Original Research Paper

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" A PROSPECTIVE RANDOMIZED COMPARATIVE STUDY ON ROPIVACAINE VERSUS LEVOBUPIVACAINE WITH OR WITHOUT FENTANYL IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK "

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ABSTRACT A prospective randomized double-blind study was undertaken to compare the onset and duration of sensory and motor blocking properties of 30 ml of 0.5% Ropivacaine and 30 ml of 0.5% levobupivacaine with or without fentanyl in supraclavicular brachial plexus block for elective upper limb orthopedic surgeries. GROUP-A(RF) received 29 ml of Inj. Ropivacaine hydrochloride 0.5% with 50mcg fentanyl(1ml),GROUP- B(R) received 30ml of Inj. Ropivacaine hydrochloride 0.5%,GROUP-C(LF) received 0.5%Levobupivacaine(29ml) with 50mcg fentanyl(1ml),GROUP-D(L) received 0.5%Levobupivacaine(30ml).There was no statistically significant difference in the onset of sensory and motor block in 4 groups. When compared to 4 groups duration of analgesia and duration of motor block was greater in Levobupivacaine with fentanyl group. It was statistically significant. Duration of analgesia and duration of motor block was least in Ropivacaine group. CONCLUSION: Duration of analgesia was longer in Levobupivacaine with fentanyl group. Duration of motor block was longer in Levobupivacaine with fentanyl group.

KEYWORDS : Levobupivacaine, Ropivacaine, Brachial Plexus Block

INTRODUCTION

With the introduction of newer and safer local anesthetics and better advantages of regional anesthesia has been taken over as the principle technique for upper limb surgeries. Ropivacaine is a new amino amide local anesthetic which has a similar structure as Bupivacaine, has all its advantages but without any cardiotoxicity.

MATERIALS AND METHOD:

In the present study entitled " Ropivacaine versus Levobupivacaine with or without fentanyl in supraclavicular brachial plexus block" was carried out in 160 patients of either sex undergoing supraclavicular brachial plexus block, using local anaesthetic agents with injection Levobupivacaine 0.5% and Ropivacaine 0.5% with or without 50mcg fentanyl in the Department of Anaesthesiology and critical care, at Kurnool Medical College, from 2017 – 2018.

GROUPS :

All the patients were randomly allocated into 4 groups so that each group consists of 40 patients.

GROUP-A(RF): 29 ml of Inj. Ropivacaine hydrochloride 0.5% with 50mcg fentanyl(1ml)

GROUP- B(R) : 30ml of Inj. Ropivacaine hydrochloride 0.5% .

GROUP-C(LF):0.5%Levobupivacaine(29ml) with 50mcg fentanyl(1ml).

GROUP-D(L): 0.5%Levobupivacaine(30ml)

INCLUSION CRITERIA:

Patients undergoing orthopedic upper limb surgeries in the age group of 18 -65 years of both sexes will be included with ASA grade I and grade II.

Pre anaesthetic checkup was done. NBM was confirmed and premedicated .On arrival of patients to the operating room, an 18 gauge intravenous cannula was inserted and monitors were connected. With all aseptic precautions, subclavian artery pulsations were felt at a point 1.5 to 2.0 cm posterior and cephalad to the midpoint of the clavicle. A skin wheal is raised with local anesthetic cephalo posterior to the pulsations. A 22 gauge, 1.55 inches short beveled needle is introduced through the point located parallel to head and neck in a caudal and slight medial and posterior direction until either paraesthesia was elicited or the first rib was encountered. After paraesthesia is elicited and encountering the negative aspiration of blood, the needle should be kept in the same position and the medication under study was injected slowly by ruling out the intravascular injection intermittently.

BLOCK ASSESSMENT :

Sensory function was assessed by pinprick and scored present or absent. Similarly, motor function was assessed by testing abduction of the arm and flexion of the arm.

A modified Bromage scale was used:

A score of 4: Full power;
A score of 3: Reduced power but able to lift the arm against resistance.
A score of 2: moves relevant muscle group against gravity but unable to lift them against resistance.

A score of 1: perceptible muscle contraction, but unable to lift the arm
A score of 0: no movement in the relevant muscle group.

Duration of the sensory blockade was assessed by asking the patient to record the time of onset first pain sensation. Sensory block was assessed by pinprick method.

Grade 0 = Sharp pain
1 = Dull sensation (Analgesia)
2 = No sensation (Anaesthesia)

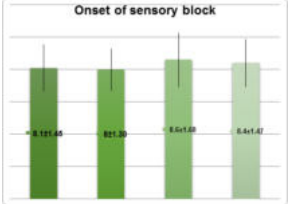
Duration of sensory block was evaluated by assessing the VAS score (VAS scale: 0 cm=no pain, 10 cm=worst pain) of the patients. Motor and the Sensory blockade were evaluated at 5,10,15,20 and 25 minutes after giving the drug. All vital data like Pulse Rate, BP, Spo2, ECG were monitored.

The relation between nominal data was analyzed using student t-test and analysis of variance (ANOVA) test. Probability less than 0.05was taken as significant at 95% confidence interval.

RESULTS

ONSET OF SENSORY BLOCK:

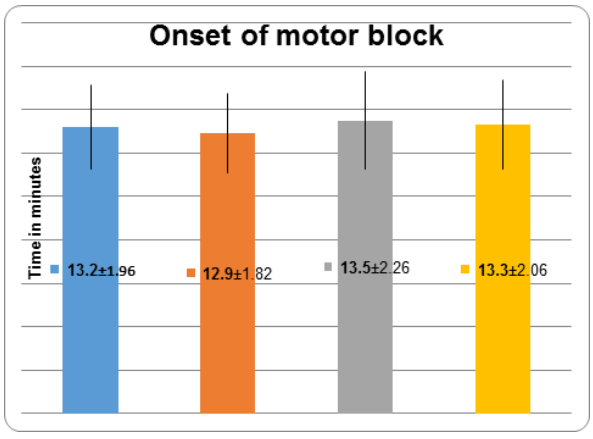
Meantime of onset of a sensory block of the study subjects in group A was 8.1 ± 1.45 minutes, group B was 8 ± 1.30 minutes, group C was 8.6 ± 1.68 minutes and group D was 8.4 ± 1.47 minutes. There was no significant difference between the groups with respect to time of onset of the sensory block on testing association with Anova. (F=1.674; p>0.05).On intergroup comparison of the mean time of sensory block with unpaired t-test, there was no significant difference between any two groups. (p>0.05).



Graph 1: Bar diagram showing Time for the onset of sensory block

ONSET OF MOTOR BLOCK:

Meantime of onset of motor block of the study subjects in group A was 13.2 ± 1.96 minutes, group B was 12.9 ± 1.82 minutes, group C was 13.5 ± 2.26 minutes and group D was 13.3 ± 2.06 minutes. There was no significant difference between the groups with respect to time of onset of the motor block on testing association with Anova. (F=0.606; p>0.05). On intergroup comparison of the mean time of motor block with unpaired t-test, there was no significant difference between any two groups. (p>0.05)



Graph 2: Bar diagram showing mean time for onset of motor block

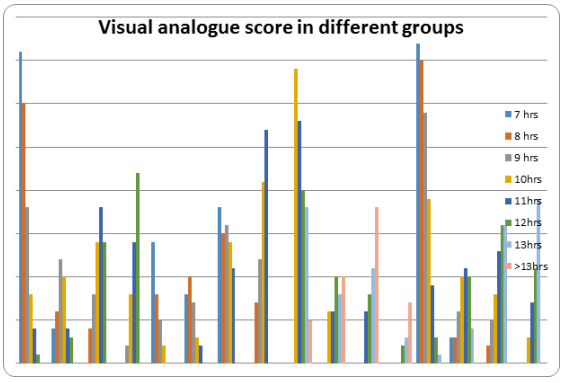
MEAN DURATION OF SENSORY BLOCK(duration of analgesia):

Mean duration of the sensory block of the study subjects in group A was 9.4 ± 1.41 hours, group B was 6.25 ± 1.63 hours, group C was 13.1 ± 2.28 hours and group D was 10.5 ± 1.13 hours. There was a significant difference between the groups with respect to mean duration of the sensory block on testing association with Anova. (F=115.78; p<0.05)

On intergroup comparison of mean duration of sensory block with unpaired t-test, there was a significant difference between all the groups. (p<0.05).

VAS scoring and rescue analgesia:

In group A, the majority of the patients needed rescue analgesic around 9hrs. In group B, the majority of the patients needed rescue analgesic around 6 hrs. In group C, patients needed rescue analgesia around 13 hrs. In group D, the majority of the patients needed rescue analgesic around 10hrs.



DISCUSSION

Brachial plexus block has emerged as a popular technique among the anesthetists for upper limb surgeries. Studies showing effects of adding fentanyl to ropivacaine and levobupivacaine in brachial plexus block is limited, so this present study is undertaken.

MEAN ONSET OF SENSORY BLOCK:

Mean onset of sensory block for ropivacaine was 8 min and mean onset of sensory block for ropivacaine with fentanyl was 8.1 min. Here mean onset of sensory block with ropivacaine with fentanyl was delayed when compared with ropivacaine, but it was statistically not significant.

The delayed onset of sensory block in ropivacaine with fentanyl (RF) group could be due to a change in the pH of the local anesthetic solution on addition of fentanyl, resulting in the slower block onset. Delay in the onset of sensory block with fentanyl in brachial plexus block was also seen in studies conducted by Nishikawa K et al, Chavan SG et al, Tejwant Rajkhowa et al, Boniface Hembrom et al.

ONSET OF MOTOR BLOCK:

Mean onset of the motor block for Ropivacaine was 12.9 min. and Ropivacaine with fentanyl was 13.2 min. Mean onset of the motor block for Ropivacaine was earlier than the mean onset of the motor block for Ropivacaine with fentanyl, but it was statistically not significant, which was similar to the study done by Tejwant Rajkhowa et al. The delayed onset of sensory and motor block in ropivacaine with fentanyl (RF) group could be due to a change in the pH of the local anesthetic solution on addition of fentanyl, resulting in the slower block onset. Mean onset of the motor block for levobupivacaine was 13.2 min. and levobupivacaine with fentanyl was 13.5 min.

Mean onset of the motor block for levobupivacaine was earlier than the mean onset of the motor block for levobupivacaine with fentanyl.Though there is a delay in mean onset of both sensory and motor blocks there was no statistical difference between all the groups. Similar results were also seen in a study conducted by Tejwant rajkhowa et al.

Mean duration of sensory block(Duration of Analgesia) :

Mean duration of Analgesia for ropivacaine was 6hrs and ropivacaine with fentanyl was 9hrs.Duration of Analgesia for ropivacaine with fentanyl was greater than the duration of analgesia for ropivacaine, which was statistically significant and it was similar to study done by Ravi madhusudhan et al. It shows that addition of opioids like fentanyl increases the duration of analgesia. The addition of fentanyl to local anesthetic prolongs the duration of action by directly acting on the peripheral nervous system. The drug may diffuse from brachial plexus sheath to the extradural and subarachnoid spaces and then bind with the opioid receptor in the dorsal horn to exert its action.

VAS score:

The duration of effective analgesia was calculated from the time between the end of local anesthetic administration to the time when VAS was less than 4 and rescue analgesic was administered when VAS score was equal to or greater than 4.

Most patients in group ropivacaine attained a VAS score of 4 at 7 hours and most patients in group ropivacaine with fentanyl attained a VAS score of 4 at 10 hours.. Addition of fentanyl causes increased the duration of analgesia and thereby fewer rescue analgesics are needed.

CONCLUSION

The following can be concluded from the present study.

- Duration of analgesia was longer in Levobupivacaine with fentanyl group.
- Duration of motor block was longer in Levobupivacaine with fentanyl group.
- Ropivacaine 0.5% and Levobupivacaine 0.5% produce similar quality of motor and sensory blockade. Hence we conclude that 30 ml 0.5% Levobupivacaine with additives like fentanyl for supraclavicular brachial plexus block produces a longer duration of sensory and motor blockade than ropivacaine with fentanyl.

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