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A STUDY TO COMPARE THE EFFICACY OF BUPIVACAINE ALONE AND BUPIVACAINE PLUS DEXAMETHASONE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

Anaesthesiology

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ABSTRACT

Peripheral nerve blocks can be used for anesthesia, postoperative analgesia, diagnosis and treatment of chronic pain disorders. Skilful application of peripheral nerveblockade broadens the anesthesia provider's range of options in providing optimal anesthetic care. These techniques can be used in all age groups, with appropriate selection and sedation.

Present prospective, randomized, double blinded study was conducted at Department of Anaesthesiology, SKMCH, Muzaffarpur, Bihar.

Total Sixty consecutive adult patients undergoing upper limb orthopaedic surgeries under supraclavicular block were studied. The patients were drafted in the study after obtaining written informed consent from them.

Patients divided in two groups : No statistically significant difference in the demographic parameters and duration of surgery between the two groups was noted.

We, therefore, conclude that addition of 8 mg dexamethasone to bupivacaine 0.25% solution in supraclavicular brachial plexus block.

1) Prolongs the duration of sensory and motor blockade.
2) Reduces the requirement of rescue analgesic in postoperative period.
3) Has no effect on the onset time of sensory and motor blockade

KEYWORDS

INTRODUCTION

Brachial plexus block is a popular and widely employedregional nerve block technique for perioperative anesthesiaand analgesia for surgery of the upper extremity. Regionalnerve block avoids the unwanted effect of the anaestheticdrugs used during general anesthesia and the stress oflaryngoscopy and tracheal intubation. Minimizing the stress response and using minimal anesthetic drugs is always beneficial for the patients with various cardiorespiratory complications.

"Regional anaesthesia" is the term first used by **Harvey Cushing** in 1901 to describe pain relief by nerve block. Regional nerve blocks are based on the concept that pain is conveyed by nerve fibers, which are amenable to interruption anywhere along their pathway.

Regional anesthesia traces its origin to Dr. Carl Koller who in 1884 employed a solution ofcocaine for topical corneal anesthesia in patients undergoing eye surgery. This marked the start of a new era in medicine namely the use of regional anesthetics for prevention of pain associated with surgery.

Local anesthetics alone for Supraclavicular brachial plexus block provide good operative conditions but have shorter duration of postoperative analgesia. So various adjuvant like Opioids, Clonidine, Neostigmine, Midazolam, etc. were added to local anesthetics in brachial plexus block to achieve quick, dense and prolonged block, but the results are either inconclusive or associated with side effects.

Steroids have powerful anti-inflammatory as well as analgesic property. They suppress inflammation through inhibition of Phospholipase A_2. Perineural injection of glucocorticoid along with local anesthetics is reported to influence the onset and duration of sensory and motor block.

Dexamethasone is a very potent and highly selective glucocorticoid. Various studies have been done using dexamethasone 8 mg as an adjuvant to local anaesthetics mixture in brachial plexus block resulting in variable effects on onset but prolonged duration of analgesia and motor block.

In this context the present study has been undertaken to evaluate the effect of Dexamethasone 8 mg, used as an adjuvant to 0.25% Bupivacaine in supraclavicular brachial plexus block, on the onset time and duration of sensory as well as motor block and post operative rescue analgesic requirement.

Aim Of Study

The aim of this study is to compare and evaluate supraclavicular brachial plexus block with bupivacaine plus dexamethasone and supraclavicular brachial plexus block with bupivacaine alone.

Objectives Of The Study

a) To study the onset time of sensory and motor blockade.
b) To study the duration of sensory and motor blockade.
c) To study the postoperative rescue analgesic requirement.

MATERIALAND METHODS

The prospective, randomized, double blinded study was conducted at Department of Anaesthesiology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from January 2019 to January 2020.

Total Sixty consecutive adult patients undergoing upper limb orthopaedic surgeries under supraclavicular block were studied. The patients were drafted in the study after obtaining written informed consent from them.

The patients posted for upper limb orthopaedic surgeries under supraclavicular block during study period are referred to as population group. A rough estimate of the strength of this group was made by forward regression of previous year data of annual upper limb orthopaedic surgeries under supraclavicular block.

Inclusion Criteria

- Adult patients of either sex, aged 18 – 60 yrs
- ASA physical status I and II
- Patients posted for elective orthopaedic surgeries of elbow, forearm and hand under supraclavicular brachial plexus block.
- Patient giving willful informed consent.

Exclusion Criteria

- Patients who have not given consent for the study
- Patients having age less than 18 and more than 60 yrs.
- ASA physical status III and more.

- Patients with history of peptic ulcer, T2DM, hepatic or renal failure.
- Patients with history of significant neurological, psychiatric, neuromuscular and cardiovascular diseases.
- Pregnancy.
- Patients receiving psycotropic drugs, chronic analgesic therapy.
- Known hypersensitive to any of the given drugs.

Methodology

Preoperative Assessment

On the day before surgery, patients were attended and examined properly for a preoperative counseling and repeat anesthetic check-up. Written informed consent was taken from all the willing participants after proper explanation of the study procedure and expected outcome in their own language.

Statistical Analysis

After completion of assessment, data were selected randomly and tabulated and then analysed with Statistical software package SPSS16 for windows, version 16.0.

OBSERVATIONS & ANALYSIS

A total of 80 patients were assessed initially for eligibility from January 2019 to January 2020 for inclusion into the study, out of which 60 patients received study drugs after randomization. Twenty patients were not included in this study on account of patient's refusal, change in the plan of surgery or anesthesia.

Six patients were considered dropouts after initial randomization and therefore not subjected to statistical analysis (unsuccessful brachial plexus block in 5 patients, data not retrieved completely in 1 patients). Therefore data of remaining 54 patients were assessed for final analysis.

Table – 1 : Mean Age

Group	N	Mean	S.D	P value	Inference
A	27	30.30	10.37	0.796	NS
B	27	31.04	10.56		

S : Significant ; NS : Not Significant

The patients who were accepted for the study were in age group 16-60 years. Both the groups were compared for significance in difference of age distribution.

Table – 2 : Mean Weight

Group	N	Mean	S.D	P value	Inference
A	27	61.19	5.12	0.719	NS
B	27	60.60	5.41		

S : Significant ; NS : Not Significant

Both the groups were compared for distribution of body weight. The apparent difference was not found to be significant in both groups.

Table – 3 : Mean Height

Group	N	Mean	S.D	P value	Inference
A	27	161.48	5.56	0.611	NS
B	27	160.70	5.59		

S : Significant ; NS : Not Significant

Both the groups were compared for distribution of body height. The apparent difference was not found to be significant in both groups.

Table –: 4 Gender

Gender	Group A		Group B	
	Number	Percent	Number	Percent
Male	17	63.00	16	59.00
Female	10	37.00	11	41.00
Total	27	100.00	27	100.00

Both the groups were compared for sex distribution. The apparent difference was not found to be significant in both groups.

Table 4 shows that there are no statistically significant difference between the groups in respect to patients' gender (Chi-square test p >0.05).

Table –: 5 ASA Graded

ASA Grade	Group A		Group B	
	Number	Percent	Number	Percent
I	20	74	18	67
II	7	26	9	63
Total	27	100.00	27	
P value : 0.551				

S : Significant ; NS : Not Significant

Both the groups were compared for ASA Grade. The apparent difference was not found to be significant in both groups.

Table 5 shows that there are no statistically significant difference between the groups in respect to patients' ASA physical status (Chi-square test p >0.05).

Table –: 6 Onset Time Of Sensory And Motor Block

Onset Time	Group A (Mean±SD)	Group B (Mean±SD)	P value
Onset time of sensory block (minute)	18.16±1.25	18.70±1.26	0.201
Onset time of motor block (minute)	19.96±1.28	20.26±1.28	0.402

Test done: Independent samples t-test.

Table 6 shows that there is no statistically significant difference between the groups in respect to onset time of sensory block (p value = 0.201). It also shows that there is no statistically significant difference between the groups in respect to onset time of motor block (p value = 0.402). So the onset times of sensory and motor block were similar in the two groups.

Table –: 7 Duration Of Sensory And Motor Block

Duration of block	Group A (Mean±SD)	Group B (Mean±SD)	P value
Duration of sensory block (minute)	1091.11±107.42	605.37±58.60	0.000
Duration of motor block (minute)	846.67±102.09	544.07±55.40	0.000

Test done: Independent samples t-test.

Table 8 shows that the duration of sensory and motor blockade were significantly longer in the group A (dexamethasone group) than in the group B (control group). The difference in block durations between the two groups is statistically highly significant (p value < 0.001).

Table –: 8 Post-operative rescue analgesic requirement (Number of intramuscular diclofenac sodium injection) in first 24 hours

				P value
Group	1	2	3	
Group A	25	2	0	0.000
Group B	0	24	3	

Test done: Chi- square test.

Table 8 depicts the post-operative rescue analgesic requirement in both the groups. Patients in group A (dexamethasone group) required less number of diclofenac sodium injection than patients in group B (control group) in first 24 hours of post operative period, and the difference is statistically highly significant (p value < 0.001).

Pulse Rate At Different Time Intervals Between The Study Groups

Pulse	Mean±SD		P value	Significance
	Group A	Group B		
0 min	77.48±5.78	78.15±6.59	0.69	NS
5 min	77.67±6.03	77.70±6.06	0.985	NS
15 min	77.67±6.03	77.74±6.01	0.966	NS
30 min	77.78±5.89	78.07±6.08	0.665	NS
60 min	77.89±6.03	77.52±5.92	0.821	NS
2 hours	78.30±6.13	78.48±5.97	0.913	NS
6 hours	77.89±6.06	78.33±6.29	0.795	NS
12 hours	76.81±5.99	77.96±5.93	0.482	NS
24 hours	78.88±5.83	78.81±6.21	0.771	NS

There was no statistically significant difference between Group A & Group B in Heart rate at different time intervals.

Systolic Blood Pressure At Different Time Intervals Between The Treatment Groups

Systolic blood pressure	Mean±SD		P value	Significance
	Group A	Group B		
0 min	116.15±11.22	116.74±10.97	0.846	NS
5 min	117.04±10.35	116.52±10.56	0.848	NS
15 min	116.37±10.15	116.67±10.56	0.916	NS
30 min	116.22±10.34	116.74±10.83	0.815	NS
60 min	116.59±10.15	116.89±10.22	0.914	NS
2 hours	116.30±10.47	116.44±10.68	0.961	NS
6 hours	116.07±10.71	116.67±11.06	0.840	NS
12 hours	116.52±10.89	116.89±10.95	0.901	NS
24 hours	116.74±11.14	117.04±11.18	0.920	NS

There was no statistically significant difference between Group A & Group B in systolic blood pressure at different time intervals.

Diastolic Blood Pressure At Different Time Intervals Between The Treatment Groups

Diastolic blood pressure	Mean±SD		P value	Significance
	Group A	Group B		
0 min	76.30±6.99	76.56±7.16	0.893	NS
5 min	76.30±6.56	76.52±6.77	0.904	NS
15 min	76.19±6.49	76.48±6.57	0.871	NS
30 min	77.00±6.30	77.26±6.75	0.884	NS
60 min	76.48±6.47	76.48±6.63	0.870	NS
2 hours	76.56±6.62	76.78±6.69	0.904	NS
6 hours	76.44±6.92	76.52±6.93	0.966	NS
12 hours	75.70±6.07	75.96±6.23	0.877	NS
24 hours	76.22±6.24	76.33±6.36	0.949	NS

There was no statistically significant difference between Group A & Group B in diastolic blood pressure at different time intervals.

Oxygen Saturation At Different Time Intervals Between The Treatment Groups

SpO_2	Mean±SD		P value	Significance
	Group A	Group B		
0 min	98.67±0.48	98.67±0.48	1	NS
5 min	98.78±0.42	98.81±0.39	0.789	NS
15 min	98.37±0.49	98.37±0.492	1	NS
30 min	98.41±0.63	98.41±0.63	1	NS
60 min	98.44±0.50	98.48±0.50	0.773	NS
2 hours	98.44±0.50	98.48±0.50	0.773	NS
6 hours	98.74±0.44	98.74±0.44	1	NS
12 hours	98.70±0.46	98.70±0.46	1	NS
24 hours	98.65±0.49	98.67±0.49	1	NS

DISCUSSION

Regional nerve block can provide effective surgical anesthesia as well as postoperative analgesia. Moreover, regional nerve block avoids the unwanted effect of the anesthetic drugs used during general anesthesia and the stress oflaryngoscopy and tracheal intubation. Supraclavicular brachial plexus block is a popular and widely employed regional nerve block technique for perioperative anesthesia and analgesia for surgery of the upper extremity. Local anesthetics alone for supraclavicular brachial plexus block provide good operative conditions but have shorter duration of postoperative analgesia. So various drugs like opioids, clonidine, neostigmine, Midazolam, etc. were used as adjuvant with local anesthetics in brachial plexus block to achieve quick, dense and prolonged block, but the results are either inconclusive or associated with side effects.

Glucocorticoids have powerful anti-inflammatory as well as analgesic property. Perineural injection of corticosteroid along with local anesthetics is reported to influence the onset and duration of sensory and motor block.

CONCLUSION

Regional anesthesia has much to offer for the patients, surgeons and anesthesiologists because of its inherent simplicity, preservation ofconsciousness, avoidance of airway instrumentation, rapid recovery and significant postoperative analgesia.

The supraclavicular block is one of the several techniques used to accomplish anesthesia of the brachial plexus. The block is performed at the level of the brachial plexus trunks where the majority of sensory, motor and sympathetic innervations of the upper extremity is carried in just three nerve structures confined to a very small surface area. Consequently, typical features of this block include rapid onset, predictable and dense anesthesia.

Perineural injection of glucocorticoid along with local anesthetic is reported to influence the onset and duration of sensory and motor block.

We, therefore, conclude that addition of 8 mg dexamethasone to bupivacaine 0.25% solution in supraclavicular brachial plexus block
1) Prolongs the duration of sensory and motor blockade.
2) Reduces the requirement of rescue analgesic in postoperative period.
3) Has no effect on the onset time of sensory and motor blockade.

REFERENCES

1. Berde CB, Strichartz GR. Local Anesthetics. In: Miller RD, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Young WL, editors. Miller's Anesthesia. 7th ed. Philadelphia: Churchill Livingstone Elsevier; 2010. p. 913-36.
2. Cummings KC, Napierkowski DE, Parra-Sanchez I, Kurz A, Dalton JE, Brems JJ, et al. Effect of dexamethasone on the duration of interscalene nerve blocks with ropivacaine or bupivacaine. Br J Anaesth 2011; 107(3):446-53.
3. Elhakim M, Ali NM, Rashed I et al. Dexamethasone reduces post-operative vomiting and pain after pediatric tonsillectomy. Can.J.Anaesth 2003; 50; 392-97.
4. Hickey R, Garland TA, Ramamurthy S. Subclavian Perivascular Block: Influence of location of paresthesia. AnesthAnalg 1989;68:767-71.
5. Kotani N, Kushikata T, Hashimoto H, Kimura F, Muraoka M, Yodono M, et al. Intrathecal methylprednisolone for intractable postherpetic neuralgia. N Engl J Med. 2000; 343(21):1514-9.
6. Movafegh A, Razazian M, Hajimaohamadi F, Meysamie A. Dexamethasone added to lidocaine prolongs axillary brachial plexus blockade. AnesthAnalg 2006; 102:263–7.
7. Nadeem A, Varshney VK, Haleem S, Singh A. A Comparative Evaluation Of Dexamethasone As An Adjunct To Bupivacaine And Levobupivacaine For Supraclavicular Brachial Plexus Block Using Peripheral Nerve Stimulator. Ann. Int. Med. Den. Res. 2018; 4(1):AN01-AN06.
8. Naveen Kumar. "Comparative study between 0.25% Bupivacaine with 8 M.G Dexamethasone and 0.25% Bupivacaine with 50µg Dexmedetomidine as an adjuvant for interscalene brachial plexus Block: prospective clinical study". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 58, November 3; Page: 13111-13119.
9. Parrington SJ, Donnell DO, Chan VWS, Shreves DB, Subramanyam R, Qu M, et al. Dexamethasone added to mepivacaine prolongs the duration of analgesia after supraclavicular brachial plexus blockade. RegAnesth Pain Med 2010; 35:422-6.
10. Parveen S, Jan M, Taj A, Bhat AA. Effect of dexamethasone as an adjuvant with bupivacaine in ultrasound guided single shot supraclavicular brachial plexus block in upper extremity surgeries- a prospective randomized study. International Journal Respiratory Medical Sciences 2017;5:2139-43.
11. Solanki NM, Garg A, Kavad SD, RathodA.Comparative study of supraclavicular brachial plexus block with or without dexamethasone. Indian Anaesth Forum 2017;18:56-62ss.
12. Tandoc MN, Fan L, Kolesnikov S, Kruglov A, Nader ND. Adjuvant dexamethasone with bupivacaine prolongs the duration of interscalene block: a prospective randomized trial. J Anesth 2011; 25(5):704-709.
13. Vieira PA, Pulai I, Tsao GC, Manikantan P, Keller B, Connelly NR. Dexamethasone with bupivacaine increases duration of analgesia in ultrasound-guided interscalene brachial plexus blockade. Eur J Anaesthesiol 2010; 27(3):285-8.
14. Weinberg G: Lipid rescue resuscitation from local anaesthetic cardiotoxicity. Toxicological Reviews 2006; 25:139-45.