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To compare the effect of intrathecal 0.5% hyperbaric bupivacaine 16mg over 0.5% hyperbaric bupivacaine 16mg + 5µg dexmedetomidine with respect to haemodynamic changes

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Abstract

Introduction: Hyperbaric bupivacaine is commonly used as local anaesthetic for administering spinal anaesthesia. Spinal anaesthesia using local anaesthetic alone is associated with relatively short duration of action. Adjuvants are added to improve the quality, to accelerate the onset of action, prolong analgesia and to overcome the problems of spinal anaesthesia. Hypothesis: To compare the effect of intrathecal 0.5% Hyperbaric Bupivacaine 16mg over 0.5% Hyperbaric Bupivacaine 16mg + 5µg Dexmedetomidine with respect to Haemodynamic changes. Sample Size: We conducted the study on 60 patients over a period of one year and six months from 1 March 2016 to 31 August 2017. Results: Our study show that supplementation of spinal bupivacaine with 5 microgram dexmedetomidine resulted in stable hemodynamics. There was no significant decrease in the mean heart rate in dexmedetomidine group when compared to bupivacaine alone group. Conclusion: Our study showed that there was no significant decrease in the mean heart rate in dexmedetomidine group when compared to bupivacaine alone group.

Keywords: Hyperbaric bupivacaine, spinal anaesthesia, dexmedetomidine, haemodynamic changes

Introduction

Spinal anaesthesia is the most commonly employed technique for lower abdominal surgeries and lower limb surgeries as it is very economical and easy to administer. Spinal anaesthesia has many advantages such as easy to perform, rapid onset of action and good muscle relaxation. Hyperbaric bupivacaine is commonly used as local anaesthetic for administering spinal anaesthesia. Spinal anaesthesia using local anaesthetic alone is associated with relatively short duration of action and hence early analgesic intervention is needed in the postoperative period. A common problem encountered during lower abdominal surgery under spinal anaesthesia is visceral pain, nausea and vomiting. Adjuvants are added to improve the quality, to accelerate the onset of action, prolong analgesia and to overcome the problems of spinal anaesthesia. Depending on the purpose, various adjuvants like Morphine, Fentanyl, Clonidine, Midazolam, Dexmedetomidine etc are added

1. Alpha 2 adrenergic receptor agonists as intrathecal adjuvants have been the focus of interest for their sedative, analgesic, peri-operative sympatholytic and hemodynamic stabilizing properties. Clonidine has been studied extensively and has shown to improve the quality of spinal anaesthesia
2. Dexmedetomidine, a new highly selective α_2 -agonist, is under evaluation as a neuraxial adjuvant
3. Based on earlier human studies, it is hypothesized that intrathecal 5 µg dexmedetomidine would produce more postoperative analgesic effect with hyperbaric bupivacaine in spinal anaesthesia with minimal side effects (4), (5).

Review of Literature

1) Kanazi GE *et al.* [5] did a prospective, double-blind study on 60 patients undergoing transurethral resection of prostate or bladder tumor under spinal anaesthesia. They were randomly allocated to one of three groups. Group B received 12mg of hyperbaric bupivacaine, group D received 12mg of bupivacaine supplemented with 3 microgram of dexmedetomidine and group C received 12mg of bupivacaine supplemented with 30

microgram of clonidine. The onset times to reach peak sensory and motor levels, and the sensory and motor regression times, were recorded. This study showed that dexmedetomidine (3 microgram) or clonidine (30 microgram), when added to intrathecal bupivacaine, produces a similar prolongation in the duration of the motor and sensory block with preserved hemodynamic stability and lack of sedation.

2) Shukla D *et al.* [11] did a prospective study on 90 patients classified as American Society of Anaesthesiologists status I and II scheduled for lower abdominal and lower limb procedures. Patients were randomly allocated to receive intrathecally either 15mg hyperbaric bupivacaine plus 0.1 ml (10µg) dexmedetomidine (group D, n=30) or 15mg hyperbaric bupivacaine plus 0.1ml (50mg) magnesium sulphate (group M, n=30) or 15mg hyperbaric bupivacaine plus 0.1 ml saline (group C, n=30) as control. The onset time to reach peak sensory and motor level, the regression time for sensory and motor block, hemodynamic changes and side effects were recorded. It was found that onset of anaesthesia was rapid and of prolonged duration in the dexmedetomidine group (D). However, in the magnesium sulfate group (M), although onset of block was delayed, the duration was significantly prolonged as compared with the control group (C), but to a lesser degree than in the dexmedetomidine group (D).

3) Rajni Gupta *et al.* [12] studied sixty patients classified in ASA 1 and 2 scheduled for lower abdominal surgeries. Patients were randomly allocated to receive either 12.5mg hyperbaric bupivacaine plus 5µg dexmedetomidine OR 12.5mg hyperbaric bupivacaine plus 25µg fentanyl. They concluded that intrathecal dexmedetomidine is associated with prolonged motor and sensory block, hemodynamic stability and reduced demand for rescue analgesics in 24 hour as compared to fentanyl 1.

4) Al-Ghanem *et al.* [13] did a study on seventy six patients classified as ASA 1, 2, 3 scheduled for vaginal hysterectomy. Patients were randomly allocated to receive intrathecally either 10mg isobaric bupivacaine plus 5µg dexmedetomidine or 10mg isobaric bupivacaine plus 25µg fentanyl. The onset time to reach peak sensory and motor level, the regression time for sensory and motor block, hemodynamic changes were recorded in women undergoing vaginal reconstructive surgery under spinal analgesia. Based on their results, they concluded that 10mg plain bupivacaine supplemented with 5µg dexmedetomidine produced prolonged motor and sensory block compared with 25µg fentanyl.

5) Mahendru V *et al.* [14] conducted a prospective, double blind study which included 120 American Society of Anaesthesiology (ASA) class I and II patients undergoing lower limb surgery under spinal anaesthesia. The patients were randomly allocated into four groups (30 patients each). Group BS received 12.5mg hyperbaric bupivacaine with normal saline, group BF received 12.5mg bupivacaine with 25 mcg fentanyl 1, group BC received 12.5mg of bupivacaine supplemented with 30 mcg clonidine, and group BD received 12.5mg bupivacaine plus 5 mcg dexmedetomidine. The onset time to reach peak sensory and motor level, the regression time of sensory and motor block, hemodynamic changes, and side effects were recorded. They concluded that intrathecal dexmedetomidine is associated with prolonged motor and sensory block, hemodynamic stability, and reduced demand of rescue

analgesics in 24 hours as compared to clonidine, fentanyl, or lone bupivacaine.

Objectives

To compare the effect of intrathecal 0.5% Hyperbaric Bupivacaine 16mg over 0.5% Hyperbaric Bupivacaine 16mg +5µg Dexmedetomidine with respect to Haemodynamic changes.

Materials and Methods

The study was conducted at Yenepoya Medical College Hospital, Mangalore, with approval from the institutional Ethics Committee and written informed consent from all patients who participated in this study. We conducted the study on 60 patients over a period of one year and six months from 1 March 2016 to 31 August 2017.

Inclusion Criteria

1. Patients posted for elective abdominal hysterectomy
2. Patients belonging to ASA Grade 1 and 2
3. Age group 40 to 60 years
4. Body weight 40 to 75 kg
5. Height 150 to 180cm

Exclusion Criteria

1. History of allergy to local anaesthetics and NSAIDs
2. Patients with cardiac arrhythmias
3. History of spinal surgery
4. Patients with spinal deformity, peripheral neuropathy and on anticoagulant therapy
5. Patient refusal
6. Duration of surgery lasting >2 hours

Results and Discussion

Prolongation of duration of spinal block is desirable both for long procedures and for postoperative pain relief. Dexmedetomidine is a newer drug being used as an adjuvant for spinal anaesthesia. The mechanism by which intrathecal alpha agonists prolong the motor and sensory block of local anaesthetics is at the best, speculative. Our study compared the efficacy of Plain Bupivacaine with Bupivacaine dexmedetomidine combination for spinal anaesthesia. In the present study, we assessed 60 patients aged 40 to 60 years belonging to ASA class I and II, posted for abdominal hysterectomy under spinal anaesthesia. Patients fulfilling the inclusion criteria received either plain bupivacaine or bupivacaine dexmedetomidine combination. The outcomes assessed were hemodynamic changes. Both groups were comparable with respect to demographic data, duration of the surgery and ASA grading. The results of our study show that supplementation of spinal bupivacaine with 5 microgram dexmedetomidine resulted stable hemodynamics. In our study we found similar blood pressure trends between the groups. This finding was in concordance with the results obtained in the studies conducted by Kanazi *et al.* [5], Gupta R *et al.* [15] Mahendru *et al.* [16] Bajwa S *et al.* [17], and Vinod CN *et al.* [18], where they demonstrated no significant difference in blood pressure variation between both the groups. This present study showed that there was no significant decrease in the mean heart rate in dexmedetomidine group when compared to bupivacaine alone group. This finding was similar to the studies done by Rajni Gupta *et al.* and Al Ghanem *et al.* who concluded that dexmedetomidine produces stable hemodynamics.

Summary and Conclusion

A prospective observational study was undertaken to compare plain bupivacaine with bupivacaine dexmedetomidine combination for spinal anesthesia. Sixty patients aged between 40 to 60 years belonging to ASA class I and II were studied. Our study showed that there was no significant decrease in the mean heart rate in dexmedetomidine group when compared to bupivacaine alone group.

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