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COMPARISON BETWEEN CLONIDINE AND EPINEPHRINE AS ADJUVANT TO BUPIVACAINE IN RESPECT TO ONSET AND POST OPERATIVE DURATION OF ANALGESIA IN SUPRA CLAVICULAR APPROACH BRACHIAL PLEXUS BLOCK IN UPPER LIMB SURGERY.

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ABSTRACT

INTRODUCTION: Supraclavicular brachial plexus block is a popular and widely employed regional nerve block technique for intra-operative anaesthesia and post-operative analgesia for surgery of upper extremity. Local anaesthetics alone for supraclavicular brachial plexus block provide good operative condition but have shorter duration of postoperative analgesia. Alpha-2 agonists are mixed with local anaesthetic agents to extend the duration of spinal, extradural and peripheral nerve blocks.

MATERIALS AND METHODS: Seventy patients patients, scheduled for elective upper limb surgeries under supraclavicular brachial plexus block were divided into two equal groups in a randomized, double-blinded fashion. Group C received clonidine 150 µg, group E received epinephrine 200 microgram added to 0.5 ml/kg body weight of 0.5% bupivacaine. Onset time and duration of sensory and motor block, duration of analgesia and cardiorespiratory variables were studied in the two groups.

RESULTS: The onset time, duration of complete sensory and motor block was statistically highly significant between two groups. Time to rescue analgesic was longer in group C than group E.

CONCLUSION: Small dose of clonidine produces early sensory and motor onset along with enhancement of the quality of the peripheral nerve block from local anesthetics and limits its two side effects to bradycardia and hypotension.

KEYWORDS :

INTRODUCTION:

In the new trend of day care surgeries, brachial plexus block seems to be a better alternative to general anaesthesia with minimal hospital stay and less financial burden on the patients.[1] Upper limb surgeries are mostly performed under brachial plexus block[2-3] . Nowadays different drugs like morphine, pethidine, clonidine, dexmedetomidine, butorphanol, buprenorphine, epinephrine[3] have been used as adjuvant with local anesthetics in brachial plexus block to achieve the better quality of sensory and motor block .

There have been various previous studies comparing the duration of analgesia by adding clonidine or epinephrine to bupivacaine versus bupivacaine alone in supraclavicular brachial plexus block.Many studies have been done comparing motor and sensory block and duration of analgesia between dexmedetomidine-clonidine and dexamethasone –epinephrine and supported that clonidine with bupivacaine could provide faster onset of sensory and motor block and also prolonged the period of analgesia and it was superior to epinephrine as an adjuvant in supra-clavicular approach to brachial plexus block by at least 300 minutes [4].

MATERIALS AND METHODS:

We compared the efficacy of clonidine and epinephrine as an adjuvant to bupivacaine in supraclavicular brachial plexus block in upper extremity surgery in respect to onset and duration of sensory and motor block, and duration of postoperative analgesia alongwith side effect.. This study was conducted in Orthopedic OT , Medical college, Kolkata and after getting permission from Hospital Ethics Committee. Eligible patients were included into the study considering both inclusion and exclusion criteria. Seventy patients were selected assuming effect size of 0.6 and α value /significance level 5%,1-β/ power of study 80% and considering the drop out about 10% of total sample size and they were divided in two groups, 35 patients in each group either to receive clonidine(150 micro gram) or epinephrine(200 micro gram) as adjuvant with 0.5 ml/kg body wt with 0.5% bupivacaine. Patients of both groups who had received the drugs and the person injecting the drugs were unaware of the study protocol. Randomization was done by computer generated tool. Double Blinding was done by the following methods: All the drugs were prepared by a trainee anaesthesiologist who was not involved in the study and person collecting the data was blinded to the study groups. The study was conducted to compare the efficacy of clonidine 150µg with 0.5 ml/kg b.wt of 0.5% bupivacaine vs. epinephrine 200µg with 0.5 ml/kg b.wt of 0.5% bupivacaine with respect to onset and duration of sensory block, motor block , duration of analgesia and haemodynamic variables. During preoperative visit on the day before surgery, patients were thoroughly explained again about the procedure to be undertaken and the risks and benefits associated with it and informed written consent were taken. On arrival in OT, the baseline parameters like heart rate(HR), oxygen saturation(Spo2) and blood pressure(BP) of every patient were obtained and continuous monitoring was done. An intravenous line was established with 18G cannula and infusion with lactated Ringer's solution was started. The patient was placed in a supine position with the head turned away from the side to be blocked. The upper limb to be anaesthetized was adducted, and hand is extended. For this procedure antiseptic dressing and draping of the site was done. Nerve stimulator was switched on and one wire connected to disposable silver chloride electrode and the other wire connected to needle (22G , 50mm insulated needle).Group C patients received 0.5ml/kg bodyweight of 0.5% bupivacaine with 150 mcg clonidine and group E patients received 0.5ml/kg body weight of 0.5% bupivacaine with 200 mcg epinephrine by an experienced anaesthesiologist. Sensory and motor block of the nerves were determined at 0, 2, 4, 6, 8, 12, 15, 20, 25,30 minutes after completion of injection, then every 30min until 2hr after they had resolved. After completion of drug injection, the dermatomal areas, corresponding to median nerve (thenar eminence), radial nerve (first web space),ulnar nerve (hypothenar eminence) were examined till complete sensory blockade. Sensory onset was considered when there was a dull sensation to pin prick in the area along the distribution of any of the above mentioned nerves. Complete sensory block was considered when there was complete loss of sensation to pin prick to the described area. Assessment of motor block was done by modified Bromage scale for upper extremities on a 3-point scale..

RESULT AND ANALYSIS:

There was no statistically significant difference in the demographic characters and duration of surgery between the two groups. The time of complete sensory block was 24.1229 ± 4.2838 (minutes) in group C. In group E it was 32.7686 ± 2.5580 (mins) and this was statistically highly significant (p value <0.001). Onset of complete motor block in group C was 24.25 ± 3.89 (mins), in group E it was 31.78±3.23 (mins) and it was highly significant. Time to rescue analgesic was longer in group C than group E. For group C it was 924.5714 ± 85.7096 (min), group E it was 653.7429 ± 104.9749 (min). Difference of mean SBP initial and mean MAP initial in two groups was statistically significant but the difference of mean SBP and mean MAP after 120 min in two groups was not statistically significant. Difference of mean DBP initial in two groups was not statistically significant (p=0.1203) and difference of mean DBP after 120 min in two groups was statistically significant. Difference of mean time onset, duration and completion of sensory and motor block in two groups were statistically (p<0.0001).

TABLE 1:

Parameters	Group C (n=35)	Group E (n=35)	P-Value
Age in years±SD	45.48±6.34	46.08±7.06	0.70(NS)
BMI±SD	23.17±1.90	23.26±1.33	0.82(NS)
Initial SBP in mm of Hg	130.20±5.32	126.88±6.26	0.019(S)
SBP in mm of Hg after 120 min.	116.34±10.6	118.51±6.63	0.30(NS)
Initial DBP in mm of Hg	79.85±3.10	72.28±5.02	0.120(NS)
DBP in mm of Hg after 120 min.	76.91±8.81	72.20±11.48	0.05(S)
Initial MAP in mm of Hg	96.63±2.54	94.48±3.88	0.007(S)
MAP after 120 min. in mm of Hg	90.05±70.13	87.63±8.09	0.189(NS)
Initial Mean Spo2	98.94±2.51	99.88±0.32	0.031(S)
Mean Spo2 after 120 min	99.08±1.86	99.54±1.44	0.25(NS)
Initial heart rate/min	84.28±7.74	86.11±5.34	0.254(NS)
Heart rate/min after 120 minutes	86.8±6.71	86.02±6.07	0.615(NS)

TABLE 2:

Parameters (Mean time in minutes)	Group C (n=35)	Group E (n=35)	P-Value
Onset Of Sensory Block	12.11±1.73	19.01±3.18	0.0001(S)
Completion of Sensory Block	24.12±4.28	32.76±2.55	<0.0001(S)
Onset Of Motor Block	16.01±4.17	20.37±3.30	0.0001(S)
Completion of Motor Block	24.25±3.89	31.7±3.23	<0.0001(S)
Mean Duration of Sensory Block	704.88±123.97	360.14±146.70	<0.0001(S)
Mean Duration of Motor Block	561.14±103.12	267.85±35.38	<0.0001(S)

P value <0.05=significant

According to adverse reaction in group-C,3(8.6%) patients had bradycardia and 3(8.6%) patients had hypotension. According to adverse reaction in Group-E, 3(12.0%) patients had tachycardia.

DISCUSSION:

Brachial plexus block is an easy and relatively safe procedure for upper limb surgery. Bupivacaine produces 3-4 hours of block, which is sufficient for most upper limb surgeries but not enough duration for elective postoperative analgesia. Addition of 150 µg of clonidine effectively and significantly prolongs the duration of analgesia in comparison to 200 µg epinephrine. Kumaresan S et al [5] found that in adrenaline group, onset of sensory block varied from 6 to12 minutes with a mean value of 9.17 minutes with a standard deviation of 1.56. In Clonidine group, it varied from 7 to 12 minutes with a mean value of 8.77 minutes and standard deviation 1.13. We found that in group-C, the mean time of complete sensory block (mean± SD) of patients was 24.1229 ± 4.2838. In group-E, the mean time of complete sensory block (mean± SD) of patients was 32.7686 ± 2.5580. Difference of mean time of complete sensory block in two groups was statistically significant (p<0.0001).We found that in group-C, the mean time onset of motor block (mean± SD) of patients was 16.0129 ± 4.1729. In group-E, the mean time onset of motor block (mean± SD) of patients was 20.3771 ± 3.3087. Difference of mean time onset of motor block in two groups was statistically significant (p<0.0001) but Eledjam JJ et al [6] and Popping Daniel M et al [7] concluded that there was no difference in the onset of sensory and motor blockade when clonidine was added to the local anesthetic solution. In our study, difference of mean duration of analgesia in two groups was statistically significant (p<0.0001) . Popping Daniel M et al [7] also concluded that clonidine prolongs the duration of motor blockade when added to the local anaesthetic solutions. We found that difference of mean time of complete motor block in two groups was statistically significant. Difference of mean SBP initial in two groups was statistically significant (p=0.0199). Difference of mean SBP at different time interval in two groups was not statistically significant. Difference of mean MAP Initial in two groups was statistically significant (p=0.0078).

CONCLUSION:

The Present study suggests that a small dose of clonidine when is added with local anaesthetic drug and given in supraclavicular brachial plexus block, can produce early onset of sensory and motor block along with enhancement of the quality of the peripheral nerve block and gives prolonged postoperative analgesia but bradycardia and hypotension are its limitation compare to epinephrine.

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