duration of motor blockade was 6.38 ± 1.08 .

Table 3: Trend of vital parameter

| Vital parameter | 1 min | 10min | 30 min | 2 hour |
|--------------------------|--------|-------|--------|--------|
| Heart rate | 97.66 | 89.66 | 81.86 | 84.4 |
| Systolic Blood Pressure | 127.13 | 112.4 | 107.66 | 109.5 |
| Diastolic Blood Pressure | 80.46 | 66.53 | 63.4 | 67.28 |
| Mean Arterial Pressure | 94.6 | 84.21 | 79.33 | 80.2 |
| SPO2 | 98 | 99 | 100 | 99 |



DISCUSSION

Majority were males. Mean age was 38.4 ± 10.05 years. T6 was the highest level achieved. Mean Time to achieve T8 dermatome was 5.06 ± 2.04 , Time of onset was 0.83 ± 0.23 , Time for complete regression was 6.38 ± 1.05 , and Duration of sensory blockade 6.36 ± 1.17 . Mean Time to achieve grade 3 in Bromage scale was 5.46 ± 2.12 , mean Time of onset of motor block was 0.9 ± 0.38 , Time for complete regression 6.41 ± 1.05 and Duration of motor blockade was 6.38 ± 1.08 . For all vital parameters a decreasing trend was seen till 30 min then after that had increasing trend.

Study by Kapinegowda ST et al ⁽¹⁰⁾ showed that mean age was 37.26 ± 13.7 years. Mean time taken for sensory block was 2.76, time to achieve 5.76 time of onset of motor block was 3.76. similar trend for vital parameters was seen. Our study is comparable with Chaudhry et al ^[11] they used 5 and 10 μg dexmedetomidine with 12.5 mg of 5% hyperbaric bupivacaine in femur surgeries, they have also not noticed the any significant difference in motor onset time. And even Gupta et al ⁽¹²⁾, Eid et al ⁽¹³⁾ showed similar results.

CONCLUSION

Addition of dexmedetomidine to hyperbaric bupivacaine is beneficial as it decreases to amount of drug required intraoperatively and postoperatively with the expense of lower heart rate and blood pressure, the lower blood pressure at times is beneficial as it decreases blood loss during surgery and provides relatively bloodless surgical field with good post operative analgesia resulting in decreased requirement of rescue analgesia to be administered.

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