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Comparison of Clonidine and Fentanyl as Adjuvants in Brachial Plexus Block.

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ABSTRACT

Clonidine, an alpha 2 agonist, has become an integral part of the Anaesthesiologist's drug armamentorium. Clonidine causes bradycardia, analgesia, sedation and hypotension due to which it is being used in the conduct of anaesthesia. In our study, we compare the effectiveness of clonidine with fentanyl as an adjuvant in Supra Clavicular Brachial Plexus block. We conducted a randomized double blind study on 40 patients undergoing upper limb surgeries under Supra Clavicular Brachial Plexus block who were divided into 2 groups. Group A who received Supra Clavicular Brachial Plexus block with 40ml of 0.25% bupivacaine with 2mcg/ml of fentanyl. Group B who received 40 ml of 0.25% bupivacaine with 1mcg/kg clonidine. In our study, we found that clonidine significantly prolongs the duration of motor blockade, absolute pain free period, and post-operative analgesia as compared to fentanyl in Supra Clavicular Brachial Plexus block.

Keywords: clonidine, fentanyl, brachial plexus, anaesthesia.

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INTRODUCTION

Brachial plexus block is a commonly used technique for anesthesia of upper limb surgery due to its easy accessibility and simplicity with predictable landmarks. Bupivacaine [1] is the most commonly administered drug in brachial plexus blocks, however, onset of action and duration of anesthesia are the limiting factors. To minimize these drawbacks, many drugs including buprenorphine, clonidine, morphine, verapamil, sufentanil and dexamethasone have been co-administered with local anesthetic to improve the quality of block and duration of action. In our study we compare the effectiveness of Clonidine and Fentanyl [3] as adjuvants to bupivacaine in supraclavicular approach to Brachial plexus block for prolonging the duration of post operative analgesia and prolongation of motor blockade.

MATERIALS AND METHODS

After obtaining the approval from the ethics committee of our university, a written informed consent from all patients, we recruited 40 healthy adults of either sex, aged 20 to 60 years, belonging to ASA physical status I or II undergoing upper limb surgeries.

The exclusion criteria were patients with progressive neurological disorders, severe liver or kidney disease, history of hypersensitivity reaction to any of the study medication, patients having opposite side pneumothorax or collapsed lung, patients having bilateral upper limb surgery, clotting disorder and patients on opioid or chronic analgesic therapy. No premedication was given to the patients. Intravenous access was obtained, Anaesthesia machine checked, resuscitative equipments and drugs were kept ready. Supraclavicular block was performed by classic approach after eliciting paresthesia. If paresthesia is not elicited, only first rib is encountered excluded from this study. To avoid intra vascular injection aspiration done every 3-5 ml of study drug injected.

In Group A: Patients received supraclavicular block with 40ml of 0.25% Bupivacaine + 2 microgram/ml fentanyl.

In Group B: Patients received supraclavicular block with 40ml of 0.25%Bupivacaine + 1 microgram/kg of clonidine

Care was taken so that the toxic doses of the local anaesthetics were not exceeded. The following variables were assessed in the perioperative period Quality and onset of block, time to achieve complete block, duration of block, (defined as the time elapsed from performance of supraclavicular block and appearance of pain in the operated limb), Sedation score was evaluated every 15 minutes after the injection, using Ramsay sedation score. Requirement of rescue analgesia in the first 24 hours and incidence of complications including nausea and vomiting, hypertension, bradycardia, pruritus and sedation was recorded in perioperative period and treated accordingly.

OBSERVATIONS AND RESULT

Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant result.

Age distribution

Age (yrs)	Group A (No.of patients)	Group B (No.of patients)
20 – 30	11	8
31 – 40	4	6
41 – 50	2	3
> 50	3	3
Range (years) Mean(years) S.D	20-72 34.6 15.5	20-65 34.9 12.7

p value=0.5502 (not significant)

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Weight distribution

Weight (kgs)	Group A (No. of patients)	Group B (No. of patients)
51 – 60	13	9
>60	6	11
Range (kgs) Mean (kgs) S.D	55-68 60.3 5.0	52-68 61.7 5.0

P value=0.2847 (not significant)

Onset of sensory block

Onset (min)	Group A (No. of patients)	Group B (No .of patients)
5-7	2	2
8-10	15	17
11-13	3	1
>14	0	0
Range(minutes) Mean (minutes) S.D	6-12 9.18 1.55	7-12 8.78 1.12

p value=0.2208 (not significant)

Onset of motor block

On set (min)	Group A (No. of patients)	Group B (No. of patients)
8-10	2	1
11-13	5	7
14-16	12	12
> 17	1	0
Range(minutes) Mean (minutes) S.D	10-18 14.13 1.67	10-16 13.78 1.27

p value=0.2362 (not significant)

Duration of surgery

Duration (min)	Group A (No. of patients)	Group B (No. of patients)
60-90	6	2
91-120	13	15
121-150	0	3
> 150	1	0
Range(minutes) Mean (minutes) S.D	90-240 107.0 24.4	90-150 113.8 14.3

p value=0.0755 (not significant)

Duration of motor blockade

Duration (mins)	Group A (No. of patients)	Group B (No. of patients)
250-300	15	0
301-400	5	1
401-500	0	18
>500	0	1
Range(minutes) Mean (minutes) S.D	250-330 280.75 18.7	480-620 550.8 28.7

p value=0.0001(significant)

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Duration of absolute pain free period

The post-operative period during which the patient did not have pain (i.e VAS – 0) in group A varied from 330 minutes to a maximum 480 minutes with mean of 371.4 minutes and a standard deviation 27.5.

In group B it varied from 500 minutes to a maximum of 720 minutes with mean of 643.8 minutes and standard deviation 36.6.

Duration (mins)	Group A (No. of patients)	Group B (No. of patients)
300-400	18	0
401-500	2	1
501-600	0	2
>600	0	17
Range(minutes) Mean(minutes) S.D	330-480 371.4 27. 5	500-720 643.8 36.6

p value=0.0001(significant)

Duration of post-operative analgesia

The post-operative period till the patient demands systemic analgesic (ie. VAS score > 5) varied from 480 minutes to a maximum of 670 minutes in group A with a mean of 564.75 minutes and a standard deviation of (24.2).

In the group B clonidine group, it varied from 840 minutes to a maximum of 1080 minutes with mean of 959.3 minutes and standard deviation of (38.3).

Duration (mins)	Group A (No. of patients)	Group B (No. of patients)
400-500	2	0
501-600	15	0
601-900	3	2
>900	0	18
Range(minutes) Mean(minutes) S.D	480-670 564.75 24.2	840-1080 959.3 38.3

p value=0.0001(significant)

Sedation score

In group A, it was mean 0.2 ± 0.1, in group B it was mean 1.7± 0.51 .

Sedation Score	Group A (No. of patients)	Group B (No. of patients)
0	16	0
1	4	6
2	0	13
3	0	1
4	0	0
Mean S.D	0.2 0.1	1.7 0.51

p value=0.0001(significant)

DISCUSSION

By statistical analysis the two groups were similar in age, weight distribution and duration of surgery. They were also similar in the onset of sensory and motor block. Eledjam JJ, Deschodt J et al study also reported that no difference in the onset of sensory blockade and motor blockade. In the Study conducted by Dr. S P

SINGH, Dr. VINITA SINGH et al the onset of sensory and motor blockade is 10.2±1.15 and 21.8±4.6 respectively, which is not significantly delayed than plexus block with plain local anaesthetic, which also corresponds with our study.

Addition of clonidine to local anaesthetic solution has significantly prolonged duration of motor blockade. These results correlates with studies conducted by Eledjam JJ, Deschodt J et al, in clonidine group it was 580.4 ± 38.7 minutes.

The mean duration of absolute pain free period is Group A=371.4 ± 27.5 minutes and Group B=643.8 ± 36.6 minutes. Addition of clonidine to local anaesthetic solution prolonged the absolute pain free period significantly. These results also correlate with studies conducted by Eledjam JJ, Deschodt J et al [6].

Duration of post-operative analgesia:

The duration of post-operative analgesia was 564.75 ± 24.2 minutes in Group A and 959.3 ± 38.3 minutes in Group B. These results correlate favorably with studies conducted by Eledjam JJ, Deschodt J et al[6], in clonidine group it was 994.2 ±34.2 minutes. In the Study conducted by Dr. S P Singh, Dr. Vinita Singh [3] et al the duration of post-operative analgesia was 7.28±0.55 hrs which also correlates with our study.

But this duration of analgesia in the fentanyl group though longer than that with plain anaesthetic is still significantly lesser than that which is produced by addition of clonidine to brachial block.

There was higher incidence of sedation in the clonidine group. In the clonidine group there was 20%(4 pt) incidence of Bradycardia, but this was haemodynamically stable and hence was not pharmacologically treated .In the fentanyl group there was 20%(4pt) incidence of nausea and vomiting and 15%(3 pt) incidence of pruritis which was not found in the clonidine group.

CONCLUSION

The addition of clonidine to local anaesthetic solution in supraclavicular approach to brachial plexus block prolongs the duration of postoperative analgesia and motor blockade, when compared to fentanyl.

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