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RESEARCH ARTICLE
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COMPARISON OF TWO DOSES OF DEXMEDETOMIDINE COMBINED WITH ROPIVACAINE IN USG-GUIDED INFRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR UPPER LIMB SURGERIES

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Abstract

Background: Ultrasound-guided infraclavicular brachial plexus block (ICB) is effective for upper limb surgeries. Dexmedetomidine, an α_2-adrenergic agonist, enhances local anesthetic effects. This study compares two doses of dexmedetomidine as an adjuvant to 0.5% ropivacaine in ICB.

Methods: Prospective, randomized study with 111 ASA I/II patients. Group 1: 19 ml 0.5% ropivacaine + 1 ml saline; Group 2: same plus 50 µg dexmedetomidine; Group 3: same plus 100 µg dexmedetomidine. Onset and duration of sensory/motor block and analgesia assessed, along with side-effects.

Results: Group 3 demonstrated significantly faster onset and longer duration ($p < 0.001$), but higher rates of bradycardia/hypotension ($p = 0.02$).

Conclusion: 100 µg dexmedetomidine accelerates block onset and prolongs analgesia but has more cardiovascular side-effects; 50 µg may offer a safer balance.

Introduction

Infraclavicular brachial plexus block provides effective regional anesthesia for upper limb surgeries with fewer complications than other brachial plexus approaches. Ropivacaine offers long-acting anesthesia with lower cardiotoxicity compared to bupivacaine, but has limited analgesic duration. Dexmedetomidine, with sedative and analgesic properties, is often used as an adjuvant to enhance block quality. This study evaluates two doses of dexmedetomidine added to ropivacaine in ICB, focusing on block onset, duration, analgesia, and side-effects.

Aims and Objectives

Primary Objective: Compare onset and duration of sensory and motor block and duration of postoperative analgesia between two dexmedetomidine doses added to ropivacaine.

Secondary Objective: Evaluate incidence of adverse effects (bradycardia, hypotension) between the doses.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- ASA I–II patients
- Age 18–60 years
- Scheduled for elective upper limb surgery under ICB

Exclusion Criteria:

- Patient refusal
- Pregnancy
- BMI > 35 kg/m²
- Allergy to local anesthetics
- Coagulopathies or infection at block site
- Pre-existing neurological deficits
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Materials and Methods

This randomized, prospective trial at SSIMS & RC, Davangere, enrolled 111 patients over two years. Using chit-pull randomization, three groups were assigned. Under standard monitoring and IV sedation, a USG-guided infraclavicular block was performed using 20 ml total volume of the respective study solutions. Onset and duration of sensory/motor block and duration of analgesia were recorded. Hemodynamics and adverse events were monitored throughout.

Statistical Analysis

Quantitative variables are presented as mean ± SD and analyzed by one-way ANOVA; categorical variables by chi-square test. A p-value < 0.05 was considered significant. Analyses were performed using IBM SPSS v26.

Results

Patient demographics were comparable across groups. Group 3 showed the fastest sensory onset (≈3.10 min) and motor onset (≈4.86 min), and longest sensory block duration (~605 min), motor block (~596 min), and analgesia (~755 min), all statistically significant ($p < 0.001$). Incidence of bradycardia and hypotension was highest in Group 3 (~13.5%, $p = 0.02$).

Table1 -Demographic data

Variables	Group1	Group 2	Group 3
Age (Year)	37.2 ± 13.3	38.0 ± 11.1	38.0 ± 11.7
Weight (Kg)	64.19 ± 9.04	64.97 ± 5.42	63.97 ± 5.66
Gender (male /female)	27(73%) / 10 (27%)	24 (64.9%) /13 (35.1%)	24 (64.9%)/13 (35.1%)

Table 2-Characteristics of block in each group

Parameters	Mean ± SD			P value
	Group 1	Group 2	Group 3	
Onset of sensory block in min	5.80 ± 1.21	4.48 ± .81	3.10 ± .71	**< 0.001**
Onset of motor block in mins	10.61 ± 1.74	7.24 ± 1.32	4.86 ±0.991	**< 0.001**
Duration of motor block in mins	368 ± 105	555 ± 152	596 ± 189	**<0.001**
Duration of sensory block in mins	389 ± 118	579 ± 150	605 ± 176	**<0.001**
Duration of analgesia in mins	421.08 ± 172.559	591.35 ± 154.005	755.68 ± 256.835	**<0.001**

Table 3-Comparison of incidence of side effects in the groups

Side effect		Group 1	Group 2	Group 3	P value
Bradycardia/ Hypotension	Yes	0(0)	1(2.7)	5 (13.5)	**0.02**
	No	37 (100)	36 (97.3)	32(86.5)	

Discussion

Dexmedetomidine significantly enhances block quality when added to ropivacaine in a dose-dependent manner. The 100 µg dose offers superior analgesic duration and quicker onset but increases cardiovascular side-effects. The 50 µg dose provides a more favorable side-effect profile while still improving block duration. These findings align with prior randomized controlled studies showing dose-related efficacy and safety trade-offs.

Conclusion

Dexmedetomidine improves the efficacy of ropivacaine in infraclavicular blocks. While the 100 µg dose provides the best block characteristics, it also increases bradycardia and hypotension risk. The 50 µg dose may represent an optimal balance between efficacy and safety.

References

1. Abdallah FW, Brull R. Facilitatory effects of perineural dexmedetomidine on neuraxial and peripheral nerve block: a systematic review and meta-analysis. Br J Anaesth. 2013 Jun;110(6):915-25.
2. Chaudhari MD, Vaswani ND, Khara BN. Vertical infraclavicular block with dexmedetomidine as an adjuvant to local anesthetics: multifaceted quality enhancement effort. Indian J Anaesth. 2016;60(2):184-90.
3. Nallam SR, Chiruvella S, Karanam S. Supraclavicular brachial plexus block: comparison of varying doses of dexmedetomidine combined with levobupivacaine: a double-blind randomized trial. Indian J Anaesth. 2017;61(3):256-61.
4. Metwally AA, Ibrahim ES, Al Lahouny MM, Mahdy WR. Ultrasound-guided double injection infraclavicular brachial plexus block: bupivacaine alone or with added dexmedetomidine or fentanyl. Menoufia Med J. 2018;31(1):13.