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Dexamethasone Vs Dexmedetomidine as Adjuvants to Ropivacaine- Comparison for Postoperative Analgesia in Brachial Plexus Block

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ABSTRACT

Background

Brachial plexus block (BPB) provides good postoperative analgesia for a limited duration. Continuous catheter techniques may have various technical challenges, cause infection, and failure due to migration. Dexmedetomidine is selective α2 agonist with α1: α2 ratio of 1600:1. Dexamethasone has a potent anti-inflammatory action. Dexamethasone as an adjuvant to LA increases peripheral nerve block analgesia. Studies comparing these two drugs have shown conflicting conclusions when used as adjuvants in BPB. Hence the current study was undertaken. Aim was to compare the efficacy of dexmedetomidine vs dexamethasone as adjuvants to ropivacaine in ultrasound-guided BPB.

Methods

This interventionalrandomized single-blindedstudy was done at a tertiary care centre among 100patients who were scheduled for upper limb surgeries at a tertiary care centre namedNRIInstitute of Medical Sciences, Andhra Pradesh, from January 2022 to June 2022. Pregnant and lactating women, patients with known allergies to study medications, patients with incomplete data were excluded from the study.

Results

Most of the patients belonged to the age group 41-50 years. Most of the patients were males. There is no significant difference in the mean age, gender, ASA grade and duration of surgery between two groups of

patients. Onset of sensory and motor blocks were quick in group A patients. Duration of sensory and motor blocks were more in group A patients. Duration of analgesia was more prolonged in group A patients.

Conclusion

We recommend adding dexmedetomidine to ropivacaine for patients scheduled for various upper limb surgeries under ultrasound-guided supraclavicular brachial plexus block.

Keywords

Dexamethasone, Dexmedetomidine, Ropivacaine, brachial plexus block, postoperative analgesia

INTRODUCTION

Regional anaesthesia provides various advantages like avoiding polypharmacy, conscious patient, and adequate postoperative analgesia.[1] Brachial plexus block (BPB) provides good postoperative analgesia for a limited duration. Continuous catheter techniques may have various technical challenges, cause infection, and failure due to migration.[2] By reducing the stress response and by using minimal drug dose, it provides adequate intraoperative analgesia apart from postoperative pain-relief.[3] It is given by supraclavicular, interscalene, infraclavicular and axillary approaches.

Ultrasound (US) helps in deposition of drug at correct place and improves block success. Brachial plexus at supraclavicular regions is compact and shallow and the visibility of nerves is good.[4-5]

Various adjuvants can be added to local anaesthetics (LA) to reduce postoperative pain. The ideal adjuvant shows a faster onset of sensory and motor blockade apart from producing fewer side effects. Previous studies have shown that duration analgesia was longer if alpha agonists like clonidine, dexmedetomidine, and steroids like dexamethasone were used as adjuvants to local anaesthetics. One meta-analysis showed that dexmedetomidine was more effective compared to clonidine.[6] So, we included dexmedetomidine in our study. Dexmedetomidine is selective α2 agonist with α1 : α2 ratio of 1600:1[7].Multiple studies have shown that dexmedetomidine as a good adjuvant in nerve blocks previously,[8-9] when mixed with LAs for brachial plexus block provides better anaesthesia and analgesia.[10]It acts by blocking hyper- polarisation activated cation currents.

Dexamethasone has a potent anti-inflammatory action. Dexamethasone as an adjuvant to LA increases peripheral nerve block analgesia.[11-12]Studies comparing these two drugs have shown conflicting conclusions when used as adjuvants in BPB.[13-14] Hence the current study was undertaken.

AIM AND OBJECTIVES

The aim was to compare dexmedetomidine and dexamethasone as adjuvants to ropivacaine in ultrasound (US) guided BPB on the duration of postoperative analgesia in upper limb surgeries. The objectives were to compare the onset of sensory and motor blockades, total analgesic consumption in 24 h, and postoperative complications.

MATERIALS AND METHODS

Source of data: This interventional randomized single blinded study was done on patients scheduled for various upper limb surgeriesat a tertiary center named NRI Institute of Medical Sciences, Chinakakani, Andhra Pradesh, from January 2022 to June 2022.

The study was randomized as 100 patients were randomly divided into two groups of 50 patients each by computer generated software.

The study is single blinded as only investigator knows the drug the patient is getting (dexmedetomidine or

dexamethasone). The patient doesn't know the drug- to avoid bias.

Inclusion criteria:

- Patients aged 20 to 60 years
- Either gender
- Patients scheduled for upper limb surgeries under US guided BPB
- Patients
- Patients who provided informed consent to participate in the study.

EXCLUSION CRITERIA

- Pregnant and lactating women
- Patients with coagulopathies
- Patients with neuromuscular disorders
- Patients with severe systemic illnesses
- Patients with infection at site of block
- Patients with incomplete data
- Patients with allergies to study medications

Sampling: Simple random sampling method was used to select study population.

Sample size calculation: Using an alpha error of 0.05 and considering the power of the study as 80%, to identify 60 min difference in minimum time required for rescue analgesia, the sample size came to be 44 in each group. So, we included 50 patients in each considering few drop outs and incomplete data.

Parameters assessed:

- Age
- Gender
- ASA grade
- Duration of surgery
- Onset of sensory and motor blocks
- Duration of sensory and motor blocks
- Duration of postoperative analgesia
- Paracetamol consumption
- Opioid consumption. (Opioid used is tramadol)

METHODOLOGY

100 patients were randomized to receive either dexmedetomidine 50 mcg (Group A) or dexamethasone 8 mg(Group B) as adjuvant to ropivacaine in ultrasound-guided supraclavicular BPB. These doses were selected as per previous studies. The commonly used doses of drugs as per literature evidence were selected. [16-17]All the patients received premedication using alprazolam 0.5 mg before night and 2 hours before surgery. All patients were continuously monitored for blood pressure, heart rate and oxygen saturation.BPB was done using ultrasound guidance. Postoperative analgesia was measured using the visual analogue scale (VAS) scoring[18] of one to ten. Rescue analgesia was given when VAS was above 3. Rescue analgesic agents used were paracetamol and tramadol injections.

STATISTICAL ANALYSIS

Data analysis was done using Epi Info software version 7.2.5. The results were expressed as mean ± S.D, percentages, and numerical parameters were compared using students t test and categorical parameters were compared using chi-square test. P value < 0.05 was considered significant.

ETHICAL CONSIDERATIONS

Ethical committee approval was taken before conducting the study. Informed consent form was taken from every patient who participated in the study.

RESULTS

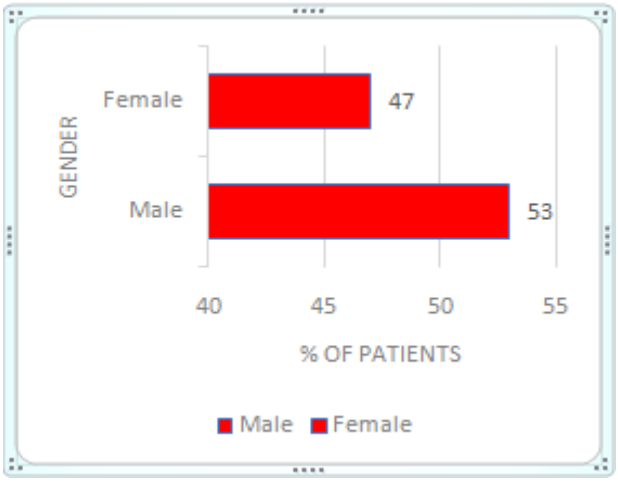
DEMOGRAPHY

Most of the patients (54%) belonged to the age group 41 to 50 years.

Age distribution	Frequency	Percentage
21-30	5	5%
31-40	11	11%
41-50	54	54%
above 50	30	30%

Table1 illustrate sage distribution and mean age of study patients**.**

Gender: Most of the patients were males.



Graph 1 shows the gender distribution of study population

Summary of baseline features in both groups

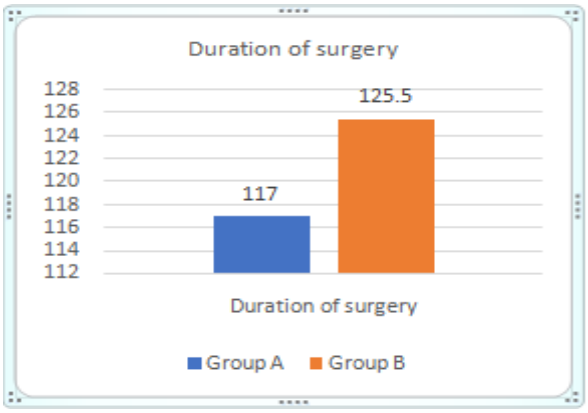
There is no significant difference in the baseline features between both groups.

Parameter	Group A	Group B	P value
Mean age	42.3±4.5 years	43.4±4.1 years	0.20
Gender Male	53%	56%	0.18
ASA Grade 1	64%	62%	0.08

Table 2 illustrates summary of baseline features in both groups.

Duration of surgery

Mean duration of surgery shows no significant difference.(p=0.54)



Graph 2 shows duration of surgery in both groups

Features of block

Onset of motor and sensory blocks was quick in group A compared to group B significantly. Duration of sensory and motor blocks were more in group A significantly.

Parameter	Group A	Group B	P value
Onset of sensory block	12.3±3.8 min	21.1±2.4 min	0.0001
Onset of motor block	17.2±4.5 min	18.6±4.7 min	0.0001
Duration of sensory block	970.4±12.4 min	940.3±14	0.0001
Duration of motor block	835±9.2	812.3±4.2	0.0001

Table 3 shows features of block in both groups

Postoperative analgesia

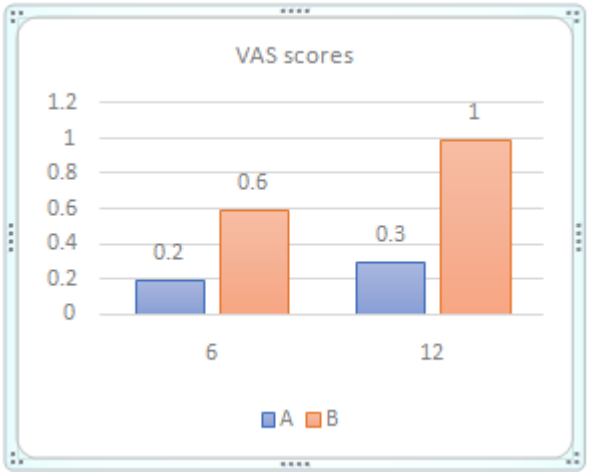
Duration of analgesia was significantly more in group A compared to group B patients. Total paracetamol and tramadol consumptions were less in group A patients significantly.

Parameter	Group A	Group B	P value
Duration of analgesia	1224±123.1	1121±24.2	0.000
Total paracetamol consumption	1.1±1.2 doses (1dose=1000mg)	1.68±0.8 doses	0.00
Total tramadol consumption	1.2±0.4 doses (1 dose=100mg)	0.7±0.2 doses	0.00

Table 4 shows postoperative analgesia in both groups

VAS score at 6 and 12 hours

VAS scores were less in group A patient compared to group B patients.



Graph 3 shows VAS scores in both groups

Side effects: No major side effects were seen in both groups

DISCUSSION

In the current study, we compared dexmedetomidine with dexamethasone when added to ropivacaine in supraclavicular BPB. There is no significant difference in demographic features like mean age, gender, ASA grade, duration of surgery between two groups. Hence the comparison is justifiable. Onset of motor and sensory blocks were quick in group A compared to group B significantly. Duration of sensory and motor blocks were more in group A significantly. Duration of analgesia was significantly more in group A compared to group B patients. Total paracetamol and tramadol consumptions were less in group A patients significantly in our study.

Waindeskar *et al*., found that, by adding 1 mcg/kg dexmedetomidine to levobupivacaine during US-guided BPB block, onset of sensory and motor blocks were quick and duration of blocks were more found to be extended significantly. similar, to our study results.[19]

Some studies found no significant improvement of onset of sensory and motor blocks by adding dexamethasone as adjuvant, in contrast to our findings.[20-21]

Ammar[22]*et al*. identified that there is reduced requirement of morphineas rescue analgesic if dexmedetomidine is added ass adjuvant in brachial plexus block. Agarwal *et al*. also found that among patients receiving supraclavicular plexus block using 100 mcg of dexmedetomidine if added to bupivacaine, found to raise the duration of analgesia.[8]

We recommend studies on the comparison of dexmedetomidine, dexamethasone compared to opioids like morphine as adjuvants to novel local anaesthetics like levobupivacaine.

The study is self-sponsored.

There were no conflicts of interest.

Acknowledgements: Nil

CONCLUSION

We recommend adding dexmedetomidine to ropivacaine for patients scheduled for various upper limb surgeries under ultrasound-guided supraclavicular brachial plexus block.

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