International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 11-12-2018; Accepted: 14-01-2019
www.medicalsciencejournal.com
Volume 5; Issue 2; February 2019; Page No. 18-24

A comparative study of dexmedetomidine and fentanyl as an adjuvant with 0.5% ropivacaine in infraclavicular brachial plexus block via coracoid approach

Parmod Kumar[1], Davinder Chawla[2*], Charu Sharma[3]
[1-3] Department of Anaesthesia, GMC Patiala, Punjab, India

Abstract
Background: Infraclavicular brachial plexus block provide effective and reliable analgesia for upper limb surgery. Adjuvants to local anaesthetic may enhance the duration and quality of analgesia.
Material and Methods: After informed consent 60 patients, aged 18 to 65 years, ASA I and II, of either sex scheduled to undergo elective elbow, forearm and hand surgery under infraclavicular brachial plexus block at Government Medical College Patiala were randomly divided into two groups of 30 patients each. Group D received 30 ml 0.5% ropivacaine + 50 µg dexmedetomidine. Group F received 30 ml 0.5% ropivacaine + 50 µg fentanyl. Patients were observed for onset and duration of sensory and motor blockade, haemodynamic changes, and duration of analgesia, postoperative pain, and adverse effects
Result: Demographic profile was comparable in the groups. The time of onset and time to complete sensory and motor blockade was early in Group F compared to Group D. Duration of sensory and motor blockade and postoperative analgesia was prolonged in Group D as compared to Group F. In Group D, decrease in mean HR and Grade 3or 4 modified ram say sedation score was observed.
Conclusion: Dexmedetomidine provides prolonged analgesia and more-dense block with less requirement of rescue analgesics as compared to fentanyl. The low heart rate and achievement of sedation score of 3 or 4 is beneficial for haemodynamic stability and better quality of block.

Keywords: infraclavicular brachial plexus block, analgesia, fentanyl, dexmedetomidine

Introduction

Typical ambulatory criteria comprises conscious patient with stable vital signs, less pain, minimal nausea and the ability to sit with minimal dizziness [1]. Postoperative pain and adverse effects of aggressive analgesia restrict the scope for ambulatory surgeries [2]. Brachial plexus block play a vital role in orthopaedic upper limb surgeries below the shoulder joint in present-day regional anaesthesia. It offers many advantages over general anaesthesia such as sympathetic block, better postoperative analgesia, shortens post-anaesthesia care unit time, less incidence of nausea, and increases patient satisfaction with reduced hospital stay and less financial burden [3].

Safe and successful block is crucial in day to-day surgeries Infraclavicular approach reduces the risk associated with inter scalene and supraclavicular approaches and the failure of musculo cutaneous nerve block in axillary approach and has the advantages of both the supraclavicular and axillary approaches with close arrangement of plexus structures and lesser incidence of pneumothorax. Infraclavicular brachial plexus block, used for the surgery in the distal arm: elbow, forearm, wrist and hand surgery; was introduced in early 20th century by Bazy and Labat [4]. The two main approaches used widely are the medial approach (mid-clavicle) and the lateral approach (around the coracoid process). Wilson *et al*. in 1998 described the coracoid approach to infraclavicular brachial plexus block, with consistent bony landmark, decreased incidence of vascular puncture or pneumothorax and satisfactory blockade [5].

Ropivacaine, the S (-) enantiomer of N-(2,6-dimethylphenyl)-1-propyl-2 pyridinecarboxamide, is an effective regional anaesthetic when administered via several routes for both intraoperative anaesthesia and postoperative analgesia. Ropivacaine prevents transmission of nerve impulses by reversible inhibition of sodium ion influx through ion-selective sodium channels in nerve membranes [6]. Ropivacaine being stereoselective and less lipophilic than bupivacaine, has a wide margin of safety [7].

A variety of perineural adjuvants like opioids, α2 agonist, vasoconstrictor agents, steroids, magnesium, midazolam etc. have been used to enhance the block duration or quality or both [8]. Certain opioids like fentanyl, tramadol, morphine, buprenorphine, when used as adjuncts to local anaesthetics provide an effective, long-lasting postoperative analgesia [9, 10].

Fentanyl is a phenylpiperidine-derivative synthetic opioid agonist. Fentanyl is known to significantly improve the duration of sensory and motor blockade as well as visual analog scale scores. The improved analgesia may be mediated through direct activation of peripheral opioid receptor or may penetrate the nerve membrane and act at the dorsal horn or via central opioid receptors by peripheral uptake to systemic circulation [11].

Alpha-2 adrenergic receptor agonists are known for their sedative and analgesic, hypnotic, sympatholytic effects through various routes of administration. Dexmedetomidine is the S-enantiomer of medetomidine. Dexmedetomidine is highly selective α2 adrenergic agonist than partial α2 adrenergic agonist clonidine (ratios of α2:α1 activity, 1620:1 for dexmedetomidine, 220:1 for clonidine) [12]. Memis¸ and colleagues, first suggested dexmedetomidine as an adjuvant for prolonging duration of single shot brachial plexus block [13]. The analgesic effect of the dexmedetomidine is mediated through α2 receptors within the locus coeruleus

and spinal cord.

In view of this context, the present study was undertaken to compare the effect of dexmedetomidine 50 µg and fentanyl 50 µg, used as adjuvant to 30 ml of 0.5% ropivacaine in infraclavicular block, on the onset, time and duration of sensory as well as motor blockade.

Materials and Method

This prospective, randomized, observer and patient blinded study was conducted after obtaining ethical committee clearance as well as written informed consent from all patients at Government Medical College Patiala. It included 60 patients, aged 18 to 65 years having American Society of Anaesthesiology physical status classification of grade I and II, of either sex scheduled to undergo elective elbow, forearm and hand surgery under infraclavicular brachial plexus block using nerve stimulation technique.

Our exclusion criteria were patient refusal, patient with uncontrolled diabetes mellitus, renal or liver disease, circulatory instability, pregnant women, allergy to local anaesthetic, on long term steroid therapy, coagulation disorder, neurological disorder or defecit or associated nerve lesion, skin lesions at the site of blockade or associated lesions in other areas of body requiring general anaesthesia, severe respiratory disease.

Thorough pre-anaesthetic check-up including clinical history, general physical examination, baseline parameters, systemic examination, routine investigations: Haemoglobin, Bleeding time, Clotting time, TLC, DLC, Renal Function Test, FBS, Serum electrolytes (Na+, K+), ECG, Complete urine examination was done in every patient. Patients were familiarized with the visual analogue scale (VAS) (0 – No pain, 10 - Worst pain) before surgery and asked to grade their pain on this scale.

Each patient was kept fasting at least for six hours pre-operatively. Tab. Diazepam was given to all patients as overnight sedation. In the pre-operative room, an intravenous access was secured and injection Ranitidine 50 mg and Midazolam 0.03mg/kg were given intravenously.60 patients were randomly allocated in 2 equal groups of 30 each using lottery method. In Group D patients received 30 ml of 0.5% ropivacaine with 50 µg dexmedetomidine while in Group F patients received 30 ml 0.5% ropivacaine with 50 µg fentanyl.

In operative room, routine monitor were attached for monitoring heart rate, respiratory rate, oxygen saturation, non-invasive blood pressure and electrocardiography. Preoperative vitals Heart Rate (HR), Blood Pressure (SBP, DBP, MAP) and oxygen saturation (SpO_2) were noted and oxygen at the rate of 2l/min administered through venturi mask.

The brachial plexus block was carried out after thorough explaination of the procedure and emphasizing the need for patient cooperation. The patient was asked to be in the supine position without a pillow, arms at his/her sides and head turned to side opposite to the one being blocked. The operative limb was laid in neutral position along the body. After sterile preparation, the coracoid process identified by palpation. 1–2 ml of 1% lignocaine was infiltrated at a point 2 cm medial and 2 cm caudal to coracoid process. Using a sterile technique, a 50 mm 22-gauge insulated stimulating needle (STIMPULEX A) was inserted perpendicular to the skin and connected to a nerve stimulator (INMED NM20) that was programmed with the following variables: current 2.0 mA and frequency 2 Hz. The needle was advanced until a muscle distal to deltoid was stimulated. In the absence of an upper extremity motor response, the needle was redirected either cephalad or caudal but never medially to avoid the injury to pleura. The initial stimulating current was set at 2.0 mA and in the presence of an upper extremity motor response, it was gradually reduced and the needle was slowly inserted till the current of 0.5 mA still elicit a slight distal motor response. A response was considered proximal if contraction of the triceps, biceps, flexor carpi radialis or flexor carpi ulnaris was elicited and distal if flexion or extension of wrist or fingers was elicited. In each patient, distal response was desired, but if it could not be obtained, proximal response was taken as satisfactory. Then, 30 ml of 0.5% ropivacaine with 50 µg dexmedetomidine or 50 µg fentanyl injected slowly with intermittent aspiration.

Patients were observed for signs of local anaesthetic systemic toxicity due to accidental intravascular injection of local anaesthetic and other complications like pneumothorax, hemothorax and phrenic nerve block.

The following parameters were observed perioperatively

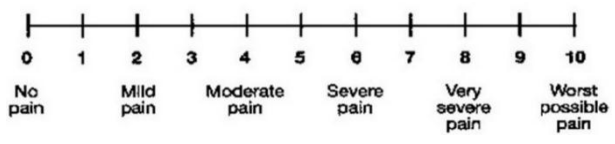
1. **Onset of sensory block:** Assessment of sensory block was done at each minute using 26 G needle after completion of drug injection in the dermatome areas corresponding to median nerve, radial nerve, ulnar nerve and musculo cutaneous nerve till complete sensory blockade. Sensory block was graded with Hollmen's Scale (H. Sc.) [14].
   - 0 – Normal sensation of pin prick.
   - 1 (+) - Pin prick felt as sharp pointed but weaker compared with the same area in other extremity.
   - 2(++) - Pin prick felt as touch with blunt object (Analgesia).
   - 3(+++) - No perception of pin prick (Anaesthesia).

   Sensory block onset was considered for grade 2 and complete sensory block for grade 3
2. **Onset of motor block:** Assessment of motor block was carried out by the same observer at each minute till complete motor blockade after drug injection. Motor block was determined according to a modified Bromage scale for upper extremities. Onset of blockade was considered for minimum grade 2 and complete blockade for minimum grade
3. **Modified Bromage Scale (MBS) For Motor Blockade [15] (Grade)**
   - 1. 0 – Able to raise the extended arm to 90degrees for a full 2 seconds.
   - 2. + - Able to flex the elbow and move the fingers but unable to raise the extended arm.
   - 3. ++ - Unable to flex the elbow but able to move the fingers.
   - 4. +++ - Unable to move the arm, elbow, or the fingers.
4. **Monitoring of vital parameters:** Heart Rate (HR), Blood Pressure (SBP, DBP, MAP) and oxygen saturation (SpO_2) values were recorded just before the block, 5, 10, 15, 20, 25, 30, 45, 60, 75, 90 and 120 minutes after the block and 30 minutes and 3, 6, and 12 hours after the end of the surgery. The patients were monitored throughout the surgery, after tourniquet deflation and postoperatively. Degree of sedation was monitored before institution of block and thence, at all intervals as that of vital parameter monitoring using the Modified Ramsay

Sedation Scale (MRSS) [16] from 1-6 as follows:

- 1 = anxious, agitated, restless.
- 2 =cooperative, oriented, tranquil.
- 3 = responds to commands only.
- 4 = brisk response to light glabellar tap or loud noise.
- 5 = sluggish response to light glabellar tap or loud noise.
- 6 =no response.

5. **Intra operative condition:** Assessment of blood loss was done and fluid administered as per the loss. The quality of operative conditions was assessed at 30, 60, 90 and 120 mins after the block according to the following Numeric Scale [13]
   - **Grade 4:** (Excellent) No complaint from patient.
   - **Grade 3:** (Good) Minor complaint with no need for the supplemental analgesics.
   - **Grade 2:** (Moderate) Complaint that required supplemental analgesia.
   - **Grade 1:** (Unsuccessful) Patient given general anesthesia.
6. **Intraoperative and post-operative complications:** Episodes of perioperative hypotension (a 20% decrease from the baseline value), bradycardia (HR < 60 beats/min), hypoxemia (SpO2 < 90%), nausea, vomiting, itching, urinary retension, shivering occurrences were recorded and managed accordingly.
7. **Recovery from sensory and motor block:** Patients was asked to note the subjective recovery of sensation and movements which were then certified by an anaesthesiologist every hourly.
8. **Duration of sensory block:** The duration of sensory block defined as the time interval between the end of local anaesthetic administration and the complete resolution of anaesthesia on all nerves. Post operatively patient was assessed every hourly for pin prick sensation in the dermatome of the nerves anaesthetized.
9. **Duration of motor block:** The duration of motor block defined as the time interval between the end of local anaesthetic administration and the recovery of complete motor function of the hand and forearm. The duration of motor block post operatively was assessed every hourly by asking the patient to move their fingers and to see whether they are able to raise the hand or not.
10. **Duration of analgesia:** Duration of analgesia was taken as the time from onset of analgesia upto time when VAS reached 4. Patient was then given rescue analgesic (IM Diclofenac 1-1.5mg/kg). The time to first analgesic use and total need for analgesics was recorded during the first postoperative 12 hours. Post operatively follow up was carried out for every hourly for first 12 hours and then 2 hourly till 24 hours. Duration of analgesia was noted according to visual analogue scale [17] (0- 10):
    0 - No pain
    5 - Moderate pain
    10 - Maximum pain.



11. **Possible side effects of infraclavicular block:** The patients was monitored throughout the surgery for the complications, such as blood vessel puncture, intravascular injection, overdose, dyspnoea, Horner's syndrome, and pneumothorax, recurrent laryngeal nerve palsy, signs and symptoms of local anaesthetic toxicity, phrenic nerve palsy, haematoma.
12. **Total surgical time**
13. **Tourniquet discomfort:** Upon arrival to the Recovery Unit, the level of consciousness was assessed according to the following scale [18]
    - Grade 1: Awake and alert,
    - Grade 2: Responding to verbal stimulus,
    - Grade 3: Responding to mild physical stimulus,
    - Grade 4: Responding to moderate-or-severe physical stimulus.

    The patient's satisfaction with the anaesthetic technique was assessed after arrival in the post-anaesthesia care unit using a 2-point scale (0 = unsatisfied; 1 = satisfied).
    The above intra- and post-operative assessment was done by an anaesthesia logist who was unaware of the drugs administered in plexus block.
    In one case, the block was supplemented with general anaesthesia due to inadequate or patchy block, which was excluded from the study.

Sample size calculation

Sample size was estimated based on pilot study, we observed that the mean difference in duration of analgesia in 2 groups was 61.34 with SD of 68.02. With this our sample size was n=26 per group at a power of 90% and confidence interval 95%. For possible dropouts, it was decided to include 30 patients per group.

Statistical analysis

The data was analysed using IBMM SPSS statistics (22.00 version) and Microsoft Excel 2007. Continuous variables were analysed with unpaired t-test. Categorical variables were analysed with the Chi-square test. Statistical significance was taken as P value <0.05, Statistical highly significant was taken as P value <0.001, Statistical non-significant was taken as P value >0.05.

Results

There was statistical no significant difference between the groups with respect to basic demographic characteristics including age, weight, sex ratio, ASA physical status and duration of surgery.

The mean time of onset of sensory block was early in fentanyl group (8.500±0.973 mins) as compared to dexmedetomidine group (9.500±0.820 mins) and the difference was statistically highly significant (p value<0.001). And there was early onset of complete sensory blockade in group F (20.800±3.078 mins) as compared to group D (22.650±2.883 mins) with statistically significant difference (p value= 0.020).

The difference in mean time of onset of motor block was statistically highly significant (p value <0.001) with early block in group F (9.86±0.776 mins) as compared to group D. 10.72±0.847 mins) and the mean time of complete motor blockade was also early in in group F (30.30±1.103 mins) as compared to group D (31.62±1.627) mins in group D with statistically significant difference (p value= 0.001). The mean score of modified bromage scale at 10 mins was 1.27±0.449 in Group D and 1.70±0.466 in Group F which was highly significant (p value =0.001)

But, there was prolonged sensory and motor blockade in group D (722.67±37.868 mins & 665.67±31.561 mins) as

compared to group F (657.00±38.430 mins & 609.33±29.935 mins) and the difference was statistically highly significant.
The mean time of duration of analgesia was 809.66±50.205 mins in group D and 737.66±47.174 mins in group F, the difference was statistically highly significant (p value <0.001). At 720, 780 and 840 minutes, the mean VAS Score in group F was higher than the score in group D and the mean of number of rescue analgesics required were 0.10 ±0.30.5 in Group D and 0.33 ±0.479 in Group F. Therefore, we observed prolonged duration of analgesia with dense block, better post op VAS and less requirement of rescue analgesics in group D as compared to group F.
The percentage of patients experiencing various side effects were similar in both the groups. The difference was statistically non-significant (p value<0.05).

Hemodynamic Parameters
The baseline mean heart rate and mean hear rate at 0, 5, 10, 15, 20, 150, 180, 360 and 720 mins was comparable in both the groups.
We observed decrease in mean heart rate in group D as compare to group F at 25 30, 45, 60, 75, 90 105, and 120 mins. The mean heart rate difference was statistically significant at 25, 105, and 120 mins and highly significant at 30, 45, 60, 75 and 90mins.
The mean systolic, diastolic, mean arterial blood pressure of both the groups was comparable at all the times. At all times, the mean SpO2 levels remained fairly constant above 95% in all patients in both the group. No statistical difference was observed in respiratory rate between two groups at all times.
The mean MRSS was 2.00 ±0.0 in both groups at 0 mins.
At 5 and 105 mins, difference in means was statistically significant (p value = 0.023 and 0.043). At 10, 15, 20, 25, 30, 45, 60, 75, 90 mins difference in means was statistically highly significant (p value <0.001). At 120 mins mean MRSS was 2.00±0.0 in both groups.
The difference in means of level of post op consciousness in recovery room was statistically insignificant in both the groups.
The difference in means of Numeric scale for intraoperative analgesic requirement of patient at 30, 60, 90 and 120 mins was statistically insignificant. (p value >0.05).
The percentage of patients experiencing various side effects were similar in both the groups.

Discussion
Brachial plexus block is the preferred choice of anaesthesia for upper limb surgeries, owing to the advantages of better postoperative pain relief, early mobility and the avoidance of risks and side effects of general anaesthesia. The detemining factors for selecting an ideal drug for brachial plexus block is safety of its use, adequate and timely sensory and motor block and post-operative pain control. Ropivacaine is emerging over bupivacaine due to higher margin of safety due to less cardiac as well as central nervous system toxic effects; however, it produces less motor block as compared to bupivacaine. Various drugs have be used as adjuvants to local anaesthetics to lower the dose of each agent, to increase the postoperative analgesia effect and reduce the need for supplementary analgesics. Dexmedetomidine and fentanyl have been successfully used as adjuvants earlier in different studies with various different technique. *Fatma Gad El-rab Askar et al* [19]. Compared the analgesic efficacy of fentanyl 1 µg/kg when added to 0.5 % bupivacaine for infraclavicular brachial plexus block in forearm orthopaedic surgeries and observed that duration of analgesia was 14.57 ± 1.04 in fentanyl group as compared to 10.77 ± 1.10 in plain bupivacaine group. Das A *et al* [20]. observed that adding dexmedetomidine to supraclavicular brachial plexus block increases the sensory and motor block duration and duration of analgesia was 846.67 min in the dexmedetomidine group compared to 544.07 min in the control group.
In the present study, designed to compare the effect of dexmedetomidine 50 µg and fentanyl 50 µg, used as adjuvant to 30 ml of 0.5% ropivacaine in infraclavicular block via coracoid approach, both the groups were comparable in terms of basic demographic profile (age, gender, body weight), ASA grade, duration of surgery and baseline hemodynamic parameters.
In our study, there was early onset and early establishment of complete sensory and motor blockade in group F as compared to group D. Our results were in concordance with a study conducted by *Cham SC et al* [21]. Who observed earlier blockade with 50 µg fentanyl (2.06±0.25 mins) as compared to 50µg dexmedetomidine (2.13±0.34 mins) used as aduvant to 0.5% ropivacaine in supraclvicular brachial plexus block and Farooq *et al* [22]. with 3 mg/kg of 0.75% ropivacaine which was supplemented with either 1 µg/kg of fentanyl or 1 µg/kg of dexmedetomidine among patient undergoing upper limb orthopedic surgeries under brachial plexus block. While contradictory to our study Hamed *et al* [23]. found that there was earlier onset of sensoy and motor block with addition of 1 mg/kg of dexmedetomidine to 0.5%bupivacaine (1.5 mg/kg) for ultrasound guided supraclavicular nerve block than addition of 1 mg/kg fentanyl. The difference in result may be due to large dose (1mg/kg) of adjuvants used in this study with 0.5 % bupivacaine in supraclavicular nerve block as compared to small fixed dose (50 µg) of adjuvants used in our study with 0.5% ropivacaine with infraclavicular block.
In our study, sensory and motor blockade remained for longer duration in group D as compared to group F. Similar results were observed in a study performed by *Cham SC et al*. [21] *Hamed et al* [23]. Swaro *et al*. [24] to compare effect dexmedetomidine and fentanyl in supraclavicular nerve block.
In our study, the post op mean Visual Analog Score (VAS) was significantly higher in group F than the score in group D at 720, 780 minutes and 840 mins. Duration of analgesia was prolonged in Group D with more-dense block and less requirement of rescue analgesics compared to group F.
Our results were in accordance with *Hamed et al*. [23] who observed statistically significant prolongation of anesthetic duration and total analgesic duration with 1 mg/kg dexmedetomidine compared to 1 mg/kg fentanyl as an adjuvant to 0.5% bupivacaine (1.5 mg/kg) in ultrasound guided supraclavicular nerve block. And *Cham SC et al*.[21] who observed that Addition of fentanyl prolonged both surgical anaesthesia and time to request for first analgesia by 30 min whereas dexmedetomidine as an adjunct prolonged anaesthetic duration by an hour and total analgesic duration by two hours compared to the patient receiving only ropivacaine (control group) for achievement of block. *Swaro et al*.[24] also found that duration of analgesia (time to requirement of rescue analgesia) in Dexmedetomidine group was longer than in Fentanyl group.
Contradictory to our results *Farooq et al*.[22] observed that the mean duration of sensory blockade in fentanyl group was 425.7 ± 42.4 min and 378.3 ± 59.6 min in dexmedetomidine

and there was statistically no significant difference observed in pain score with fentanyl (1 µg/kg) and dexmedetomidine(1 µg/kg) as an adjuvant to 3 mg/kg of 0.75%. This may be due to difference in technique of brachial plexus, different conc of ropivacaine used and different dose of adjuvants as compared to our study with 50µg of dexmedetomidine or fentanyl supplemented with 0.5% ropivacaine in infraclavicular brachial plexus block.

Hemodynamic Parameters

There was decrease in mean heart rate in Group D at 30, 45, 60, 75, 90, 105 and 120 mins as compared to Group F. Our results were similar with *Patki et al.* [25] and *Agarwal et al.* [26] who observed that patients had decreased heart rate with the use of dexmedetomidine as an adjuvant in brachial plexus block which may be related with systemic absorption of dexmedetomidine.

In our study, systolic, diastolic and mean arterial blood pressure of both the groups were comparable at all the times, similar to studies conducted by *Cham SC et al*., [21] *Sebastian D et al*. [27] *Farooq et al*. [22] While, *Hamed et al.* [23] observed significantly low HR and MBP among fentanyl (1mg/kg) group as compared to dexmedetomidine (1mg/kg) group as an adjuvant to 0.5%bupivacaine (1.5 mg/kg), this may be due to large dose of fentanyl (1mg/kg) used in this study.

The mean SpO2 levels remained above 95% in all patients in both the groups. No statistical difference in respiratory rate between two groups at all times.

In our study, the sedation score was 2 in both groups at 0 mins. The sedation score was 3 or 4 in Group D as compared to sedation score 2 in Group F at 10, 15, 20, 25, 30, 45, 60, 75, 90 mins. At 120 mins sedation score was 2.00 in both groups. Our results were similar to various studies conducted by *Agarwal S et al.,*[26] *Swaro et al.*[24] *and Cham SC et al.*[21] who found sedation score of 3 with dexmdetomidine as aduvant to bupivacaine.

The mean score for post op consciousness in recovery room was comparable in in both the groups**.**

In our study, the difference in means of intraoperative analgesic requirement was statistically insignificant.

The percentage of patients experiencing various side effects were similar in both the groups. There were 4 episodes of bradycardia in group D but they were responsive to atropine and the difference in both the groups was statisticay insignificant with 1 episode of bradycardia in group F. Similar to our study, *Das A. et al.* [20], *Swaro et al.* [24] observed bradycardia in three or four patients and all of these patients were easily managed with atropine.

Table 1: Demographic Parameters and Surgical Time

Variable	Group D		Group F		P value	Significance
	Mean	S.D	Mean	S.D		
Age (yrs)	39.33	14.17	36.67	15.55	0.490	NS
Gender (M/F)	25/05		25/05		1.00	NS
ASA grade (I/II)	23/07		26/04		0.317	NS
Body weight (kg)	64.60	6.30	66.83	4.31	0.115	NS
Duration of surgery (mins)	111.17	23.032	100.00	32.668	0.132	NS

Table 2: Block Characteristics

Variable	Group D		Group F		P value	Significance
	Mean	S.D	Mean	S.D		
Onset of sensory block (mins)	9.50	0.820	8.50	0.973	<0.001	HS
Time of complete sensory block (mins)	22.650	2.883	20.800	3.078	0.020	S
Onset of motor block	10.72	0.847	9.86	0.776	<0.001	HS
Time of complete motor block (mins)	31.62	1.627	30.30	1.103	0.001	S
Duration of sensory blockade (mins)	722.67	37.868	657.00	38.430	<0.001	HS
Duration of motor blockade (mins)	665.67	31.561	609.33	29.935	<0.001	HS
Duration of analgesia (mins)	809.66	50.205	737.66	47.174	<0.001	HS
No. of rescue analgesic	0.10	0.305	0.33	0.479	0.029	S

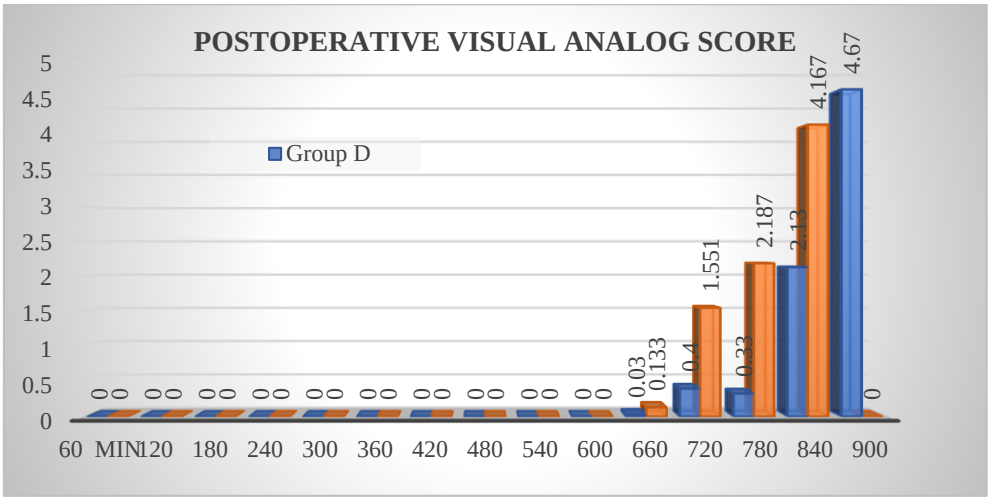


Fig 1: Post-Operative VAS

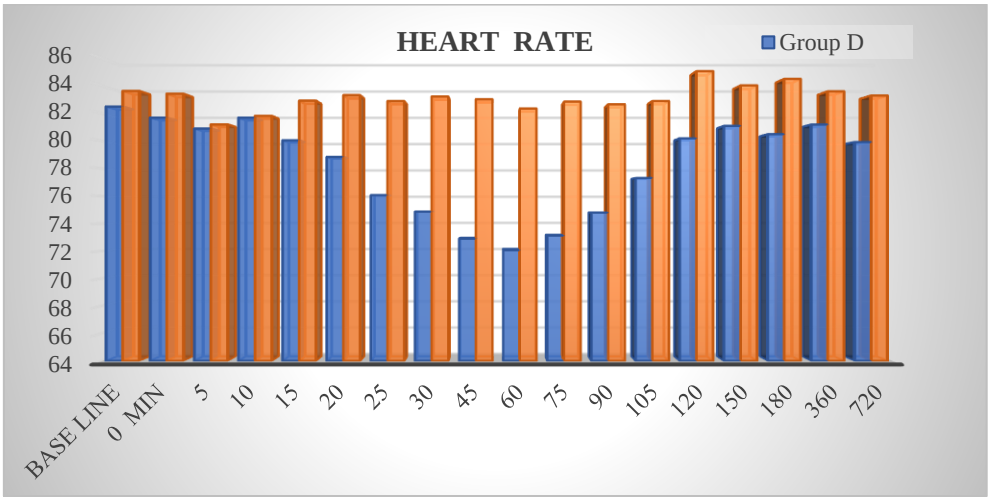


Fig 2: Intraoperative Mean Heart Rate

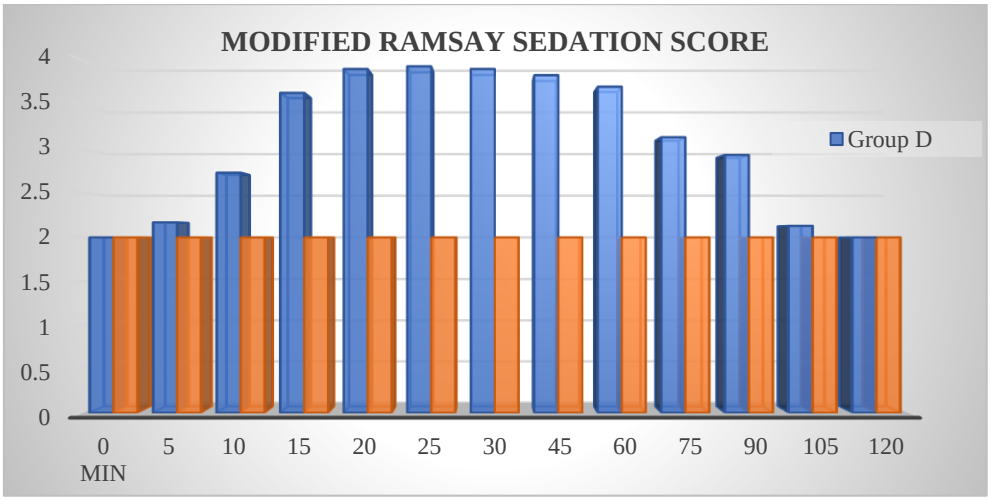


Fig 3: Modified Ramsay Sedation Score

Conclusion

1. Although there was an early onset of block in fentanyl group but dexmedetomidine provides prolonged sensory and motor blockade when used as an adjuvant to 0.5% ropivacaine in infraclavicular brachial plexus block.
2. Dexmedetomidine as an adjuvant to 0.5 % ropivacaine provides prolonged analgesia and more-dense block with less requirement of rescue analgesics as compared to fentanyl.
3. The low heart rate and achievement of sedation score of 3 or 4 with dexmedetomidine is beneficial for haemodynamic stability and better quality of block.

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