

COMPARISON OF SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH AND WITHOUT DEXAMETHASONE AS AN ADJUVANT TO BUPIVACAINE – LIGNOCAINE WITH ADRENALINE FOR PERIOPERATIVE ANALGESIA IN PATIENTS UNDERGOING UPPER LIMB SURGERIES

Anaesthesiology

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ABSTRACT

INTRODUCTION: Use of adjuvant prolongs the brachial plexus block. It is simple, safe, preserves consciousness, avoids airway instrumentation, provides excellent perioperative analgesia. Various adjuncts to local anaesthetics had been studied for prolongation of analgesic effect but in this present study we used dexamethasone which has anti-inflammatory and analgesic effect.

AIM: Aim is Comparison of SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH AND WITHOUT DEXAMETHASONE AS AN ADJUVANT TO BUPIVACAINE – LIGNOCAINE WITH ADRENALINE FOR PERIOPERATIVE ANALGESIA IN PATIENTS UNDERGOING UPPER LIMB SURGERIES

MATERIALS AND METHODS: Fifty patients aged between 18 to 60 years with ASA grade 1, 2 and 3 posted for elective upper limb orthopedic surgeries were included in the study. The study patients were randomly divided into 2 groups with 25 patients in each STUDY SUBJECTS-TOTAL 50 CASES • Group C:- Inj 2% LIGNOCAINE WITH ADRENALINE (1:200000) 20 ML+ INJ BUPIVACAINE 0.5% 10 ml with normal saline 0.9% 1 ml • Group D:- Inj 2% LIGNOCAINE WITH ADRENALINE (1:200000) 20 ML+ INJ BUPIVACAINE 0.5% 10 ml with INJ DEXAMETHASONE (4 mg) 1 ml

RESULTS: The two groups were comparable in demographic data. There was significantly faster onset of sensory blockade and prolonged duration of analgesia in the dexamethasone group than the saline group. There were no significant side effects.

CONCLUSION: Addition of low dose Dexamethasone to local anaesthetics in brachial plexus block results in significantly early onset and markedly prolonged duration of analgesia without any complications.

KEYWORDS

Analgesia, Dexamethasone, Local Anaesthetics, supraclavicular block.

I. INTRODUCTION

Brachial plexus block consists of injecting local anaesthetic drugs in the fascial spaces surrounding the nerve plexus, thereby blocking the autonomic, sensory and motor fibers supplying the upper extremity^(1,2). Among various techniques, supraclavicular approach is a preferred one being simple, safe, preserve consciousness, avoids airway instrumentation, provides rapid recovery and good postoperative analgesia. It should always be considered to the patients where general condition is poor or not adequately prepared. In our study we used dexamethasone as adjuvant which has anti-inflammatory as well as analgesic effect alongwith local anaesthetic Inj Lignocaine with Adrenaline and Inj Bupivacaine to evaluate the onset time and duration of sensory block, motor block and duration of analgesia.

II. MATERIALS AND METHODS

After obtaining approval from institutional ethics committee and written informed consent from the patients, the study was conducted at a tertiary care teaching hospital during february 2020 to December 2020. Fifty patients of American Society of Anaesthesiologists (ASA) physical status I, II - III aged between 18-60 years of either sex undergoing upper limb orthopedic surgeries were included in the study. Exclusion criteria

- Patients who are unwilling or uncooperative
- Any bleeding disorder and patients on anticoagulant treatment
- Patients having Neurological and musculoskeletal diseases
- Geriatric, pediatric, pregnant patient
- Local infection at injection sites
- History of allergies to local anaesthetic and signs of allergy to Lignocaine test dose.

Fifty patients aged between 18 to 60 years with ASA grade 1, 2 and 3 posted for elective upper limb orthopedic surgeries were included in the study. The study patients were randomly divided into 2 groups with 25 patients in each group. All patients are assessed for their preoperative condition a day before surgery. Patient's demographic data like age, sex, height, weight was recorded. Vitals like heart rate, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and SpO2 are recorded. Thorough clinical history and findings of the examination of airway, cardiovascular, respiratory and other systems are recorded. Routine investigations like Complete Blood Count, Random Blood Sugar (RBS), Serum Creatinine, Chest X ray, coagulation profile, ECG are done in all patients. Patients are fasted for 6 hrs before time of operation.

Before operation patients were explained about the procedure and a written informed consent taken. Intravenous line secured with 18G intravenous catheter and 500ml DNS was started. Standard monitors such as electrocardiogram, pulse oximeter, and blood pressure cuff were applied, and patient's baseline parameter such as pulse, blood pressure, respiratory rate, and SpO2 was recorded. All patients were premedicated with (on operation table): injection ondansetron 4 mg intravenously, Inj. Glycopyrolate 0.2mg intravenously, Inj. Midazolam 1mg intravenously.

Under aseptic and antiseptic precaution, brachial plexus block was given through supraclavicular classical approach⁽³⁾. The patients were placed in the dorsal recumbent position with the head turned away from the site of brachial block. Midclavicular point, external jugular vein and subclavian artery pulsation were identified. About 1cm above the midclavicular point just lateral to subclavian artery pulsation, a 23×11/2" G needle was introduced and directed caudal, downward and medially toward the first rib until paraesthesia was noted along radial and ulnar distribution or motor response was elicited. After performing negative aspiration for blood in order to avoid intravascular injection, the anaesthetic drug was administered in incremental doses. The patient either received Dexamethasone 1 ml or Normal saline 1 ml as adjuvant with Bupivacaine (0.5%) 10 ml along with Lignocaine 2% with adrenaline 1:200000 20 ml depending on the group to which they belong.

Immediately after block, patients were evaluated for the assessment of onset of sensory and motor blockade. Vitals were recorded before and after the procedure, at 5min and there after every 10min till end of procedure and postoperatively at every 1 hour till 4 hours in recovery room and then 2 hourly in ward upto 10 hours (at 6hr, 8hr, 10hr).

Sensory block was assessed by pinprick test using a needle at each minute after the completion of drug injection in the corresponding dermatomal areas till complete blockade.

The sensory and motor characteristics of the blockade were assessed as per the criteria mentioned below:

SENSORY CHARACTERISTICS

Onset – is taken as time duration from end of injection to dull response to pin prick.

Duration – is taken as time duration from complete block to feeling of pin prick sensation.

MOTOR CHARACTERISTICS

Onset – is taken as time duration from end of injection to decreased thumb movement

Duration – is taken as time duration from complete block to reappearance of thumb movement

DURATION OF POST OPERATIVE ANALGESIA:

It is as time duration from onset of sensory block to first rescue analgesic requested by the patient at VAS ≥ 3 .

If the block was considered to be adequate, surgeons were allowed to apply tourniquet and start the surgery. Patients were monitored for nausea, vomiting, hypersensitivity reaction, any sign of cardiovascular system (CVS) or central nervous system (CNS) toxicity, evidence of pneumothorax, hematoma, and post-block neuropathy during the study. The patients were educated regarding reporting of pain using VAS which is of 10 points where "0" indicates no pain and "10" indicates worst possible pain. INJ. DICLOFENAC SODIUM 75 mg was given intramuscularly and the time for rescue analgesia noted. (VAS ≥ 3)

Both groups were compared for complete onset time and total duration of sensory blockade, complete onset time and total duration of motor blockade, and total duration of analgesia. All the data were filled in proforma and were statistically analyzed. Intergroup comparison of the quantitative data among the different groups was done using the unpaired t-test and of the qualitative data was done by Chi-square test. Intragroup comparison of the quantitative data was done using unpaired t-test where baseline value was used as control. $P < 0.05$ was taken as statistically significant and $P < 0.001$ was taken as highly significant.

RESULTS

The patients in the two study groups were comparable for age, sex, weight, height, ASA physical status which were statistically not significant ($P > 0.05$) as shown in Table-1. Observation of various haemodynamic parameters were comparable and had shown almost same in both the groups ($P > 0.05$). The duration of surgery was also comparable in both groups ($P > 0.05$). On comparing both the groups, Group D produced earlier onset and duration of sensory blockade statistically significant as compared to Group C ($P < 0.001$), Group D produced statistically significantly earlier onset and duration of motor blockade as compared to Group C ($P < 0.001$), Group D produced significantly prolonged the duration of analgesia as compared to Group C ($P < 0.001$)

Table - 1 Mean demographic data in Group C and Group D

Variable	Study Group				P value
	Group D		Group C		
	Mean	SD	Mean	SD	
Age (in Years)	36.48	14.224	33.64	15.307	0.2544
Weight (in Kgs)	57.96	8.8926	54.76	11.944	0.1489
Gender (M/F)	21/4		20/5		

Table - 2 Mean onset time of complete sensory block in Group D and Group C

Variable	Study group				P value (T test)
	Group D		Group C		
	Mean	SD	Mean	SD	
Onset time of sensory block (in seconds)	102.56	9.591996664	217.6	157.6903294	< 0.001
Duration of sensory block (in minutes)	508	44.18144407	415.6	40.20746199	< 0.001

Chart - 1

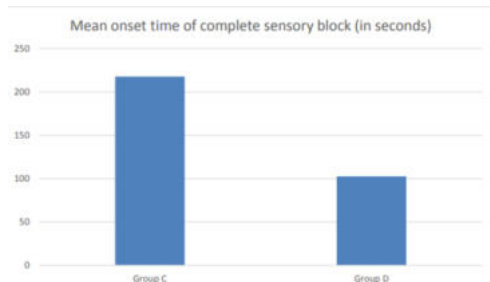


Chart - 2

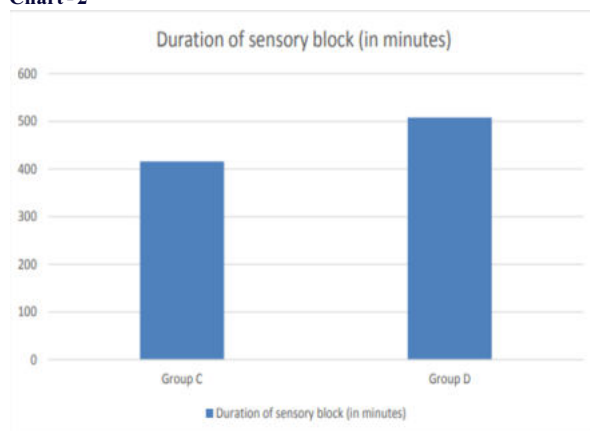


Table - 3 Mean onset time of complete motor block in Group D and Group C

Variable	Study group				P value (T test)
	Group D		Group C		
	Mean	SD	Mean	SD	
Onset time of motor block (in seconds)	130.4	8.371379815	426.32	238.314535	< 0.001
Duration of motor block (in minutes)	381.6	50.88654046	336.4	24.31131424	< 0.001

Chart - 3

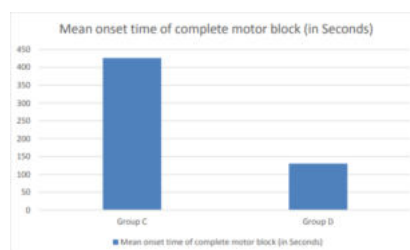


Chart - 4

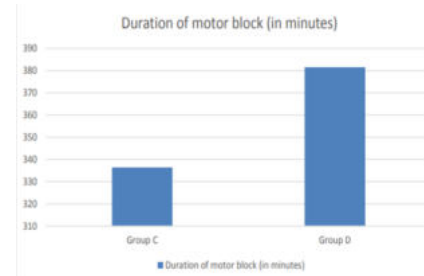


Table - 4 Mean duration of analgesia in Group D and Group C

Variable	Study group				P value (T test)
	Group D		Group C		
	Mean	SD	Mean	SD	
Duration of analgesia (in hrs)	12.76	2.177705214	8.166666666 7	2.42670329 6	<0.001

Chart - 5

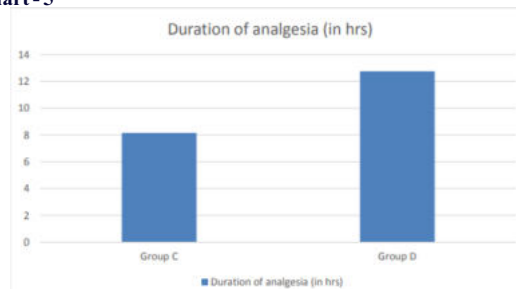


Chart -6

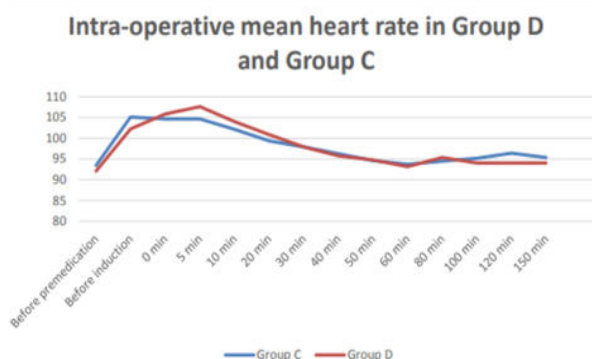


Chart -7

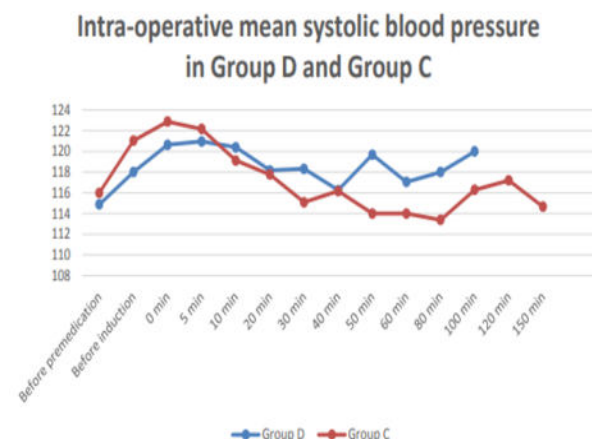
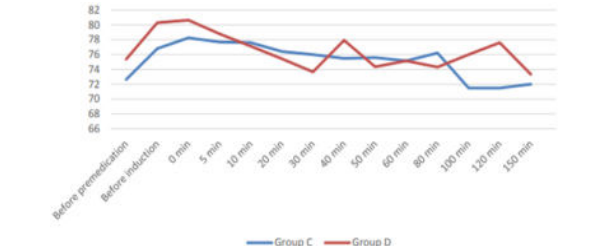


Chart -8



The post operative VAS score in Group D was lower than Group C for the most of the time.

CHART9

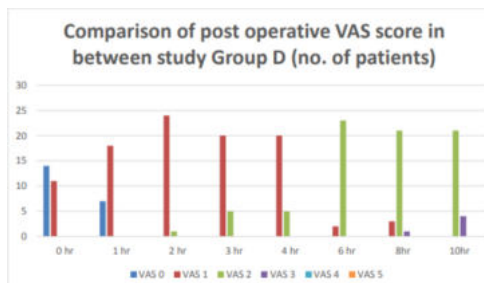
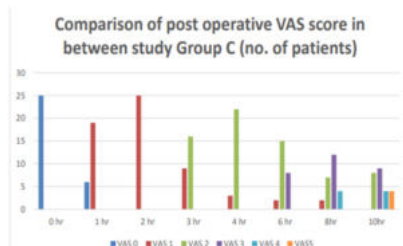


Chart -10



DISCUSSION

Supraclavicular approach of brachial plexus block is the most commonly used approach and provides the most complete and reliable anaesthesia for upper limb surgery. Supraclavicular blocks are performed at the level of the brachial plexus trunks. For brachial plexus block, a drug that has fast onset, long duration and minimal toxicity could be an advantage. The present study is done to compare the effect of DEXAMETHASONE (4 mg) 1 ml as an adjuvant⁹⁴ to 10 ml BUPIVACAINE (0.5%) and 20 ml LIGNOCAINE 2% with ADRENALINE (1:200000) in supraclavicular brachial plexus block, on the onset time and duration of sensory and motor block as well as on the duration of post-operative analgesia.

ONSET TIME OF COMPLETE SENSORY and MOTOR BLOCK: In our study, the mean onset time of complete sensory block in Group D and Group C was 102.56 ± 9.591996664 and 121.76 ± 157.6903294 seconds respectively and the mean onset time of complete motor block in Group D and Group C was 130.7 ± 8.37 and 426.32 ± 238.3145 seconds respectively. After applying T test, both differences were statistically highly significant ($p < 0.001$).

These results are comparable to other studies. In December 2012, Dr R. G. Pathak¹, Dr Anand P. Satkar², Dr Rajendra N. Khade³⁽⁵⁾ conducted a study - Supraclavicular brachial plexus block with and without Dexamethasone to compare effect of addition of Dexamethasone to local anaesthetic drugs. Group 1 (25 cases) - received 1.5% adrenalized xylocaine (20 ml) and 0.5% Bupivacaine (16 ml) + Dexamethasone 8 mg (2 ml) Group 2 (25 control) - received 1.5% adrenalized xylocaine (20 ml) and 0.5% Bupivacaine (16 ml) + 0.9% normal saline (2 ml). The mean onset of sensory block in group 1 in mins 5.92 ± 2.8 and in group 2 in mins 6.6 ± 2.95 , mean onset of motor block in group 1 was 15.8 ± 5.6 min and in group 2 was 16.6 ± 5.11 min.

Duration of sensory and motor block : In our study, the mean duration of motor block in Group D and Group C was 381.66 ± 50.88654046 and 361.6 ± 33.42813187 minutes respectively and the mean duration of sensory blockade in Group D and Group C was 508 ± 44.18144407 and 415.6 ± 40.20746199 minutes respectively. After applying T test, the difference was statistically highly significant ($p < 0.001$).

This results are comparable to other study. In May-august 2015, E. Devandar Reddy, S. Srikanth⁶ conducted A study for Supraclavicular Brachial plexus block using Lidocaine with Adrenaline and Dexamethasone as an adjunct. Group A were received 7 mg/kg of 1.5% lidocaine with adrenaline with 2 ml 0.9% normal saline and Group B received 7 mg/kg of 1.5% lidocaine with adrenaline with 2 ml (8 mg) Dexamethasone. The duration of sensory block was prolonged in Dexamethasone group (230.00 ± 13.37 min) than control group (150.50 ± 12.45 min), duration of motor block was also prolonged in dexamethasone group (243.5 ± 13.49 min) than control group (170.5 ± 13.03 min).

Duration of Analgesia: In our study, the mean duration of analgesia in Group D and Group C was 12.76 ± 2.177 and 8.16 ± 2.42 Hours respectively. After applying T test, the difference was statistically highly significant ($p < 0.05$).

This results are comparable with In October - 2019⁷, Chandrasekhar Behera, Sucheta Pattanaik, Deba Behera, Manjubala Acharya, Purna Chandra Debata conducted a study about supraclavicular brachial plexus block using Lignocaine with adrenalin and Lignocaine with adrenalin with Dexamethasone as an adjunct. Duration of post op analgesia was 396.13 ± 109.42 min in normal saline group and it was 705.80 ± 121.46 min in Dexamethasone group, ($P = 0.001$).

HAEMODYNAMIC CHANGES: In our study, we have observed statistically insignificant changes in heart rate, SBP and DBP during the intraoperative and postoperative 119 period. None of our patients required any anticholinergic treatment or any vasopressor support during the study period.

In May-august 2015, E. Devandar Reddy, S. Srikanth conducted A study on 60 cases for Supraclavicular Brachial plexus block. They concluded that Dexamethasone as an adjunct administered with lidocaine with adrenaline in brachial plexus block produces early onset of sensory and motor blockade, prolongs duration of both sensory and

motor blockade, without any haemodynamic changes or side effects.

COMPLICATION AND SIDE EFFECTS

There was no incidence of headache, nausea, vomiting, hypotension, bradycardia, chest pain, coughing, convulsion and respiratory depression and procedure related complication. There was no CNS and CVS toxicity seen in either group in our study.

CONCLUSION

We conclude that DEXAMETHASONE as an adjuvant to BUPIVACAINE and LIGNOCAINE WITH ADRENALINE, in supraclavicular brachial block for upper limb surgery fastens the onset time for sensory & motor block and prolongs the duration of sensory & motor blocks with longer duration of postoperative analgesia, causes decrease in need of rescue analgesia in patients with no side effects.

REFERENCES

1. Morgan & Mikhail's clinical anaesthesiology 5 th edition section 4 ch- 46, peripheral nerve block :981-986.
2. Miller's anaesthesia et al:8th edition ch-57, peripheral nerve blocks :1721-1724.
3. IanMcConachie, John McGeachie, Janet Barrie. Regional Anaesthetic techniques. In : Thomas EJ Healy, Paul R Knight. Editors. Wylie's – A practice of Anesthesia. 7th Ed. Arnold;2003.
4. Kopacz DJ, Lacouture PG, Wu D, Nandy P, Swanton R, Landau C. The dose response and effects of Dexamethasone on Bupivacaine microcapsules for intercostal blockade (T9 to T11) in healthy volunteers. *AnesthAnalg*. 2003;96:576–82
5. <http://www.ijsrp.org/research-paper-1212/ijsrp-p1218.pdf>
6. <https://pimr.org.in/dev.PDF>
7. supraclavicular-brachial-plexus-block-using-lignocaine-with-adrenalin-and-lignocaine-with-adrenalin-with-dexamethasone-as-an-adjunct-a-comparativestudy_October_2019_1570272004_1500189.pdf(worldwidejournals.com)