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Original Research Article

A Comparaitive Study between 25 Mcg Dexmedetomidine and 25 Mcg Clonidine as Adjuvant with 0.5% Levobupivacaine in Supraclavicular Brachial Plexus Block in Upper Limb Surgeries.

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Abstract

Introduction: This study compares the efficacy and safety of dexmedetomidine and clonidine as adjuvants to levobupivacaine in supraclavicular brachial plexus block for upper limb surgeries. Dexmedetomidine's higher selectivity for α2-adrenergic receptors potentially enhances its analgesic effects compared to clonidine.

Methods: A prospective study conducted at Rangaraya Medical College, Kakinada, evaluated ASA grade I and II patients, aged 18-50, undergoing upper limb surgeries. groups C and D received clonidine and dexmedetomidine, respectively, with levobupivacaine in supraclavicular blocks. Sensory and motor block characteristics were assessed post-operatively for 24 hours.

Results: Group D exhibited faster onset of sensory and motor blocks (4.86 ± 0.91 mins and 7.08 ± 1.006 mins) compared to group C (7.2 ± 1.1 mins and 9.94 ± 1.67 mins). Motor block duration was longer in group D (12.7 ± 0.7 hrs) than group C (10.8 ± 0.6 hrs). Rescue analgesic requirement and sedation scores significantly varied between groups.

Conclusions: Dexmedetomidine as an adjuvant to levobupivacaine in brachial plexus block demonstrated faster onset of sensory and motor blocks, prolonged motor block duration, and reduced rescue analgesic requirement compared to clonidine. These findings suggest dexmedetomidine's potential superiority in enhancing regional anesthesia outcomes for upper limb surgeries.

Keywords: Dexmedetomidine, Clonidine, Brachial Plexus Block, Sensory Block, Motor Block.

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Introduction

The use of adjuvants in regional anesthesia aims to enhance the quality and duration of nerve blocks, providing better perioperative analgesia and reducing the need for systemic analgesics. [1] Dexmedetomidine and clonidine, both α2-adrenergic agonists, are commonly used for this purpose. This comparative study evaluates the efficacy and safety of 25 mcg dexmedetomidine versus 25 mcg clonidine as adjuvants to 0.5% levobupivacaine in supraclavicular brachial plexus block (BPB) for upper limb surgeries. [2]

Dexmedetomidine has been shown to prolong the duration of analgesia and motor block (MB) when used as an adjuvant in peripheral nerve blocks, potentially due to its higher selectivity for α2-adrenergic receptors, which enhances its sedative and analgesic effects. [3, 4] Clonidine, on the other hand, is also effective in prolonging the duration of analgesia and providing stable hemodynamic conditions but is less selective than dexmedetomidine.

This study aims to compare these two agents to determine which provides superior analgesic efficacy and fewer side effects when used with levobupivacaine in upper limb surgeries. The findings contribute to optimizing anesthesia protocols and improving patient outcomes in regional anesthesia.

Materials and Methods

It was a prospective research conducted in the department of Anesthesia, Rangaraya Medical College, Kakinada. Study was conducted between August 2023 to February 2024. An informed written consent was taken from the participants and

they cannot submit consent was taken from the concern legal heirs.

Inclusion criteria included ASA grade I and II patients, aged between 18 and 50 years, who were scheduled for elective upper limb surgeries. Exclusion criteria encompassed ASA grade III and IV patients, those with severe anemia, hypovolemia, septicemia, or shock, known hypersensitivity to clonidine or dexmedetomidine, bleeding disorders or anticoagulant therapy, local infection at the puncture site, allergy to local anesthetic drugs, patient refusal, and documented neuromuscular disorders. Initially the study was explained and doubts were cleared. As per the institutional protocol blood parameters were analyzed and if satisfactory, patients were allocated into two groups: group C received 25cc of 0.5% levobupivacaine with clonidine 25mcg, and group D received 25cc of 0.5% levobupivacaine with dexmedetomidine 25mcg.

The patient was positioned supine with arms by the side and head turned slightly to the opposite side. The interscalene groove and midpoint of the clavicle were identified. After aseptic preparation, the subclavian artery pulsation was felt, and a skin wheel was raised 1.5 to 2 cm posterosuperior to it with local anesthetic. Neural location was achieved using a nerve stimulator connected to a 22G, 50mm needle, targeting a distal motor response at 0.5 mA. Following negative aspiration of blood, the drug was injected. Patients were monitored for anesthesia and analgesia for 24 hours post-operatively, with sensory and motor blocks evaluated. In addition to the vital parameters, onset of sensory block (SB), onset of MB, duration of SB, duration of motor blockade were observed in groups.

Statistical Analysis: The data was analyzed using SPSS version 20. The data was presented in mean and percentage. Student T test, Chi square test was used and $P < 0.05$ was considered to be statistically significant.

Results

The mean age was 39.9 ± 9.91 and 39.9 ± 11 years for groups C and D, respectively, with no significant difference. The mean onset time for SB was 7.2 ± 1.1 minutes for group C and 4.86 ± 0.91 minutes for group D, showing a significant difference. Onset of MB was 9.94 ± 1.67 minutes for group C and 7.08 ± 1.006 minutes for group D, also significantly different. The mean duration of MB was 10.8 ± 0.6 hours for group C and 12.7 ± 0.7 hours for group D, with a significant difference. In group C, 26% required one rescue analgesic dose and 74% needed two, while in group D, 66% needed one dose and 34% required two ($p < 0.014$). Sedation scores differed significantly.

Discussion

The BPB offers short-duration post-op analgesia, even with long-acting agents like levobupivacaine. To extend analgesia, adjuvants like opioids, midazolam, and neostigmine have been evaluated. Newer drugs such as clonidine and dexmedetomidine have shown to produce anti-nociception when used intrathecally and epidurally.

The mean onset time for SB in group C (7.2 ± 1.1 minutes) and group D (4.86 ± 0.91 minutes) demonstrated a significant difference, indicating a faster onset in the dexmedetomidine group. This aligns with previous findings where dexmedetomidine, due to its α2-adrenergic agonist properties, enhances the onset and quality of nerve blocks. Esmaoglu et al. [5] observed that dexmedetomidine added to levobupivacaine in axillary brachial plexus blocks resulted in faster sensory and motor block onset compared to levobupivacaine alone. Similarly, Agarwal et al. [6] reported that dexmedetomidine significantly reduced the onset time of SB when combined with bupivacaine for supraclavicular blocks. In contrast, clonidine, although beneficial, shows a slower onset due to its less selective α2-adrenergic agonist effect, as demonstrated in the study by Singh and Aggarwal [7], where clonidine added to bupivacaine provided slower SB onset compared to dexmedetomidine.

The significant difference in the onset of motor block between group C (9.94 ± 1.67 minutes) and group D (7.08 ± 1.006 minutes) underscores the impact of adjuvants dexmedetomidine and clonidine on motor function. Dexmedetomidine, being a highly selective α2-adrenergic agonist, accelerates the onset of MB due to its potentiation of local anesthetics. This aligns with findings by Kumar and Tripathi [4], who reported a faster onset of MB with dexmedetomidine as an adjuvant in brachial plexus blocks. Conversely, clonidine, while effective, may induce a slower MB onset owing to its lesser selectivity and slower onset compared to dexmedetomidine. [8] The observed differences in MB onset highlight the distinct pharmacological profiles of these adjuvants and their implications for regional anesthesia.

The significant difference in the mean duration of MB between Group C (10.8 ± 0.6 hours) and Group D (12.7 ± 0.7 hours) suggests varying effects of adjuvants dexmedetomidine and clonidine on motor function duration. Dexmedetomidine, recognized for its α2-adrenergic agonism, prolongs MB duration due to its ability to potentiate local anesthetics, as supported by Singla et al. [8] in their study on supraclavicular brachial plexus blocks. Conversely, clonidine, while effective, may result in a shorter MB duration due to its less selective and slower onset compared to

dexmedetomidine. These findings underscore the importance of adjuvant selection in regional anesthesia to achieve desired block duration and patient comfort. [9, 10]

The disparity in rescue analgesic requirements between Group C and Group D underscores the impact of adjuvants dexmedetomidine and clonidine on postoperative pain management. Dexmedetomidine, renowned for its analgesic properties, is associated with reduced rescue analgesic consumption, as demonstrated by Abdelhamid and El-lakany [9] in their study on brachial plexus blocks. Conversely, clonidine, while effective, may necessitate higher rescue analgesic doses due to its less potent analgesic effect compared to dexmedetomidine. These findings align with the observed higher rescue analgesic requirement in Group C compared to Group D. The differences in sedation scores further highlight the divergent effects of these adjuvants on patient comfort and sedation levels. Studies by Abdallah and Brull [10] and El-Rahmawy et al. [11] support the sedative properties of dexmedetomidine, contributing to reduced rescue analgesic needs and improved patient satisfaction. Conversely, clonidine, while effective as an adjuvant, may lead to increased sedation levels, impacting postoperative recovery and patient outcomes.

In conclusion, the use of dexmedetomidine as an adjuvant in brachial plexus blocks appears to reduce rescue analgesic requirements and enhance sedation scores compared to clonidine. These findings suggest that dexmedetomidine may offer superior postoperative pain management and improved patient comfort in upper limb surgeries. However, further studies are warranted to elucidate the optimal adjuvant choice for regional anesthesia based on patient characteristics and surgical requirements.

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