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SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK USING LIGNOCAINE WITH ADRENALIN AND LIGNOCAINE WITH ADRENALIN WITH DEXAMETHASONE AS AN ADJUNCT-A COMPARATIVE STUDY.

Chandrasekhar Behera — Post Graduate Trainee Student, Department Of Anesthesia, Hi-tech Medical College And Hospital, Bhubaneswar

Sucheta Pattanaik — Assistant Professor, Department Of Anesthesia, Hi-tech Medical College And Hospital, Bhubaneswar

Deba Behera — Assistant Professor, Department Of Anesthesia, Hi-tech Medical College And Hospital, Bhubaneswar

Manjubala Acharya — Associate Professor, Department Of Anesthesia, Hi-tech Medical College And Hospital, Bhubaneswar

Purna Chandra Debata* — Professor And Hod, Department Of Anesthesia, Hi-tech Medical College And Hospital, Bhubaneswar. * Corresponding Author

ABSTRACT

BACKGROUND AND OBJECTIVE: Regional anesthesia of the extremities and of the trunk is a useful alternative to general anesthesia in many situations. Brachial plexus block has now evolved into valuable and safe alternative to general anesthesia for upper limb surgeries.

MATERIALS AND METHODS: This randomized study on Sixty ASA I and II candidates, were randomly allocated to receive 1.5% lidocaine (29 ml) with adrenaline (1:200,000) and either 1 ml of normal saline (group A, n=30) or 1 ml of dexamethasone (4 mg) (group B, n=30).The duration of sensory and motor block, duration of analgesia and number of rescue analgesics in post-op 24 hours were analyzed.

RESULTS: The duration of sensory and motor blockade and post op analgesia (in mins) (178.60 ±30.26 vs. 420.73±80.87and 150.70±32.32vs. 306.93±70.24 and 396.13±109.42 vs 705.80±121.46) respectively, were significantly longer in the dexamethasone group (P=0.001).

CONCLUSION: Addition of dexamethasone to lidocaine with adrenaline in supraclavicular brachial plexus block prolongs the duration of sensory and motor blockade, duration of analgesia and lessens no of rescue analgesia needed in 24 hrs.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (1). It is always a subjective experience. Pain has been a major concern of human kind and it has been the object of ubiquitous efforts to understand and to control it. Peripheral nerve blocks provide longer and more localized pain relief than neuraxial techniques while avoiding the side effects of systemic medication. Regional anesthesia of the extremities and of the trunk is a useful alternative to general anesthesia in many situations (2).

Brachial plexus block has now evolved into valuable and safe alternative to general anesthesia for upper limb surgeries. It is a great tool in the armamentarium of the anesthesiologists for relief of pain preoperatively, per-operatively and post operatively. Since its introduction by William Steward Halsted in 1885 (3), it has undergone many changes and modification to arrive at a better technique.

MATERIAL AND METHODS

This is a randomized, double-blind clinical trial in which 60 patients (30 in each group) were selected for elective surgeries. All patients were in the age range of 20 to 60 years and ASA-I or II stages. This clinical study was conducted in Hi-Tech Medical College and Hospital, Bhubaneswar from January 2019 to May 2019.

Patients with coagulopathy; peripheral neuropathy; psychiatric or neuromuscular diseases; uncontrolled systemic disease; history of substance abuse, local cutaneous infections; pregnant or lactating patients; morbidly obese patients, allergy to local anesthetics; ASA class III and iv patients; uncooperative patients were excluded from the study.

After approval from ethical committee, thorough pre anesthetic evaluation was done. All the patients were fasted overnight. All of them received oral diazepam 10 mg and tablet ranitidine 150mg night before the surgery. Investigations like Hb %, TC, DC, ESR, fasting and post prandial blood sugars, blood urea, serum creatinine, serum electrolytes, urine albumin and sugar, BT, CT, screening for HIV & Hbs Ag, Chest X-ray and ECG were done.

Supraclavicular brachial plexus block was carried out as an elective procedure on the patients undergoing upper limb surgery. Sixty patients were randomly allocated into two groups (group-A, n=30 and group B, n=30) in double blind fashion.

Intravenous access was secured with 18 G cannula on the contralateral upper limb under aseptic techniques. Pulse oximeter, noninvasive blood pressure monitoring and ECG monitoring were done. Under aseptic precautions, brachial plexus block was performed by supraclavicular approach (classical / perivascular) with patients placed in supine position. The head was turned away 450 from the side to be blocked and the arm adducted with hand extended towards the ipsilateral knee. The mid portion of the clavicle was identified and marked. The point of entry at the lateral border of anterior scalene muscle, approximately 1.5 to 2cm posterior to the midpoint of clavicle was also marked. Local infiltration is performed at the site of the nerve and a 22G, 50mm length fully insulated needle except at blunt tip [Stimuplex (B Braun) needles with extension tubing] was introduced in the parasagittal plane at the previously marked point. In the nerve

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stimulator, frequency was set at 1Hz, Positive electrode was connected to ECG lead, at 1.5 mA current strength a twitch of the fingers was observed for. current strength was decreased to 0.5 mA, if we get a satisfactory twitch of all fingers, the drug injected with repeated aspiration for blood. Group A received 29 ml of 1.5% lignocaine with adrenaline (1:2,00,000) and 1 ml distilled water. Group B received 29 ml of 1.5% lignocaine with adrenaline (1:2,00,000) along with dexamethasone 1 ml (4 mg/ml).

The duration of sensory blockade, defined as the time between onset of action and return of pinprick response, was assessed every 30 minutes in at least 3 major nerve territory. The duration of motor blockade, was assessed every 30 minutes till the return of complete muscle power in at least 2 major nerve distributions. The duration of analgesia, defined as the time between the onset of action and the onset of pain, was the time when the patients received the first dose of analgesic. Supplemental analgesia was given in the form of inj. diclofenac sodium 1.5mg/kg IM, when visual analogue scale score was more than 40mm.

RESULTS

The groups of patients were comparable with respect to patient age, weight, gender ratio and duration of surgery.

Comparison of the mean duration of sensory block among both the groups, it was 178.60 ±30.26 minutes and 420.73±80.87 minutes in the group A and group B respectively. The statistical analysis by student's unpaired 't' test showed that the difference between duration of sensory block in group A and group B was very highly significant (p<0.001). (Table 1). The mean duration of motor block was 150.70 ±32.32 minutes and 306.93±70.24 minutes in the group A and group B respectively. The statistical analysis by student's unpaired 't' test showed that the difference between duration of motor block in group A and group B was very highly significant (p<0.001).

Table No. 1 Mean duration of sensory and motor block (in minutes)

Groups	Sensory block (mean±sd)	Motor block (mean±sd)
Group A	178.60±30.26	150.70±32.32
Group B	420.73±80.87	306.93±70.24
T* value	15.36	11.06
P value	<0.001	<0.001

Mean duration of analgesia was 396.13±109.42 minutes and 705.80±121.46 minutes in the group A and group B respectively. The statistical analysis by student's unpaired 't' test showed that the difference between duration of analgesia in group A and group B was very highly significant (p<0.001). (Table 2).

Table No.2: Duration of analgesia (in minutes)

Groups	Mean duration of analgesia (mean±SD)
Group A	396.13±109.42
Group B	705.80±121.46
t* value	10.38
P value	<0.001

Table No.3, shows that in group B, 60% of patients required only 1 rescue analgesic dose and 30% of patients required 2 where as only 10% patients required 3 rescue analgesic doses in post-op 24 hours. In group A 80 % of patients required 3 and 20% of patients required 2 rescue analgesic doses in post-op 24 hours. This difference in number of rescue analgesic doses required by patient of both groups in statistically highly significant by student's unpaired 't' test (p<0.001).

Table No.3: Number of rescue analgesics in post-op 24 hours

No. of RA in 24 hours post-op	Mean duration of analgesia(mean±SD)	
	Group A (n=30)	**Group** (n=30)
1	0(0%)	18(60%)
2	6(20%)	9(30%)
3	24(80%)	3(10%)

DISCUSSION

The mechanism of blockade prolonging effect of dexamethasone is not clearly understood. The Block prolonging effect may be due to its local action on normal nociceptive C fibres [4,5] . This is supported by the finding that the degree of block prolongation had the same rank order as the relative anti-inflammatory potencies of glucocorticoids and is completely reversed by administration of a specific glucocorticoid receptor antagonist. [6,7] Dexamethasone has been shown to inhibit nitric oxide synthase [8], a mediator of local anesthetic tachyphylaxis.

Our findings are comparable with the study conducted by Shrestha B. RT et al [9] in 40 patients; they found complete sensory block in dexamethasone group (mean 14.5 ± 2.10 min) which was statistically significant in comparison with controlled group.

Ali Movafegh *et. al.,* [10] in 60 adults had used either 34 ml local anesthetic lignocaine (1.5%) with 2ml of isotonic saline (Control group, n=30) or 34 ml lignocaine (1.5%) with 2 ml of dexamethasone (8mg) (dexamethasone group, n=30). The duration of analgesia was comparable with our study. They observed prolonged duration of analgesia with dexamethasone group (242 ± 76 min) Vs control group (98 ± 33 min) which was statistically significant.

Prashant A Biradar *et. al.,* [11] who concluded that addition of dexamethasone to 1.5% lidocaine with adrenaline in supraclavicular brachial plexus block speeds the onset and prolongs the duration of sensory and motor blockade. Yadav RK *et. al.,* [12] who found that onsets of action, duration of analgesia were better when dexamethasone was added to lidocaine and adrenaline mixture and also less number of rescue analgesics required as compared with neostigmine.

Corticosteroids may have a local effect on the nerve; the dexamethasone effect may be related to this action. [13] Some authors also believe that analgesic properties of corticosteroids are the result of their systematic effect. [14,15]

Systematic toxicity from a single dose of dexamethasone is unlikely. It is effective [16] and widely administered intravenously by anesthesiologists for prophylaxis against postoperative nausea and vomiting. Concerns about steroid-induced hyperglycemia have been borne out in high-dose intravenous regimen [17] but have not been problematic in practice (American Society of Anesthesiologists Annual Meeting, October 2009, Abstract A 955).

CONCLUSION

Both groups were comparable with regard to pulse rate, systolic blood pressure, and diastolic blood pressure and O_2 saturation. There was no statistically significant difference (P< 0.05). No hemodynamic intervention was needed in either group. From our study, we conclude that, the addition of dexamethasone (4mg) as an adjuvant to lidocaine (1.5%) and adrenaline (1:2,00,000) mixture leads to longer duration of sensory block, longer duration of motor block, longer duration of analgesia without any side effects, Less number of rescue analgesics in post-op 24 hours and no significant difference in hemodynamic variables i.e., pulse rate, systolic BP, diastolic BP and O_2saturation.

CONFLICTS OF INTEREST

There are no conflicts of interest associated with this study.

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