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Original Research Article

A Hospital Based Clinical Study Determining the Effect of Adding Dexmedetomidine and Fentanyl to Levobupivacaine in Subarachnoid Block for LSCS on the Outcome of the Patient

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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to determine the effect of adding dexmedetomidine and fentanyl to levobupivacaine in subarachnoid block for LSCS on the outcome of the patient.

Methods: This comparative study was carried out in the Department of Anesthesiology for duration of six months and consisted of 150 patients. Patients were divided into three equal groups group I, group II and group III. Patients' detailed demographics were recorded after taken written consent.

Results: The mean age of the patients in group I was 28.42 ± 6.54 years with BMI 23.17±8.32, mean age in group II was 27.33 ±7.53 years with BMI 24.46 ± 6.14 and in group III mean age was 26.94 ±9.51 years with BMI 24.76 ±4.36. Patents arterial pressure and heart beat per minute recorded. In Group III and II (5.15±2.38 min, 6.04±5.16 min), the maximum in Group I (8.02± 2.18 min) time needed for the highest level of sensory block was the shortest gap between three categories ($p < 0.001$). Bromage Scale 3 was averaged in a similar way, less in Group III (2.88 ±1.52) and statistically significant across the three groups ($p < 0.001$). The time needed for sensory regression to level S1 (sensory block duration) in Group II was maximum (501.05 ± 14.38 min) and high between groups of three ($p< 003$). The time gap needed in Group II (403.37 ±10.05 min) and Group I (300.06±4.46 min) for the first analgesic requirement was highly important ($p < 0.001$) and the most significant. Frequency of side effects (Hypotension, Nausea/Vomiting, Respiratory depression) Shivering were also observed between the patients of these three groups.

Conclusion: We concluded that for an adjuvant of 0.5percent isobaric levobupivalacaine, Intrathecal dexmedetomidine induces both prolonged motor blockage and post operative analgesia than fentanyl.

Keywords: Levobupivacaine; Spinal anesthesia, Fentanyl, Intrathecal analgesia, Cesarean section; Dexmedetomidine.

Introduction

Subarachnoid block is the most widely used regional anesthetic procedure for lower abdominal and lower limb surgery including lower segment cesarean section (LSCS). [1] It provide rapid onset, consistent sensory and motor blockade with adequate muscle relaxation for all types of surgery below the level of umbilicus. Regional anesthesia is safer than general anesthesia and has the advantage of the parturient being awake during the birth process. [2] Intrathecal local anesthetics (LA) alone are not enough for effective postoperative analgesia and higher doses of LA are also associated with hemodynamic instability, which can lead to unfavorable maternal and fetal outcome. So far many adjuncts have been used to augment the analgesia produced by intrathecal LA and to reduce their adverse effects. [3] The very latest addition to LA used for labor analgesia is levobupivacaine, which is the left-turning molecule of bupivacaine.4 Levobupivacaine seems identical to bupivacaine in potency and shows longer duration of action on neural tissue. Because bupivacaine is a racemic mixture of both the left- and right-turning molecules, it has been recently referred to as racemic bupivacaine to further distinguish it from levobupivacaine. [4] Isobaric levobupivacaine has

less cardiotoxicity propensity and less chance of cephalic spread, which favor particularly in LSCS.

The addition of opioids to local anesthetic solution had disadvantages, such as pruritus and respiratory depression. Dexmedetomidine, a new highly selective α2-agonist, is under evaluation as a neuraxial adjuvant as it provides stable hemodynamic conditions, good quality of intraoperative and prolonged postoperative analgesia with minimal side effects. [5-7] Dexmedetomidine has been approved by Food and Drug Administration (FDA) as a short-term sedative for mechanically ventilated intensive care unit (ICU) patients. 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. [5-7]

Fentanyl is the most common short-acting opioid that is used intrathecally in combination with local anesthetics. It has synergistic effects with local anesthetics and improves the status of intraoperative and postoperative analgesia. [8] It has been reported that intrathecal administration of fentanyl at the dose of 10–25 microgram can prolong the duration of postoperative analgesia for approximately 180–240 min. [9] However, intrathecal opioids can cause some side effects such as itching, urinary retention, nausea and vomiting as well as respiratory depression. [10,11]

The aim of the present study was to determine the effect of adding dexmedetomidine and fentanyl to levobupivacaine in subarachnoid block for LSCS on the outcome of the patient.

Materials and Methods

This comparative study was carried out in the Department of Anesthesiology, IGIMS, Patna, Bihar, India for duration of six months and consisted of 150 patients. Patients were divided into three equal groups group I, group II and group III. Patients' detailed demographics were recorded after taken written consent. Patients who had eclampsia, pre-eclampsia, diabetes and those who did not give any written consent were excluded from this study.

Group I had 50 patients and received 2.5 ml isobaric levobupivacane, group II with 50 patients and received 2.5 ml isobaric levobupivacaine and 5μg dexmedetomidine, and group III received 2.5 ml isobaric levobupivacaine and 25 μg fentanyl respectively. The anesthesiologist who engaged in drug preparations carried out randomization. The group allocation was not identified to another investigator who was interested in process and supervision. The drug regimen used in spinal anaesthesia was also blinded to the patients.

A comparison of block characteristics and duration of postoperative analgesia were the primary findings. Secondary findings were compared with hemodynamic parameters, rescuer analgesia and adverse effects of intrahecally given dexmedetomidine or fentanyl with isobaric levobupivacaine of 0.5 percent. The sensory bock level measured bilaterally in the midclavicular line, the hypodermic needle and dermatic levels were checked every 2 minutes with a lack of pine prick sensations, before successive tests were carried out at the highest level. The highest degree of sensory blockade, the period from injection to S1, was reported from the time of sensory regression. Using the Chi-square test, nominal categorical data was compared. The full SPSS 26.0 version analysed the results. The p value <0.05 was found with a statistically significant difference.

Results

Table 1: Baseline details

Variables	Group I(n=50)	Group II(n=50)	Group III(n=50)
Mean Age (Yrs)	28.42 ± 6.54	27.33 ±7.53	26.94 ±9.51
BMI	23.17±8.32	24.46 ± 6.14	24.76 ±4.36
HR (beats/min)	84.04 ± 7.63	85.55 ± 6.54	85.85 ±4.56
MAP (mmHg)	97.07 ±3.14	95.45 ±4.76	96.14 ±5.35

The mean age of the patients in group I was 28.42 ± 6.54 years with BMI 23.17±8.32, mean age in group II was 27.33 ±7.53 years with BMI 24.46 ± 6.14 and in group III mean age was 26.94 ±9.51 years with BMI 24.76 ±4.36. Patents arterial pressure and heart beat per minute recorded.

Table 2: Comparison of block characteristics by the first analgesic needs of the groups

Variables	Group I(n=50)	Group II(n=50)	Group III(n=50)	P value
Sensory Block (mean time)	8.02± 2.18	5.15±2.38	6.04±5.16	<0.001
Bromage 3(mean time)	4.86 ± 1.58	3.81 ± 1.45	2.88 ±1.52	<0.001
S1 level sensory regression (mean time)	285.15 ± 16.34	501.05 ± 14.38	416.04 ± 18.42	<0.001
first analgesic (mean time)	300.06±4.46	403.37 ±10.05	344.26 ± 12.28	<0.001

In Group III and II (5.15±2.38 min, 6.04±5.16 min), the maximum in Group I (8.02± 2.18 min) time needed for the highest level of sensory block was the shortest gap between three categories (p <

0.001). Bromage Scale 3 was averaged in a similar way, less in Group III (2.88 ±1.52) and statistically significant across the three groups (p < 0.001). The time needed for sensory regression to level S1 (sensory block duration) in Group II was maximum (501.05 ± 14.38 min) and high between groups of three (p< 003). The time gap needed in Group II (403.37 ±10.05 min) and Group I (300.06±4.46 min) for the first analgesic requirement was highly important (p < 0.001) and the most significant.

Table 3: Frequency of side effects between the groups

Variables	Group I	Group II	Group III	P value
Nausea/Vomiting	3	4	6	0.75
Shivering	5	0	4	0.44
Hypotension	7	6	6	0.92
Respiratory depression	0	0	3	0.12

Frequency of side effects (Hypotension, Nausea/Vomiting, Respiratory depression) Shivering were also observed between the patients of these three groups.

Discussion

Spinal anesthetic provides deep sensory block, as well as the fact that it has fewer side effects on both the woman and the fetus. It is still the preferred method of performing cesarean sections. [12,13] Despite the numerous advantages of this approach, it has a short duration and is incapable of providing adequate postoperative analgesia. Adequate postoperative analgesia is critical after a cesarean delivery because it allows for more effective breastfeeding and baby care. Many drugs, including opioids, magnesium sulfate, vasopressors and 2-adrenergic agonists (dexmedetomidine and clonidine), have been tried extensively as adjuvants to local anesthetics in recent years, and they appear to have some advantages not only in the management of postoperative pain, but also in the optimization of patient satisfaction with the procedure. [13-15] Intrathecally administered fentanyl in combination with local anesthetics is the most common short-acting opioid utilized in the United States. When used with local anesthetics, it has synergistic effects that improve the status of intraoperative as well as postoperative analgesia. [13] It has been observed that intrathecal administration of fentanyl at a dose of 10–25 micrograms can significantly increase the duration of postoperative analgesia for roughly 180–240 minutes when administered intravenously.

Today, intrathecal administration of Dexmedetomidine has attracted considerable attention during spinal anesthesia with the aim of increasing the duration of analgesia and decreasing post operative pain. Many studies have addressed the administration of different doses of intrathecal Dex (3 µg, 5 µg, 10 µg,15 µg) as an adjuvant to local anesthetics. [16–19] It seems that Dexmedetomidine induces the activation of α2-agonist receptors in the spinal cord, which leads to a decrease in the transmission of nociceptive signals such as substance P. It has also been revealed that its analgesic effects after the surgery are due to the inhibition of the intracellular potassium transport activities. [20]

The mean age of the patients in group I was 28.42 ± 6.54 years with BMI 23.17±8.32, mean age in group II was 27.33 ±7.53 years with BMI 24.46 ± 6.14 and in group III mean age was 26.94 ±9.51 years with BMI 24.76 ±4.36. Patents arterial pressure and heart beat per minute recorded. In Group III and II (5.15±2.38 min, 6.04±5.16 min), the maximum in Group I (8.02± 2.18 min) time needed for the highest level of sensory block was the shortest gap between three categories (p < 0.001). This was comparable to the study conducted by Joginder Pal et al. [21] Bromage Scale 3 was averaged in a similar way, less in Group III (2.88 ±1.52) and statistically significant across the three groups (p < 0.001). The time needed for sensory regression to level S1 (sensory block duration) in Group II was maximum (501.05 ± 14.38 min) and high between groups of three (p< 003). The time gap needed in Group II (403.37 ±10.05 min) and Group I (300.06±4.46 min) for the first analgesic requirement was highly important (p < 0.001) and the most significant. . Our research showed resemblance to the many previous studies in which addition of Intrathecal dexmedetomidine in isobaric levobupivalacaine provided better results than fentanyl. [22,23] Frequency of side effects (Hypotension, Nausea/Vomiting, Respiratory depression) Shivering were also observed between the patients of these three groups. Most common complication was hypotension which was seen among all the three groups and followed by nausea/vomiting, shivering and respiratory depression. These were comparable to the previous findings. [18]

Conclusion

We concluded that for an adjuvant of 0.5 percent isobaric levobupivalacaine, Intrathecal dexmedetomidine induces both prolonged motor blockage and post operative analgesia than fentanyl.

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