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A comparative study of Intrathecal Dexmedetomidine with Bupivacaine versus Fentanyl with Bupivacaine in Spinal Anaesthesia for Elective Caesarean Sections- A cross sectional study

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ABSTRACT:
Spinal anesthesia is the most commonly used technique for lower abdominal surgeries as it is very economical and easy to administer. However, postoperative pain control is a major problem because spinal anesthesia using only local anesthetics is associated with relatively short duration of action, and thus early analgesic intervention is needed in the postoperative period. A total 40 primigravida and multigravida cases between 20 to 35 years, undergoing Caesarean section under subarachnoid block belong to ASA grade I & II at East Point College of medical sciences and research centre, were included in the study. In this study onset of motor blockade (p=0.024) was statistically significant whereas complete motor blockade (p=0.099), onset of sensory blockade (0.834), Two segment regression time (0.274) and duration for maximum sensory blockade (0.748) were not statistically significant. Time period of rescue analgesia was statistically significant between two study groups (P=0.003). From this study we conclude that, 5 μg dexmedetomidine seems to be an attractive alternative to 25 μg fentanyl as an adjuvant to spinal hyperbaric bupivacaine in surgical procedures. It provides good quality of intraoperative analgesia, hemodynamically stable conditions, minimal side effects, and excellent quality of postoperative analgesia.

KEYWORDS: Dexmedetomidine, Bupivacaine, Fentanyl.

I. INTRODUCTION:

Spinal anesthesia is the most commonly used technique for lower abdominal surgeries as it is very economical and easy to administer. However, postoperative pain control is a major problem because spinal anesthesia using only local anesthetics is associated with relatively short duration of action, and thus early analgesic intervention is needed in the postoperative period. A number of adjuvants, such as clonidine and midazolam, and others have been studied to prolong the effect of spinal anesthesia. A common problem during lower abdominal surgeries under spinal anesthesia is visceral pain, nausea, and vomiting. The addition of fentanyl to hyperbaric bupivacaine improves the quality of intraoperative and early postoperative subarachnoid block. The addition of opioids to local anesthetic solution have 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. 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. Till date, there has been

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no study comparing the addition of dexmedetomidine to hyperbaric bupivacaine with hyperbaric fentanyl to bupivacaine, although various studies have compared dexmedetomidine and fentanyl with isobaric bupivacaine.[1,2]

Bupivacaine, an amide type of local anesthetic, has high potency, slow onset (5–8 minutes) and long duration of action (1.5–2 hours). For cesarean section intrathecal dose of hyperbaric bupivacaine is 12 to 15 mg. Cesarean delivery requires traction of peritoneum and handling of intraperitoneal organs, resulting in intraoperative visceral pain. With higher doses of hyperbaric bupivacaine, incidence of intraoperative visceral pain associated with higher blocks is reduced. Opiods have been a choice in regional (intrathecal and epidural routes) anesthesia to improve the antinociceptive effect of local anesthetics. Morphine and fentanyl are being used intrathecally, together with local anesthetics in cesarean section.

OBJECTIVE: To compare Intrathecal Dexmedetomidine with Bupivacaine versus Fentanyl with Bupivacaine in Spinal Anaesthesia for Elective Caesarean Sections

II. MATERIALS AND METHODS:

A total 40 primigravida and multigravida cases between 20 to 35 years, undergoing Caesarean section under subarachnoid block belong to ASA grade I & II at East Point College of medical sciences and research centre, were included in the study.

Group A cases were administered with Intrathecal 5 μg Dexmedetomidine with 12.5 mg hyperbaric Bupivacaine and Group B cases administered with 0.5ml 25µg fentanyl with 1.5ml 0.5% hyperbaric bupivacaine intrathecally. During procedure, time to onset and complete motor blockade and sensory blocked was observed. Associated clinical complications were noted and neonatal APGAR scores 1 and 5 minutes.

Ethical approval: For collection and analysis of data in our study approval was obtained by institutional ethical committee.

III. RESULTS:

Table 1: Demographic parameters among two drug groups:

Demographic parameters	Group 1		Group 2		
	Mean	SD	Mean	SD	P-value
Motor block					
Onset of motor blockade	2.22	1.24	2.29	0.97	0.024
Complete motor blockade	5.86	2.44	6.43	2.25	0.099
Sensory block					
Onset of sensory blockade	4.92	2.21	4.83	1.95	0.834
Time for maximum sensory blockade	12.44	3.97	12.78	3.94	0.748
Two segment regression time	79.4	12.08	88.82	11.32	0.274

In this study onset of motor blockade (p=0.024) was statistically significant whereas complete motor blockade (p=0.099), onset of sensory blockade (0.834), Two segment regression time (0.274) and duration for maximum sensory blockade (0.748) were not statistically significant.

Table 2: APGAR score among study groups.

	Group 1 (Mean±SD)	Group 2(Mean±SD)	p-value
APGAR score			
APGAR score at 1 min	7.42±2	7.74±1	0.53
APGAR score at 5 min	9.75±1	9.96±0.9	0.85
Time period for rescue analgesia (In sec)			
	248±26	168.2±18	0.003

Time period of rescue analgesia was statistically significant between two study groups (P=0.003).

IV. DISCUSSION:

In this study onset of motor blockade (p=0.024) was statistically significant whereas complete motor blockade (p=0.099), onset of sensory blockade (0.834), Two segment regression time (0.274) and duration for maximum sensory blockade (0.748) were not statistically significant. Time period of rescue analgesia was statistically significant between two study groups (P=0.003).

According to a study by Rajni Gupta , Sixty patients classified in American Society of Anesthesiologists classes I and II scheduled for lower abdominal surgeries were studied. Patients were randomly allocated to receive either 12.5 mg hyperbaric bupivacaine plus 5 μg dexmedetomidine (group D, n = 30) or 12.5 mg hyperbaric bupivacaine plus 25 μg fentanyl (group F, n = 30) intrathecal. Patients in dexmedetomidine group (D) had a significantly longer sensory and motor block time than patients in fentanyl group (F). The mean time of sensory regression to S1 was 476±23 min in group D and 187±12 min in group F (P<0.001). The regression time of motor block to reach modified Bromage 0 was 421±21 min in group D and 149±18 min in group F (P<0.001).[3]

According to a study by S. Fyneface-Ogan, Ninety laboring multiparous women were allocated to have single shot intrathecal bupivacaine alone (B), bupivacaine with fentanyl (BF), or bupivacaine with dexmedetomidine (BD). Sensory and motor block characteristics; time from injection to two dermatome sensory regression, sensory regression to S1 dermatome, and motor block regression to Bromage 1 were recorded. Labour pain was assessed with a 10 cm verbal pain scale. Peak sensory block levels in the three groups were essentially the same. The time for sensory and motor blocks to reach T10 dermatome and Bromage 1, respectively, was faster in group BD than in the other groups. The time for sensory regression to S1 was significantly prolonged in the group BD. Motor block regression time to Bromage 1 was also prolonged in the group BD. Neonatal outcome was normal in all groups.[4]

According to a study by Fatemeh Khosravi, involved 110 pregnant women with ASA I and II and gestational age ≥ 37 weeks who were candidates for elective cesarean section. They were randomly divided into two groups of 55; Group B-D received 10 mg bupivacaine (0.5%) + 5 µg dexmedetomidine and Group B-F received 10 mg bupivacaine (0.5%) + 25 µg fentanyl, intrathecally. The onset of block, duration of analgesia, the score of pain intensity, hemodynamic changes, Apgar scores, and any adverse events were evaluated. P-value < 0.05 was considered statistically significant. Patients in two groups were similar in terms of demographic characteristics and ASA classification. Duration of analgesia in the B-D group was significantly longer than B-F group (428.64± 73.39 vs 273.18± 61.91 min; P< 0.001). The score of pain intensity during recovery time in the B-D group was significantly lower than that of B-F group (0.33± 0.84 vs 0.51± 0.57 min; P=0.004). The onset of block was also faster in the B-D group than B-F group (98.27± 35.95 vs 110.45± 37.69 seconds; P=0.036). The two groups did not show significant differences in hemodynamic changes and other variables (P> 0.05).[5]

According to a study by Xia, Ninety patients were allocated into the Dexmedetomidine group (received bupivacaine + 5 mcg dexmedetomidine) and the Control group (received bupivacaine + the same volume of saline) using a double-blinded and randomized method. The first patient in each group received 5 mg of intrathecal (IT) hyperbaric bupivacaine, and the next dose for the following patient was determined by the probability of successful anaesthesia of the previous neighbouring dose. An improved up-down sequence allocated method combined with probit analysis was used to determine the ED95 of intrathecal hyperbaric bupivacaine for the two groups.The ED95 and 95% confidence intervals (95% CI) of IT hyperbaric bupivacaine of the Dex group and Control group were 8.4 mg (95% CI, 6.5~ 13.8 mg) and 12.1 mg (95% CI, 8.3~ 312.8 mg), respectively. The duration of sensory block was longer in the Dexmedetomidine group than in the Control group (110.3 ± 35.3 vs 67.5 ± 26.2). The duration of analgesia was also longer in the Dexmedetomidine group than in the Control group (224.9 ± 45.4 vs 155.1 ± 31.6). The consumption of postoperative rescued sufentanil was significantly higher in the Control group than in the Dexmedetomidine group.[6]

V. CONCLUSION:

From this study we conclude that, 5 μg dexmedetomidine seems to be an attractive alternative to 25 μg fentanyl as an adjuvant to spinal hyperbaric bupivacaine in lower abdominal surgical procedures. It provides good quality of intraoperative analgesia, hemodynamically stable conditions, minimal side effects, and excellent quality of postoperative analgesia.

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