ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 08 | August - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# CLONIDINE AS AN ADJUVANT WITH INTRATHECAL BUPIVACAINE FOR EXTENDED ANALGESIA IN ORTHOPAEDIC SURGERY- REVIEW ARTICLE

Anaesthesiology

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## ABSTRACT

Bupivacaine is an extensively used in spinal anaesthesia. Though duration of action is prolonged but it fails to produce post- operative analgesia.To overcome this pitfall , clonidine is used as an adjuvant. Clonidine is an alfa-2 receptor agonist. Intrathecal clonidine prolongs spinal anaesthesia improves efficacy of analgesia and has a hemodynamic stabilizing effect. It has effect on prolongation of the sensory blockade and reduction in the volume or concentration of local anaesthetic requirement in post-operative patients. Thus, has gained immense popularity. Thus, we review the articles to evaluate the analgesic and adverse effect of the intrathecal clonidine with bupivacaine for analgesia.

## KEYWORDS

Clonidine , Intrathecal Bupivacaine, total hip replacement,synergistic,adrenergic agonist

**INTRODUCTION:**

Spinal anaesthesia is a type of regional anaesthesia which is widely practiced technique due its wide safety margin. In this a local anaesthetic is introduced directly into cerebrospinal fluid. Thus, help in blocking the pain sensation (1).

Bupivacaine is an extensively used in spinal anaesthesia (2). It is a local anaesthetic with amino amide group. It is a water soluble white crystalline powder. It has a long-acting local anaesthetic effect. It is the safe local anaesthetic drug (3).

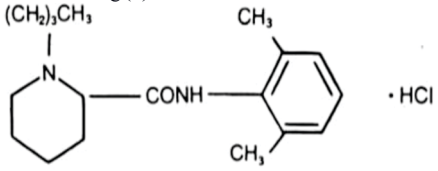


Figure 1
Chemical Structure of Bupivacaine

**Figure 1:** Chemical structure of Bupivacaine [4].

The mechanism of action is like other local anaesthetic. These compounds block influx of the sodium ion through the nerve membrane, thus preventing the action potential generation. On external lipid layer there is competitive binding of calcium site which interferes in mobility of phosphate groups. The increased duration of action is due to its affinity to nerve tissue (4,5).

Even though the bupivacaine is long active local anaesthetic drug, but it is associated with hort acting post-operative analgesia (6). It has been shown that more than 80% of patients undergoing surgical procedures complains of inadequate pain control in post-operative period. Adequate pain management is important to reduce the post-surgical complications along with it will hasten the post-operative mobilisation of patient especially in orthopaedic surgeries (7).

Since post-operative pain relief is of utmost concern for an anaesthesiologist. As optimal pain control will prevent the discomfort to the patient (8).

To overcome this pitfall of short duration of post-operative analgesia of bupivacaine intrathecal clonidine is uses as an adjuvant (9).

Clonidine is an Alpha -2 Adrenergic Agonist. It absorbs rapidly and almost completely in gastro-intestinal tract. It is metabolised in urine and excreted in urine. When it is used intrathecally it gives good post-operative analgesia and has been associated with minimal adverse effect (10).

Clonidine has a synergistic effect with local anaesthetic thus apart from providing good post-operative analgesia, it is associated with the prolonged sensory and motor blockade thus improving the pain relief and reducing the doses of analgesic (11). The analgesic effect after administration of clonidine intrathecally is due to activation of post synaptic alfa-2 adrenoreceptors in the spinal cord. It blocks the conduction of C and A delta fibres, increase potassium conductance, and intensifies conduction block of local anaesthetics (12).

**Review:**

To allow early mobilization of post-operative orthopaedic patient effective post operative pain management is crucial. Literature reported various trials proved that clonidine used as an adjuvant in neuraxial block mainly spinal anaesthesia has more promising effects when combined with intrathecal bupivacaine. This combination significantly prolongs sensory block as well as motor block, improved quality of analgesia, reduces post operative pain when compared with intrathecal bupivacaine alone.

A study conducted by Wahi A. et al (13) compared the mean duration of analgesia with intrathecal bupivacaine with clonidine and bupivacaine alone for lower limb orthopaedic surgery, they reported that significant increase in duration of sensory as well as motor blockade in patients where clonidine used as adjuvants to bupivacaine than patients where plane bupivacaine used.

A study conducted by Elia N. et al (14) shows intrathecal clonidine as an adjuvant to local anaesthetic studied for duration of sensory and motor blockade and to qualify beneficial and harmful effects of clonidine, where they observed that prolongation of sensory block in dose dependent way, prolongation of motor blockade with weak evidence of dose responsiveness. There is significant decrease in risk of intraoperative pain with increase chances of arterial hypotension.

A study by Strebel S. et al (15) concluded small dose of intrathecal clonidine (<150mg) with Bupivacaine studied for various objective in orthopaedic surgery revealed that prolong motor blockade with intrathecal clonidine (>75 microgram) used as an adjuvant with bupivacaine. Haemodynamic stability was maintained with larger dose of clonidine (150 microgram). Sedation which is central effects of apha-2 adrenergic drugs generally occurs after systemic, epidural, or intrathecal administration of clonidine. Significant sedation occurs in patient receiving 3 microgram/ kilogram intrathecal clonidine. There is less reduction in arterial blood pressure by clonidine in tested dose range. Haemodynamic parameters were stable in dose range of (75-250 microgram)

A study by Sethi BS. et al (12) reported that with addition of 1 microgram/kg of clonidine to 0.5% Bupivacaine significantly prolong the analgesia and significantly reduces the post operative analgesic requirement with improved quality of analgesia. Study also noted that statistically significant decrease in mean arterial pressure and heart rate with clonidine as compared to plain bupivacaine. But none of the patient required therapeutic intervention for either. Intrathecal dose of 1microgram/kg do not produce excessive haemodynamic effects in healthy patients.

## CONCLUSION:

We concluded that adjuvant of intrathecal clonidine to bupivacaine prolongs the duration of post-operative analgesia thus provides comfort to patient and help in early mobility as required in orthopaedic surgery. It also reduces the dose of post-operative analgesia. Clonidine addition to bupivacaine is safe and effective. It is associated with prolonged effect of spinal anaesthesia which is important for orthopaedic surgeries as it takes longer time.

**Completing Interest:** No competing interest present.

**Grant information:** No grant supported the study.

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