

SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH AND WITHOUT DEXAMETHASONE AS AN ADJUVANT TO LOCAL ANESTHETICS- AN OBSERVATIONAL STUDY.

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Abstract.

Aim:

Branchial plexus block accompanied by bupivacaine gives very efficacious anesthesia and analgesia. The addition of dexamethasone as an additive in bupivacaine prolonged the anesthetic and analgesic effect. This study aimed to contrast the outset and period of sensory and motor blockade and the period of the analgesic effect after adding dexamethasone to anesthesia and anesthesia without adding dexamethasone in the Supraclavicular brachial plexus block.

Materials and Methods:

This study included 100 patients and was conducted in Cuttack, Odisha. The age group of patients was between 20-60 years. Patients were divided into 2 categories:

Category 1 (cases): In this group, 16 ml of 2% lignocaine with adrenaline was administered and 16 ml of 0.5% bupivacaine with 10mg dexamethasone was administered.

Category 2 (control): In this group, 16 ml of 2% lignocaine with adrenaline was administered and 16 ml of 0.5% bupivacaine with saline was administered.

Results:

In category 1 the sensory blockage was outset in 7 minutes whereas in category 2 the outset of sensory blockage was 14 minutes. The motor blockage in Category 1 started in 4 minutes and in Category 2 it started in 19 minutes. There was no complication during the operative period and post-operatively.

Conclusion:

The addition of dexamethasone in 16 ml of 2% lignocaine with adrenaline and 16 ml of 0.5% bupivacaine with 10mg dexamethasone increases the outset of sensory and motor blockage. It significantly increases the period of sensory and motor blockage and duration of analgesia.

Recommendation:

The in-plane approach is strongly recommended for this block; the needle tip and shaft should be continuously visualized in real-time to avoid inadvertent pleural puncture.

Keywords: Supraclavicular brachial plexus, dexamethasone, adjuvant, anesthetics, Submitted: 2023-09-29, Accepted: 2023-09-30

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1. INTRODUCTION.

Branchial plexus block is an accepted and broadly used local anesthetic approach for anes-

thesia during the operative process and analgesia for surgery of the upper part of the body. There are so many other methods like infraclavicular, trans scalene, and interscalene but supraclavicular is the most effortless approach. They also increase the analgesic effect after the surgery and have very few side effects. This approach can be operated in all age ranges with proper selection and sedation [1]. Brachial nerve blocks are preferred as they are more secure than general anesthesia with definite benefits. During a medical procedure peripheral nerve block comes up with a great anesthetic effect. It lasts longer postoperatively without inappropriate extensive aftereffects [2]. It increases the analgesic effect postoperatively with very few side effects. Furthermore, it is very favorable to old age patients, as the laryngeal and pharyngeal reflexes are sound reduce the possibility of aspiration and circumvent complicated cannulisation [3].

Opioids like morphine, fentanyl, tramadol, etc. are also applied as an adjuvant. Steroids as an additive to local anesthetic drugs in brachial plexus nerve block are getting popular. Steroids increase the anesthetic effects by obstructing the channeling of receptive myelinated C fibers. Steroids disturb the normal functioning of the potassium channel. On the other hand, dexamethasone does not cause any respiratory dysfunction [4].

Brachial plexus blocks are the most used peripheral blocks because of their success and their extended period of analgesic effect. The desired result of the brachial plexus block depends on the certainty that these divisions are covered in a tubular sheath of fascia. By finding the single branch with the use of a nerve stimulator and administering an appropriate amount of anesthesia anticipation of the complete plexus can be done [5].

The supraclavicular method is a greatly relied-on method for brachial plexus block. Due to the crossing of the plexus from the first rib, the brachial plexus is organized in a tight position. Therefore, the insertion of three trunks in the block can be anticipated [4-6]. The adverse effect of the brachial block is the time needed for the outset of response and the period of analgesic ef-

fect. Rising the quantity of local anesthesia causes complications of extensive toxicity. As a stimulating catheter with a stimulating nerve block needle is used it needs additional time, cost, and skill. So, dexamethasone as an adjuvant is very effective in peripheral nerve block. Dexamethasone has very few after-effects and prevents the toxicity produced by bupivacaine [6]. Corticosteroids worked locally without systemic absorption [7]. This study aims to evaluate the effect of dexamethasone on the onset of sensory and motor nerve block in the Supraclavicular nerve block.

2. MATERIALS AND METHODS.

2.1. Study population.

This study comprises 100 patients and the study was conducted in Cuttack, Odisha.

2.2. Inclusion criteria.

Patients age ranges from 20-60 years, patients underwent upper limb surgeries.

2.3. Exclusion criteria.

Patients who did not give agreement for the block, had problems with coagulation of blood, were prescribed anticoagulants, respiratory discomfort, patients with an allergy to local anesthesia, and patients with a history of diabetes and renal failure were excluded from this study.

2.4. Data Collection and Analysis.

Detailed examination of patients was done which involved complete history, physical and systemic checkup. Laboratory investigation includes CBC, BT, CT, and random blood sugar. The patients had empty stomachs the whole night. The outset of sensory block starts with the duration of administration of local anesthesia to the onset of analgesic effect on every major brachial nerve. The outset of the sensory block can be checked using pinpricked with a 27-gauge needle. The Pinprick technique indicated three sensations that is normal sensation, reduced sensation, and total loss of sensation. After injecting the local anesthesia, the moment patients were not capable of

raising his or her fingers or hands that indicated the motor block started acting.

Patients without any complaints of pain and discomfort were considered suitable at the time of the anesthetic procedure. The anesthesia action stops when patients come with severe pain. Then other analgesics are given to reduce the pain. The patients should be kept under observation to check the period of motor block after the operation. To get back the motor activity tell the patients to lift the hand or make movement of the fingers. When the patients were able to lift the hand or make finger movements that indicates the termination of motor block.

2.5. *Statistical Analysis.*

Microsoft Excel sheet SPSS 22 version software was used for the statistical analysis. For complete detail frequencies and proportions were used. The chi-square assessment was implied as a test of significance.

3. RESULTS.

A total of 100 patients were included in this study. At the initial stage, several 193 patients were examined for eligibility, however, 93 patients were excluded from this study due to not being eligible.

In Table 1 patients were divided according to gender in which 35 (70%) patients were male and 15 (30%) were female in category 1 and in category 2, 30 (60%) patients were males, and 20 (40%) patients were females. The mean time of operation in Category 1 was 51 ± 9.8 minutes and in Category 2 it was 46.7 ± 15.6 minutes. Statistically, there were no changes in either of the categories.

As shown in Table 2, the average pulse rate of patients in Category 1 was 83 ± 7.42 , and in Category 2 was 85.1 ± 6.9 . Mean systolic blood pressure in category 1 patients was 127.1 ± 8.1 and in category 2 patients was 124.2 ± 8.7 , diastolic blood pressure in category 1 patients was 77.3 ± 5.51 whereas in category 2 patients was 75.35 ± 6.8 . SPO₂ of patients in category 1 was 99.2 ± 0.45 and in category 2 was 99.1 ± 0.35 .

In Table 3, it is evident that the outset of motor block was early in category 1 which is 3.95 ± 0.98 minutes. In category 2 the average onset was 13.8 ± 1 . The onset sensory block was also early in category 1 (7.5 ± 1.71 minutes) as compared to category 2 (13.8 ± 1.8 minutes).

4. DISCUSSION.

SuA supraclavicular nerve block is a broadly utilized nerve block technique during the time of surgery and analgesia. Branchial plexus block stops the inappropriate difficulty of general anesthesia. The supraclavicular block along with local anesthesia provides a good effect during the operating process but the analgesic effect after the surgery is very short [7]. The combination of bupivacaine and lidocaine provides good anesthetic during the surgical procedure, but it also has a shorter analgesic effect after the operation [4]. So many other opioids are applied as an additive to get the prolonged effect of the anesthesia like fentanyl, dexmedetomidine, clonidine, etc. [7]. But it has many adverse effects.

A supraclavicular nerve block is the most common block used for numbness and analgesia of the top part of the body. It helps in quick, heavy, and expected anesthesia of the upper extremity during surgery [5]. It works on all three trunks of the branchial plexus. Lidocaine is always used with adrenaline it helps in sooner action and bupivacaine increases the time of action. In this research, dexamethasone was employed to accelerate the time of anesthetic along with analgesic effect. The advantages of dexamethasone include easy accessibility, economic, anti-inflammatory, and analgesia [3].

As it was evident dexamethasone as an adjuvant causes sooner action of sensory and motor blockage. A study was carried out by Islam [8], in which they had a similar result as in this study. However, studies conducted by Sheikh [9] and Arish [10] did not find any remarkable variance in the action of sensory and motor blockage in the two categories. The collaborative reaction of dexamethasone with local anesthesia causes the sooner action of sensory and motor nerve block.

Table 1: Classification of cases according to gender.

Gender	Category 1	Category 2
Male	35	30
Female	15	20
Total	50 (100%)	50 (100%)

Table 2: Preoperative monitoring of heart rate, systolic blood pressure, diastolic blood pressure, and SPO₂.

Variables	Category 1	Category 2
Heart rate	83±7.42	85.1±6.9
Systolic blood pressure	127.1±8.1	124.2±8.7
Diastolic blood pressure	77.3±5.51	75.35±6.8
SPO ₂	99.2±0.45	99.1±0.35

Table 3: Contrast of cases with concerning outset of sensory and motor block.

Variables	Category 1	Category 2
Onset of motor block	3.95±0.98	19.1±2.1
Onset of sensory block	7.5±1.71	13.8±1.8

In addition to this research, it was evaluated that dexamethasone being an additive increases the time of sensory and motor blockage. Studies carried out by Biradar [11], and Dhumane [12] have similar results as compared to the present study. The block works on the nerve fibers instead of the systemic one which in turn increases its effect. The drawback of the increased effect of anesthesia is self-inflicting injury by the patients and the problem in evaluating any nerve injury during the surgery.

The patients were under observation during the operation and after the operation for up to 1 day. In this research heart rate, systolic blood pressure, and diastolic blood pressure were normal during the surgery and after the surgery. No difficulty was faced due to nerve blocks. Dexamethasone is a nonparticulate steroid and it is polyethylene glycol and benzyl alcohol free.

5. CONCLUSION.

This study evaluated the inclusion of dexamethasone as an additive to bupivacaine in brachial

plexus nerve block causes a decrease in the outset of sensory and motor blockage and increases the time of sensory and motor nerve block. It has a few adverse effects. Therefore, dexamethasone is a great additive in the supraclavicular brachial nerve block.

6. LIMITATIONS.

The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population.

7. RECOMMENDATION.

The in-plane approach is strongly recommended for this block; the needle tip and shaft should be continuously visualized in real-time to avoid inadvertent pleural puncture.

8. ACKNOWLEDGEMENT.

We are thankful to the patients; without them, the study could not have been done. We are

thankful to the supporting staff of our hospital who were involved in the patient care of the study group.

9. LIST OF ABBREVIATIONS.

CBC- complete blood count
BT- Bleeding test
CT- Computed tomography
SPSS- Statistical Package for Social Sciences
SPO2- Saturation of Peripheral Oxygen

10. SOURCE OF FUNDING.

The study was not funded.

11. CONFLICT OF INTEREST.

The authors report no conflicts of interest in this work.

12. PUBLISHER DETAILS.

Publisher: Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256775434261
Location: Wisdom Centre, P.O.BOX. 148, Uganda, East Africa.



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