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Title Of The Article -To Compare The Effect Of Intravenous Dexmedetomidine With Fentanyl On Brachial Plexus Block.

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Abstract:

Aims:Our aim was to study the comparison of intravenous Dexmedetomidine With Fentanyl on Brachial Plexus block with 0.5% Bupivacaine and 2% Lidocaine Mixture in supraclavicular brachial plexus block for sensory ,motor block ,analgesia sedation, hemodynamics and side effects.

Methods and Material:60 patients were subsequently randomized using 'slip in a box' technique into two groups of 30 each as under.Group A patients receive received dexmedetomidine 1 mcg/kg IV as loading dose over 10 minutes, followed by continuous infusion of dexmedetomidine 0.5 mcg/kg/hrIV.Group B receive fentanyl 1 mcg/kg IV bolus followed by continuous infusion of Fentanyl 1 mcg/kg/hr IV Time for onset of sensory and motor block, duration of motor block and analgesia, intra operative hemodynamics and sedation ,side effects ,complications were assessed.

Statistical analysis used: For Statistical analysis chi-square test and independent student 't' test were applied by SPSS software (version 22) and p-value <0.05 was considered as statistically significant.

Results:
In Group A and Group B the mean onset time of sensory block was 6.91 (±1.87) min and 8.36 (±1.68) min respectively .Mean duration of motor block was 496.31 (±88.32)min while in group B, it was 411.77 (±76.98)min. In Group A, the mean duration of analgesia was 1139.37(±96.45)min while in Group B, it was 850.36 (±100.36)min.

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Conclusions:Intravenous Dexmedetomidine when supplemented with supraclavicular brachial plexus block fastens the onset and have longer duration of motor and sensory blockade ,better sedation with no side effects as compared to Fentanyl.

Keywords: Intravenous, Dexmedetomidine, Fentanyl & Brachial Plexus Block.
Study Design: Comparative Study.

1. INTRODUCTION

Now a days supraclavicular brachial plexus block is well established choice of anesthesia for upper limb surgeries.It provides excellent intraoperative analgesia and motor block alongwithpost operative analgesia.
Many local anesthetics are available for infiltration, but 0.5% Bupivacaine and 2% Lidocaine is appropriate for surgeries lasting for 3-4 hrs. However this combination alone is not sufficient enough to produce postoperative analgesia and hence an adjuvant may have to be added along with the local anesthetic.Several additives such as opioid, alpha agonist,steroids have been used with local anesthetics to prolong the duration of Brachial Plexus Block. They were also found to prolong duration of block and post operative analgesia when administered as an oral premedication and when administered by the intravenous route.

Dexmedetomidine is a more selective alpha 2 adrenoceptor agonist with sedative and analgesic properties.Dexmedetomidine has been found to exert its analgesic actions both at spinal and supraspinallevels.Dexmedetomidine has been used as an adjunct to local anesthetics for brachial plexus Block and has been found to be prolonging effect of block and operative analgesia. Very few studies have been conducted to evaluate effect of IV Dexmedetomidine on Brachial Plexus Block .
Fentanyl is a potent synthetic opioid analgesia with a strong agonistic action at the μ-opioid receptor with a rapid onset and short duration of action. Fentanyl, when added to local anaesthesia in peripheral nerve blocks, potentiates the local anaesthesia action via central opioid receptor-mediated analgesia by the peripheral uptake of fentanyl to the systemic circulation
Objective of this study is to find out the effects of intravenous 0.5μg/kg body weight of Dexmedetomidine 10 minutes before Brachial Plexus Block using 0.5% Bupivacaine and 2% Lidocaine mixture on the onset and duration of sensory and motor block and postoperative analgesia and compare its effects with Fentanyl for same charecterstics.

Inclusion criteria:
Elective cases of ASA Grade I and II,Age group 18-60 years,Patients able to understand the instructions in English or Hindi.

Exclusion criteria:
Cases of ASA Grade III and above and Emergency Procedures,Patients who are mentally ill.

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2. MATERIALS AND METHODS

60 patients were subsequently randomized using 'slip in a box' technique into two groups of 30 each as underAfter obtaining institutional ethical approval and informed written consent from patient they will randomly allocated into 2 groups, Group A patients receive received dexmedetomidine 1 mcg/kg IV as loading dose over 10 minutes, followed by continuous infusion of dexmedetomidine 0.5 mcg/kg/hrIV.Group B receive fentanyl 1 mcg/kg IV bolus followed by continuous infusion of Fentanyl 1 mcg/kg/hrIV.All patients were kept nil per oral 6hrs before the surgery.When patient shifted to preoperative room an IV line will obtain with 18 gauge cannula and all patients will preloaded with a Ringer lactate solution 10 ml/kg body weight. And will be connected to multiparameter monitor.In the operation theatre, all patients will be connected to multipara monitor and all the basal parameters (NIBP, SPO2, heart rate, Ecg)will be recorded. After that patient will be premedicate with antibiotic and antacid intravenous drugs.

Group A.patients receive received dexmedetomidine 1 mcg/kg IV as loading dose over 10 minutes, followed by continuous infusion of dexmedetomidine 0.5 mcg/kg/hr IV. Group B will receive injection fentanyl. Following the infusion patients will be placed in supine position. Under aseptic precautions brachial plexus block will be performed by supraclavicular approach using 40 ml solution containing 6 mg/kg lignocaine (2%) with adrenaline (1:200,000) and 2 mg/kg of bupivacaine (0.5%) was injected to both the groups and after block pt is assessed for efficacy of block for 15 minutes. Once desired effect is achieved pt is handed over to surgeon and supplemental oxygen given.

The following parameters will be noted.
► Onset of sensory blockade and motor blockade.
►Total duration of analgesia will be noted.
►Total duration of sensory blockade and motor blockade will be noted.

Parameters of observation
Block characteristics

1. Onset of motor block: The time to reach the modified Bromage score of 2 for the upper limb following block administration.
2. Onset of sensory block: The time to reach a complete lack of sensation to cold following block administration.
3. Duration of motor block: The time interval between the onset of motor block to complete regression of the block (Bromage score of 0).
4. Duration of sensory block: The time interval between the onset of sensory block to the restoration of sensation to cold.

Total duration of surgery and side effects will be noted. till the end of surgery and post operatively every hourly employing multiparameter monitor which displays heart rate, systolic

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bloodpressure(SBP) diastolic blood pressure(DBP), mean arterialpressure(MAP), ECG and arterial pulse saturation(SPO2) hourly.

Patients will be monitored during the post operative period for analgesia, and side effects like bradycardia, post operative nausea and vomiting.Intra op and post of sedation is documented by Ramsay sedation score.

► Post operative pain assessment will be done using Visual AnalogueScale (0-10) and rescue analgesic will be inj. Diclofenac 75mg intramuscular given if score is 4 or above.

VAS Scale:-
► Grade 0 : No pain
►Grade 1 – 3 : Mild Pain (can be ignored)
►Grade 3 – 5 : Moderate Pain (Interferes with tasks)
►Grade 5 – 7 : Moderate Pain (Interferes with concentration)
►Grade 7 – 9 : Severe Pain (Interferes with basic needs)
►Grade 9-10: Worst Pain Possible (Bed rest required)

Statistical analysis
The data obtained were presented as mean ± SD, ranges, numbers, and ratios. Results were analyzed using the chi-square test, the Mann-Whitney test for non-parametric data, and an unpaired 't'-test for parametric data. Statistical analysis was carried out using the SPSS (version 10, 2002; SPSS Inc., Chicago, IL, USA) for Windows statistical package. P value less than 0.05 was considered statistically significant.

3. RESULTS

TABLE 1: TABLE SHOWING COMPARISON AND STATISTICAL ANALYSIS OF DEMOGRAPHIC VARIABLES OF PATIENTS IN THE TWO STUDY GROUPS

S. No.	Variable	Group LC	Group LD	p-value
1.	Age (Years)	42.11(±13.81)	43.36 (±12.81)	**0.7176**
2.	Sex Ratio (M:F)	18:15	20:13	**0.803**
3.	Weight (Kilograms)	61.21 (±11.23)	60.89 (±9.87)	**0.9071**

* - Statistically significant (p-value < 0.05)

TABLE 2: TABLE SHOWING COMPARISON AND STATISTICAL ANALYSIS OF DURATION OF SURGERY [MEAN (±SD)] IN THE TWO STUDY GROUPS

Variable	Group A	Group B	p-value
Duration of Surgery (in minutes)	110.21 (±35.21)	112.61(±36.61)	**0.7967**

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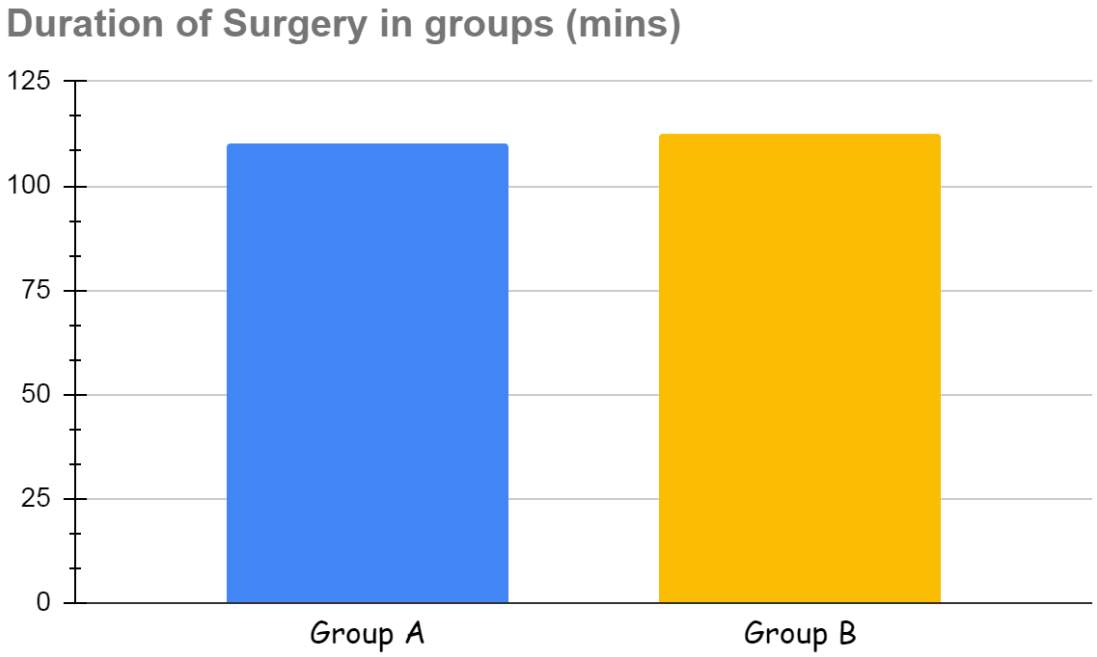

TABLE 3: TABLE SHOWING COMPARISON AND STATISTICAL ANALYSIS OF ONSET AND DURATION OF SENSORY BLOCK [MEAN (±SD)] IN THE TWO STUDY GROUPS

Variable	**Group A**	**Group B**	**p-value**
Onset of Sensory Block (in minutes)	6.91 (±1.87)	8.36 (±1.68)	**0.0025***
Duration of Sensory Block (in minutes)	697.86 (±45.68)	540.89(±39.81)	**<0.001***

TABLE 4: TABLE SHOWING COMPARISON AND STATISTICAL ANALYSIS OF ONSET AND DURATION OF MOTOR BLOCK [MEAN (±SD)] IN THE TWO STUDY GROUPS

Variable	**Group A**	**Group B**	**p-value**
Onset of Motor Block (in minutes)	11.69 (±2.96)	14.78 (±1.97)	**0.001***
Duration of Motor Block (in minutes)	496.31 (±88.32)	411.77 (±76.98)	**0.001***

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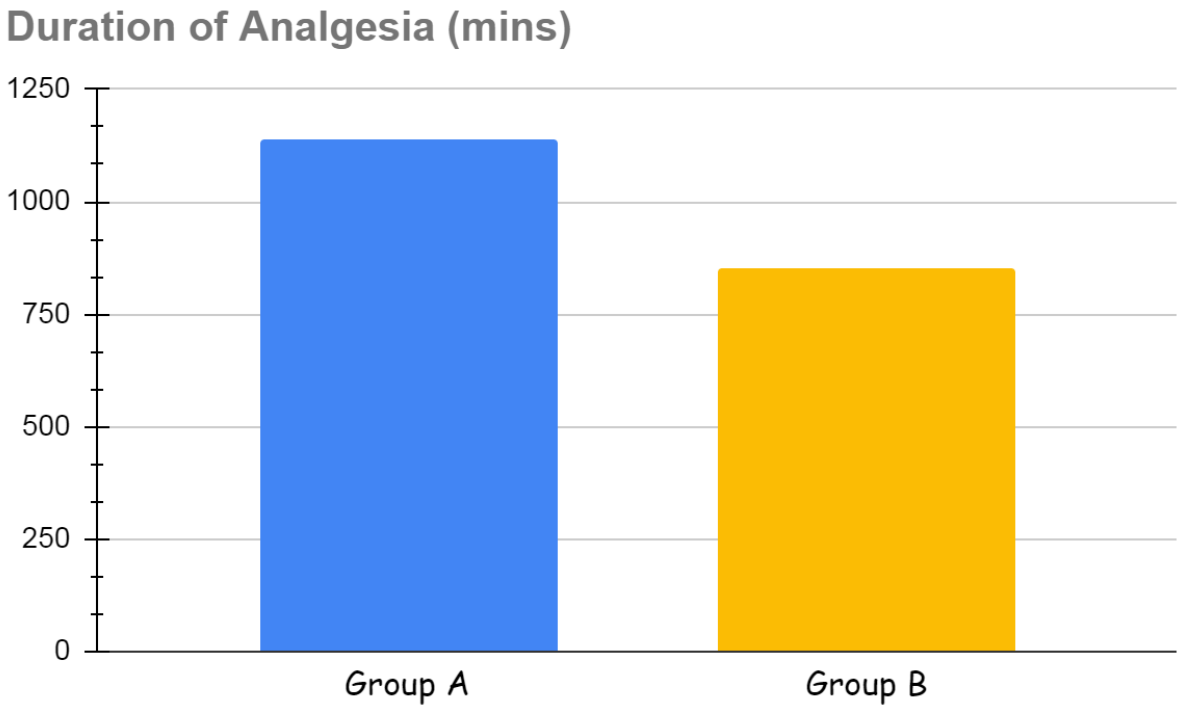
TABLE 5: TABLE SHOWING COMPARISON AND STATISTICAL ANALYSIS OF DURATION OF ANALGESIA [MEAN (±SD)] IN THE TWO STUDY GROUPS

Variable	**Group A**	**Group B**	**p-value**
Duration of Analgesia (in minutes)VAS >4	1139.37(±96.45)	850.36 (±100.36)	**<0.001***



Side effects

Side effects in both groups are not severe and easily tolerable.One patient in Group A had bradycardia which was asymptomatic and required no treatment.Intraop and post op sedation as documented by Ramsay sedation score was significantly more in Group A then Group B.Incidence of nausea and vomiting is not statistically significant in both groups.

4. DISCUSSION

- The two groups are comparable for baseline characteristics for age,sex and weight having p -value 0.7176,0.803 and 0.9071 respectively .The duration of surgery in two groups is also comparable wth Group A (110.21 ±35.21) and Group B (112.61±36.61) with p value 0.7967 which is statistically insignificant.

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- Dexmedetomedine is used as adjuvant and as intravenous in various studies supporting its safety and augmenting the quality of block if given in spinal anesthesia Al-Mustafa et al[1] Caudal anesthesia El-Hennawy et al[2].Axiliary Brachial block ,Esmaoglu et al [3], Kaygusuz et al.[12], Mizrak et al[5]. and supraclavicular block Ammar AS et al[6] ,,Rayashettypura et al[7],Priyank Samar et al[8],Gunjan Kumar et al[9]

- The onset of sensory block is quick in dexmedetomidine group 6.91 (±1.87) then in fentany group.8.36 (±1.68) which is statistically significant with p value 0.0025* A study done by **KatarzynaRutkowska**etal[4] in patients with end stage renal disases sedated with dexmedetomidine or midazolam for the formation of arteriovenousfistula.In their study sixty-four patients received either dexmedetomidine (loading dose 1 μg kg−1 10 min−1 followed by infusion of 0.2–0.7 μg kg−1 h−1) or midazolam (bolus dose 0.04 mg kg−1 followed by infusion of 0.04–0.08 mg kg−1 h−1).They didnot find the difference in onset of block in both groups.But the difference in onset of sensory and motor is documented in studies by **Abdallah et al**[10], **Gunjan Kumar et al**[9],,**Priyank Samar et al**[8] ,.Mizrak A et al[5].

- Similarly the duration of sensory block is more in dexmedetomidine group 697.86 (±45.68) then in fentanyl group 540.89(±39.81) which is statistically significant with p value <0.001*. Similar results were found by **KatarzynaRutkowska et a**l[4].Analgesic properties of Dexmedetomedien can be explained by various mechanism like their systemic effects,localvasoconstrictive effect , a decrease in localized inflammatory mediators,an increase in anti-inflammatory cytokines through an α2-adrenoceptor–mediated mechanism and may be direct effect on the nerve.(**Talke P** et al,Hutschala D et al[11]).The significant increase duration on sensory block quality in this study is similar to these findings.

- In our study the onset of motor block in dexmedetomidine group is 11.69 (±2.96) and in fentanyl group is 14.78 (±1.97) with the p value of 0.001*.This shows that dexmedetomedine have better action on motor block onset .
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Ammaret al[4]. studied .sixty adult patients who were divided into 2 equal groups of 30 subjects each. Patients in Group I received an infraclavicular brachial plexus block using 30 mL of 0.33% bupivacaine and Group II patients received 30 mL of 0.33% bupivacaine mixed with 0.75 μg/kg of dexmedetomidine.demonstrated enhancement of onset of sensory and motor blockade.Similar findings are also documented by **Abdallah et al**[10],**KatarzynaRutkowska et**[4] al,,**Gunjan Kumar et al**[9].

- Similarly the duration of motor block for dexmedetomedine group is 496.31 (±88.32) and for fentanyl group is 411.77 (±76.98) which is also statistically better with p value of 0.001*.

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- The duration of analgesia in fentanyl group is 850.36 (±100.36) and for dexmedetomedine is 1139.37(±96.45).By this we are able to conclude that analgesia is increased by dexmedetomedine infusion with decreased requirement for rescue analgesia.The duration of rescue analgesia documented by Priyank et al is 1320±276 in dexmedetomedine group. They divided the patient in two groups ,group 1 (IV dexmedetomidine) received dexmedetomidine 1 mcg/kg IV as loading dose over 10 minutes, followed by continuous infusion of dexmedetomidine 0.4 mcg/kg/hr IV. Group P (P dexmedetomidine) received dexmedetomidine at 1 mcg/kg perineurally.Similar finding of increase in motor and sensory block is shown by the study of **Abdallah et al[10]** .They studied ninety-nine patients which were randomized to receive Interscalene brachial block using 15 ml ropivacaine, 0.5%, with 0.5 μg/kg dexmedetomidine administered perineurally (Dex_P group), intravenously (Dex_{IV} group), or none (control group)..

- In both groups side effects are not significant.Indexmedetomedine there is 1 episodes of bradycardia which did not required treatment.And the systolic blood pressure is low in the dexmedetomedine group in the duration of surgery without any hypotension .This may be beneficial for surgery by decreasing the blood loss.This finding may require further studies to confirm this.Haemodynamic patient were stable.These findings were supported by Esmaoglu A et al[3],Rayashettypura G et al[7] and Abdallah et al[10].

5. CONCLUSION:

Intravenous Dexmedetomidine when supplemented with supraclavicular brachial plexus block fastens the onset and have longer duration of motor and sensory blockade ,better sedation with no side effects as compared to Fentanyl.

6. REFERENCES:

[1] Al-Mustafa MM, Abu-Halaweh SA, Aloweidi AS, Murshidi MM, Ammari BA, Awwad ZM, Al-Edwan GM, Ramsay MA,Effect of dexmedetomidine added to spinal bupivacaine for urological procedures.,Saudi Med J. 2009 Mar; 30(3):365-70

[2] El-Hennawy AM, Abd-Elwahab AM, Abd-Elmaksoud AM, El-Ozairy HS, Boulis SR

[3] Addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. Br J Anaesth. 2009 Aug; 103(2):268-74.

[4] Esmaoglu A, Yegenoglu F, Akin A, Turk CY. Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. AnesthAnalg. 2010;111:1548–51.

[5] KatarzynaRutkowska et al, The effect of dexmedetomidine sedation on brachial plexus block in patients with end-stage renal disease,Eur J Anaesthesiol 2009 Oct;26(10):851-5.

[6] Mizrak A, Gul R, Erkutlu I, Alptekin M, Oner U ,Premedication with dexmedetomidine alone or together with 0.5% lidocaine for IVRA. J Surg Res. 2010 Dec; 164(2):242-7.

[7] Ammar AS, Mahmoud KM,Ultrasound-guided single injection infraclavicular brachial plexus block using bupivacaine alone or combined with dexmedetomidine for pain control in upper limb surgery: A prospective randomized controlled trial.Saudi J Anaesth. 2012 Apr; 6(2):109-14.

ISSN: 0975-3583,0976-2833 VOL12, ISSUE06,2021

[8] Rayashettypura G. Somsunder et al Comparing Efficacy of PerineuralDexmedetomidine with Intravenous Dexmedetomidine as Adjuvant to Levobupivacaine in Supraclavicular Brachial Plexus Block,Anesth Essays Res. 2019 Jul-Sep; 13(3): 441–445

[9] Priyank Samar et al Comparative Study of Intravenous Dexmedetomidine Sedation With PerineuralDexmedetomidine on Supraclavicular Approach Brachial Plexus Block in Upper Limb OrthopaedicSurgery,Cureus. 2020 Oct; 12(10): e10768

[10] Gunjan Kumar, Prakash K. Dubey , Om P. Sanjeev,Effect of Midazolam and Dexmedetomidine Sedation on the Onset and Duration of Supraclavicular Brachial Plexus Block: A Randomised Comparative Study,Turk J AnaesthesiolReanim. 2018 Jun; 46(3): 201–207

[11] Abdallah FW, Dwyer T, et al. IV and perineuraldexmedetomidine similarly prolong the duration of analgesia after interscalene brachial plexus block: A randomized, three-arm, triple-masked, placebo-controlled trial. Anesthesiology. 2016;124:683–95

[12] Talke P, Lobo E, Brown R. Systemically administered alpha2-agonist-induced peripheral vasoconstriction in humans. Anesthesiology 2003; 99:65–70.

[13] Kaygusuz K et al,Effects of adding dexmedetomidine to levobupivacaine in axillary brachial plexus block, Res Clin Exp. 2012 Jun; 73(3):103-11.