IOSR Journal of Mathematics (IOSR-JM)
e-ISSN: 2278-0661, p-ISSN: 2278-8727, Volume 22, Issue 3, Ser. 1 (May. – June. 2026), PP 48-51
www.iosrjournals.org

Comparison Of Clonidine And Dexmedetomidine As Adjuvants To Bupivacaine In Supraclavicular Brachial Plexus Block-A Hospital Based Randomized Double Blind Study.

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Abstract:
Background*: Supraclavicular brachial plexus block is commonly used for upper limb surgeries because it provides effective intraoperative anesthesia and postoperative analgesia. To improve the quality and duration of the block, adjuvants like clonidine and dexmedetomidine (alpha-2 adrenergic agonists) are added to local anesthetics such as bupivacaine. These adjuvants help in prolonging sensory and motor block and reducing postoperative pain. However, there is a need to compare their efficacy and safety to determine the better adjuvant.*
Materials and Methods*: This prospective randomized double-blind study was conducted in the Department of Anaesthesiology at Akash Institute of Medical Sciences, Bengaluru, from May 2024 to May 2025. A total of 80 ASA grade I and II patients aged between 18–60 years undergoing elective upper limb surgeries under supraclavicular brachial plexus block were included.*
Patients were randomly divided into two groups:
- ***Group C:*** *Received 20 ml of 0.5% bupivacaine with clonidine (0.5 mcg/kg)*
- ***Group D:*** *Received 20 ml of 0.5% bupivacaine with dexmedetomidine (0.5 mcg/kg)*

Standard ASA monitors were used and the block was performed under ultrasound guidance. Parameters studied included onset and duration of sensory and motor block, duration of analgesia, and adverse effects such as bradycardia, hypotension, and sedation. Data were collected and analyzed statistically significant.
Results*: The study showed that the duration of sensory block was significantly longer in the dexmedetomidine group compared to the clonidine group .*
Conclusion: *Dexmedetomidine is a better adjuvant than clonidine when added to bupivacaine for supraclavicular brachial plexus block, as it significantly prolongs sensory and motor block duration and provides longer postoperative analgesia with a favorable safety profile.*
Key Word: *Supraclavicular brachial plexus block; Dexmedetomidine; Clonidine; Bupivacaine; Postoperative analgesia; sensory block; motor block.*

Date of Submission: 01-05-2026 Date of Acceptance: 11-05-2026

I. Introduction

Supraclavicular brachial plexus block is a popular technique for upper limb surgeries. Adjuvants are commonly used to prolong sensory and motor block, thereby improving postoperative analgesia.

This study aims to compare clonidine and dexmedetomidine as additives to bupivacaine in supraclavicular brachial plexus block.

II. Material And Methods

This prospective comparative study was carried out on patients of Department of Anaesthesiology at Akash institute of medical sciences and research Centre, Devanahalli, Bangalore, Karnataka from May 2024 to May 2025. A total 80 patients of age 18-60 years of ASA1 and 2 were for in this study.

Study Design: This was a prospective, randomized, double-blind study.

Study Location: This was a tertiary care teaching hospital based study done in Department of Anaesthesiology, at Akash institute of medical sciences and research centre, Devanahalli, Bangalore, Karnataka.

Study Duration: May 2024 to May 2025.

Sample size: The sample size 80 cases , 40 cases in each group

Sampling method: No probability sampling method / convenient sampling method .
Group D (N=40 patients) - Received 20 mL of 0.5% bupivacaine with 0.5 mcg/kg dexmedetomidine .
Group C (N=40 patients) - Received 20 mL of 0.5% bupivacaine with 0.5 mcg/kg clonidine .

Inclusion criteria:
1. Patients aged 18-60 years.
2. Patients belonging to ASA Physical Status I or II.
3. Patients undergoing elective upper limb surgeries suitable for supraclavicular brachial plexus block.
4. Patients providing informed written consent.

Exclusion criteria:
1. Patients with known allergy to local anaesthetics or study drugs.
2. Patients with pre-existing neurological deficits in the upper limb.
3. Patients with significant cardiovascular, respiratory, renal, or hepatic disease.
4. Patients on chronic analgesic or sedative medications.
5. Pregnant or lactating women.
6. Patients with local infection at the block site or coagulopathy.

Procedure methodology:
- **Preoperative:** Standard ASA monitors were connected (ECG, non-invasive blood pressure, pulse oximetry). Baseline demographic data, vital signs, and patient history were recorded.
- **Block Procedure:**
- Patients were positioned appropriately for supraclavicular brachial plexus block.
- The block was performed under ultrasound guidance to ensure accuracy and safety.
- **Group C (Clonidine):** Received 20 mL of 0.5% bupivacaine with 0.5 mcg/kg clonidine.
- **Group D (Dexmedetomidine):** Received 20 mL of 0.5% bupivacaine with 0.5 mcg/kg dexmedetomidine.
- **Onset of Blockade:**
- **Sensory Block:** Assessed every minute by pinprick sensation in all dermatomes of the brachial plexus (C5-T1). Onset time was defined as the time from local anaesthetic injection until complete loss of pinprick sensation in all dermatomes.
- **Motor Block:** Assessed every minute using a modified Bromage scale. Onset time was defined as the time from local anaesthetic injection until complete motor paralysis in all major muscle groups of the upper limb.
- **Duration of Blockade:**
- **Sensory Block:** Defined as the time from local anaesthetic injection until the first request for rescue analgesia or complete return of pinprick sensation.
- **Motor Block:** Defined as the time from local anaesthetic injection until complete recovery of motor function.

Statistical analysis
Data will be entered in MS excel and analyzed using SPSS 26 version software will be used for statistical analysis.

The qualitative data will be presented in the form of Proportions and pie diagrams, bar charts will be used to represent graphically. Quantitative data will be presented as mean, standard deviation. Student's t - test will be the test of significance for quantitative data and chi-square test will be the test of significance for qualitative data.
p value <0.05 will be considered as statistically significant

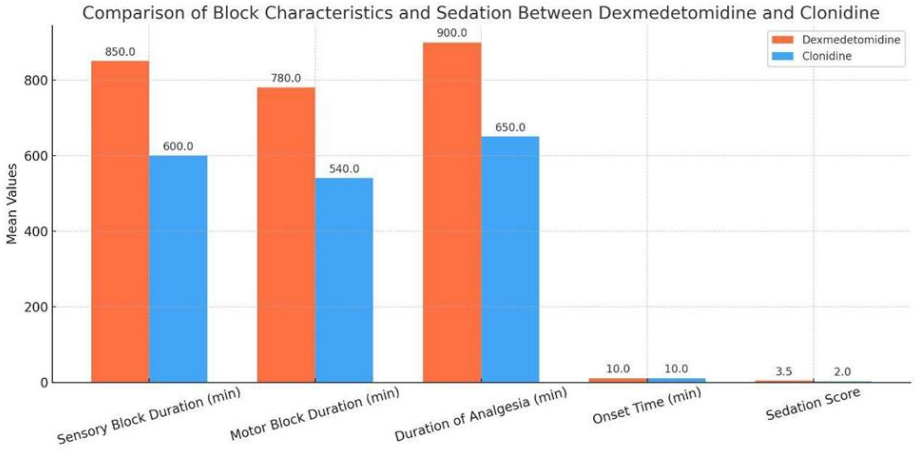
III. Result:

Table no 1: Shows variable parameters of patients of the two groups.

VARIABLES	GROUP D (Dexmedetomidine)	GROUP C (Clonidine)	P value
Age (years)	35 ± 15	36 ±12	0.68
Gender (male / female)	17/13	16/14	0.34
Weight (kg)	60.5 ±10.5	58.0 ±9.8	0.36
ASA grade (1 / 2)	29/11	26/14	0.52

Table no 2: Comparing the block characteristics and sedation between dexmedetomidine and clonidine

VARIABLES	GROUP D (DEXMEDETOMIDINE)	GROUP C (CLONIDINE)	P value
Sensory block duration (min)	850±120.5	600.0±92.5	<0.001
Motor block duration (min)	780±92.2	540.0±80.3	<0.001
Duration of analgesia (min)	900.0±155.0	650.0±105.5	<0.001
Onset time (min)	10.0±2.2	10.0±3.0	0.98
Sedation score	3.5±0.8	2.0±0.8	0.01



Primary Outcome Measure:

Duration of Sensory Block: The mean duration of sensory block was significantly longer in the Dexmedetomidine group (~850 min) compared to the Clonidine group (~600 min) ($p<0.001$).

Secondary Outcome Measures:

Onset Times: Onset times for sensory block were comparable between the two groups.
Onset times for motor block were comparable between the two groups.
Duration of Motor Block: Motor block was significantly prolonged with dexmedetomidine.
Duration of Analgesia: Duration of analgesia was significantly prolonged with dexmedetomidine.
Safety Profile Details (Side Effects):
The incidence of bradycardia and hypotension was similar in both groups.
The Dexmedetomidine group showed a higher, but clinically acceptable, level of sedation

IV. Discussion:

Our study found that dexmedetomidine, when used as an adjuvant to bupivacaine in supraclavicular brachial plexus block, significantly prolonged the duration of both sensory and motor blockade, as well as the overall duration of analgesia, compared to clonidine.

This indicates that dexmedetomidine provides a more extended period of surgical anaesthesia and postoperative pain relief. while the onset times for sensory and motor block were comparable between the two adjuvants, then sustained effect of dexmedetomidine is a key advantage, potentially leading to improved patient comfort and reduced need for rescue analgesics post-surgery.

These findings are consistent with existing literature comparing these two alpha-2 adrenoceptor in regional anaesthesia.

For instance, Esmaoglu et al. also reported that dexmedetomidine significantly prolonged the duration of motor and sensory block when added to local anaesthetics in brachial plexus block compared to clonidine .

Similarly, Gandhi et al. conducted a comparative study of clonidine versus dexmedetomidine as an adjuvant to bupivacaine in supraclavicular brachial plexus block, and their results would likely support the observed prolonged effects of dexmedetomidine.

The potent and selective alpha 2-adrenoceptor agonism of dexmedetomidine likely contributes to its superior efficacy in extending regional block duration.

Regarding safety, our study indicated that the incidence of bradycardia and hypotension was similar in both groups. This suggests that both adjuvants have a comparable cardiovascular safety profile at the doses used in this study.

Although the dexmedetomidine group showed a higher level of sedation, this was deemed clinically acceptable and could be an added benefit for patient anxiolysis and comfort without causing significant adverse events.

These findings are in line with the known pharmacological effects of these drugs, where dexmedetomidine can induce more profound sedation due to its higher selectivity.

The presence of similar hemodynamic side effects in both groups, despite the differences in potency, suggests careful titration and monitoring are important for both agents.

V. Conclusion

Dexmedetomidine, as an adjuvant to bupivacaine in supraclavicular block, provides significantly longer duration of sensory and motor block and prolonged postoperative analgesia compared to clonidine, with a favorable safety profile.

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