Evaluation of the Effects of Dexmedetomidine on Intraoperative Hemodynamic Parameters Following Intrathecal Bupivacaine with Dexmedetomidine

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Abstract: Spinal anesthesia is a commonly used technique in anaesthetic practice for gynaecological, lower abdominal, pelvic, and lower limb surgeries. The aim of this manuscript was to compare the hemodynamic parameters following intrathecal bupivacaine with dexmedetomidine and bupivacaine alone in lower abdominal surgeries.

Objective: The objective of this study was to compare the hemodynamic parameters following intrathecal bupivacaine with and without dexmedetomidine.

Methods: A total of 100 patients were randomly assigned to two groups.

- Group A: Patients who received 3.0 ml of 0.5% Bupivacaine (Heavy) + 0.5 ml normal saline served as the control group.
- Group B: Patients who received 3.0 ml of 0.5% Bupivacaine (Heavy) mixed with 5 µg Dexmedetomidine (0.5 ml).

All patients were normotensive, without co-morbid medical conditions, and had normal preoperative investigations. They were observed for block characteristics, hemodynamic parameters, side effects, and adverse reactions.

Results: There were no significant differences in mean systolic BP and diastolic BP between the two groups. Maximum lowering in heart rate occurred in Group B.

Conclusion: Dexmedetomidine, a newer Alpha 2 agonist, seems to be an attractive adjuvant to spinal Bupivacaine even in doses as low as 5 µg. Dexmedetomidine provides longer duration of sensory and motor block without increasing the incidence of significant adverse effects. It provides prolonged sensory and motor blockade, haemodynamic stability.

Key words: Dexmedetomidine, hyperbaric 0.5% bupivacaine, intrathecal, Bupivacaine

I. Introduction

Spinal anesthesia is commonly used technique in anaesthetic practice for gynaecological, lower abdominal, pelvic, and lower limb surgeries. Spinal anesthesia is commonly used for surgery because of ease of administration.

Bupivacaine, a piperidide derivative synthesized in 1957 by Ekenstam and introduced in clinical practice in 1963. It is a racemic mixture of D and L isomers and is relatively more cardiotoxic compared to other local anesthetics.

To overcome this, adjuvants like epinephrine, phenylephrine, adenosine, magnesium sulphate, sodium bicarbonate, neostigmine and alpha 2 agonists like clonidine, dexmedetomidine have been used intrathecally. They produce sedation and anxiolysis by binding to presynaptic alpha 2 receptors in locus ceruleus. Post synaptic activation in CNS inhibits sympathetic activity thus decreasing heart rate and blood pressure.

Dexmedetomidine is a suitable adjuvant to spinal anesthesia. It has sedative and analgesic effects due to its more selective alpha 2A receptor agonist activity. The stable hemodynamic and the decreased oxygen demand due to enhanced sympathetic stability make this agent very useful pharmacologic agent for preoperative patient care. Bolus dose of alpha 2 agonists is associated with side effects like hypotension and bradycardia.

II. Material And Methods

Study was conducted on 100 patients who were randomly divided into two groups (50 patients in each group). Group A - Patients who received 3.0 ml of 0.5% Bupivacaine (Heavy) + 0.5 ml normal saline served as control group. Group B - Patients who received 3.0 ml of 0.5% Bupivacaine (Heavy) mixed with 5 µg Dexmedetomidine (0.5 ml). All patients included in the study were normotensive and
had no co-morbid medical disease condition and normal preoperative investigations belong to ASA I & II grade. Patients were observed for hemodynamic parameters, occurrences of side effects and adverse reactions.

Back of the patient was prepared with a solution of povidone iodine and spirit. In midline approach, 25 gauge Quincke needle was placed in the L3-L4 interspace. The drug was injected after confirming the free flow of CSF. Following the injection, the needle was removed and the patient was placed in supine position. Intraoperatively, the pulse rate, respiratory rate, blood pressure, SPO2, were monitored and recorded until the end of the surgery.

III. Observation And Results

A total of 100 patients were enrolled in the study. All the patients completed the study protocol and were included in the data analysis. Fig 1. Group A consisted of 50 patients and group B of 50 patients. There was no significant difference in the demographic data between the two groups.

The mean heart rate of patients at preoperative was 78.0 ± 7.09 and 79.32 ± 7.46 in patients of Group A and Group B respectively. Maximum lowering in heart rate occurred in group B (90min-120min)

Fig 1: Bar graph showing the mean heart rate in different time interval in both groups

Fig 2. Group A baseline mean systolic B P was 122.7 ± 8.39 mm Hg where as in Group B it was 123.76 ± 7.97 mm Hg. After 180 min mean systolic B.P was 120.62 ± 5.08 in group A and 121.16 ± 5.07 in group B. There was no significant difference in mean systolic BP between two groups in different time interval

Fig 2: Bar graph showing the mean systolic blood pressure (mm Hg) in different time interval in both groups

Fig 3 Group A mean diastolic BP (baseline) 76.24 ± 8.67. Group B mean diastolic BP (baseline) 76.04 ± 6.84. Mean diastolic B.P at 180 min was 66.10 ± 3.88 in group A and 69.18 ± 6.16 in group B. There is no significant difference in diastolic BP between two groups in different time interval.

Fig 3: Bar graph showing the Diastolic blood pressure (mm Hg) in different time interval in both groups
Fig. 4 shows hypotension developed in 15 (30%) patients in group A whereas 10 (20%) patients in group B. Only 6 (12%) of 50 patient in group B had bradycardia. 69 patients (35 in Group A and 34 of Group B out of 50 patients in each group) had no complication.

![Bar graph showing the frequency distribution of different complications in patients of both group](N=100)

IV. Conclusion

Dexmedetomidine a newer Alpha 2 agonist seems to be an attractive adjuvant to spinal Bupivacaine even in doses as low as 5 µg. No significant differences in mean systolic BP and diastolic BP between two groups, maximum lowering in heart rate occurred in group B. Thus the observations and finding of above study allow us to conclude that it provide haemodynamic stability, without increasing the incidence of significant adverse effects.

Reference