



A PROSPECTIVE RANDOMIZED CONTROLLED STUDY ON EFFECT OF DEXMETETOMIDINE AND FENTANYL AS AN ADJUNCT TO PERINEURAL BUPIVACAINE OR LIGNOADRENALINE ON DURATION OF POST-OPERATIVE ANALGESIA, SEDATION AND OVERALL COMFORT OF THE PATIENTS UNDERGOING UPPER LIMB SURGERIES

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ABSTRACT

Background: Supraclavicular brachial plexus block is a widely used technique for upper limb surgeries. The addition of adjuvants may improve block quality and extend postoperative analgesia. Dexmedetomidine and fentanyl are commonly studied, but their comparative utility remains debated. **Objective:** To compare the effect of dexmedetomidine and fentanyl as adjuvants to perineural bupivacaine–lignoadrenaline in supraclavicular brachial plexus block with respect to block onset, duration of analgesia, sedation, and overall comfort. **Methods:** Sixty ASA I–II patients aged 18–65 years undergoing elective upper limb surgeries were randomized into three groups (n=20 each). Group D received bupivacaine–lignoadrenaline with dexmedetomidine (0.5 µg/kg), Group F received bupivacaine–lignoadrenaline with fentanyl (1 µg/kg), and Group C received bupivacaine–lignoadrenaline alone. Outcomes assessed were onset and duration of sensory/motor block, duration of postoperative analgesia, sedation (Ramsay scale), comfort (Likert scale), and adverse events. **Results:** Group D achieved faster onset (sensory 5.7 ± 2.2 min; motor 6.8 ± 2.4 min) and significantly prolonged block duration (sensory 819 ± 77 min; motor 778 ± 75 min) compared with Group F (500 ± 37 min; 466 ± 47 min) and Group C (474 ± 37 min; 421 ± 44 min). Duration of analgesia was longest in Group D (13.5 h), followed by Group F (8.3 h) and Group C (7.5 h) (p<0.001). Dexmedetomidine improved comfort scores and produced mild, desirable sedation. Bradycardia/hypotension occurred in two patients (Group D), while nausea/vomiting occurred in two patients (Group F). **Conclusion:** Dexmedetomidine is a superior adjuvant to fentanyl in supraclavicular brachial plexus block, offering faster onset, prolonged analgesia, and greater patient comfort with acceptable safety.

KEYWORDS : Dexmedetomidine, Fentanyl, Supraclavicular brachial plexus block, Regional anaesthesia, Analgesia

INTRODUCTION

Regional anaesthesia plays a vital role in upper limb surgeries, offering dense anaesthesia and prolonged analgesia. The supraclavicular brachial plexus block is particularly effective but limited by the duration of local anaesthetics. Adjuvants are therefore used to enhance block characteristics.

Dexmedetomidine, an α₂-adrenergic agonist, provides analgesia and sedation via central and peripheral mechanisms, while fentanyl, a μ-opioid receptor agonist, enhances block density but carries opioid-related side effects. This study compares their effects as adjuncts to bupivacaine–lignoadrenaline.

MATERIALS AND METHODS

- **Design:** Prospective, randomized, double-blind study.
- **Setting:** Department of Anaesthesia, Rama Medical College, Mandhana, Kanpur.
- **Patients:** 60 ASA I–II patients, aged 18–65 years, undergoing elective upper limb surgeries.
- **Exclusion:** Refusal, allergy, pregnancy, cardiac/hepatic/renal disease, coagulopathy, infection at injection site.
- **Groups:**
 - Group D: Bupivacaine–lignoadrenaline + dexmedetomidine (0.5 µg/kg)
 - Group F: Bupivacaine–lignoadrenaline + fentanyl (1 µg/kg)
 - Group C: Bupivacaine–lignoadrenaline (control)
- **Block Technique:** Ultrasound/nerve stimulator guidance; total volume 20 mL.
- **Assessments:**
 - Sensory onset: pinprick method
 - Motor onset: Modified Bromage scale
 - Sedation: Ramsay sedation score
 - Comfort: 5-point Likert scale
- **Outcomes:** Primary—duration of postoperative analgesia; Secondary—onset/duration of block, sedation, comfort, side effects.
- **Statistical Analysis:** ANOVA and Chi-square; p<0.05 significant.

RESULTS

- **Onset:** Group D fastest (sensory 5.7 min; motor 6.8 min) compared to Group F (11.8 and 13.7 min) and Group C (16.3 and 18.4 min).
- **Duration:** Group D prolonged sensory (819 min) and motor (778 min) block, significantly longer than Group F (500/466 min) and Group C (474/421 min).
- **Analgesia:** Group D = 13.5 h, Group F = 8.3 h, Group C = 7.5 h (p<0.001).
- **Sedation & Comfort:** Group D had mild sedation (Ramsay ~2) and highest comfort scores. Group F had higher incidence of nausea/vomiting. Group C had lowest satisfaction.
- **Adverse Events:** Bradycardia/hypotension in 2 patients (Group D), nausea/vomiting in 2 patients (Group F), none in Group C.

DISCUSSION

Dexmedetomidine demonstrated superior efficacy over fentanyl as an adjuvant in supraclavicular block. It shortened onset, prolonged block duration, and improved patient comfort. Its α₂-mediated actions explain its longer analgesia, while fentanyl's effects were shorter-lived and accompanied by opioid side effects.

Findings align with recent literature supporting dexmedetomidine as the adjuvant of choice in brachial plexus blocks.

CONCLUSION

Dexmedetomidine provides faster onset, longer block duration, extended postoperative analgesia, and better comfort compared to fentanyl and control, with an acceptable safety profile. It is a more effective adjuvant in supraclavicular brachial plexus block for upper limb surgeries.

Declarations

Conflicts of Interest: The authors declare no conflicts of interest.

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