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Original Research Article

Comparative Study of two Different Doses of Dexmedetomidine with Hyperbaric Bupivacaine in Spinal Anaesthesia in Lower Limb Surgeries

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Abstract: Effective perioperative pain management during lower limb surgeries has been demonstrated to decrease associated morbidity and ameliorate patient's post operative outcome. Dexmedetomidine which is a selective alpha-2 agonist has recently been reported to be used as adjuvant to prolong spinal anesthesia. The present study was done to evaluate the onset and duration of sensory and motor block, haemodynamic changes as well as post operative analgesia and adverse effects of adding dexmedetomidine to hyperbaric bupivacaine for lower limb surgery in spinal anesthesia. The present study was done at Dept. of Anaesthesiology Gandhi Medical College, Bhopal on 60 patients, who were divided into two groups: Group D5 (received 3 ml hyperbaric 0.5% bupivacaine 15 mg +5 µg dexmedetomidine) and Group D10 (received 3 ml hyperbaric 0.5% bupivacaine 15 mg +10 µg dexmedetomidine). Preloading was done followed by spinal anesthesia at the level of L3-L4 using a 25-gauge Quincke spinal needle. Blood pressure, heart rate and partial pressure of oxygen was monitored before performing the spinal anesthesia, and once in every 5 minutes, then after every 15 minutes in the Post Anesthesia Care Unit (PACU) till the recovery of sensory and motor functions. In the PACU, the sensory level and Bromage scale were recorded every 15 minutes until the patient was discharged from the PACU. The level of sedation was evaluated just before surgery, intra operatively and post-operatively every 15 minutes using the Ramsay sedation scales. The time to reach T10 sensory dermatome in group D5and group D10 was 3.5±0.8 min and 3.1±0.5 min and time to reach Bromage 3 scale was 4.4±1.2 min and 3.9±1.0 min respectively ($p>0.05$). The regression of the sensory block to S1 dermatome in group D5 and Group D10 was 249.6+26.8 min and 340.2±42.9 min respectively and motor block to Bromage scale 0 was 225.0+23.3 min and 302.1±31.5 min respectively ($p<0.001$).
Keywords: exmedetomidine, perioperative pain, motor block.

INTRODUCTION

Central neuraxial blockage was being used for giving regional anaesthesia for major lower limb surgeries. Administration of only local anaesthetics for subarachnoid block allows optimum operative conditions but it fails to provide longer duration of postoperative analgesia [1]. Hence different drugs like opioids, neostigmine, epinephrine, ketamine and clonidine had been used as adjuvants [2]. Administration of intrathecal anaesthetics with these adjuvants provide quick, dense and prolonged blockage, but additionally associated with different side effects [3].

Dexmedetomidine is a selective α2-adrenergic agonist. When it is administered via systemic route, it provides sedative, analgesic and anaesthetic sparing effects [4]. In adults as well as peadiatric population, dexmedetomidine has been used successfully as an adjuvant with bupivacaine as local anaesthetic for neuraxial block [5].

Former studies have also reported intrathecal administration of dexmedetomidine in the dose range of 2-10 µg [4].

In reference to the above studies, the present study was planned to compare safety and efficacy of two different doses of dexmedetomidine (5 µg Vs. 10 µg) as an adjuvant added to intrathecal 15 mg (3 ml) 0.5% hyperbaric bupivacaine for spinal anaesthesia in lower limb surgeries.

MATERIALS AND METHODS

The present prospective and comparative study was done on 60 patients belonging to ASA grade I and II having age between 20-40 years scheduled for lower limb surgeries in the Dept. of Anaesthesiology Gandhi Medical College, Bhopal.

A Written informed consent from all the patients and Ethical Committee approval was obtained before starting the study.

Patient who refused, had neurological diseases, raised ICT spinal deformities, infection at local site, coagulopathy, failed spinal and drug allergy were excluded from the study. Patients using beta blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, or noted to have dysrhythmias were excluded from the study.

Preloading was done with 10 ml/kg of crystalloid solution. With the patient in the sitting position, spinal anesthesia was performed at the level of L3-L4 using a 25-gauge Quincke spinal needle.

Patients were divided into two groups 30 patients of each: Group D5 (received 3 ml hyperbaric 0.5% bupivacaine 15 mg +5 µg dexmedetomidine) and Group D10 (received 3 ml hyperbaric 0.5% bupivacaine 15 mg +10 µg dexmedetomidine).

The anesthesiologist performing the block recorded the baseline value of vital signs (blood pressure, heart rate and partial pressure of oxygen) before performing the spinal anesthesia, and once in every 5 minutes, then after every 15 minutes in the Post Anesthesia Care Unit (PACU) till the recovery of sensory and motor function.

For the purpose of the study, hypotension was defined as a systolic blood pressure of <90 mm Hg and bradycardia was defined as HR <50 beats/minute. The sensory dermatome level was assessed by pin prick sensation and motor dermatome level was assessed according to the modified Bromage scale.

In the PACU, the sensory level and Bromage scale were recorded every 15 minutes until the patient was discharged from the PACU.

All durations were calculated considering the time of spinal injection as time zero. Patients were discharged from the PACU after sensory regression to the S1 segment, and Bromage scale of 0.

The level of sedation was evaluated just before surgery, intra operatively and post-operatively ever 15 minutes using the Ramsay sedation scales.

All the data was analysed using IBM SPSS ver. 20. For the time to reach T10 dermatome, Bromage 3 scale, and the regression of the sensory block to S1 dermatome and Bromage scale 0, ANOVA test was used to compare the means. The level of significance used was $p<0.05$.

RESULTS

Mean age in Group D5 and Group D10 was 36.5±12.2 years and 37.8 ± 10.6 years respectively ($p >0.05$). Mean height in Group D5 and Group D10 was 162±8 cm and 161±7 cm and mean weight was 65±7 Kg and 62±5 kg respectively ($p >0.05$).

In group D5, there were 17 (56.66%) males and 13 (43.34%) females whereas, Group D10 there were 18 (60%) males and 12 (40%) females ($p >0.05$). In Group D5, there were 24 (80%) patients of ASA grade I and 6 (20%) patients of ASA grade II whereas, in Group D10, 25 (83.33%) patients belonged to ASA grade I and 5 (16.67%) patients belong to ASA grade II ($p >0.05$).

Table 1: Comparison of different parameters between both the groups

Parameters	Group D5	Group D10	P Value
Time to reach T10	3.5±0.8	3.1±0.5	NS
Time to Bromage 3	4.4±1.2	3.9±1.0	NS
Time to reach S1	249.6+26.8	340.2±42.9	<0.001
Time to Bromage 0	225.0+23.3	302.1±31.5	<0.001

Data is expressed as mean± SD; NS; not ignificant

The total amount of fluids administered following spinal anesthesia in Group D5 and Group D10 was 1310.0+236.7 ml and 1163.6±251.3 ml and duration of surgery was 98.4±32.5 min and 96.0±24.5 min respectively ($p>0.05$).

None of the patients in either group required blood transfusion and additive analgesia ($p>0.05$).

Amount of ephedrine or atropine, side effects like bradycardia, hypotension, shivering and nausea or vomiting in the intraoperative or in PACU were comparable in the two groups ($p>0.05$).

Heart rate (HR) and mean arterial pressure (MAP) measured in OT and PACU were also comparable between two groups ($P>0.05$).

Ramsay sedation score was 2 in all the study subjects during their stay in OT and PACU. The SpO_2 was higher than 95% in all patients in the two groups both in the intraoperative and in the PACU. No patients suffered from respiratory depression or shivering during the study.

DISCUSSION

With the use of an appropriate perioperative analgesic, post operative pain and related complications can be minimized. Sufficient pain relief of patients can reduce the chances of associated morbidity, anxiety, hospital duration and related cost of treatment [6].

A study done by Kanazi et al. including 60 patients who had undergone transurethral resection of prostate or bladder tumor under spinal anesthesia, reported shorter onset time of motor block but longer sensory and motor regression times in bupivacaine given with dexmedetomidine (3 mg) as compared to bupivacaine alone [7]. They reported mean time of sensory regression to the S1 segment was 303±75 min whereas in present study it was longer, which clearly indicate dose dependent response of dexmedetomidine.

The regression of motor block to Bromage 0 was 302.1±31.5 min with higher dose of dexmedetomidine (10 µg); similar reports were shown by Kanazi et al. [7].

Halder et al. did a similar study on 80 patients who were posted for lower limb orthopedic surgery under spinal anaesthesia, and found that duration of both sensory and motor block was significantly longer in dexmedetomidine (10 µg) group, VAS score was significantly lower in patients receiving 10 µg dexmedetomidine as compared to 5 µg dexmedetomidine ($p<0.05$) without producing any considerable side effects [4]. Almost similar results were found in present study.

In present study, analgesic effect of intrathecal bupivacaine was enhanced in a dose dependent manner by dexmedetomidine when used as an intrathecal adjuvant. Patients of Group D10 needed less number of rescue analgesia as compared to Group D5.

Das et al. did a study on 100 patients of elective abdominal hysterectomy and reported almost similar results as found in present study [8].

Gupta et al. had also reported less consumption of diclofenac sodium in patients receiving ropivacaine along with intrathecal dexmedetomidine group compared to patients who had received plain ropivacaine ($p<0.05$) [9]. Similar results were reported by Eid et al. who demonstrated a dose dependant reduction in consumption of diclofenac in patients receiving dexmedetomidine [10].

CONCLUSION

To conclude administration of dexmedetomidine in 10µg dose compared to 5µg dose provided fast onset and longer duration of sensory and motor blockade and also reduced the requirement of post operative rescue analgesia when used along with hyperbaric bupivacaine 0.5% in spinal anaesthesia in lower limb surgeries.

REFERENCES

1. de Oliveira Gs, Balliu B, Nader A, Mc Carthy RJ; Dose-ranging effects of intrathecal epinephrine on anesthesia/ analgesia: a meta –analysis and metregression of randomized controlled trials. Reg Anesth Pain Med, 2012; 37:423-32.
2. Ho KM, Ismail H, Lee KC, Branch R; Use of intrathecal neostigmine as an adjunct to other spinal medications in perioperative and peripartum analgesia: a meta-analysis. Anaesth Intensive Care, 2005; 33:41-53.
3. Popping DM, Elia N, Marret E, Wenk M, Tramer MR; Opioids added to local anesthetics for single-shot intrathecal anesthesia in patients undergoing minor surgery: a meta –analysis of randomized trials. Pain, 2012; 153:784-93.
4. Halder S, Das A, Mandal D, Chandra M, Ray S, Biswas MR et al.; Effect of Different Doses of Dexmedetomidine as Adjuvant in Bupivacaine - Induced Subarachnoid Block for Traumatized Lower Limb Orthopaedic Surgery: A Prospective, Double-Blinded and Randomized Controlled Study. Journal of Clinical and Diagnostic Research, 2014; 8(11): GC01-6.
5. El-Hennawy AM, Abd-Elwahab AM, Abd-Elmaksoud AM, El-Ozairy HS, Boulis SR; Addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. Br J Anaesth, 2009; 103:268-74.
6. Parvizi J, Miller AG, Gandhi K; Multimodal pain management after total joint arthroplasty. J Bone Joint Surg Am, 2011;93(11):1075-84.
7. Kanazi GE, Aouad MT, Jabbour-Khoury SI, Al Jazzar MD, Alameddine MM, Al-Yaman R et al.; Effect of Low-Dose Dexmedetomidine or Clonidine on the characteristics of bupivacaine spinal block. Acta Anaesthesiol Scand; 2006; 50: 222-7.
8. Das A, Halder S, Chattopadhyay S, Mandal P, Chhaule S, Banu R; Effect of Two Different Doses of Dexmedetomidine as Adjuvant in Bupivacaine Induced Subarachnoid Block for Elective Abdominal Hysterectomy Operations: A Prospective, Double-blind, Randomized Controlled Study. Oman Medical Journal, 2015; 30 (4): 257–63.

9. Gupta R, Bogra J, Verma R, Kohli M, Kushwaha JK, Kumar S; Dexmedetomidine as an intrathecal adjuvant for postoperative analgesia. Indian J Anaesth, 2011; 55(4):347-351.
10. Eid HEA, Shafie MA, Youssef HY; Dose-related prolongation of hyperbaric bupivacaine spinal anesthesia by dexmedetomidine. Ain Shams Journal of Anesthesiology, 2011; 4:83-95.