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ORIGINAL ARTICLE

Comparison of Dexmedetomidine and Fentanyl as Adjuvants to Intrathecal Levobupivacaine in Lower Segment Cesarean Section

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ABSTRACT

Objective: 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 & Duration: The study was conducted at Anesthesiology/Obstetrics and Gynaecology departments of Mayo hospital, Lahore for duration of six months i.e from 1st November 2020 to 30th April 2021.

Methods: This analysis included a total of 120 cases. After the informed consent the patients had received comprehensive demographics. Three equal classes of patients were divided into groups A, B and C. Group I had 40 patients and received 2.5 ml isobaric levobupivacane, group II with 40 patients and received 2.5 ml isobaric levobupivacaine and 5µg dexmedetomidine, and group III 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. The full SPSS 26.0 version was used to analyze the results.

Results: The mean age of the patients in group I was 27.44 ± 7.64 years with BMI 23.19±8.44, mean age in group II was 27.22 ±7.42 years with BMI 24.44 ± 6.16 and in group III mean age was 26.99 ±9.61 years with BMI 24.72 ±4.34. Duration of sensory and motor blockade was observed and resulted that it was earlier in group III as compared to group I and II. Prolonged duration of sensory and motor blockade was observed in group II as compared to groups I and III with significantly P value< 0.001.

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.

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

INTRODUCTION

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. [1,2] 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. [2-4]

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. [3] 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. The use of intrathecal opioids, on the other hand, might result in a variety of side effects including itching, urine retention, nausea and vomiting, and even respiratory depression. [6,7]

Dexmedetomidine (Dex), a novel selective 2-agonist, is being launched as an adjuvant to local anesthetics. It has considerable analgesic, sympatholytic, and sedative characteristics and is being used as an adjuvant in the treatment of chronic pain.

The drug Dex is roughly eight times more selective for 2-adrenergic receptors (2-AR) than clonidine, which is related with sedative and analgesic effects in supraspinal and spinal regions, as well as an antinociceptive effect on both visceral and somatic pain. More importantly, this medication does not pass the placenta in a considerable amount (0.77 maternal/fetal index), indicating that it is safe for use during cesarean delivery. [9] A large number of studies have found that the intrathecal infusion of Dex can extend analgesia while also reducing the negative effects associated with the administration of opioid medications. [2,6,8,10] The administration of Dex intravenously, on the other hand, has been linked to a number of negative effects, including decreased cardiac and blood pressure, according to some research. [10-12]A number of studies have demonstrated that the intrathecal administration of fentanyl plus LA produces synergistic analgesic effects.[13] Fentanyl is an opioid that acts as a lipophilic -receptor agonist. Internally administered fentanyl produces its impact by interacting with opioid receptors in the dorsal

horn of the spinal cord, and it has the potential to diffuse and act across the entire spinal cord. Recent studies have shown that dexmedetomidine, a highly selective 2–adrenoreceptor agonist, can increase the duration of sensory and motor blockade as well as offer hemodynamic stability during the intraoperative period when used in conjunction with intrathecal LA. [14-15] It also generates drowsiness, anxiolysis, and analgesia (involving spinal and supraspinal locations) in a dose-dependent manner, with no evidence of respiratory depression.

It has been established that spinal adjuvants can improve the overall quality of spinal anaesthesia. The medication fentanyl has been shown to be safe when injected intrathecally during a caesarean section in a number of clinical investigations. [16] When used with bupivacaine intrathecally during caesarean section, it has been demonstrated to increase the length of time patients are pain-free after the procedure. [17] The purpose of this study is to determine the effect of adding fentanyl to levobupivacaine in subarachnoid block for LSCS on the outcome of the patient.

We hypothesized that dexmedetomidine, when used as an adjuvant, would help to enhance the conditions of intra-operative cave blockage and intra-operative cave part during the procedure.

MATERIAL AND METHODS

This comparative study was carried out at Anesthesiology/Obstetrics and Gynaecology departments of Mayo hospital, Lahore for duration of six months i.e from 1st November 2020 to 30th April 2021and consisted of 120 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 40 patients and received 2.5 ml isobaric levobupivacane, group II with 40 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 intra-hecally 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 pineprick 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

Total 120 patients were included in this study and divided into three equal groups. The mean age of the patients in group I was 27.44 ± 7.64 years with BMI 23.19±8.44, mean age in group II was 27.22 ±7.42 years with BMI 24.44 ± 6.16 and in group III mean age was 26.99 ±9.61 years with BMI 24.72 ±4.34. Patents arterial pressure and heart beat per minute recorded.(table 1)

Table 1: Baseline details of enrolled cases.

Variables	Group I(n=40)	Group II(n=40)	Group III(n=40)
Mean Age(Yrs)	27.44 ± 7.64	27.22 ±7.42	26.99 ±9.61
BMI	23.19±8.44	24.44 ± 6.16	24.72 ±4.34
HR (beats/min)	84.09 ± 7.71	86.57 ± 6.63	85.74 ± 4.54
MAP (mmHg)	97.04 ±3.17	95.42 ±4.71	96.13 ±5.31

In Group III and II (5.18±2.34 min, 6.07±5.13 min), the maximum in Group I (8.09± 2.11 min) time needed for the highest level of sensory block was the shortest gap between three categories (p < 0.003) (Table 2). Bromage Scale 3 was averaged in a similar way, less in Group III (2.89 ±1.51) and statistically significant across the three groups (p < 0.003). The time needed for sensory regression to level S1 (sensory block duration) in Group II was maximum (501.04 ± 14.34 min) and high between groups of three (p< 003). The time gap needed in Group II (403.34 ±10.07 min) and Group I (300.04±4.43 min) for the first analgesic requirement was highly important (p < 0.001) and the most significant (300.04±4.43 min).(Table 2)

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

Variables	Group I(n=40)	Group II(n=40)	Group III(n=40)	P value
Sensory Block(mean time)	8.09± 2.11	5.18±2.34	6.07±5.13	<0.003
Bromage 3(mean time)	4.81 ± 1.57	3.87 ± 1.44	2.89 ±1.51	<0.003
S1 level sensory regression(mean time)	287.12 ± 16.51	501.04 ± 14.34	416.07 ± 19.41	<0.003
first analgesic(mean time)	300.04±4.43	403.34 ±10.07	341.21 ± 12.31	<0.003

Frequency of side effects (Hypotension, Nausea/Vomiting, Respiratory depression) Shivering were also observed between the patients of these three groups.(Table 3)

Table 3: Frequency of side effects between the groups

Variables	Group I	Group II	Group III	P value
Nausea/Vomiting	2	3	5	0.71
Shivering	4	0	3	0.41
Hypotension	6	5	5	0.97
Respiratory depression	0	0	2	0.15

DISCUSSION

There was a never-ending search for a local anesthetic that was less likely to cause cardiotoxicity and less likely to move to the brain. Because it is an amide LA and the S-enantiomer of bupivacaine with a lengthy duration of action, levo-bupivacaine has a lower risk of cardiotoxicity and less cephalic distribution. We did this experiment to investigate the comparative efficacy of Levobupivacaine with adjuvant dexmedetomidine or fentanyl intrathecally for LSCS in comparison to the other two options.

In this observational study 120 patients of both genders were presented in this study. Patients were divided into three equal groups I,II and II. The mean age of the patients in group I was 27.44 ± 7.64 years with BMI 23.19±8.44, mean age in group II was 27.22 ±7.42 years with BMI 24.44 ± 6.16 and in group III mean age was 26.99 ±9.61 years with BMI 24.72 ±4.34. Patents arterial pressure and heart beat per minute recorded. These findings were comparable to the previous studies in which most of the patients were aged between 22-35 years with mean BMI 23-27 kg/m^2. Group I had 40 patients and received 2.5 ml isobaric levobupivacane, group II with 40 patients and received 2.5 ml isobaric levobupivacaine and 5µg dexmedetomidine, and group III received 2.5 ml isobaric levobupivacaine and 25 µg fentanyl intrathecally. We found maximum time in group I for sensory block 8.09± 2.11 min as compared to group III and II (5.18±2.34 min, 6.07±5.13 min). This was comparable to the study conducted by Joginder Pal et al.[20]

In current study Bromage Scale 3 was averaged in a similar way, less in Group III (2.89 ±1.51) and statistically significant across the three groups ($p < 0.003$). The time needed for sensory regression to level S1 (sensory block duration) in Group II was maximum (501.04 ± 14.34 min) and high between groups of three (p< 003). [21] The time gap needed in Group II (403.34 ±10.07 min) and Group I (300.04±4.43 min) for the first analgesic requirement was highly important ($p < 0.001$) and the most significant (300.04±4.43 min). These results indicated that adjuvant of 0.5percent isobaric levobupivalacaine, Intrathecal dexmedetomidine induces both prolonged motor blockage and post operative analgesia than fentanyl. Our research showed resemblance to the many previous studis in which addition of Intrathecal dexmedetomidine in isobaric levobupivalacaine provided better results than fentanyl.[22,23]

In our study post operative side effects were seen higher in group III 37.5% as compared to group I 30% and II 20%. 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.[24] Sun et al, on the other hand, found that shaking, as well as nausea and vomiting, were the most often seen symptoms in the fentanyl group.[2] We came to the conclusion that 5 micrograms dexmedetomidine is a superior alternative to 25 micrograms of fentanyl in the caesarean section in the intratheal levobupivacaine in the caesarean section. It provides early sensory and motor blocks, persistent pre- and post-operative analgesia, sedation, hemodynamic stabilization, and only a few side effects, with no deleterious impact on neonatal Apgar values.

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.

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