

Effectiveness of Dexmedetomidine and Fentanyl with Intrathecal Levobupivacaine in Lower Segment C-Section

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ABSTRACT

Aim: To determine the effectiveness of dexmedetomidine on the spinal anaesthesia as an adjuvant to the hyperbaric levobupivacaine in patients undergoing cesarean section.

Study Design: Comparative/observational

Place and duration of study: Department of Anaesthesia, Akhtar Saeed Medical & Dental College Lahore from 1st October 2019 to 31st March 2020.

Methodology: Ninety cases were included and patients had received comprehensive demographics. Three equal classes of patients were divided into groups A, B and C. Group A had 30 patients and received 2.5 ml isobaric levobupivacaine, group B with 30 patients and received 2.5 ml isobaric levobupivacaine, 5µg dexmedetomidine, and group C received 2.5 ml isobaric levobupivacaine and 25 µg fentanyl intrathecally. The outcomes of these groups were analysed in which sensory and motor blockage period were measured from the time the intrathecal drugs were administered.

Results: The mean ages of the patients in group A was 28.78±3.22 years with body mass index 24.18±3.92 kg/m², in group B was 28.12±4.68 years with body mass index 23.65±3.44 kg/m² and in group C was 28.95±3.16 years with body mass index 23.44±3.65 kg/m². Duration of sensory and motor blockade was observed and resulted that it was earlier in group C as compared to group A and B. Prolonged duration of sensory and motor blockade was observed in group B as compared to groups B and C with significantly P value< 0.001.

Conclusion: An adjuvant of 0.5% isobaric levobupivacaine, Intrathecal dexmedetomidine induces both prolonged motor blockage and post operative analgesia than fentanyl.

Key words: Levobupivacaine, Spinal anesthesia, Fentanyl, Intrathecal analgesia, Cesarean section, Dexmedetomidine

INTRODUCTION

Spinal anaesthesia, as very inexpensive and easy to handle, is most widely-used for lower abdominal operations. Postoperative pain management is therefore a major issue, because spinal anaesthesia with local anaesthesia only is relatively short-term and early analgesic treatments are therefore needed in the postoperative process. Several adjuvants have been studied for the longer term, for example, clonidine, midazolam, etc.^{1,2} The common problem in lower abdominal anaesthesia is gastrointestinal pain, nausea and vomiting.³ Intraoperative, early postoperative subarachnoid blocks are strengthened with the addition of fentanyl to hyperbaric bupivacaine.⁴

Fentanyl is a lipophilic µ-receptor opioid agonist when intrathecally administered has synergistic analgesic effects.⁵ Intrathecally, fentanyl effect on the dorsal horn of the spinal cord. Dexmedetomidine is a highly selective adrenoceptor agonist α₂, which is recently used to extend sensory and motor blocking duration and to provide hemodynamic stability during intra-operative period. Dexmedetomidine is use as intrathecal LA adjuvant.

A minimum dose of intrathecal dexmedetomidine does not cause possible foetal toxicity after it has been absorbed into the blood, and metabolised by the liver.⁶⁻⁹ Zhou et al¹⁰ have found that dexmedetomidine can reduce traumatic and immune stress reactions caused by operations and have a protective effect on the spinal cord in spinal cord surgery.^{11,12} We have assumed that dexmedetomidine, added as an adjuvant, may improve the duration of intra-operative blockage.

MATERIALS AND METHODS

This comparative study was carried out at Department of Anaesthesia, Akhtar Saeed Medical & Dental College Lahore from 1st October 2019 to 31st March 2020 and comprised 90 patients. Patients were divided into three equal groups group A, group B and group C. 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 A received 2.5 mL Levobupivacaine Group B received isobaric Levobupivacaine and 5 µg Dexmedetomidine, and Group C received 2.5 ml Levobupivacaine isobaric and 25 µg Fentanyl intrathecally respectively. The anesthesiologist who engaged in drug preparations carried out randomly. The group allocation was not identified to another

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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 intrathecally given dexmedetomidine or fentanyl with isobaric levobupivacaine of 0.5%. The sensory block level measured bilaterally in the midclavicular line, the hypodermic needle and dermatomal levels were checked every 2 minutes with a lack of pin 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 24.0 version analysed the results. The p value <0.05 was found with a statistically significant difference.

RESULTS

The mean age of the patients in group A was 28.78±3.22 years with body mass index 24.18±3.92 kg/m², mean age in group B was 28.12±4.68 years with body mass index 23.65±3.44 kg/m² and in group C mean age was 28.95±3.16 years with body mass index 23.44±3.65 kg/m². Patients arterial pressure and heart beat per minute recorded (Table 1).

In Group C (4.46±1.76 min), the maximum in Group A (6.47±1.08 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 C (3.32 ± 0.15) and statistically significant across the three groups (p < 0.001). The time needed for sensory regression to level S1 (sensory block duration) in Group B was maximum (402.08±23.43 min) and high between groups of three (p< 001). The time gap needed in Group B (310.75±12.18 min) and Group A (202.01±17.86 min) for the first analgesic requirement was highly important (p<0.001) and the most significant (202.01±17.86 min) [Table 2].

Table 1: Baseline details of enrolled cases

Variable	Group A (n=30)	Group B (n=30)	Group C (n=30)
Mean age(years)	28.78±3.22	28.12±4.68	28.95±3.16
Body mass index (kg/m ²)	24.18±3.92	23.65±3.44	23.44±3.65
Heart rate (beats/min)	86.12±6.55	84.75±5.36	83.48±7.16
Mean arterial pressure (mmHg)	96.80±1.21	94.92±3.17	94.80±3.25

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

Variables	Group A (n=30)	Group B (n=30)	Group C (n=30)	P value
Sensory block (mean time)	6.47±1.08	5.74±1.28	4.46±1.76	<0.001
Bromage 3 (mean time)	5.15±0.74	4.23±0.51	3.32±0.15	<0.001
S1 level sensory regression (mean time)	211.15±22.43	402.08±23.43	368.14±21.34	<0.001
First analgesic (mean time)	202.01±17.86	310.75±12.18	275.41±11.47	<0.001

Table 3: Frequency of side effects between the groups

Sid effect	Group A	Group B	Group C	P value
Nausea/vomiting	3	2	4	0.60
Shivering	3	0	2	0.37
Hypotension	3	4	4	0.94
Reparatory depression	0	0	3	0.17

Frequency of side effects (hypotension, nausea/vomiting, respiratory depression) shivering were also observed between the patients of these three groups (Table 3).

DISCUSSION

The addition of 3µg/5µg dexmedetomidine to spinal ropivacaine in parturients has been observed in this prospective randomised, double-blind, placebo-controlled study, with the onset of sensory and motor blocks accelerated, sensory block times extended, visceral traction reactions declared, muscle relaxed, postoperative analgesia improved. We found that RD3 extended the sensory block time and did not extend the engine block time. It is unclear which mechanism is used by intrathecal α2-adrenoceptor agonists to expand local anaesthetic motor and sensory blocks. They function by linking C fibres and dorsal horn neurons to the presynaptic. Its pain relieves the release of C-fibers and hyperpolarisation of the dorsal neurons of the postsynaptic horn.^{13,14}

These findings were consistent with the results of Al-Mustafa et al¹⁵, who found in their studies to accelerate sensory block spread and motor block spread around the backbone by intrathecal dexmedetomidine as a bupivacaine additive. In addition, dexmedetomidine (5µg), composed of fentanyl (25µg), was tested in Ramadan et al. studying intrathecal bupivacaine (10 mg), which found the impacts of the addition of dexmedetomidine (5 µg) versus fentanyl (25µg) and the conclusion that dexmetomidide was added in intrathecal bupivacain(10 mg) In three groups no adverse effects have been reported on mothers or babies.¹⁶

In comparison to what we observed, other research indicated that the beginning of the dexmedetomidine and motor obstruction were previously in the dexmedetomidine group compared to the dexmedetomidine group.^{17,18} A long time to the initial analgesic requirement of our group B study supported by the study conducted by Rahimzadeh et al.¹⁹ In our study this time was substantially shorter than that of group C.

The sedation rates of dexmedetomidine patients in the two other classes were slightly higher. This illustrates clearly that intrathecal dexmedetomidine offers patients greater sedation than intrathecal fentanyl which is beneficial in caesarean section patients. These results were comparable to some previous studies.^{19,20}

There were no major variations among the groups between the incidences of nausea, vomiting, hypotension, bradycardia and respiratory depression.

CONCLUSION

The alternative for 25 microgram of fentanyl to the intrathecal levobupivacaine in the caesarean section is better 5 micrograms dexmedetomidine. It offers early

sensory and motor block, sustained pre- and post-operative analgesia, sedation, stabilisation of hemodynamics and limited side-effects and no negative effects on newborn Apgar levels.

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