



## Anaesthesiology

**FUNCTIONAL ASSESSMENT OF HYPERBARIC BUPIVACAINE (0.5%) VS HYPERBARIC BUPIVACINE (0.5%) WITH DEXMEDETOMIDINE 10MCG TO SPINAL ANESTHESIA FOR LOWER ABDOMINAL SURGERIES**

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**ABSTRACT** **Background. Introduction-**The present study compared the sedation and the analgesic effect of addition of Dexmedetomidine to Bupivacaine with Bupivacaine as a sole anesthetic agent for lower abdominal surgeries. **Methods-** A Observational study was undertaken from August 2022 to June 2024 among 92 patients undergoing lower abdominal surgeries under spinal anesthesia. They were randomly allocated into two groups of 46 each group A(n=46) and group B(n=46). In group A, patients received 0.5% hyperbaric Bupivacaine at 12.5mg along with 10mcg of Dexmedetomidine, which was made up of to 3ml with normal saline. In group B, patients received 0.5% hyperbaric Bupivacaine 12.5mg. Analgesia, sedation and hemodynamic parameters during intraoperative and post-operative period were compared between the study groups. **Results-** Significantly higher sedation score was present for patients in group A than group B. Group A patients had significantly lower VAS scores (mean=2.78) than group B (mean=5.37) (p<0.001). During the intra-op period, pulse rate, SBP, DBP and MAP were significantly lower in group A than group B patients at 15, 30 minutes, 45 minutes and 60 minutes. **Conclusion-** Dexmedetomidine when added to Bupivacaine for regional anaesthesia provides deeper sedation, enhanced analgesia, and improved intra-operative hemodynamic stability compared to plain Bupivacaine.

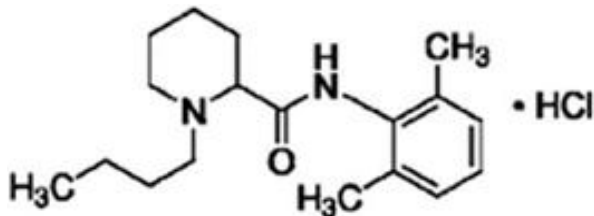
**KEYWORDS :** Hyperbaric Bupivacaine (0.5%), Dexmedetomidine, Postoperative analgesia and sedation.

#### INTRODUCTION:

In addition to being a safe reasonably safe anesthetic technique, a subarachnoid block offers the benefit of postoperative pain management while maintaining mental state and regular airway reflexes.<sup>1</sup> Bupivacaine is the most often used anesthetic for subarachnoid block. There are several notable changes to the subarachnoid block in relation to the length of operation and postoperative analgesia.<sup>2</sup> Adjuvants are often employed to produce desired analgesic effects, including opioids and Alpha 2 agonists.<sup>2</sup> Dexmedetomidine has developed into a magic bullet for a number of procedures and uses in critical care and perioperative environments.<sup>3</sup>

**Sub-arachnoid Block:** A safe and efficient substitute for general anesthesia in cases when the surgical site is on the legs, perineum or lower body is subarachnoid (spinal) block. Spinal anesthesia remained the primary type of neuraxial anesthesia well into the 20th century.

**Bupivacaine Hydrochloride:** Bupivacaine is a very effective and long-lasting local anesthetic used.



1. Figure- Pharmacological structure of Bupivacaine Hydrochloride

**INDICATIONS<sup>4</sup>:** Bupivacaine hydrochloride injection strengths and presentations are recommended for each type of block intended to produce local or regional anaesthesia or analgesia. The amount of Bupivacaine Hydrochloride injection depends on a number of factors, including the anaesthetic technique, the area to be anaesthetized, the vascularity of the tissues, the number of neuronal segments to be blocked, the depth of anaesthesia and degree of muscle relaxation required, the desired duration of anaesthesia.

**Adverse Events<sup>5</sup> :** Rarely do allergic responses to amide-type local anesthetics without preservatives are documented. Preservatives like methylparaben, which are used with local anesthetics, might potentially cause reactions in patients.



2. Figure- Hyperbaric Bupivacaine (0.5%) Ampoule

The behavior of hyperbaric bupivacaine differed significantly from the regular solution's.

**Adjuvants:** Acts by prolonging the duration of sensory-motor block and lowering the cumulative dosage of local anaesthetics required, co-administration of adjuvants has the potential to improve perineural block effectiveness and decrease local anaesthetic toxicity.

**Dexmedetomidine:** Towards the end of 1999, the Food and Drug Administration (FDA) approved Dexmedetomidine, a relatively new drug, for use in the intensive care units. Dexmedetomidine is a strong and highly selective alpha2-adrenoreceptor (AR) agonist that provides analgesia, anxiolysis, and dose-dependent sedation. Dexmedetomidine is a helpful sedative that has hemodynamic stability, analgesic effects.



3. Figure- Dexmedetomidine 50mcg Ampoule

**Indications:** Dexmedetomidine is highly lipophilic, it may quickly enter the CSF and bind to the  $\alpha_2$ -AR in the spinal cord to provide analgesic effects. It increases the length of time that local anesthetics cause sensory and motor blockage, regardless of how they are

administered.<sup>6</sup>

**Adverse Events:** Dexmedetomidine causes most oftenly bradycardia, hypertension, and hypotension.

**Objectives:** To observe the intraoperative hemodynamic changes, postoperative analgesia and sedation in addition of Dexmedetomidine to Local anesthetics.

**Case Study:**

The study was started after obtaining institutional ethics committee clearance. 92 patients of ASA grade 1 and 2 in the age group of 18-60years of either sex undergoing elective and emergency lower abdominal surgeries under spinal anesthesia at Kanachur Institute of Medical Science, Mangalore were recruited. Under aseptic conditions lumbar puncture was performed in sitting position with 27- G Quincke spinal needle at the level of L2-L3 intervertebral space and the drug was given intrathecally. In group A, patients received 0.5% hyperbaric bupivacaine at 12.5mg along with 10mcg of Dexmedetomidine, which was made up to 3ml with normal saline. In group B, patients received 0.5% hyperbaric bupivacaine 12.5mg. Readings were recorded every 5 min for the first 30min and thereafter every 10min until the end of surgery. Sensory block was assessed at 2mins interval for first 20mins and then at 5mins interval until no change in level was seen. Onset of sensory block to T10 dermatome, peak level of sensory block and the duration of sensory block were noted. Sedation was assessed every 5 min for the first 30min and then every 15min until the end of surgery.

Postoperative follow-up was carried out for 24h. Patients were monitored for sensory and motor block, postoperative analgesia, sedation, side effects and complications for 24h

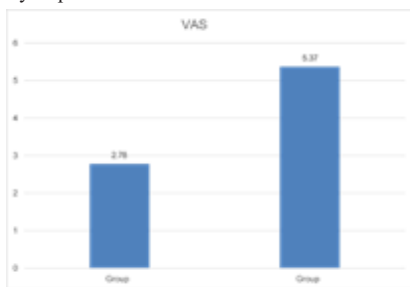
**DISCUSSION:**

The effect of adding Dexmedetomidine to Bupivacaine was studied among the participants. Group A had Hypotension and Bradycardia at 15min, 30min and 45mins intraoperatively than Group B. There was significantly less VAS score in Group A, when compared to Group B. There was significantly higher sedation score present in Group A.

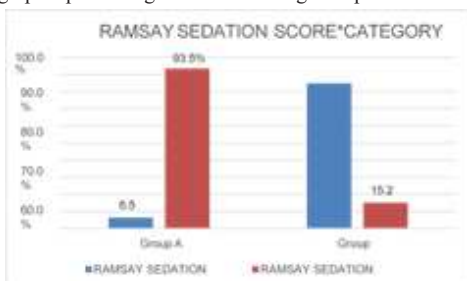
Study by Iyengar et al<sup>7</sup> also demonstrated that patients who received Dexmedetomidine along with local anaesthetic had prolonged sedation when compared to the group that did not receive Dexmedetomidine.

Study by Sun Y et al<sup>8</sup> demonstrated that the mean VAS score was 2 among the group of patients who received Bupivacaine and the mean score was 0 in the group that received Dexmedetomidine along with Bupivacaine.

Dinesh et al<sup>9</sup> in his study observed that postoperatively the mean HR, SBP, DBP and MAP was significantly lower in the group that received Dexmedetomidine and Bupivacaine in comparison to the group that received only Bupivacaine



4. Bar graph representing VAS score among Group A and B



5. Bar graph representing Ramsay sedation score among Group A and B

**CONCLUSION:**

Our study demonstrates that Dexmedetomidine When, added to Bupivacaine for regional anaesthesia provides deeper sedation, enhanced analgesia, increased motor blockade and improved intra-operative hemodynamic stability compared to plain Bupivacaine. These findings are consistent with existing literature and highlight the clinical benefits of Dexmedetomidine in enhancing the quality and duration of regional anaesthesia.

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