

Original Research

Comparison of isobaric levobupivacaine and isobaric levobupivacaine with dexmedetomidine in spinal anaesthesia

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ABSTRACT:

Background: Dexmedetomidine is an α_2 receptor agonist and its α_2/α_1 selectivity is 8 times higher than that of clonidine. In animal models, intrathecal dexmedetomidine has been demonstrated to have an analgesic effect. Levobupivacaine is a long-acting local anaesthetic with a pharmacological structure similar to that of bupivacaine. **Aim of the study:** To compare isobaric levobupivacaine versus isobaric levobupivacaine with dexmedetomidine in spinal anaesthesia. **Materials and methods:** The present study was conducted in the Department of Anesthesiology of the medical institution. For the study, we selected a total of 80 patients in the age group of 20-65 years of physical status American Society of Anesthesiologists (ASA) Classes I and II admitted for surgeries requiring spinal anaesthesia. Group 1 and Group 2. Group 1 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml normal saline, whereas Group 2 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml (3 μ g) dexmedetomidine. **Results:** In the present study, a total of 80 patients were recruited. Patients were grouped into Group 1 and 2 with 40 patients in each group. It was observed that the number of male patients in group 1 and 2 were 22 and 24, respectively. The number of female patients in group 1 and 2 was 18 and 16, respectively. The mean age of patients in group 1 was 41.25 years and in group 2 was 43.66 years. It was observed that the mean duration of sensory block in Group 2 was significantly higher than Group 1. The mean duration of motor block in both the groups was similar and was statistically non-significant. **Conclusion:** Addition of Dexmedetomidine with Levobupivacaine significantly increases the sensory block time. However, there is non-significant effect for motor block.

Keywords: Levobupivacaine, spinal anaesthesia, Dexmedetomidine.

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INTRODUCTION:

There is no doubt that pain management in the postoperative period is essential due to ethical and humanitarian reasons. Moreover, adequate pain management may shorten the duration of hospital stay with less economic burden.¹ General anesthesia (GA) alone is not sufficient for postoperative pain control due to the incision. Furthermore, GA (with exception of large doses of opioid) does not eliminate the surgical stress response and may cause unwanted side effects such as nausea and vomiting.² The administration of

opioids in these cases further worsens the situation with prolonged recovery time and hospital stay with more costs.³ Dexmedetomidine is an α_2 receptor agonist and its α_2/α_1 selectivity is 8 times higher than that of clonidine. In animal models, intrathecal dexmedetomidine has been demonstrated to have an analgesic effect.⁴ Levobupivacaine is a long-acting local anaesthetic with a pharmacological structure similar to that of bupivacaine. Levobupivacaine has been shown to have a larger safety margin and less neurotoxic and cardiotoxic side-effects than bupivacaine.⁵ Ropivacaine

a newer amide local anesthetic with a high pKa and low lipid solubility has gained popularity as an intrathecal agent. It may be a suitable alternative as long acting local anesthetic because it is considered to be less cardiotoxic and has a significantly higher threshold for Central Nervous System (CNS) toxicity on a milligram basis than bupivacaine.⁶ Hence, the present study was conducted to compare isobaric levobupivacaine versus isobaric levobupivacaine with dexmedetomidine in spinal anaesthesia.

MATERIALS AND METHODS:

The present study was conducted in the Department of Anesthesiology of the medical institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, we selected a total of 80 patients in the age group of 20-65 years of physical status American Society of Anesthesiologists (ASA) Classes I and II admitted for surgeries requiring spinal anesthesia. An informed written consent was obtained from all the participants after explaining them the protocol of the study. The patients were randomly grouped into two groups, Group 1 and Group 2. Group 1 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml normal saline, whereas Group 2 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml (3 µg) dexmedetomidine. Visual analog scale (VAS) with 0–10 cm line was used to determine the level of analgesia in the postoperative period for 24 h and was explained to the patient a day before surgery during the preanesthetic checkup. The

first end mark “0” means “no pain” and the end marked “10” means “severe pain.” Rescue analgesia was given if VAS score >3.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student’s t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

RESULTS:

In the present study, a total of 80 patients were recruited. Patients were grouped into Group 1 and 2 with 40 patients in each group. Table 1 shows the demographic data of the participants in group 1 and 2. It was observed that the number of male patients in group 1 and 2 were 22 and 24, respectively. The number of female patients in group 1 and 2 was 18 and 16, respectively. The mean age of patients in group 1 was 41.25 years and in group 2 was 43.66 years. The mean weight of participants in group 1 was 69.28 kg and in group 2 was 70.02 kg.

Table 1: Demographic data of the participants in group 1 and 2

| Variables | Group 1 | Group 2 |
|------------------------|---------|---------|
| Total no. of patients | 40 | 40 |
| No. of male patients | 22 | 24 |
| No. of female patients | 18 | 16 |
| Mean age (years) | 41.25 | 43.66 |
| Mean weight (kg) | 69.28 | 70.02 |

Table 2: Mean duration of sensory and motor block

| | Sensory block | | Motor block | |
|---------------------|---------------|---------|-------------|---------|
| | Group 1 | Group 2 | Group 1 | Group 2 |
| Mean duration (min) | 210.11 | 330.82 | 172.39 | 210.65 |
| p-value | 0.001 | | 0.52 | |

Fig 1:

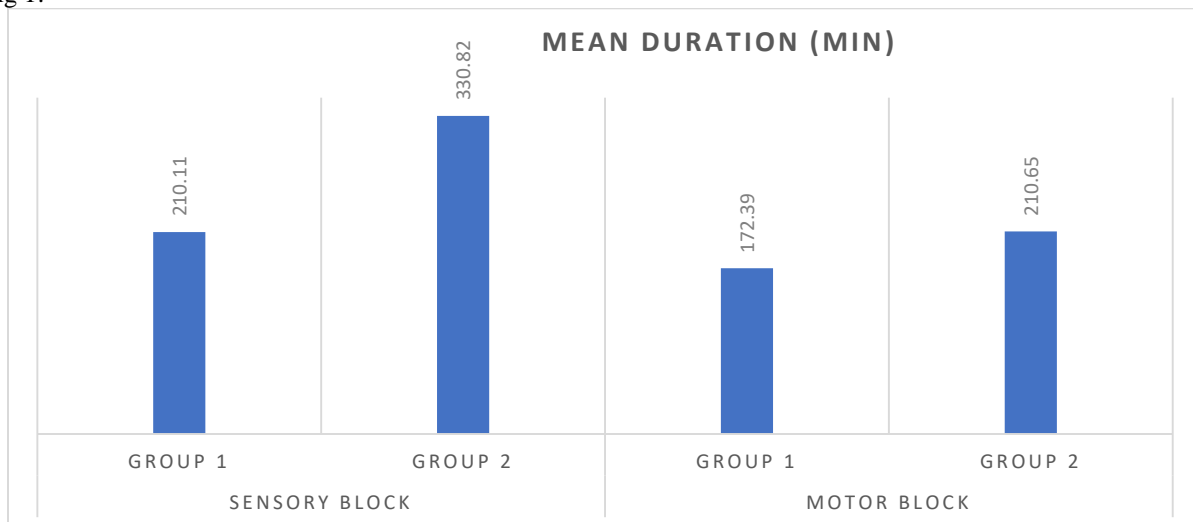


Table 2 shows the mean duration of sensory and motor block. It was observed that the mean duration of sensory block in Group 2 was significantly higher than Group 1. The mean duration of motor block in both the groups was similar and was statistically non-significant. [Fig 1]

DISCUSSION:

In the present study, we compared the sensory and motor block between Group 1 and 2. Group 1 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml normal saline, whereas Group 2 patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml (3 µg) dexmedetomidine. It was observed that mean duration of sensory block in Group 2 was significantly higher than Group 1. The mean duration of motor block in both the groups was similar and was statistically non-significant. The results were compared with studies from the literature and was found to be statistically significant. Goyal A et al ⁷ compared the sensorial, motor block levels, and side-effects of equal doses of hyperbaric bupivacaine and levobupivacaine with intrathecal fentanyl addition in elective cesarean cases. After approval of College Ethical Committee, 30 parturient with American Society of Anesthesiologists I-II undergoing elective cesarean section were enrolled for study with their informed consent. They were randomly divided equally to either Group BF receiving 10 mg (2 ml) hyperbaric bupivacaine and 25 mcg (0.5 ml) fentanyl, or Group LF receiving 10 mg (2 ml) isobaric levobupivacaine and 25 mcg (0.5 ml) fentanyl. Sensory and motor block characteristics of the groups were assessed with pinprick, cold swab, and Bromage scale; observed hemodynamic changes and side-effects were recorded. Effects on the neonate were observed by APGAR score at 1 and 5 min and umbilical cord blood gas analysis. Hemodynamic parameters like mean arterial pressure of Group BF were found to be lower. Group BF exhibited maximum motor block level whereas in Group LF, max sensorial block level and postoperative visual analog scale scores were higher. Umbilical blood gas pCO₂ was slightly higher, and pO₂ was marginally lower in Group BF. Onset of motor block time, time to max motor block, time to T10 sensorial block, reversal of two dermatome, the first analgesic need were similar in both groups. They concluded that intrathecal isobaric levobupivacaine-fentanyl combination is a good alternative to hyperbaric bupivacaine-fentanyl combination in cesarean surgery as it is less effective in motor block, it maintains hemodynamic stability at higher sensorial block levels. Kataria AP et al ⁸ performed a prospective, randomized study which included 60 adult patients between the age group of 20 and 65 years of physical status American Society of Anesthesiologists Classes I and II who

underwent infraumbilical surgeries. Group L patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml normal saline while Group LD patients received 3 ml (15 mg) of 0.5% isobaric levobupivacaine + 0.3 ml (3 µg) dexmedetomidine. The two groups were compared with respect to the onset and duration of sensory and motor block and hemodynamic stability. The mean duration of sensory block in Group L was 199.50 ± 7.96 min while in Group LD was 340.20 ± 11.78 min. All the differences were statistically highly significant between the two groups. Mean duration of motor block in Group L and LD was 150.83 ± 9.17 min and 190.20 ± 9.61 min, respectively. Both the differences were highly significant. It was concluded that Group LD has early-onset and prolonged duration of sensory and motor block and longer duration of postoperative analgesia than Group L. Samar P et al ⁹ compared the efficacy of 3-ml 0.5% isobaric levobupivacaine versus 3-ml 0.75% isobaric ropivacaine in patients undergoing elective lower abdominal and lower limb surgeries. They allocated 60 patients into two groups (n=30 each) to receive either a spinal block of 3-ml 0.5% isobaric levobupivacaine (group L) or 3-ml 0.75% isobaric ropivacaine (group R). Haemodynamic parameters were measured intraoperatively till the end of surgery and postoperatively for two hours. The onset and duration of sensory block and motor block were recorded. Adverse events were also recorded. The mean age in group L was 37.83 ± 16.51 years and the mean age in group R was 38.50 ± 12.97 years. The mean onset of sensory block in group L was significantly faster than in group R. Similarly, so was the mean onset of motor block in group L versus group R. The mean duration of sensory block in group L was significantly longer than in group R, as was the mean duration of motor block in group L versus group R. In group L, 13.3% of patients had complications, with hypotension being the most common (6.7%); in group R, 40% had complications, of which bradycardia was the most common. They concluded that there was an earlier onset of sensory and motor block and prolonged duration of sensory and motor block with intrathecal administration of 3-ml 0.5% isobaric levobupivacaine as compared to 3-ml 0.75% isobaric ropivacaine. Haemodynamic parameters were more stable with levobupivacaine than ropivacaine. Adverse effects were more common with ropivacaine. Sethi D et al ¹⁰ compared spinal block characteristics of equipotent doses of plain 0.5% levobupivacaine, plain 0.75% ropivacaine and hyperbaric 0.5% bupivacaine for elective caesarean (CS) delivery. A total of 100 parturient women undergoing elective CS under spinal anaesthesia were enrolled for the study. The parturients were randomly assigned to receive one of the following in a

subarachnoid block: hyperbaric 0.5% bupivacaine 10 mg (group B), plain 0.5% levobupivacaine 10 mg (group L), or plain 0.5% ropivacaine 15 mg (group R). Motor block duration [groups B, LB, R: 143.78 (30.43) minutes, 139.31 (33.38) minutes, 137.32 (27.39) minutes, respectively; $P=0.80$], sensory block duration [groups B, LB, R: 122.87 (34.93) minutes, 113.03 (39.24) minutes, 125.58 (24.93) minutes, respectively] and first analgesic request time [groups B, LB, R: 136.87 (28.70) minutes, 133.59 (27.30) minutes, 144.19 (32.09) minutes, respectively] were statistically comparable. The groups were statistically comparable for sensory block onset time [T6 block; groups B, LB, R: 4.62 (2.80) minutes, 4.93 (2.63) minutes, 5.73 (3.00) minutes, respectively] but motor block onset time was statistically prolonged for group R as compared to group B [Bromage 3 block; group B, LB, R: 5.93 (3.41) minutes, 9.00 (4.00) minutes, 10.16 (5.66) minutes, respectively]. No statistically significant differences were seen in sensory and motor block recovery times, haemodynamic parameters or side-effects. They concluded that the anaesthesia from a spinal block with 10 mg plain levobupivacaine or 15 mg plain ropivacaine is comparable to the anaesthetic effect of 10 mg hyperbaric bupivacaine in elective caesarean deliveries.

CONCLUSION:

Within the limitations of the present study, it can be concluded that addition of Dexmedetomidine with Levobupivacaine significantly increases the sensory block time. However, there is non-significant effect for motor block.

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