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To Evaluate the Analgesic Efficacy of Dexamethasone 8mg (2ml) Added To 0.5% Ropivacaine (30ml) Compared To 0.5% Ropivacaine with 2ml Normal Saline in Supraclavicular Brachial Plexus Block in Patients Undergoing Upper Limb Surgeries

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Abstract:
INTRODUCTION: *Dexamethasone was selected as an adjuvant to local anesthetics in brachial plexus block in our study because it has been reported to prolong duration of action of local anesthetics and respiratory depression is less common.*
AIMS AND OBJECTIVES: ***To*** *evaluate the efficacy of inj dexamethasone 8mg (2ml) added to 0.5% ropivacaine 150mg (30 ml) compared to 0.5% ropivacaine 150mg (30ml) with 2ml normal saline in supraclavicular brachial plexus block in patients undergoing upper limb surgeries with respect to Onset of sensory blockade and motor blockade ,Duration of motor blockade,Duration of analgesia.*
MATERIALS AND METHODS: *Group I -30ml of 0.5% ropivacaine plus 2ml of dexamethasone. Group II - 30ml of 0.5% ropivacaine plus 2ml of normal saline.*
SUMMARY AND CONCLUSION: *Onset of sensory block is reduced in group I than control group Onset of motor block was comparable in both the groups.The duration of analgesia in dexamethasone group was significantly prolonged as compared with control group The duration of motor block in dexamethasone group was significantly prolonged as compared with control group The sedation scores, haemodynamic parameters, side effects and complications were comparable in both the groups .*

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I. Introduction

Nowadays different drugs have been used as adjuvant with local anesthetics in brachial plexus block to achieve quick, dense and prolonged block[1].Dexamethasone has been studied as an adjuvant to local anesthetic in peripheral nerve block[2,3].· Steroids have nerve block prolonging effects. They produce analgesia by blocking transmission of nociceptive myelinated c-fibers and suppressing ectopic neuronal discharge. They might bring about this effect by altering the function of potassium channels in the excitable cells. Thus, dexamethasone was selected as an adjuvant to local anesthetics in brachial plexus block in our study because it has been reported to prolong duration of action of local anesthetics and respiratory depression is less common.

II. Aims And Objectives

To evaluate the efficacy of inj dexamethasone 8mg (2ml) added to 0.5% ropivacaine 150mg (30 ml) compared to 0.5% ropivacaine 150mg (30ml) with 2ml normal saline in supraclavicular brachial plexus block in patients undergoing upper limb surgeries with respect to Onset of sensory blockade and motor blockade, Duration of motor blockade, Duration of analgesia (time to first request for analgesic)

PATIENTS AND METHODS

After institutional approval, this randomized controlled clinical control comparative study was conducted from November 2019 to October 2020 over a period of two years in the Department of Anaesthesiology, Government General Hospital / Guntur Medical college, Guntur.

Inclusion criteria:

The following criteria were taken for including the patients in this study.

1) ASA Status I and II
2) Age between 18 and 65 years
3) Patients undergoing upperlimb surgeries under supraclavicular brachial plexus block.

Exclusion Criteria:

1) Patient not willing to participate in the study.
2) Patients with ASA grade $\geq$ III
3) Patients with known hypersensitivity to local anaesthetic drugs.

STUDY DESIGN:

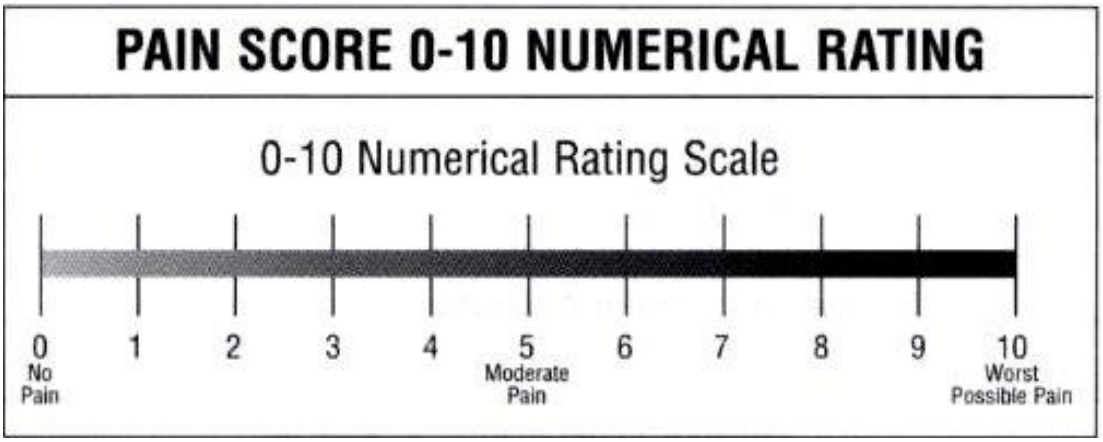
This prospective, randomized, controlled study conducted on 100 ASA I and II patients undergoing upper limb surgeries under supraclavicular brachial plexus block who fulfilled inclusion criteria. The study was started after receiving institutional ethical committee approval and informed written consent from all the patients and they were randomly divided into two groups.

TWO GROUPS:

Group I -30ml of 0.5% ropivacaine plus 2ml of dexamethasone.
Group II -30ml of 0.5% ropivacaine plus 2ml of normal saline.

METHOD:

During pre anaesthetic checkup the numerical rating scale was explained to all patients using 10 cm scale.Informed consent was obtained from all the 100 patients after detailed explanation of the procedure to be performed.



PROCEDURE:

The basal parameters pulse rate,respiratory rate,blood pressure and spo2 were recorded before starting the case.Peripheral venous canulation was done with 18G IV cannula in opposite arm and all the patients were preloaded with 10ml/kg Ringer lactate solution.e.Under strict aseptic precautions all the patients received brachial plexus block through the supraclavicular approach.

Group I -30ml of 0.5% ropivacaine plus 2ml of dexamethasone (8mg).
Group II -30ml of 0.5% ropivacaine plus 2ml of normal saline.

In supraclavicular route of brachial plexus block the plexus is blocked where it is most compactly arranged at the level of the three trunksTime of injection was recorded as 0 hour. In the two groups the following parameters are noted.Onset of sensory and motor blockade,Duration of motor blockade,Duration of post operative analgesia (time to administration of rescue analgesic),Sedation scores (Ramsay sedation score), Side effects.Continuously spo2 and pulse rate were monitored .haemodynamic variables such hear rate, systolic and diastolic blood pressures,mean arterial pressure,were recored every 15 mins intraoperatively after block and

every one hour postoperatively for 6 hrs, and 2 nd hourly for 12 hrs.Sensory block was assessed by pinprick method.

Onset of sensory block: it was taken as the period from the time of injection of local anaesthetic solution to the absence of pinprick sensation as experienced by the patient.

Sensory block was graded as:

Grade 0: sharp pin felt

Grade 1: analgesia, dull sensation felt (sensory onset)

Grade 2: anaesthesia, no sensation felt (complete sensory block)

Duration of sensory block: It was taken as the period from the time of loss of pinprick sensation to the reappearance of pinprick sensation as revealed by the patient.

Duration of analgesia: It was taken as the time between the injection and the onset of pain and request for rescue analgesic.Rescue analgesia was given in form of inj diclofenac sodium (1.5mg/kg)intramuscularly along with oral paracetamol 500mg at the numeric rating scale of >4 which was assessed every 2nd hourly after shifting the patient to the post operative ward.The time of shifting the patient to the post operative ward was recorded as 0 hour for pain assessment by numeric rating scale and time of administration of rescue analgesia was noted.

Assessment of motor blockade was carried out by the same observer at each minute till complete motor blockade after drug injection.Motor blockade was determined according to a modified bromage scale for upper extremities on a 3 point sacle.

Grade 0: normal motor function with full flexion and extension of elbow, wrist, and fingers.

Grade 1: decreased motor strength with ability to move the fingers only (onset)

Grade 2: complete motor block with inability to move the fingers.

All patients were observed for any side effects like nausea, vomiting, dryness of mouth, and complications like pneumothorax, haematoma, local anaesthetic toxicity, and post –block neuropathy in the intra and post operative periods. Sedation of the patient was assessed by ramsay sedation score.

Grading of sedation was evaluated by:

RAMSAY SEDATION ASSESSMENT SCALE:

Awake levels:	patient anxious or agitated or both	1
	Patient cooperative, oriented and tranquil	2
	Patient responds to commands only	3
Asleep levels:	a brisk response to a light glabellar tap	4
	A sluggish response to a light glabellar tap	5
	No response	6

Statistical data:

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

III. Observations And Results

AGE AND SEX DISTRIBUTION:

Age and Sex distribution was statistically analysed using fisher's exact test and p value is 0.30(>0.05) which is statistically insignificant, indicating that the sex distribution comparable in the two groups.

COMPARISON OF ONSET OF SENSORY BLOCK:

Time in minutes	GROUP I(n=50)	GROUP II(n=50)
MEAN	6.56	6.86
STANDARD DEVIATION	1.05	1.40

P=0.2288 which is not statistically significant.

In both the groups themean onset time of sensory blockade was between, 6.56 to 6.86 minutes p value is 0.22 which is statistically insignificant.

COMPARISON OF ONSET OF MOTOR BLOCKADE

Time in minutes	GROUP I(n=50)	GROUP II(n=50)
MEAN	9.24	9.38
STANDARD DEVIATION	1.10	1.31

P=0.56 value which is not clinically significant.In both the groups the onset of motor block was between 8-12 minutes.

COMPARISON OF DURATION OF ANALGESIA

Time in minutes	Group I	Group II
MEAN	579.30	417.20
STANDARD DEVIATION	56.91	28.73

P = 0.0001($p<0.05$)

The average duration of analgesia in group I was 580 minutes which was significantly greater than the average duration of analgesia of 420 minutes in group II with a p value of <0.0001 indicating that the duration of analgesia is significantly prolonged in group I when compared to group II patients.

After shifting the patient to post operative ward the pain scores of the patient were assessed every 2nd hourly by Numerical rating scale for pain assessment 0-10. The time of shifting the patient to postoperative ward was taken as 0 hour and assessed. The observations of the scores were tabulated as follows

By the end of 6th hour there was significant pain complained by group II that required administration of rescue analgesia where was as in group I only mild pain was complained.

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

By the end of 10th hour significant pain compliant started in gropu I with mean pain scores of 5.48 which required administration of first rescue analgesia where as in group II due to administration of rescue analgesia earlier the mean pain scores were <5.

DURATION OF MOTOR BLOCK

Time in minutes	GROUP I	GROUP II
MEAN	481.70	365.10
STANDARD DEVIATION	39.00	35.04

P less than 0.0001(<0.05)

The average duration of motor block in group I was 480 minutes which was significantly greater than the average duration of motor block of 365 minutes in group II with a p value of <0.0001 indicating that the duration of analgesia is significantly prolonged in group I when compared to group II patients

COMPARISON OF QUALITY OF BLOCK

	GROUP I	GROUP II
GRADE 1	0	0
GRADE 2	2(4%)	6(12%)
GRADE 3	6(12%)	20(40%)
GRADE 4	42(84%)	24(48%)

In group I 84% of patients achieved grade 4 quality of blockade as opposed to 48% in group II .Fischer exact test was applied for assessment of quality of block with p value of 0.0005 (P <0.05) which was statistically significant., indicating that the quality of block was superior in group I when compared to group II. No patient had failed block and 4 % of patients in group I and 12% of patients in group II had grade 2 block and 6(12%) of patients in grouo I and 20(40%) patients in group II had grade 3 block.

COMPARISON OF SEDATION SCORES

Sedation of the patient was assessed by Ramsay sedation score.

RAMSAY SCORE	GROUP I	GROUP II
Score 1	0	0
Score 2	38(76%)	42(84%)
Score 3	12(24%)	8(16%)
Score 4	0	0
Score 5	0	0
Score 6	0	0

The patients in both the groups had sedation scores between 2 and 3 and statistical analysis by fischers exact test the p value is 0.45($p>0.05$) which is statistically not significant indicating that the sedation scores were comparable in both the groups.

COMPARISON OF HAEMODYNAMIC PARAMETERS

The basal haemodynamic parameters were recorded initially and after drug administration every 15minutes till 1 hour and every 30 minutes until 180 minutes were recorded and compared.

SIDE EFFECTS AND COMPLICATIONS

The side effects in our study compared are nausea, vomiting, and dry mouth about 60% of the patients have no side effects in both groups and the side effects are also minimal and were comparable in both the groups.

We did not observe any complications like haemothorax, pneumothorax, convulsions local anaesthetic toxicity in any patients of our study groups.

IV. Discussion

In the present study we aimed to evaluate the efficacy of dexamethasone along with local anaethetic in supraclavicular brachial plexus block.

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

Onset of sensory block:

In the present we observed that the onset of sensory block had mean duration of 6.56±1.05 minutes in group I and had mean duration 6.86±1.40 minutes in group II with a p value of 0.22(p>0.05).

The time for onset of sensory block is reduced in group I than group II, it is comparable because as the p value is 0.22 (.>0.05) which was shown statistically insignificant

The present study correlates to the study. Conducted by Dr R. G. Pathak, Dr Anand P. Satkar Dr Rajendra N. Khade[4] who studied the effect of Supraclavicular brachial plexus block with and without Dexamethasone – A Comparative Study 50 patients were studied with 2 groups and conclude that the mean onset of sensory block in minutes was 5.92 ± 2.827in group I (dexamethasone grouopand 6.6 ± 2.958 in group II (control group) (p = 0.4101). data was not significant statistically as p > 0.05. the onset of sensory blockade time with dexamethasone correlates with the present study.

The present study correlates to the study. Conducted by A. Movafegh, M. Razazian, F. Hajimaohamadi, and A. Meysamie,[5] "Dexamethasone added to lidocaine prolongs axillary brachial plexus blockade," they concluded that the onset of sensory blockade were comparable in both the groups.

Onset of motor blockade:

In present study we observed that the onset of motor block had a mean duration of 9.24±1.10 minutes in group I and had a mean duration of 9.38±1.31 minutes in group II and a p value f 0.56 (p>0.05)

The time to onset of motor blockade is comparable in both the groups are comparable as p value is more than 0.05.

The present study was correlated with the study conducted by Dr.Mijanur Rahaman Shaikh et al[6] Role of dexamethasone in Supraclavicular Brachial Plexus Block 60 patients studied with 2 groups. The onset time of motor block (19.96 ± 1.28 min) in dexamethasone group versus 20.26 ± 1.28 min in control group) was also similar in the two groups (p value = 0.402).

Duration of analgesia:

In present study we observed that the duration of analgesia in group I had a mean duration of 579.30+/-56.91(9.6 hours) minutes. and the mean duration of was 417.20±28.73-minutes (6.95 hours) in group II and a p value of <0.0001(p<0.05) which is considered statistically significant.

There was a significant increase in duration of analgesia in dexamethasone group than control group and the difference was shown statistically significant.

The present study correlates with study done by, Dr. Feroz Ahmad Dar (M.D), Dr. Neelofar Jan2 (M.B.B.S)[7]. The duration of pain relief (postoperative analgesia) was markedly prolonged in group RD (14.5±0.3 hours), while it was only 8.3±0.4 hours in group R (p<0.001). Which was statistically significant and showed that Addition of dexamethasone to ropivacaine in supraclavicular brachial plexus block significantly prolongs the duration of analgesia and motor block in patients undergoing upper limb surgeries and is a remarkably safe and cost effective method of providing post operative analgesia.

This correlates well with the study conducted by Kalpana K, Natesh S. Rao, Sadanand Gopal[8] This study demonstrates that dexamethasone significantly prolongs the analgesic effect of plain ropivacaine 0.5% used as a single injection brachial plexus block. The mean time of onset of sensory block (13.85±5.20min) and motor block (22.17±4.68min) was significantly faster in group D compared to group R.

The present study results correlates with study conducted In the year 2011, a study by Cummings KC et al[9], the mean duration of postoperative analgesia was around 22 hours in a group which received ropivacaine with dexamethasone and its was around 11.8 hours in group receiving ropivacaine only and stated that dexamethasone prolongs analgesia from interscalene blocks using ropivacaine or bupivacaine, with the effect being stronger with ropivacaine. However, block duration was longer with plain bupivacaine than ropivacaine.

Thus, although dexamethasone prolonged the action of ropivacaine more than that of bupivacaine, the combined effect of dexamethasone and either drug produced nearly the same 22h of analgesia

Our study correlates well with one such randomized prospective trial was done by Shrestha BR, Maharjan SK, Tabedar S[10]. In their study forty patients undergoing arm, forearm and hand surgeries were randomly selected. The forty patients were divided in two groups of 20 each. In-group one, a brachial plexus block was done with 40-50 ml of local anesthetic with 1:200,000 adrenaline and in the other group the block was performed with the same amount of local anesthetic with dexamethasone. Prolonged duration of analgesia occurred (12.75 ± 5.33 hours verses 3.16 ± 0.48 hours; p= 0.00) in the dexamethasone group than in the other group and concluded that addition of dexamethasone to local anesthetic significantly prolongs the postoperative analgesia.

Duration of motor blockade:

In present study we observed that the duration of motorblockade in group I had a mean duration of 481.70+/-39.00 minutes and had a mean duration of 365.10+/-35.04minutes in group II and a p value of <0.0001(p<0.05) which is considered statistically significant.

There was a significant increase in duration of motor blockade in dexamethasone group than control group and the difference was shown statistically significant.

The present study results correlate with study conducted by Ali Movafegh, Mehran Razazian, Fatemeh Hajimaohamadi, and Alipasha Meysamie[5] did a prospective, randomized, double-blind study to evaluate the effect of dexamethasone added to lidocaine on the onset and duration of axillary brachial plexus block. Sixty patients scheduled for elective hand and forearm surgery under axillary brachial plexus block were randomly allocated to receive either 34 mL lidocaine 1.5% with 2 mL of isotonic saline chloride (control group,n = 30) or 34 mL lidocaine 1.5% with 2 mL of dexamethasone (8 mg) (dexamethasone group, n = 30). Neither epinephrine nor bicarbonate was added to the treatment mixture. They used a nerve stimulator in all of the patients. They found that the duration of surgery and the onset times of sensory and motor block were similar in the two groups. The duration of sensory (242 ± 76 versus 98 ± 33 min) and motor (310 ± 81 versus 130 ± 31 min) blockade were significantly longer in the dexamethasone than in the control group (P < 0.01)

Our study correlates well with One such study conducted by Dr MIjanur Rahaman Shaikh et al[6].The duration of motor block (846.67 ± 102.09 min in dexamethasone group versus 544.07 ± 55.40 min in control group) was also significantly longer in the dexamethasone group than in the control group (p value < 0.001). Conclude that addition of 8 mg dexamethasone to bupivacaine 0.25% solution in supraclavicular brachial plexus block prolongs the duration of sensory and motor blockade, reduces the requirement of rescue analgesic in postoperative period but has no effect on the onset time of sensory and motor blockade.

Quality of blockade:

The quality of block was assessed by numeric rating scale from grade I to grade V. In the present we observed that 84% (42/50) of the patients in group I had grade IV block when compared to 48% (24/50) in group II with p value of 0.0005 (<0.05) which is considered significant. The grades of quality of block in both the groups were already discussed in the table in our results.

The present study results correlate with study, this correlates well with the study conducted by Kalpana K, Natesh S. Rao, Sadanand Gopal[8] This study demonstrates that dexamethasone with ropivacaine and plain ropivacaine groups both were comparable in quality of blockade.

Sedation scores:

In the present study we used Ramsay sedation score to assess the sedation levels, in both the groups the sedation score was between 2/6 and 3/6. In dexamethasone group scores were 2/6 in 38 patients and 3/6 in 12 patients. In control group scores were 2/6 in 42 patients and 3/6 in 8 patients on statistical analysis of the data the p value was 0.45 which indicates that both the groups were comparable with no significant differences in relation to the sedation scores.

In both the groups we did not observe any clinically significant sedation with scores greater than 3, all the patients were cooperative and oriented (grade 2), responding to commands (grade 3) and comfortable, through out the surgery with arousable sedative effects. No patient had airway compromise or required airway assistance. The mild sedation was actually desirable during the period of surgery under regional anesthesia.

Hemodynamic parameters:

In our study the basal heart rate, systolic, diastolic and mean arterial pressures were comparable. No patient in either groups developed significant bradycardia or hypotension that required treatment and both the groups were comparable in Hemodynamic parameters throughout the surgery and in the postoperative period.

Side effects:

In the present study side effects like nausea, vomiting and dry mouth were negligible and were comparable in both the groups. We did not observe any complications like hemothorax, pneumothorax, convulsions, local anesthetic toxicity or post block neuropathy in any of our groupsThe major limitation of our study was that we did not 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.

V. Summary And Conclusion

- Onset of sensory block is reduced in group I (dexamethsone group) than control group but are comparable in both the groups which was shown statistically insignificant.
- Onset of motor block was comparable in both the groups, which was shown statistically insignificant.
- The duration of analgesia in dexamethasone group was significantly prolonged as compared with control group and difference was statistically significant.
- The duration of motor block in dexamethasone group was significantly prolonged as compared with control group and difference was statistically significant.
- The sedation scores, haemodynamic parameters, side effects and complications were comparable in both the groups with out any significant difference

Refernces:

[1]. YakshTL, llfeld BM, wiese AJ.perineural local aneasthatic andadjuvant action: the meaning of an ex vivo data set for efficacy and safety. Reg anesth pain med 2012;37:366-8 10.

[2]. Moore DC. regional block 4th ed. Springfield:IL:Charles C , Thomas: 1965

[3]. UrmeyWF.Upperextremitblocks. in: brownDLeditor. Regional aneasthesia and analgesia. Philadelphia:W.B.saunders,1996:254-278.

[4]. Dr R. G. Pathak Dr Anand P. Satkar, Dr Rajendra N. Khade[66]-Supraclavicular brachial plexus block with and without Dexamethasone ;a comparative Study.; International Journal of Scientific and Research Publications, Volume 2, Issue 12,December 2012.

[5]. Movafegh A. Razazian M. Hajimaohamadi F. Meysamie A. Dexamethasone added to lidocaine prolongs axillary brachial plexus blockade. Anesthesia & Analgesia 2006. 102(1):263-7.

[6]. Dr Mijanur rahaman shaik,Dr saikat mujumdar,dr anjan dasetal[64] a Prospective, randomized, double blinded study. Role of Dexamethasone In Supraclavicular Brachial Plexus Block IOSR Journal of Dental and Medical Sciences.Volume -12, Issue1(Nov-Dec. 2013)

[7]. Dr. Feroz Ahmad Dar Dr. Neelofar Jan[63] Randomized double blinded study Effect of Addition of Dexamethasone to Ropivacaine in Supraclavicular brachial plexus block IOSR Journal of Dental and Medical Sciences Volume 10, Issue 4(Sep-oct,2013.)

[8]. Kalpana K,, Natesh S. Rao, Sadanand Gopal,**[59]** EFFECT OF ADDITION OF DEXAMETHASONE TO ROPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK: A PROSPECTIVE RANDOMISED, DOUBLE-BLIND STUDY. Journal of evidence based medicine and healthcare aug 2015 vol-2;issue 33.

[9]. K. C. Cummings III, D. E. Napierkowski, I. Parra-Sanch et al[65]-Effect of dexamethasone on the duration of interscalene nerve blocks with ropivacaine or bupivacaine,a randomized double blinde study.British Journal of Anaesthesia107(3): 446–53 (2011)Advance Access publication 14 June 2011.

[10]. Shreshta BR,Maharjan SK,Shreshta S et al[71]—comparative stuy between tramadol and dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block,a prospective, randomized, double blind study.-J Nepal Assoc 2007,46(168).

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