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"COMPARATIVE CLINICAL STUDY OF INTRATHECAL 'DEXMEDETOMIDINE OR FENTANYL (AS ADJUVANT)' WITH BUPIVACAINE (HEAVY) ON DURATION OF SPINAL BLOCK GIVEN IN PATIENTS UNDERGOING INFRAUMBILICAL SURGERIES"

Anaesthesiology

Dr P S Malviya — Professor, Department of Anaesthesiology and Critical Care, Moti Lal Nehru Medical College Prayagraj.

Dr Geetha Ramadurai — Assistant Professor, Department of Anaesthesiology and Critical Care, Moti Lal Nehru Medical College Prayagraj.

Dr Rajiv Gautam — Associate Professor, Department of Anaesthesiology and Critical Care, Moti Lal Nehru Medical College Prayagraj.

Dr Shashiprabha Sankhwar* — Junior Resident, Department of Anaesthesiology and Critical Care, Moti Lal Nehru Medical College Prayagraj. *Corresponding Author

ABSTRACT

A prospective,comparative,clinical,double blinded study was carried out to compare the effect of addition of dexmedetomine or fentanyl to intrathecal bupivacaine(hyperbaric) to observe the effect on duration of sensory and motor block and duration of analgesia among patients undergoing infraumbilical surgeries.

MATERIAL AND METHODS: A total number of 90 patients of either sex, age between 18- 60 years, ASA class I and II were randomly allocated into three groups, thirty in each group. Group C: Bupivacaine (heavy) 12.5 mg (served as control);Group D: Bupivacaine (heavy) 12.5 mg + Dexmedetomidine 5 µg;Group F**:** Bupivacaine (heavy) 12.5 mg + fentanyl 25 µg (0.5 mL).Patients were observed for onset and duration of sensory and motor block, duration of analgesia and side effects.

RESULTS : Earliest onset of motor block was observed in Group Dexmedetomidine in comparison to Group Fentanyl. Significantly higher duration of sensory, motor blockade and duration of analgesia was observed in Dexmedetomidine group in comparison to Fentanyl group. No significant hemodynamic changes was observed in both group.

CONCLUSIONS : We concluded that the addition of dexmedetomidine & fentanyl as adjuvant to bupivacaine for infraumbilical surgery, earliest onset of motor block, prolonged duration of block and postoperative analgesia was observed in dexmedetomidine as compare to fentanyl.

KEYWORDS

Fentanyl , Dexmedetomidine, bupivacaine, duration

INTRODUCTION :

Spinal block is the commonly used technique for infraumbilical surgeries because of its rapid onset, less failure rates, lower risk of infection and cost effectiveness. The intrathecal adjuvants include dexmedetomidine, opioids(such as morphine, fentanyl, sufentanil) and other drugs like, clonidine, ketamine and midazolam.[1][2]

Dexmedetomidine, a highly potent and selective α_2 receptor agonist has been used as a adjuvant to general anaesthesia. Dexmedetomidine is rapidly emerging as the choice of additive to spinal anaesthesia in view of its antinociceptive action for both somatic and visceral pain along with stable haemodynamics.[3] It is now emerging as an adjuvant to regional anesthesia and analgesia, where evolving studies can build the evidence for its safe use in central neuraxial blocks.[4] Based on earlier studies, it is hypothesized that intrathecal 5 µg dexmedetomidine would produce more postoperative analgesic effect than bupivacaine alone in spinal anaesthesia with minimal side effects.[5][6][7]

Fentanyl is a short acting narcotic analgesic with potent morphine like action.The addition of fentanyl to hyperbaric bupivacaine improves the quality of intraoperative and early postoperative subarachnoid block.[8]

MATERIAL AND METHOD:

This study was conducted in Swaroop Rani Nehru hospital associated with the Motilal Nehru Medical College, Prayagraj, over a period of one year from July 2019 to june 2020, after approval from ethical committee of institution and obtaining written and informed consent from the patients. Patients were randomly assigned to three groups, using SNOSE method (sequentially numbered, opaque, sealed envelopes). It involved total 90 patients of 30 in each group of age between 18–60 years of either sex under ASA grade of I – II .

Patients were allocated to one of the following groups-

- **Group C :** Bupivacaine (heavy) 12.5 mg alone .
- **Group D :** (Bupivacaine heavy) 12.5 mg + Dexmedetomidine 5 µg
- **Group F :** Bupivacaine (heavy) 12.5 mg + fentanyl 25 µg (0.5 mL)

All the patients were kept for 8 h fasting prior to surgery. Patients were placed in lateral decuibitus position for spinal anesthesia. Standard monitoring including NIBP,ECG,heart rate and pulse oximetry performed. After All parameters were assessed every 5 min,15 min,30 min,60 min,90 min,150 min. Assessment of sensory block was done by using pinprick method by using 22 Gauge blunt needle and motor block was assessed by using Modified Bromage scale Modified Bromage Scale[87].

STATISTICAL ANALYSIS:

Analysis was done by using SPSS ver 23 and MS excel Software's. The required sample size calculation done by using the following formula as proposed by Kirkwood BR et[10]

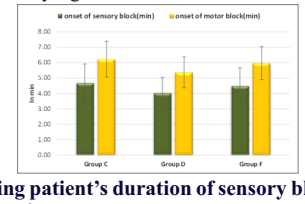
$$N = \frac{(u + v)^2(\sigma_1^2 + \sigma_0^2)}{(\mu_1 - \mu_0)^2}$$

OBSERVATION AND RESULT:

Statistical analysis showed that there was no significant difference in gender wise distribution,height,weight and age of patient in between various groups.

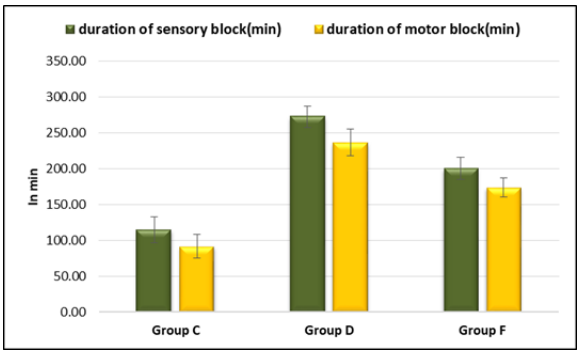
Graph1:showing patient's onset of sensory block, onset of motor block in various groups

In the present study the mean time taken to achieve highest sensory block in group C was 4.67± 1.25 minutes, group D was 4.3±10 minutes and in group F was 4.48 ± 1.19 minutes with a p value of 0.96 which was statistically not significant. The mean time taken for onset of Bromage 3 in group C was 6.23± 1.17 minutes, group D was 5.37± 1.0 minutes and in group F was 5.97±1 7 minutes with p value of 0.08 which was statistically significant.



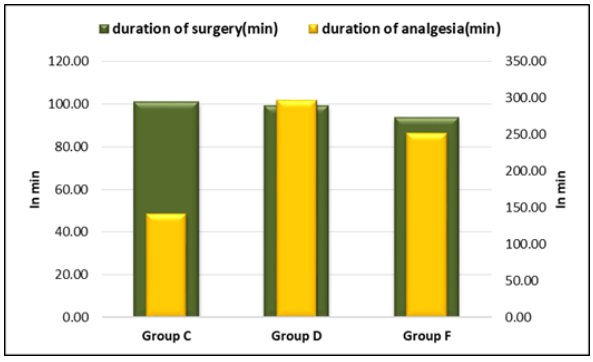
Graph 2: showing patient's duration of sensory block, duration of motor block in various groups

It was observed in our study that the mean time taken for regression to S1 segment in group C was 115.33±18 0 minutes, group D was 272.67±14.55 minutes and in group F was 200.83± 15.65 minutes with a p value of <0.01 which is statistically significant. The mean time taken for regression to bromage 0 in group C was 92.20± 16.79 minutes, group D was 237.33 ± 18.56 minutes and in group F was 174.33± 13.18 minutes with a p value of <0.01 which is statistically significant.



Graph 3: showing patient's duration of surgery, duration of analgesia in various groups

In the present study the mean time for rescue analgesia in group C was 142.40± 12.69 minutes group D was 296.80± 21.18 minutes and in group F was 252.17± 21.44 minutes with a p value of <0.01 which was statistically significant.



DISCUSSION

SENSORY BLOCKADE: In our study the addition of adjuvants like fentanyl and dexmedetomidine to intrathecal bupivacaine did not have significant difference in the onset of sensory block. Other similar study was conducted by **Gupta et al** [11] There was no difference between groups D and F in the highest level of block achieved in the two groups (T5 and T6, respectively) or in the time to reach peak level. He also observed a sensory regression time to S1 was 476±20 minutes in group D and 187±12.3 minutes group F with a p value of <0.01. Block regression was significantly slower with the addition of intrathecal dexmedetomidine as compared with intrathecal fentanyl**. AL Mustafa et al** [6] noted a regression of sensory block were highly significant (N versus D5, N versus D10, and D5 versus D10, p<0.01). Dexmedetomidine has a dose dependent effect on the regression of sensory block when used as an adjuvant to bupivacaine in spinal anesthesia. ***Al-Ghanem et al*** [12] study, time for sensory regression to S1 level (min) in BN group was 241.83 ± 22.26, BF group was 329.83 ± 44.10 and BD group was 560.53 ± 81.86 with significant p value (p<0.01). Using dexmedetomidine as an adjuvant to bupivacaine for spinal anesthesia in their study has longer duration of sensory block in our study time of regression to S1 segment was prolonged with intrathecal dexmedetomidine as compared to fentanyl.

MOTOR BLOCK:

In our study the mean time taken for onset of Bromage 3 in group C was 6.23± 1.17 minutes, group D was 5.37± 1.0 minutes and in group F was 5.97±1 7 minutes with p value of 0.08 which was statistically significant. **Al Mustafa et al** [6] who used varying doses of dexmedetomidine (5ug & 10ug) with bupivacaine found onset time of 13±3.4 minute and 10.4±3.4 minute with a p value of <0.01 which was significant Onset motor block were highly significant (N versus D5, N versus D10, and D5 versus D10). Dexmedetomidine has a dose dependent effect on the onset of motor block when used as an adjuvant to bupivacaine in spinal anesthesia. In our study intrathecal dexmedetomidine produced prolonged motor effects when compared to intrathecal fentanyl with bupivacaine. Following study also support our study. **Rahimzadeh P, Faiz SHR** [13] designed a study in which regression to bromage 0 (min) regression to bromage 0 (min) BN group was 147.3 ± 33.5, BF group was 185.56 ± 35.87, BD group was 331.60 ± 73.96 and P value was < 0.01 which is statistically significant. Complete regression of motor block (Bromage 0) was reached in all patients and with the highest duration in BD group. **Pocham V, Naik LG** [14] showed that there was a highly significant difference in the duration of motor blockade between the two groups fentanyl (252.90 ± 8.31) min and the dexmedetomidine group (419.70 ± 16.85). Addition of 5 µg dexmedetomidine with hyperbaric bupivacaine significantly prolongs motor block when compared with 25µg of fentanyl with hyperbaric bupivacaine.

DURATION OF ANALGESIA:

In the present study the mean time for rescue analgesia in group C was 142.40± 12.69 minutes group D was 296.80± 21.18 minutes and in group F was 252.17± 21.44 minutes with a p value of <0.01 which was statistically significant.**Gupta et al**[11] noted that the time for rescue analgesia was 251.7±30.7 minutes and 168.9±15.96 minutes in dexmedetomidine and fentanyl group respectively with p value of <0.01 which was significant statistically. The time to rescue analgesic was significantly longer in group D as compared to group F.**Rahimzadeh P, Faiz SHR**[13] designed a study in which time to rescue analgesia (min) in BN group was 221.83 ± 22.26 group, BF group was 296.33 ± 44.83, BD group 496.63 ± 70.19 and p value < 0.01. None of the patients requested analgesic during the surgery

CONCLUSION:

To conclude, it is mentioned that both drugs dexmedetomidine and fentanyl were able to enhance anaesthetic effect of Bupivacaine (heavy) in spinal anaesthesia Both were safe since we did not observe any significant side effects. Dexmedetomidine produces longer duration of analgesia as compared with fentanyl. Their use was also comparable in contributing to postoperative analgesia.

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