



EFFECTS OF SINGLE DOSE OF INTRAVENOUS DEXMEDETOMIDINE ON HYPERBARIC BUPIVACAINE SPINAL ANAESTHESIA : A RANDOMIZED STUDY

Anesthesiology

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ABSTRACT

Background : The present study is designed to evaluate the effect of intravenous dexmedetomidine on spinal anesthesia with 0.5% of hyperbaric bupivacaine.

Objective: To evaluate the effect of intravenous dexmedetomidine on sensory regression, hemodynamic profile, level of sedation and postoperative analgesia.

Materials and Methods: Sixty patients of American Society of Anaesthesiologists (ASA) physical status I/II patients undergoing elective surgeries under spinal anaesthesia were randomized into two groups of 30 each. Immediately after subarachnoid block with 3 ml of 0.5% hyperbaric bupivacaine, patients in group D received a loading dose of 0.5 µg/kg of dexmedetomidine intravenously over a period of ten minutes, whereas, patients in group C received an equivalent quantity of normal saline.

KEYWORDS

Dexmedetomidine, hyperbaric bupivacaine, intrathecal, Ramsay sedation scale, spinal anesthesia

Introduction :

Sixty patients were divided into dexmedetomidine group (group D) and control group (group C) of 30 each using computer-generated random list. All the patients are pre-loaded with 10 ml/kg of lactated Ringer's solution. Immediately after subarachnoid block with 3 ml of 0.5% hyperbaric bupivacaine, group D patients received a loading dose of 0.5 µg/kg of dexmedetomidine IV by infusion pump over 10 min whereas group C received an equivalent quantity of normal saline as loading dose. Vitals were recorded (heart rate, blood pressure, SpO₂, respiratory rate) immediately after the subarachnoid block and every 5 min till the end of surgery and for 30 min after completion of surgery in post-anaesthesia care unit.

Materials and Methods :

Sixty patients scheduled for surgery at MediCiti institute of medical sciences amenable under spinal anaesthesia were included in my study. After obtaining approval from the institutional ethics committee and written informed consent from the patients, 60 patients were scheduled for surgeries amenable under spinal anaesthesia at MediCiti Institute of Medical sciences, Ghanpur, Medchal, Telangana 501401 after meeting the following selection criteria were included in the study

Age < 60 years in ASA Gr I- II and surgeries more than 2 hours of duration.

Motor blockade was assessed by *modified Bromage scale* and the level of sedation was evaluated intraoperatively and postoperatively every 15 minutes using Ramsey level of sedation scales till the patient was discharged from PACU. Sedation score greater than 4/6 was defined as excessive sedation. Similarly, motor blockade was assessed every 2 minutes before the onset of surgery and every 15 minutes at the PACU.

Modified Bromage Scale

- 1 = Complete block (unable to move feet or knees)
- 2 = Almost complete block (able to move feet only)
- 3 = Partial block (just able to move knees)
- 4 = Detectable weakness of hip flexion (between scores 3 and 5)
- 5 = No detectable weakness of hip flexion while supine (full flexion of knees)
- 6 = Able to perform partial knee bend

Ramsay Sedation Scale

- 1 Patient is anxious and agitated or restless, or both
- 2 Patient is co-operative, oriented, and tranquil
- 3 Patient responds to commands only
- 4 Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
- 5 Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
- 6 Patient exhibits no response

Many small randomized controlled trials have reported benefits when using dexmedetomidine for sedation for invasive procedures compared with standard techniques. Procedures investigated include radiological and gastrointestinal endoscopic procedures, awake carotid endarterectomy, shockwave lithotripsy, and dental procedures. A limited number of studies have shown a prolongation of regional nerve block when dexmedetomidine was added to the local anaesthetic. Clonidine remains popular as an adjunct to local anaesthetic for caudal epidural in children. The use of dexmedetomidine has been described as efficacious in providing prolonged neuraxial analgesia, although its superiority to clonidine for this indication has not been proven.

In keeping with its unique mechanism of action, patients receiving dexmedetomidine were found to be more rousable, more cooperative, and better able to communicate their pain than those receiving the other sedatives. There was, however, more hypotension and bradycardia with dexmedetomidine when compared with midazolam, although with no increase in the rate of drug discontinuation due to adverse effects. The rates of hypotension and bradycardia with dexmedetomidine and propofol were comparable. Studies by Brummett *et al* showed that dexmedetomidine enhances duration of bupivacaine anesthesia and analgesia of sciatic nerve block in rats without any evidence of histopathological damage to the nerve. In another study, dexmedetomidine added to ropivacaine increased the duration of sciatic nerve blockade in rats, most likely due to the blockade of hyperpolarization-activated cation current (i.e., a direct effect on the peripheral nerve activity). Kosugi *et al.*, examined the effects of various adrenoceptor agonists including dexmedetomidine, tetracaine, oxymetazoline and clonidine, and also an α₂ adrenoceptor antagonist (atipamezole) on compound action potential (CAP) recorded from frog sciatic nerve, and found that CAPs were inhibited by α₂ adrenoceptor agents so that they were able to block nerve conduction. Yoshitomi *et al.*, demonstrated that dexmedetomidine as well as clonidine enhanced the local anesthetic action of lignocaine via peripheral α_{2A} adrenoceptors. Studies have shown that clonidine when added to bupivacaine prolongs the duration of anesthesia and analgesia in brachial plexus block, but was associated with bradycardia, hypotension, and respiratory depression as side effects. Masuki *et al.*, suggested that dexmedetomidine induces vasoconstriction via α₂ adrenoceptors in the human forearm possibly also causing vasoconstriction around the site of injection, delaying the absorption of local anesthetic and hence prolonging its effect. Esmaglu *et al.*, reported prolongation of axillary brachial plexus block when dexmedetomidine was added to levobupivacaine. This study was the basis for my present study. In my study patients were allocated randomly to the dexmedetomidine group and the control group. Spinal anaesthesia achieved with 3 ml of hyperbaric 0.5 % bupivacaine were given a 0.5 micro gram per Kg of single dose of dexmedetomidine intravenously as an infusion over ten minutes. The control group similarly received same quantity of normal saline intravenously after successful subarachnoid block with 3 ml of 0.5 %

hyperbaric bupivacaine. My study was to compare the duration of sensory block and motor block and the sedation score besides monitoring the haemodynamic stability of the patients chosen for study both during surgery and also postoperative period.

In my study systolic BP of less than 90 mmHg was treated with a bolus administration of 300 ml of lactated Ringer's solution over 10 min and 6 mg of intravenous ephedrine. Bradycardia. Heart rate less than 50 beats/min, and if persisted was treated with 0.6 mg of intravenous atropine. The time for the first request of analgesic was also noted. Initially, pain was treated with IV Paracetamol 20 mg/kg and were given Diclofenac 75 mg intra muscularly if the pain persisted.

Observation and results

Table-1 : Two segment regression of sensory block

Duration (in mins)	Group-D	Group-C
Mean	128	94.6
Std. deviation	10.3	7.2
Total	30	30

P=0.00002

Table-2 : Time at which first analgesic requested

Duration (in mins)	Group-D	Group-C
Mean	230.2	160
Std. deviation	6.99	7.02
Total	30	30

P=0.00001

Table-3: Total analgesic consumption

Inj. Diclofenac sodium	Group-D	Group-C
Mean	2	2.9
Std. deviation	0	0.305
Total	30	30

P=0.00000

Table-4: Sedation score

Sedation Score	Group-D	Group-C
Mean	2.89	2.13
Std. deviation	0.35	0.1
Total	30	30

P=0.00000

This study was done at MediCiti institute of medical sciences Ghanpur, Medchal, Hyderabad. Patients were allocated randomly to the dexmedetomidine group and the control group. Spinal anaesthesia achieved with 3 ml of hyperbaric 0.5 % bupivacaine were given a 0.5 micro gram per Kg of single dose of dexmedetomidine intravenously as an infusion over ten minutes. The control group similarly received same quantity of normal saline intravenously after successful subarachnoid block with 3 ml of 0.5 % hyperbaric bupivacaine. My study was to compare the duration of sensory block and motor block and the sedation score besides monitoring the haemodynamic stability of the patients chosen for study both during surgery and also postoperative period. Motor block was checked with modified Bromage scale and sensory block was assessed by using alcohol swab at mid axillary line. Time taken for highest level of sensory blockade and time taken for regression as two dermatomal regression to the S1 level was monitored. The haemodynamic stability was assessed taking into consideration of heart rate, blood pressure both systolic, diastolic and mean. The sedation was monitored using Ramsey sedation scale. Also the analgesic requirements for the first demand and total analgesic consumption in the entire day were compared. My study showed significant prolongation of regression of sensory blockade and also prolonged motor blockade when dexmedetomidine was given intravenously after spinal anaesthesia with 0.5 % hyperbaric bupivacaine. Occasional bradycardia noticed was easily controlled with injection atropine. Occasional hypotension which was transient was managed with mephenteramine. Dexmedetomidine produced arousable sedation was favourable for spinal anaesthesia and surgery. Dexmedetomidine was effective during postoperative period by providing satisfactory analgesia and sedation. The incidence of postoperative shivering were not seen after dexmedetomidine compared to the control group.

CONCLUSION

Single dose IV dexmedetomidine of 0.5 mcg/kg prolongs the duration of sensory blockade and analgesia with lesser incidence of bradycardia and hypotension intraoperatively as well as postoperatively. It produces satisfactory arousable sedation without causing any respiratory depression. Dexmedetomidine was found to be very effective for postoperative analgesia. The time for request for analgesic in dexmedetomidine group was found to be significantly prolonged. Postoperative shivering too was less when compared to the control group.

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Conflicts of interest

There are no conflicts of interest

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