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A Comparative Study of Intrathecal Dexmedetomidine and Clonidine as an Adjuvant to Intrathecal Bupivacaine in Lower Limb Orthopaedic Surgeries.

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Abstract

Spinal anaesthesia is the preferred choice of anaesthesia for lower limb orthopaedic surgeries since long time. However, postoperative pain is a major problem because spinal anaesthesia using local anaesthetic is associated with relatively short duration of action and thus early intervention is needed in postoperative period. Adjuvants used with local anaesthetics prolong the effect of spinal anaesthesia. Dexmedetomidine is a potent alpha 2 agonist and is approximately 1600 times more selective towards the alpha 2 adrenergic receptor than clonidine.

Keywords: Spinal anesthesia, adjuvants, clonidine, dexmedetomidine, bupivacaine.

Introduction

Various adjuvants have been added to intra thecal local anesthetic to prolong the post operative analgesia. Intrathecal use of hyperbaric 0.5% bupivacaine is appropriate for surgeries of short duration and may lead to early analgesic intervention in the postoperative period.[(1)] For intrathecal alpha agonist, most of literature is for clonidine and there are very few studies about intrathecal use of dexmedetomidine.[(3).] Dexmedetomidine is now emerging as an adjuvant to regional anesthesia and analgesia, where evolving studies can build the evidence for its safe use in central neuraxial blocks.[(4)] In view of few studies about efficacy of dexmedetomidine as an adjuvant to intrathecal hyperbaric bupivacaine, we planned a double blind randomized control study to compare the spinal block characteristics, side effects and the hemodynamic changes following intrathecal bupivacaine supplemented with a low dose of either dexmedetomidine or clonidine in patients scheduled for lower limb surgery.

Dexmedetomidine is an imidazole compound, is a potent alpha 2 adrenergic agonist which acts mainly in the pontine nucleus locus ceruleus, which mediates sympathetic nervous function, vigilance, memory, analgesia and arousal when given intravenously.

Dexmeditomidine when added to intrathecal bupivacaine provides good postoperative pain relief without sedation and respiratory depression. The additive effect is by binding to presynaptic C fibers and dorsal horn neurons. It depresses the release of C fiber transmitters and hyperpolarisation of postsynaptic dorsal horn neurons in addition to sodium channel blocking effect by bupivacaine.

Clonidine is an alpha 2 adrenergic agonist and imidazoline derivatives, act synergistically with local anaesthetics by opening potassium channels.

Aims and objectives

The purpose of the study is to compare postoperative analgesia and adverse effects of Intrathecal dexmedetomidine and clonidine as adjuvant with bupivacaine during elective lower limb orthopaedic surgeries.

This study was done among 60 Patients aged between 20-60 years coming for lower limb orthopaedic surgeries .The following parameters were monitored.

- Time of onset of sensory and motor block.
- Hemodynamic changes such as blood pressure, heart rate
- Duration of post operative analgesia
- Adverse effects ,if any

Study design

This is a randomized, double blind controlled study.

Study population

The study population included the patients admitted and posted for elective surgery under the orthopedic surgery department at Coimbatore Medical College Hospital

Sample size

A sample size of 60 (30 in each group) was taken with confidence level of 95%

Inclusion criteria

- Patients aged 20-60 years scheduled for lower limb orthopaedic surgeries.
- ASA I AND II
- Weight 40-80 kg
- Height 150-180 cms

Exclusion crieria

- Patient refusal
- Infection at the site
- Bleeding disorders
- Allergic to local anaesthetics
- Co morbid conditions such as uncontrolled diabetes mellitus ,uncontrolled hypertension, ischemic heart disease, valvular heart disease, chronic lung disease, chronic renal failure
- Patient not capable of giving consent (psychiatric patients)

Methodology

The study was conducted in Coimbatore medical college and hospital after obtaining college ethical committee approval,and getting written informed consent from 60 patients aged 20-60 years, ASA I and II scheduled for lowerlimb orthopaedic surgeries were enrolled for the study. Preoperatively, physical examination, airway assessment and routine investigations were done. Patients were kept nil per oral for 10 hours. Patients premedicated with Tablet Diazepam 5 mg and Tablet Ranitidine 150mg orally on the previous night before surgery.

Patients were randomized to receive either intrathecal dexmedetomidine with bupivacaine (Group DB) or intrathecal clonidine with bupivacaine (Group CB). Preoperative baseline vital signs were recorded. After informing the procedure to the patient, patients were placed in sitting position, L3 - L4 space identified using 23 G Quincke spinal needle. In Group CB, the patients received hyperbaric bupivacaine (0.5%) 12.5 mg with 30 µg (0.2 ml) clonidine. In Group DB, the patients received subarachnoid block with injection hyperbaric bupivacaine (0.5%) 12.5 mg with 3 µg dexmedetomidine. Total volume of 3ml was injected in both groups.

After injection was complete, patient was placed in supine position with pillow under the head. The level of sensory block was assessed by cotton soaked in spirit every 5, 15, 30, 45 minutes and motor block was assessed by modified Bromage scale.

Results

The onset of sensory blockade was similar in both groups.The onset of motor blockade was significantly earlier (p value<0.05)in groupBD (7.920±0.78min) than in groupBC(8.34±_0.56min). Time to reach T8 dermatomal level was faster in groupBD (10.33±0.43min) than in groupBC(13.93±0.72min). Hemodynamic effects were similar in both groups. Two segment regression time was prolonged in group BD (141.35±5.7min)than in groupBC(128.24±9.8min)which was highly significant(p<0.0001).Total duration of analgesic effect was significantly prolonged in groupBD (345.7±9.2min)than in groupBC(311.7±9.6min).

Conclusion

The addition of dexmedetomidine as an adjuvant to intrathecal bupivacaine prolongs the two segment regression time and also the total duration of sensory and motor blockade without any significant adverse effects when compared with Clonidine.

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