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To evaluate the efficacy of Inj. Dexmedetomidine (1µg/kg) vs Inj Clonidine (1µg/ kg) as adjuvant to 0.5% Bupivacaine in Supraclavicular brachial plexus block in patients undergoing various surgeries on the upper limb .

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Abstract:
Background: *Brachial plexus block has now evolved into valuable and safe alternative to general anaesthesia for upper limb surgeries. Supraclavicular approach to brachial plexus block produces the most complete upper limb block. Additives to local anaesthetics increase the quality and duration of block. This study is taken to compare the efficacy of additives to bupivacaine.*
Aim: *To compare the efficacy of Inj. Dexmedetomidine vs Inj. Clonidine as adjuvant to 0.5% Bupivacaine in Supraclavicular brachial plexus block in onset of sensory blockade and motor blockade, duration of motor blockade, duration of analgesia (time to first request for analgesic),quality of block.*
Methods: *100 patients who were scheduled for elective hand and forearm surgeries (upper limb) under supraclavicular brachial plexus block were studied. 50 patients in each group. Group C (0.5% Bupivacaine + 1µg/kg Clonidine), Group D (0.5% Bupivacaine + 1µg/kg Dexmedetomidine).*
Results: *On set of sensory block and motor block, duration of motor block, duration of analgesia between two groups were evaluated. Onset of sensory block and motor block is reduced in both groups which is statistically insignificant. Duration of motor block is prolonged in group D (P value<0.0004) which is significant. Duration of analgesia also prolonged in GroupD (P value<0.0001).*
Conclusion: *Dexmedetomidine prolongs the duration of motor block and enhances the quality of block and duration of analgesia significantly when compared with Clonidine when used as an adjuvant to Bupivacaine in supraclavicular brachial plexus block . The added advantage of conscious sedation, hemodynamic stability, and minimal side effects makes it a potential adjuvant for nerve blocks.*
Key Words: *Supraclavicular brachial plexus block, Dexmedetomedine, Clonidine, Bupivacaine, sensory block, motor block, duration of analgesia.*

I. Introduction

Brachial plexus block has now evolved into valuable and safe alternative to general anaesthesia for upper limb surgeries. Various approaches like interscalene ,supraclavicular, infraclavicular and axillary have been used for blocking the brachial plexus. Supraclavicular approach to brachial plexus block produces the most complete upper limb block. It blocks the brachial plexus at the level of the trunks formed by C5 to T1 nerve roots and ensures the complete and reliable nerve block where almost the entire sensory, motor and sympathetic innervations of the of the upper extremity are blocked .[1,2,3,4,]

II. Aims and Objectives

"To evaluate the efficacy of Inj. Dexmedetomidine (1µg/kg) vs Inj Clonidine (1µg/ kg) as adjuvant to 0.5% Bupivacaine in Supraclavicular brachial plexus block in patients undergoing various surgeries on the upper limb" . With respect to

1. Onset of sensory blockade and motor blockade.
2. Duration of motor blockade.
3. Duration of analgesia (time to first request for analgesic).
4. Quality of block.
5. Sedation intraoperatively.

III. Materials And Methods

A total number of 100 patients who were scheduled for elective hand and forearm surgeries (upper limb) under supraclavicular brachial plexus block were studied .The patients were between the age

group of 18 – 60 years , belonging to both sexes .The patients were allocated randomly into one of the two groups as follows.

Group	No of Cases	Drug
C	50	0.5% Bupivacaine(29cc) + 1µg/kg Clonidine(1cc)
D	50	0.5% Bupivacaine (29cc) + 1µg/kg Dexmedetomidine (1cc)

The study solutions were prepared by an anaesthesiologist not involved in patient management or data collection . Patient, anaesthesiologist and investigator were unaware of the treatment groups.

Inclusion Criteria:

ASA grade I and II physical status, aged between 18- 60 years, belonging to both the sexes undergoing various upper limb surgeries under supraclavicular brachial plexus block.

Exclusion Criteria :

- Patients not willing to participate in the study.
- Patients with ASA grade III, IV& V.
- Patients on adrenoreceptor agonists or antagonist therapy.
- Patients with known hypersensitivity to local anaesthetic drugs.
- Patients with coagulation abnormalities.
- Pregnant women.
- Patients with pre-existing peripheral neuropathy.
- Patients with body weight less than 50 kgs.
- Infection at the site of injection.

Statistical data:

At the end of the study all the data is compiled and statistically analyzed using GRAPH PAD SOFTWARE quick calcs and VASSARSTATS.

- Descriptive data presented as mean ±SD.
- Unpaired t – test was applied for demographic data ,
- Fischer exact test was applied for ,sex , assessment of quality of block and sedation scores. P – value was considered significant if < 0.05 and highly significant if < 0.001.

IV. Method:

Informed consent was obtained from all the 100 patients after the detailed explanation of the procedure**,** Anatomical land marks identified, Brachial plexus block procedure was done.

Group C (n = 50): 0.5% Bupivacaine 29 cc + 1µg/kg Clonidine (1cc)

Group D (n = 50): 0.5% Bupivacaine 29 cc + 1µg/kg Dexmedetomidine (1cc),

Time of injection was recorded as 0 hour. In the two groups the following are noted.

1.) Onset of sensory and motor blockade
2.) Duration of motor blockade
3.) Duration of analgesia (Time to administration of rescue analgesic)
4.) Sedation scores (Ramsay sedation score)
5.) Quality of block.

Motor blockade was determined by Modified Bromage scale.

Grade 0: Normal motor function with full flexion and extension.
Grade 1: Decreased motor strength with ability to move the fingers only (onset)
Grade 2: Complete motor block with inability to move the fingers.

At the end of the procedure quality of the block assessed:

Grade 4: (Excellent) no complaint from the 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 anaesthesia.

Sedation of the patient was assessed by Ramsay Sedation score.

V. Observations And Results

Data was collected in both groups for following parameters and observations of the analysed data were tabulated as follows .
AGE: All the patients were between the ages of 18 - 60 years. Most of the patients are between 25 to 55 years.p value is 0.64 ($p > 0.05$) which is not statistically significant .

SEX DISTRIBUTION: Sex distribution was statistically analysed using Fisher's exact test and p value is 0.30 ($p > 0.05$) which is statistically insignificant .

WEIGHT: All the patients were between the weights of 50 to 65 kg.The p value is 0.46 ($p > 0.05$) which is not significant .

HEIGHT: All the patients were between 150 - 180 cms .The p value is 0.23 ($p > 0.05$) which is not significant statistically .

Comparision Of Onset Of Sensory Block:

It was taken as the period from the time of the injection of the anaesthetic solution to the absence of pin prick sensation as experienced by the patient (in minutes). Assessment of sensory block was done at each minute after completion of drug injection.

	GROUP C (n = 50)	GROUP D (n = 50)
MEAN	5.88	5.56
STANDARD DEVIATION	1.73	1.65

P value = 0.34 ($p > 0.05$) which is not statistically significant. In both the groups the onset of sensory blockade was between 4 – 7 minutes, that is not statistically significant .

Comparision Of Onset Of Motor Blockade:

It was considered when there was decreased motor strength with ability to move fingers only .Assessment of motor block was carried out at each minute after completion of drug injection by modified bromage scale.

VI.		**VII.**	GROUP C (n = 50)	**VIII.**	GROUP D (n = 50)
IX.	MEAN	**X.**	9.08	**XI.**	8.64
XII.	STANDARD DEVIATION	**XIII.**	1.91	**XIV.**	1.95

P value = 0.25 ($p > 0.05$) which is not statistically significant .

Comparision Of Duration Of Analgesia:

It was taken as the time interval between the end of local anaesthetic administration and the onset of pain and demand for rescue analgesia which was assessed using Numeric rating scale of 0 – 10 ; recorded post operatively every 2 nd hourly till the score of 5.

	GROUP C (n = 50)	GROUP D (n = 50)
MEAN	429 .00	608.40
TANDARD DEVIATION	36.18	40.81

p value < 0.0001 ($p < 0.05$).

The average duration of analgesia in Group D was 608 minutes which was significantly greater than the average duration of analgesia of 429 minutes in Group C, with a p value of < 0.0001 indicating that the duration of analgesia is significantly prolonged in Group D.

After shifting the patient to post operative ward the pain scores of the patient were assessed every 2nd hourly by NRSP assessment 0 – 10. By 4th hour mild pain was complained in Clonidine group with NRSP < 5 which does not require any rescue analgesia but the pain was statistically significant when compared to Dexmedetomidine group where no patient complained of pain.

By the end of 6thhour there was significant pain complained by the Clonidine group that required administration of rescue analgesia (Diclofenac IM 1.5 mg/kg) where as in Dexmedetomidine group only mild pain was complained .

By the end of 8th hour mean pain scores were comparable between two groups where Dexmedetomidine group had pain scores of <5 and Clonidine group had decreased pain scores because of rescue analgesia administration.

Comparision Of Duration Of Motor Blockade :

The duration of motor block was taken as the time interval between the end of local anaesthetic administration and the recovery of complete motor function of the hand and forearm.

	GROUP C (n = 50)	GROUP D (n = 50)
MEAN	392.00	569.40
STANDARD DEVIATION	32.17	38.44

pvalue < 0.0001 (p < 0.05)

The average duration of motor block in group D was 569.40 minutes which was stastically significant, greater than the average duration of motor block of 392 minutes in group C with a pvalue of <0.0001.

Comparision Of Quality Of Block:

	GROUP C (n = 50)	GROUP D (n = 50)
GRADE 1	0	0
GRADE 2	6 (12%)	2 (4%)
GRADE 3	20 (40%)	6 (12%)
GRADE 4	24 (48%)	42 (84%)

In Group D , 84% of the patients achieved Grade 4 quality of blockade as opposed to 48% in Group C ,with p value of 0.0004 (p < 0.05) which was statistically significant.

Comparision Of Sedation Scores :

Sedation of the patient was assessed by Ramsay Sedation score .All the patients in both groups had sedation scores between 2 and 3 with the p value is 0.45 (p > 0.05) which was statistically not significant.

Comparision Of Haemodynamic Parameters :

All the haemodynamic parameters were recorded. Heart rate , systolic and diastolic blood pressure, mean arterial pressures were compare between two groups . No stastically significant difference in both groups.

XV. Discussion

The supra clavicular block is associated with rapid onset and reliable anaesthesia.[1,2] Alpha 2 adrenergic agonists become popular because of their sedative , analgesic , antihypertensive , anti emetic actions in addition to reducing the anaesthetic drug requirement.

To date, several studies evaluated the effects of clonidine in axillary brachial plexusblocks[5,6,7,8,9.] and found that clonidine had an improving effect on quality and duration of anesthesia.

Bajwa et al[10] had compared dexmedetomidine and clonidine in epidural anesthesia and concluded that dexmedetomidine is a better neuraxial adjuvant compared with clonidine for providing an early onset of sensory analgesia and prolonged postoperative analgesia.

Popping *et al*.[11] in their metaanalysis of randomized trials showed that the beneficial effect of clonidine on the duration of analgesia was observed with all tested local anaesthetics. They observed that the prolongation of motor block was higher when clonidine was added to bupivacaine as compared with ropivacaine. So basing on the literature we had selected Bupivacaine as the local anaesthetic in our study.

We ensured that the demographic variables age, weight and height have been shown to be comparable in both groups .

The time for onset of sensory block is reduced in both the groups, the p value is 0.34 (p > 0.05) which was shown statistically insignificant .

.The time for onset of motor block is reduced in both the groups with onset times in dexmedetomidine group less than clonidine group, the p value was 0.1 ($p > 0.05$) which was shown statistically insignificant .

There was a significant increase in duration of analgesia in Dexmedetomidine group as compared with Clonidine group and the difference was shown statistically significant. There was significant increase in duration of motor block in Dexmedetomidine group as compared with Clonidine group and the difference was statistically significant .

The quality of block was assessed by numeric rating scale from Grade 1 to Grade 4. No significant difference in relation to the sedation scores.

XVI. Limitations:

The major limitation of our study was that we didn't use ultrasound – guided blocks because of unavailability at the time of our study ; this could have helped us to lower the dosages and volumes of local anaesthetic.

XVII. Conclusion :

Dexmedetomidine prolongs the duration of motor block and enhances the quality of block and duration of analgesia significantly when compared with Clonidine when used as an adjuvant to Bupivacaine in supraclavicular brachial plexus block . The added advantage of conscious sedation, hemodynamic stability, and minimal side effects makes it a potential adjuvant for nerve blocks.

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