ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 11 | November - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EVALUATION OF ANALGESIC EFFICACY OF DEXMEDATOMIDINE AS AN ADJUVANT CO-ADMINISTERED WITH 0.75% ROPIVACAINE BY SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR UPPER LIMB SURGERY

Medical Science

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ABSTRACT

INTRODUCTION: Brachial plexus block is a regional anesthesia technique that is sometimes employed as an alternative or as an adjunct to general anesthesia for surgery of the upper extremity. This technique involves the injection of local anesthetic agents in close proximity to the brachial plexus, temporarily blocking the sensation and ability to move the upper extremity.

OBJECTIVES: To compare time of onset and duration of sensory and motor block between two groups. To compare peri-operative and post-operative analgesia between two groups

MATERIAL AND METHOD: Orthopaedic operation theatre, post-anaesthesia care unit, orthopaedic post- operative ward of Nil Ratan Sircar Medical College and Hospital. All the ASA physical status I and II patients of either sex, age between 18-60 years undergoing upper limb orthopaedic surgery under supraclavicular brachial plexus block.

CONCLUSION: Addition of Dexmedetomidine to ropivacaine in supraclavicular brachial plexus block significantly prolongs the duration of analgesia and motor block in patients undergoing upper limb surgeries and is a remarkably safe and cost effective method of providing post-operative analgesia.

KEYWORDS

Dexmedatomidine, Ropivacaine, Supraclavicular Brachial Plexus Block, Upper Limb Surgery

INTRODUCTION

Brachial plexus block is a regional anesthesia technique that is sometimes employed as an alternative or as an adjunct to general anesthesia for surgery of the upper extremity. This technique involves the injection of local anesthetic agents in close proximity to the brachial plexus, temporarily blocking the sensation and ability to move the upper extremity. The subject can remain awake during the ensuing surgical procedure, or s/he can be sedated or even fully anesthetized if necessary.

There are several techniques for blocking the nerves of the brachial plexus. These techniques are classified by the level at which the needle or catheter is inserted for injecting the local anesthetic — interscalene block on the neck, supraclavicular block immediately above the clavicle, infraclavicular block below the clavicle and axillary block in the axilla (armpit).[1]

General anesthesia may result in deleterious effect of cardiovascularsystem, central nervous system depression, respiratory depression, loss of protective airway reflexes (such as coughing), need for tracheal intubation and mechanical ventilation, and residual anesthetic effects. The most important advantage of brachial plexus block is that it allows for the avoidance of general anesthesia and therefore its attendant complications and side effects. Although brachial plexus block is not without risk, it usually affects fewer organ systems than general anesthesia.[2] Brachial plexus blockade may be a reasonable option when all of the following criteria are met.

1. To compare time of onset of sensory and motor block between two groups
2. To compare duration of sensory and motor block between two groups
3. To compare peri-operative analgesia between two groups
4. To compare post-operative analgesia between two groups

MATERIAL AND METHOD

1. ***STUDY AREA***- Orthopaedic operation theatre, post-anaesthesia care unit, orthopaedic post- operative ward of Nil Ratan Sircar Medical College and Hospital.

2. ***SAMPLE SIZE*** – Total numbers of patients were 60, divided in the following two groups:

GROUP A- 30 patients who were receive 30ml 0f 0.5%ropivacaine And 1 ml normal saline.

GROUP B- 30 patients who were receive 30 ml of 0.75% Ropivacaine and 1ml dexmedatomidine.

5. EXCLUSION CRITERIA–

a. Patient refusal
b. Known history of allergy to the drugs under study
c. ASA physical status III and more
d. Hypertension
e. Diabetes Mellitus
f. Epilepsy
g. Pregnancy
h. Patient having sepsis or local site infection
i. Patient on antipsychotics

RESULT AND ANALYSIS

Our study showed that in group-A (R), the mean of age (mean±s.d.) of patients was 30.9000 ± 10.4728 yrs with range 18.0000 - 58.0000yrs and the median was 28.0000 yrs and in group-B (R+D), the mean of age (mean±s.d.) of patients was 30.8667 ± 10.1700 yrs with range 18.0000 - 52.0000 yrs and the median was 28.0000 yrs. Distribution of age in two groups was not statistically significant (p=0.9901). In group-A(R), 11(36.7%) patients had female and 19(63.0%) patients had male. In group-B (R+D), 11(36.7%) patients had female and 19(63.0%) patients had male. In group-A (R), the mean of height (mean±s.d.) of patients was 161.1667 ± 5.4966 cm with range 153.0000 - 172.0000 cm and the median was 162.0000 cm and in group-B (R+D), the mean of height (mean±s.d.) of patients was 161.3333 ± 5.6893 cm with range 150.0000 - 170.0000 cm and the median was 163.0000 cm. Distribution of height in two groups was not statistically significant (p=0.9085).

In our study showed that the group-A (R), the mean of weight (mean±s.d.) of patients was 61.0667 ± 5.1188 kg with range 53.0000 - 70.0000 kg and the median was 62.0000 kg and in group-B (R+D), the mean of weight (mean±s.d.) of patients was 61.2000 ± 5.4608 kg with range 52.0000 - 70.0000 kg and the median was 62.5000 kg. Distribution of weight in two groups was not statistically significant (p=0.9226). In group-A(R), 22(73.3%) patients had ASA status I and 8(26.7%) patients had ASA status II. In group-B (R+D), 20(66.7%) patients had ASA status I and 10(33.3%) patients had ASA status II. In group-A (R), the mean of onset time of sensory block (mean±s.d.) of

patients was 15.3333 ± 2.7334 min with range 10.0000 - 19.0000 min and the median was 16.5000 min and in group-B (R+D), the mean of onset time of sensory block (mean±s.d.) of patients was 10.4000 ± 2.4719 min with range 6.0000 - 15.0000 min and the median was 11.0000 min. Distribution of onset time of sensory block in two groups was statistically significant (p<0.0001). In group-A (R), the mean of onset time of motor block (mean±s.d.) of patients was 20.3333 ± 1.2411 min with range 18.0000 - 23.0000 min and the median was 20.0000 min and in group-B (R+D), the mean of onset time of motor block (mean±s.d.) of patients was 15.3333 ± 3.2092 min with range 9.0000 - 20.0000 min and the median was 16.5000 min. Distribution of onset time of motor block in two groups was statistically significant (p<0.0001).

We found in group-A (R), the mean of first rescue analgesia (mean±s.d.) of patients was 405.9667 ± 51.0020 min with range 260.0000 - 460.0000 min and the median was 415.0000 min and in group-B (R+D), the mean of first rescue analgesia (mean±s.d.) of patients was 502.7667 ± 50.9155 minwith range 380.0000 - 600.0000 min and the median was 510.0000 min. Distribution of first rescue analgesia in two groups was statistically significant (p<0.0001).

Difference of mean HR and SBP at different follow-up in two groups was not statistically significant .

Our study showed that in group-A (R), the mean of VAS 1 (mean±s.d.) of patients was .1000 ± .3051 hr with range 0.0000 - 1.0000 hr and the median was 0.0000 hr and in group-B (R+D), the mean of VAS 1 (mean±s.d.) of patients was .0667 ± .2537 hr with range 0.0000 - 1.0000 hr and the median was 0.0000 hr. Distribution of VAS 1in two groups was not statistically significant (p=0.6472). In group-A (R), the mean of VAS 4 (mean±s.d.) of patients was 2.4000 ± 1.0700 hr with range 0.0000 - 4.0000 hr and the median was 3.0000 hr and in group-B (R+D), the mean of VAS 4 (mean±s.d.) of patients was 1.0667 ±.6915 hr with range 0.0000 - 2.0000 hr and the median was 1.0000 hr. Distribution of VAS 4 in two groups was statistically significant (p<0.0001). In group-A (R), the mean of VAS 8 (mean±s.d.) of patients was 3.9667 ± .9279 hr with range 2.0000 - 5.0000 hr and the median was 4.0000 hr and in group-B (R+D), the mean of VAS 8 (mean±s.d.) of patients was 2.4333 ±.5683 hr with range 2.0000 - 4.0000 hr and the median was 2.0000 hr. Distribution of VAS 8 in two groups was statistically significant (p<0.0001). In group-A (R), the mean of VAS 12 (mean±s.d.) of patients was 2.9333 ± .9444 hr with range 1.0000 - 4.0000 hr and the median was 3.0000 hr and in group-B (R+D), the mean of VAS 12 (mean±s.d.) of patients was 1.4667 ±.5074 hr with range 1.0000 - 2.0000 hr and the median was 1.0000 hr. Distribution of VAS 12 in two groups was statistically significant (p<0.0001).

We found in group-A (R), the mean of VAS 24 (mean±s.d.) of patients was 3.4333 ± 1.1043 hr with range 2.0000 - 5.0000 hr and the median was 3.0000 hr and in group-B (R+D), the mean of VAS 24 (mean±s.d.) of patients was 2.5000 ±.6823 hr with range 2.0000 - 4.0000 hr and the median was 2.0000 hr. Distribution of VAS 24 in two groups was statistically significant (p=0.0002). In group-A (R), the mean of total analgesia (mean±s.d.) of patients was 2.3000 ± .4661 with range 2.0000 - 3.0000 and the median was 2.0000 and in group-B (R+D), the mean of total analgesia (mean±s.d.) of patients was 1.4667 ±.5074 with range 1.0000 - 2.0000 and the median was 1.0000. Distribution of total analgesia in two groups was statistically significant (p<0.0001). In group-A(R), 1(3.3%) patients had adverse effect and in group-B(R+D), no patients had adverse effect.

DISCUSSION

Present study was conducted in the department of Anaesthesiology in Nil Ratan Sircar Medical College & Hospital, Kolkata, West Bengal. 60 patients were selected using above defined criteria, 30 patients had in Group-A(R) and 30 patients had in Group-B (R+D). Present study was conducted November 2017 to September 2018. Using computer generated random numbers, patients were allocated into 2 groups:-

GROUP A (R)- 30 patients who were received 30 ml 0f 0.5% Ropivacaine and 2 ml normal saline.
GROUP B (R+D)-30 patients who were received 29 ml of 0.5% Ropivacaine and 1ml (100 ug) dexmedetomidine.

Dar FA [3] et al showed that mean age of group R was 30±8 years and 31±9 years in group DR. Difference of mean age in two groups was not statistically significant. Bais DS et al [4] showed that the average age in group R was 27.68±7.7 yrs. with the youngest being 16 yrs. and the oldest being 42 yrs. The average age in group RD was 31.08±9.4 yrs. with the youngest being 16 yrs. and the oldest being 45 yrs. There was no statistically significant difference between the two groups in reference to the age distribution.

We found that distribution of mean age in two groups was not statistically significant (p=0.9901). Thus age was matched in three groups.

Dar FA [3] et al showed that 34 patients had female in group-R and 35 patients had female in group-DR. 6 patients had male in group-R and 5 patients had male in group-DR. That was not statistically significant.

We found that in group-A, 11(36.7%) patients had female and 19(63.3%) patients had male. In group-B, 11(36.7%) patients had female and 19(63.3%) patients had male. Association between gender in two groups was not statistically significant (p=1.0000).

Dar FA [3] et al showed that the mean weight (kg) was 68±10 in group-R and 65±12 in group-DR. Difference of mean weight in two groups was not statistically significant. They also found that the mean height (cm) 172±6 in group-R and 174±8 in group-DR. Difference of mean height in two groups was not statistically significant.

Kumar S et al [5] showed that ASA I/II had 25/15 in group-D and 23/17 in group-R. We found that in group-A, 22(73.3%) patients had ASA status I and 8(26.7%) patients had ASA status II. In group-B, 20(66.7%) patients had ASA status I and 10(33.3%) patients had ASA status II.

Bais DS et al [4] found that the time to onset of sensory block which was 14.12±2.1 min in group R and 14.96±3.0 min in group RD, the difference of which was not found to be statistically significant. Dar FA [3] found that the time to onset of sensory block which was 17.5±4.2 min in group R and 14.65±3.31 min in group RD, the difference of which was found to be statistically significant. We found that the mean in group-A (R), the mean of onset time of sensory block (mean±s.d.) of patients was 15.3333 ± 2.7334 min with range 10.0000 - 19.0000 min and the median was 16.5000 min and in group-B (R+D), the mean of onset time of sensory block (mean±s.d.) of patients was 10.4000 ± 2.4719 min with range 6.0000 - 15.0000 min and the median was 11.0000 min. Distribution of onset time of sensory block in two groups was statistically significant (p<0.0001). Bais DS et al [4] found that the time to onset of motor block in the two groups and was found to be 18.12±3.4 min in group R and 17.14±2.9 min in group RD. The difference was not found to be statistically significant. Dar FA et al [3] found that the time to onset of motor block in the two groups and was found to be 20.67±3.03 min in group R and 18.01±4.51 min in group RD. The difference was found to be statistically significant.

We found that the mean of onset time of motor block (mean±s.d.) of patients was 20.3333 ± 1.2411 min with range 18.0000 - 23.0000 min and the median was 20.0000 min in group- A. The mean of onset time of motor block (mean±s.d.) of patients was 18.6000 ± 1.5222 min with range 16.0000 - 21.0000 min and the median was 19.0000 min in group- B. Distribution of mean onset time of motor block in two groups was statistically significant (p<0.0001).

We found that the in group-A (R), the mean of first rescue analgesia (mean±s.d.) of patients was 405.9667 ± 51.0020 min with range 260.0000 - 460.0000 min and the median was 415.0000 min and in group-B (R+D), the mean of first rescue analgesia (mean±s.d.) of patients was 502.7667 ± 50.9155 min with range 380.0000 - 600.0000 min and the median was 510.0000 min. Distribution of first rescue analgesia in two groups was statistically significant (p<0.0001). Bais DS et al [4] found that the duration of sensory block which was 9.44±0.8 hours in group R and 19.52±1.5 hours in group RD. The difference between the two groups was found to be statistically significant. Dar FA [3] et al found that the duration of sensory block which was 7.5.±0.55 hours in group R and 12.3±0.40 hours in group RD. The difference between the two groups was found to be statistically significant. Bais DS et al [4] found that the duration of motor block which was around 7.28±0.8 hours in group R and 7.6±0.7 hours in group RD. The difference between the two groups was not statistically significant. Dar FA [3] et al found that the duration of motor block which was around 6.4±0.30 hours in group R and 8.2±0.50 hours in group RD. The difference between the two groups was statistically significant.

Bais DS et al [4] Rescue analgesics were supplemented in Group R after 7 hrs. due to increase in pain and after 20 hrs. In Group RD. In group-A (R), the mean of total analgesia (mean±s.d.) of patients was 2.3000 ± .4661 with range 2.0000 - 3.0000 and the median was 2.0000 and in group-B (R+D), the mean of total analgesia (mean±s.d.) of patients was 1.4667 ± .5074 with range 1.0000 - 2.0000 and the median was 1.0000. Distribution of total analgesia in two groups was statistically significant ($p<0.0001$). In group-A(R), 1(3.3%) patients had adverse effect and in group-B(R+D), no patients had adverse effect.

Dar FA et al [3] found that the VAS scores for the two groups were found to be significantly different between 6 to 12 hrs. following institution of the block, with higher pain scores being recorded in group R due to fade of the block. We found that the VAS scores for the two groups were found to be significantly different between 4 to 24 hrs.

CONCLUSION

From our study we found that addition of Dexmedetomidine as an adjuvant to Ropivacaine (0.5%) for single injection supraclavicular brachial plexus block early onset of sensory and motor block and prolongs the duration of sensory and motor block, needs less number of rescue analgesics in the post-operative period. Significant difference in the VAS pain scores was found between 4 to 24 hrs after onset of blockade. This finding is consistent with previous studies. Dexmedetomidine along with ropivacaine decreases the onset of motor and sensory block and increases the duration of sensory and motor block in supraclavicular brachial plexus block. Addition of Dexmedetomidine to ropivacaine in supraclavicular brachial plexus block significantly prolongs the duration of analgesia and motor block in patients undergoing upper limb surgeries and is a remarkably safe and cost effective method of providing post-operative analgesia.

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