

Original Article

Effectiveness of Dexamethasone as an Adjuvant to Bupivacaine in Supraclavicular Brachial Plexus Block

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Abstract: Supraclavicular Brachial Plexus block is a simple and effective technique of providing anesthesia for elbow, forearm and hand surgery. This study investigated the onset of sensory and motor blockade and duration of analgesia after addition of dexamethasone with bupivacaine in supraclavicular brachial plexus block. An observational, comparative study was performed at Bir Hospital and National Trauma Center, Kathmandu. Forty patients undergoing surgery of elbow, forearm and hand under Supraclavicular Brachial Plexus Block, with 0.25% bupivacaine with dexamethasone (n = 20) in group I versus 0.25% bupivacaine with normal saline (n = 20) in group II with equal volume of 30 ml in each group. Randomization was done with lottery system using sealed envelope. Onset of sensory and motor blockade and duration of analgesia was compared in both the groups. The rescue analgesia injection diclofenac 75 mg was given if Visual Analogue Score was five or more. Each patient was assessed postoperatively by a blinded investigator at regular intervals of 15 minutes in first hour, 30 minutes in next hour and then hourly till the time to first rescue analgesia. SPSS version 24.0 software was used. Continuous variables like onset of sensory and motor block and time to first rescue analgesia was assessed with student's t-test and Chi square test was applied to assess categorical variable like VAS score. The time to onset of sensory block in bupivacaine only group (505.50±72.52) seconds compared to bupivacaine with dexamethasone group (249.75±78.36) seconds. Time to onset of motor block in bupivacaine only group (792.00±89.94) seconds compared to bupivacaine with dexamethasone group (506.25±94.35) seconds. Time to first rescue analgesia in bupivacaine only group (537.00±162.25) minutes compared to bupivacaine with dexamethasone group (1371.00±282.95) minutes. Time to onset of sensory and motor block was significantly faster and duration of analgesia was significantly prolonged in bupivacaine with dexamethasone group compared to bupivacaine only group in patient undergoing surgery of arm, forearm, and hand surgery under supraclavicular brachial plexus block.

Keywords: dexamethasone, bupivacaine, supraclavicular brachial plexus block

1. INTRODUCTION

Regional anesthesia is a major component of modern anesthetic practice, regional nerve blocks avoid the unwanted effect of anesthetic drugs used during general anesthesia and the stress of laryngoscopy and tracheal intubation. Brachial plexus block is popular and widely employed regional nerve block technique for perioperative anesthesia and analgesia for surgery of upper extremity [1]. It decreases risk of aspiration due to intact laryngeal and pharyngeal reflexes, maintain hemodynamic stability and provide better postoperative analgesia without undue sedation facilitating early mobilization and discharge. The nerve of brachial plexus may be blocked anywhere along their course [2]. The approach for blocking brachial plexus nerve are interscalene, supraclavicular, infraclavicular and axillary approach. Among them Supraclavicular approach to Brachial plexus provides more consistent and effective regional anesthesia to the upper extremity other approaches [3]. Local anesthetics alone for Supraclavicular brachial plexus block provide good operative conditions but have shorter duration of motor and sensory blockade. So various adjunct like morphine, i tramadol, ii fentanyl, iii clonidine, iv dexmedetomidine, v midazolam vi 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 [4]. Any adjuncts to brachial plexus block should prolong the analgesic effect without incurring systemic side effects or prolonged motor block, and should also reduce the total dose of local anesthetic [5]. The administration of adjunct to local anesthetics in brachial plexus block must demonstrate prolonged analgesic efficacy over systemic administration, if they are to be useful in clinical practice [6]. Use of Dexamethasone as an adjuvant to local anesthetic drug in brachial plexus block is gaining popularity. Dexamethasone, a long acting glucocorticoid ($t_{1/2} > 36$ hours) has potent anti-inflammatory and analgesic effects. Recently, Dexamethasone has been studied as an adjuvant to local anesthetic in peripheral nerve block [7]. Dexamethasone works by binding in the cytoplasm and combining with glucocorticoid receptors; from here it moves into the nucleus. In the nucleus it binds to specific DNA sequences to regulate gene transcription involved in the function of inflammatory response mediators. This results in the induction and repression of genes related to inflammatory process [8]. Bupivacaine is an amide local anesthetic, which acts by inactivating voltage-dependent sodium channels [9]. It has been preferred to other local anesthetics for nerve blocks due to its longer duration of action, its potency and its lesser central nervous system toxicity. Upper limb surgery under supraclavicular brachial plexus block with local anesthetic agent alone is a challenge to the anesthesiologist around the world [10]. Dexamethasone is a drug easily available in our local context. At recommended doses, it has shown to increase the effectiveness of local anesthetics with least side effects. Also, on addition to local anesthetics, dexamethasone limits its toxic dose and thus decrease the incidence of local anesthetics toxicity [11]. At our center, Dexamethasone is being used as an adjuvant to Bupivacaine in brachial plexus block but adequate studies in the context of the country have not been found in the published journal. Considering the above facts, we designed the present study to evaluate the effectiveness of Dexamethasone as an adjuvant to 0.25% bupivacaine in supraclavicular brachial plexus block, on onset of sensory and motor block and duration of analgesia [12]. A randomized, double-blind research with dexamethasone adjuvant to 0.5% levobupivacaine in supraclavicular brachial plexus block. It included 60 elbow, forearm, and hand surgery patients under supraclavicular brachial plexus block. Randomly assigning 30 subjects to two groups. Group-1 received 30 ml levobupivacaine 0.5% + 2 ml normal saline, while Group-2 received 2 ml desxamethasone (8mg) + 30 ml levobupivacaine. The median and ulnar nerves were tested on the index and little fingers after injection [13]. Radial nerve testing used the thumb's dorsal surface. Visual analog scale measured pain. The mean time of sensory blockade beginning was 10.20 minutes in Group 1 and 8.1667 minutes in

Group 2, whereas motor blockade onset was 15.033 minutes and 13.76 minutes, respectively. The mean length of sensory blockade was 657.2 minutes and 923 minutes in Group 2, while motor blockade was 540 minutes and 798.83 minutes, respectively [14]. The 12-hour postoperative VAS was lower in group. They found that adding dexamethasone to 0.5% isobaric levobupivacaine in supraclavicular brachial plexus block accelerates and prolongs sensory and motor blockade [15]. A recent compared brachial plexus block with and without midazolam in 2013, it studied 100 individuals of either sex undergoing normal or emergency upper limb surgery. Group I (XB) received xylocaine with adrenaline and bupivacaine, while group II (XBM) received a mixture of the two together with midazolam. Pinpricking with a 22-gauge needle every 5 minutes up to 10 minutes examined sensory block quality, and sedation score was 0-sharp, 1-dull, and 2-one sensation [16]. A score of 2 indicated a successful sensory block. To test hand and arm function, patients touched their noses. On the visual analogue scale, 0 means no pain and 10 means greatest suffering. There was a significant difference in sensory block onset (12 ± 4.2 min vs. 6 ± 3.1 min in group II) and duration (3 ± 3.2 hr vs. 18 ± 2.2 hr). The onset time of motor block was substantially shorter in group I (11 ± 2.3 mins) and longer in group II (4 ± 3.1 mins vs. 14 ± 3.5 mins) ($p < 0.05$) [17]. The study included 30 pediatric patients aged 4-12 with ASA physical status I and II scheduled for forearm and hand surgery under general anesthesia. The trial had two groups of 15 patients: group BD received Dexamethasone (0.1mg/kg) adjuvant to Bupivacaine 0.125% and group B received Bupivacaine alone. The duration of analgesia in group BD was substantially longer (27.1 ± 13.4 hours) than in group B (13.9 ± 11.3 hours) ($P < 0.05$) [18]. Dexamethasone in low-volume supraclavicular brachial plexus block patients scheduled for elective upper limb surgery. The study included 60 patients. Group C received 20 ml of 0.5% Bupivacaine with 2 ml normal saline, while Group D received 2 ml Dexamethasone 8mg; 30 patients were in each group [19]. Observed sensory and motor blockage and analgesia duration. In group D, sensory block onset was substantially faster (10.36 ± 1.99 min) than in group C (12.9 ± 2.23 min). Group C and D had sensory block durations of 242.66 ± 26.38 min and 366 ± 28.11 min, respectively. The onset of motor block was faster in group D (12 ± 1.64 min) compared to group C (18.03 ± 2.41 min). The motor block duration was substantially longer in group D (333.37 ± 28.75 min) compared to group C (213 ± 26.80 min) ($p < 0.05$). Group C had a higher post-operative VAS score ($p < 0.05$) after 210 min compared to group D. They concluded that adding dexamethasone to supraclavicular brachial plexus block produces early onset and persistent analgesia with less local anesthetic [20]. A randomized, comparative research compared supraclavicular brachial plexus block with and without local anesthetic. Under supraclavicular brachial plexus block, 60 patients of either sex, 18–70 years old, ASA grade I and II underwent elective or emergency upper limb procedures. Patients were randomly assigned to groups A (40 ml lignocaine 2% with adrenaline (1:200000) + 0.5% bupivacaine) and B (40 ml lignocaine 2% with adrenaline (1:200000) + 0.5% bupivacaine with dexamethasone 8mg). Comparing the onset and duration of sensory and motor block, analgesia, and procedural problems in two groups. Group A had a sensory block onset of 18.45 ± 3.51 minutes, while group B had 13.8 ± 2.78 minutes ($P = 0.01$). Group A experienced motor block onset at 19.65 ± 5.64 minutes, while group B experienced it at 11.55 ± 5.16 minutes ($P < 0.05$). Group A had a sensory block lasting 6.75 ± 0.96 hours, while group B had 8.2 ± 1.76 hours ($P = 0.003$). Motor block lasted 6.75 ± 0.91 hours in group B and 6.1 ± 0.96 hours in group A ($P > 0.05$). A study found that adding neostigmine or dexamethasone to local anesthetic provided brachial plexus block perioperative analgesia. Three groups of 90 patients aged 18-60 received 24ml of study medications. Groups A, B, and C received lignocaine with adrenaline (1.5%), 500mcg Neostigmine, and 4mg Dexamethasone for supraclavicular brachial plexus block. The parameters studied were onset of analgesia, completeness of sensory and motor blocking, duration, surgeon's score, side effects, number of supplemental analgesics dose, and 12-

hour post-operative VAS score for pain. Each group received 24 ml of study medication, after pre-anesthetic examination, all patients received nerve stimulator-activated supra-clavicular brachial plexus block (BPB) [21]. By blocking cytokine pathways, dexamethasone is potently anti-inflammatory and immunosuppressive. Dexamethasone binds to glucocorticoid receptors in the cytoplasm and enters the nucleus. It regulates inflammatory response mediator gene transcription in the nucleus by binding to certain DNA regions [22]. This induces and represses inflammatory genes. Dexamethasone is a potent glucocorticoid receptor ligand. With thirty times the potency of cortisol and six times that of hydrocortisone, it is a powerful anti-inflammatory medication. By blocking potassium channels on unmyelinated c-fibers, dexamethasone in peripheral nerve lowers stimuli transmission and nociceptive information. Dexamethasone produces tissue vasoconstriction, which slows local anesthetic uptake and absorption, prolonging patient comfort. Dexamethasone inhibits the release of anti-inflammatory mediators including interleukins and cytokines and increases their release, reducing postoperative pain [23].

2. MATERIALS AND METHODS

The study has followed the observational, comparative study design. Data has been collected from department of anesthesiology and intensive care, National Academy of Medical Sciences, National Trauma Center and Bir Hospital, Kathmandu. The mean onset time of sensory block was significantly faster in group D (receiving 0.25% Bupivacaine with Dexamethasone) (10.36 ± 1.99 min) when compared to group C (receiving bupivacaine 0.25% with normal saline) (12.9 ± 2.23 min). Therefore, a pooled Standard Deviation of 2.11 was calculated ($SD = 4.45$). The difference of mean between two groups were ($d_1 = 10.36$ min, $d_2 = 12.9$ min $D = d_2 - d_1$ ($12.9 - 10.36 = 2.54$)) [$D_2 = 6.45$].

$$z\alpha = 1.96 \text{ (95\% confidence interval) and } Z\beta = 1.64 \text{ (power 95\%).}$$

So,

$$\text{Sample Size (n)} = 2 \times (Z\alpha + Z\beta)^2 \times SD^2 \div D^2$$

$$\text{i.e. } 2 \times (1.96 + 1.64)^2 \times 2.11^2 \div 2.54^2$$

$$\text{i.e. } 17.88 \text{ (approximately 18)}$$

I.e. total of 40 sample size is calculated. (Taking 10% drop out)

n = the number of patients in each group,

$Z\alpha$ = constant at given alpha error

$Z\beta$ = constant at given beta error

SD = standard deviation,

D = difference of mean between two group

In the preoperative visit on the evening before surgery, VAS scoring system consisting of 10 cm line with 0 = no pain and 10 = worst possible pain was explained. Patients was kept nil per Oral for at least 6 hours prior to surgery. The patients were randomly allocated to two groups using an identical opaque sealed envelope. An Anesthesia assistant distributed sealed envelope to the patients and loaded the drugs for the brachial plexus block. Group I (n = 20) received Injection Bupivacaine (0.25%) 28 ml and 2ml Dexamethasone (8mg) and Group II (n = 20) received Injection Bupivacaine (0.25%) 28 ml and 2ml Normal

saline. Heart Rate (HR), Systolic and Diastolic Blood Pressures, respiratory rate and Oxygen Saturation (Spo₂) was recorded just before the block and at 5 minutes intervals thereafter. An intravenous drip was started before undertaking the procedure with 18G cannula which was continued throughout the duration of surgery for maintenance fluid. Oxygen was administered through oxygen mask. Patient was kept in supine position with head turned to the opposite side of the block and ipsilateral forearm adducted. Injection site was prepared by aseptic technique with Povidine iodine solution. Block was performed with the help of 22 G 2'' insulated blunt beveled nerve stimulating needle with peripheral nerve stimulator (Stimuplex[®]; B Braun) and portable ultrasonography machine (SAMGSUNG). Portable ultrasound machine with linear superficial probe (4.2cm) with frequency of 5-10 MHz was used. The USG probe was covered with sterile plastic sheath and sterile ultrasound gel will be used for better visualization of image and minimization of interference. The USG probe was kept at supraclavicular fossa parallel to clavicle in oblique coronal plane. At first subclavian artery, first rib and pleura will be identified and then hypo echoic nerves of brachial plexus was identified lying just lateral to the pulsating subclavian artery. After identifying brachial plexus, a skin wheal was created with lidocaine 1% 2ml and stimulating needle was advanced by in-plane approach with respect to the probe. In real time vision and with the help of peripheral nerve stimulator, motor response to the electrical stimulus was observed in corresponding area of the hand. The setting of nerve stimulator was kept at frequency of 1Hz with current strength of 2mA. After obtaining motor response the strength of the current was gradually decreased and if the motor response persisted even at 0.3-0.5 mA, local anesthetic was injected under ultrasound vision. Total volume of 30 ml of 0.25% plain Bupivacaine with normal saline or Dexamethasone was injected increasingly with aspiration after each 5 ml of injection. The pretesting was done among 5 patients, scheduled for elective surgeries of elbow, forearm and hand and meeting the inclusion criteria and not having any of the exclusion criteria. It was conducted in National Trauma Center and Bir Hospital, Kathmandu, Nepal, according to the Performa. Data collection was conducted by filling the Performa containing the demographic details of the patient, vitals and side effects of the drug. Also, time taken to onset of sensory and motor block and time to first rescue analgesia and Visual Analogue Score for pain at 15 minutes in first hour, every 30 minutes in second hour and hourly thereafter in postoperative period was mentioned in Performa. Data entry and statistical analysis was performed using SPSS version 24 for windows. Data analysis was done using suitable tests. Continuous variables like age, weight, heart rate, blood pressure, mean arterial pressure, onset of sensory and motor block and duration of analgesia were compared between two groups by independent t-Student's test. Categorical variables like Visual Analogue Scale score, ASA physical status and gender between the two groups were analyzed by Chi-square test.

3. RESULTS AND DISCUSSION

A total of 40 patients meeting the inclusion criteria were enrolled in the study. Each group included equal number of patients (n=20). Result of randomization was revealed after the completion of the study and it revealed that the Group-I patients had received 0.25% bupivacaine 28 ml with normal saline 2ml; Group-II patients had received bupivacaine 28ml with dexamethasone 2 ml.

3.1 Demographic data of the patients

The age distributions of the patients included in this study were comparable in two groups. As shown in the figure, the mean age of patients in bupivacaine with Dexamethasone group (group I) was 32.70 ± 14.69 years; in Bupivacaine with normal Saline group (group II) it was 31.75 ± 12.65 years. There was no

statistically significant difference in mean age among the two groups as the p-value was 0.82 as shown in table 01. The sex distributions of the patients included in this study were comparable in two groups. The number of male and female in both the groups were same. Number of male and female in group I (Bupivacaine with Dexamethasone) and group II (Bupivacaine with Normal Saline) were 13 and 7 respectively. The sex distribution was statistically insignificant in both the group ($P = 1.000$). The mean weight of patients among the two groups was comparable. The mean weight of patients in bupivacaine with Dexamethasone group (Group I) was 61.95 ± 6.62 kg; in Bupivacaine with normal saline group (Group II) was 62.90 ± 7.73 kg. There was no statistically significant difference in mean weight among the two groups as the p-value was 0.67. The ASA distribution in both the groups were comparable and statistically insignificant ($P = 0.66$). Number of ASA I patient in Bupivacaine with Dexamethasone group (Group I) were 16 and Bupivacaine with normal saline group (Group II) were 18. Number of ASA II patients in group I were 4 and group II were 2.

Table 01: Demographic data of the patients

	Group	Mean	SD	P value
Age	Group I	32.70	14.69	0.82
	Group II	31.75	12.65	
Weight	Group I	61.95	6.62	0.67
	Group II	62.90	7.73	

	Group	Male	Female	P value
Sex	Group I	13	7	1.000
	Group II	13	7	

	Group	ASA I	ASA II	P value
ASA	Group I	16	4	0.66
	Group II	18	2	

3.2 Time to onset of sensory block

The mean onset of sensory block was faster in dexamethasone with bupivacaine group (group I) than in bupivacaine with normal saline group (group II). The mean time in group I was (279.75 ± 78.36) seconds and in group II was (505.50 ± 78.52) seconds which was statistically significant ($P < 0.001$).

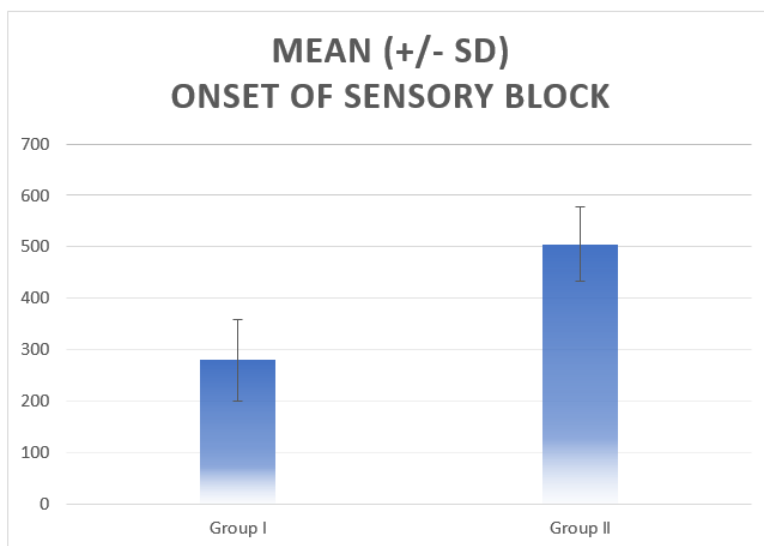


Figure 01: onset of sensory block

Table 02: Time to onset of sensory block

	Group	Mean	SD	P value
Time to onset of sensory block (seconds)	Group I	279.75	78.36	0.0001
	Group II	505.50	72.52	

3.3 Time to onset of motor block

The mean onset of motor block was faster in dexamethasone with bupivacaine group (group I) than in bupivacaine with normal saline group (group II). The mean time in group I was (506.65±94.35) seconds and in group II was (792.00±84.95) seconds which was statistically significant (P<0.001).

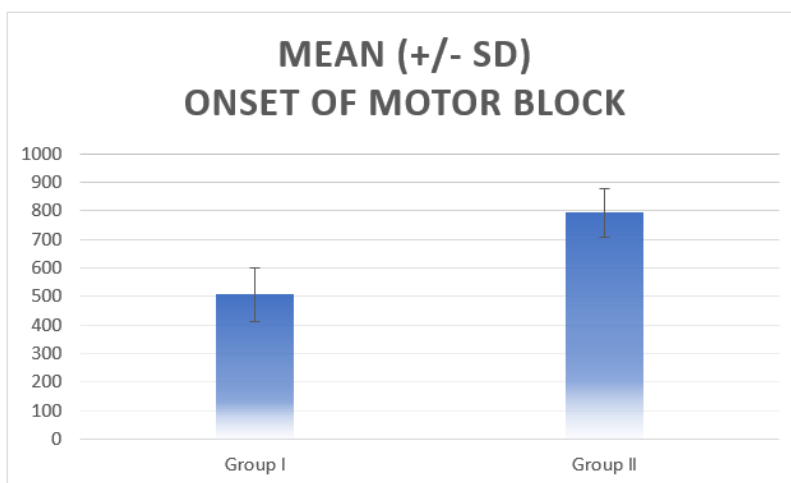


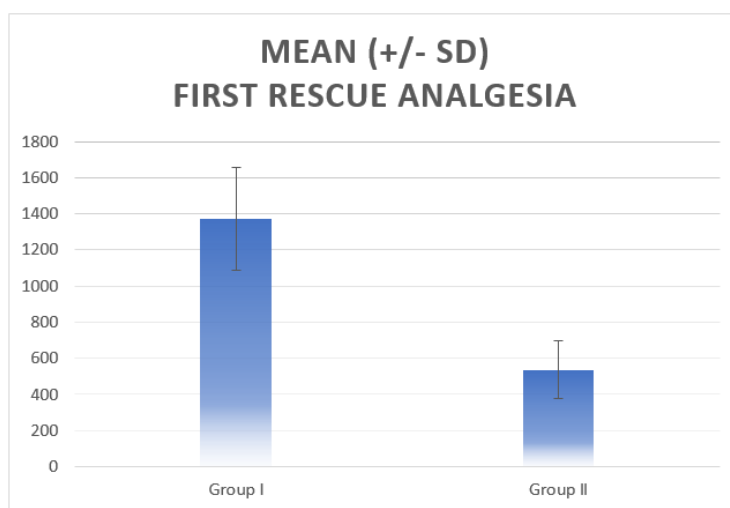
Figure 02: onset of motor block

Table 03: Time to onset of motor block

	Group	Mean	SD	P value
Time to onset of motor block (seconds)	Group I	506.25	94.35	0.0001
	Group II	792	89.94	

3.4 Time to first rescue analgesia

The mean time to first rescue analgesia among the two groups were highly variable. The mean time to first rescue analgesia in bupivacaine with dexamethasone group (Group I) was 1371.75 ± 282.95 minutes and in bupivacaine with normal saline group (Group II) was 537 ± 162.25 minutes which was significant statistically ($p < 0.001$).

**Figure 03:** Duration of first rescue analgesia distribution in two groups**Table 04:** Time to first rescue analgesia

	Group	Mean	SD	P value
Duration of first rescue analgesic (minutes)	Group I	1371.75	282.95	0.0001
	Group II	537	162.25	

3.5 DISCUSSION

Upper limb surgery with supraclavicular brachial plexus block is simple and safe, most surgical procedures still utilize general anesthesia, although regional anesthesia is becoming more prevalent. Using regional anesthesia for analgesia during and after surgery avoids the difficulties of general anesthesia. The brachial plexus block blocks upper extremity autonomic, sensory, and motor fibers by injecting local analgesics into the fascial areas around the nerve plexus. It is easy, safe, and effective, outperforming general and

intravenous anesthetic [24]. When the patient has poor general health or related problems such as uncontrolled diabetes, cardiovascular, or respiratory disease, a regional method should be explored. It is also useful when the patient wants to stay awake throughout surgery and stay ambulatory [25]. The supraclavicular brachial plexus block is a common regional nerve block for upper extremity surgery. The most consistent brachial plexus block technique, supraclavicular, delivers quick, dense, and predictable upper extremity anesthesia. Anesthesiologists prioritize pain relief. Each postoperative pain management treatment must meet three criteria. It should work, be safe, and be feasible. Single-injection local anesthetics give little analgesia. The use of additives in local anesthetics and continuous infusion via indwelling catheters have been tried to extend the analgesic period beyond the operation room [26]. Our study used dexamethasone as a local anesthetic adjuvant. Our research was comparative and observational. Forty elbow, forearm, and hand surgery patients received supraclavicular brachial plexus block. Sealing envelopes randomly assigned patients to two groups. Cases or study group I received 30ml of 0.25% bupivacaine and 2ml of Dexamethasone. Group II (control) got 0.25% bupivacaine and 2ml normal saline for 30ml [27]. After meeting eligibility criteria, all study participants received good anesthesia. None of the research participants had general anesthetic surgery. Our study aimed to examine the onset of sensory and motor block and the duration of analgesia with dexamethasone and bupivacaine in supraclavicular brachial plexus block. Bupivacaine with Dexamethasone group (group I) had a mean age of 32.70 ± 14.69 years, while Bupivacaine with normal Saline group (group II) had a mean age of 31.75 ± 12.65 years [28]. Using unpaired 't' test, the two groups did not vary statistically ($P=0.82$). Two groups of patients had similar sex distributions. Both groups had the same number of men and women. The male and female numbers in groups I (Bupivacaine with Dexamethasone) and II (Normal Saline) were 13 and 7. Both groups had insignificant sex distributions ($P = 1.000$) [29]. In the dexamethasone group, the beginning of action was significantly faster (14.5 ± 2.10 minutes) compared to the normal saline group (18.15 ± 4.25 minutes), $p < 0.05$ [30]. The duration of analgesia was longer in the Dexamethasone group (12.75 ± 5.33 hours) compared to the normal saline group (3.16 ± 0.48 hours), $p =$ Group I experienced faster onset of sensory block (4.66 ± 1.3 minutes) than Group II (8.425 ± 1.2 minutes) in this investigation. The duration of analgesia in Group I was longer (22.86 ± 4.71) than in Group II (8.95 ± 2.7 hours). A study used ultrasonography and PNS, therefore 30 ml of bupivacaine plus dexamethasone may extend analgesia, it found that ultrasound-guided Bupivacaine 0.5% with Dexamethasone 8 mg in group D and Bupivacaine 0.5% with normal saline in group C resulted in a significant decrease in sensory block onset (10.36 ± 1.99 min) and prolonged analgesia duration (242.66 ± 26.38 min vs. 366 ± 28.11 min) [31]. In our study, sensory block onset occurred at 4.66 ± 1.3 minutes, while in their study it was 10.36 ± 1.99 minutes after administering dexamethasone. In group I, analgesia lasted 1371.75 ± 282.95 minutes, while in group D, it lasted 366 ± 28.11 hours, which was longer in our study group. This may be because this trial utilized 20 ml of medicines instead of 30 ml. PNS with ultrasound may help reduce sensory block and extend analgesia. This trial group also had less local anesthetic (0.25% vs. 0.5%) [32]. A study examined the use of dexamethasone as an adjuvant to bupivacaine 0.125% for post-operative analgesia in pediatric upper limb surgery under general anesthesia. Compared to group I, their study had a considerably longer duration of analgesia (27.13 ± 13.42 hours vs. 22.86 ± 4.71 hours). Their investigation employed low local anesthetic. This may be owing to the GA procedure and intraoperative opioid research [33]. A study divided 60 patients undergoing orthopedic surgeries around the elbow and forearm under supraclavicular brachial plexus block into two groups: group A received 35 ml of mixture of lignocaine 2%, bupivacaine 0.5%, and adrenaline 1:200000, while group B received identical local anesthetics with dexamethasone (8mg). The onset time of sensory

block was similar to our study group (196.33 ± 26.45 seconds vs. 279.75 ± 78.36 seconds). Our investigation found a somewhat higher mean onset of motor block (225.66 ± 26.86 seconds vs. 506.65 ± 94.35 seconds). Dexamethasone significantly extended analgesia, similar to our trial (18 hours vs. 21 hours) [34]. Despite adding lignocaine and using a higher concentration of bupivacaine, our study group had similar sensory block and analgesic duration. The paresthesia-only block may explain the comparable results after adding lignocaine and greater bupivacaine concentrations. Parveen et al. used 0.5% Bupivacaine with Dexamethasone (30ml) in group I and normal saline (30ml) in group II for supraclavicular brachial plexus block. Assessed were analgesia onset and duration [35].

4. CONCLUSIONS

Regional anesthesia is a major component of modern anesthetic practice, regional nerve blocks avoid the unwanted effect of anesthetic drugs used during general anesthesia and the stress of laryngoscopy and tracheal intubation. Brachial plexus block is popular and widely employed regional nerve block technique for perioperative anesthesia and analgesia for surgery of upper extremity. It decreases risk of aspiration due to intact laryngeal and pharyngeal reflexes, maintain hemodynamic stability and provide better postoperative analgesia without undue sedation facilitating early mobilization and discharge. The nerve of brachial plexus may be blocked anywhere along their course. It has concluded that the addition of dexamethasone 8 mg to 0.25 % bupivacaine in supraclavicular brachial plexus block fastens the onset of action of sensory and motor block and prolongs the duration of analgesia significantly compared to use of bupivacaine alone. Further studies are required to elucidate the mechanism of action, determine the optimal dose, and examine the safety profile of dexamethasone before its routine use as a perineural adjuvant can be advocated. The use of Dexamethasone as an adjuvant to 0.25 % Bupivacaine is recommended in patients scheduled for upper limb surgeries around arm, forearm and hand under supraclavicular brachial plexus block for early onset of block and prolonged duration of analgesia. Further studies investigating optimal dose of dexamethasone to be used in brachial plexus block in upper limb surgeries is recommended. Combination of dexamethasone with other local anesthetics and comparisons with other commonly used adjuvants to compare efficacy of dexamethasone in prolonging post-operative analgesia is recommended.

REFERENCES

- [1] Ribeiro, K. S., Ollapally, A., & Misquith, J. (2016). Dexamethasone as an adjuvant to bupivacaine in supraclavicular brachial plexus block in paediatrics for post-operative analgesia. *Journal of Clinical and Diagnostic Research: JCDR*, 10(12), UC01.
- [2] Nigam, R., Murthy, M., Kosam, D., & Kujur, A. R. (2015). Efficacy of dexamethasone as an adjuvant to bupivacaine in supraclavicular brachial plexus block. *Journal of Evolution of Medical and Dental Sciences*, 4(64), 11157-11164.
- [3] Liu, J., Richman, K. A., Grodofsky, S. R., Bhatt, S., Huffman, G. R., Kelly IV, J. D., ... & Elkassabany, N. (2015). Is there a dose response of dexamethasone as adjuvant for supraclavicular brachial plexus nerve block? A prospective randomized double-blinded clinical study. *Journal of clinical anesthesia*, 27(3), 237-242.
- [4] Adinarayanan, S., Chandran, R., Swaminathan, S., Srinivasan, G., & Bidkar, P. U. (2019). Comparison of dexamethasone and dexmedetomidine as adjuvants to bupivacaine in

- supraclavicular brachial plexus block: a prospective randomized study. *Indian J Clin Anaesth*, 6(4), 523-7.
- [5] Warda Anam, Khadija Anum & Muhammad Anas (2023). Literature Review on Effectiveness of Mirror Therapy and Conventional Therapy in Patients with Stroke. *Dinkum Journal of Medical Innovations*, 2(07):240-248.
- [6] Islam, S. M., Hossain, M. H. M. D., & Maruf, A. A. (2011). Effect of addition of dexamethasone to local anaesthetics in supraclavicular brachial plexus block. *JAFMC Bangladesh*, 7(1), 11-14.
- [7] Engineer, S. R., Patel, R., Bishnoi, A., & Umrigar, C. M. (2017). Dexamethasone as an adjuvant to bupivacaine in brachial plexus block in upper limb surgery. *Int J Sci Rep*, 3(10), 265-70.
- [8] Bindal, D., Narang, N., Mahindra, R., Gupta, H., Kubre, J., & Saxena, A. (2018). Effect of dexamethasone on characteristics of supraclavicular nerve block with bupivacaine and ropivacaine: a prospective, double-blind, randomized control trial. *Anesthesia Essays and Researches*, 12(1), 234-239.
- [9] Hamada, M. H., Ibrahim, W. M. E., & Ashiry, M. A. (2019). Comparative study between Dexmedetomidine and Dexamethasone as an adjuvant to Bupivacaine in ultrasound guided supraclavicular brachial plexus block in upper limb surgeries. *The Egyptian Journal of Hospital Medicine*, 75(6), 3060-3069.
- [10] Sarah Rehman, Saira Rana & Mehru-Nisa (2023). Knowledge, Influence of Factors, and Management Strategies among Family Members with Behavioral Conditions. *Dinkum Journal of Medical Innovations*, 2(03):79-84.
- [11] Kore, S. S., Ubhe, S. B., & Fasil, F. (2022). Comparison between dexamethasone and fentanyl as an adjuvant to bupivacaine and lignocaine in supraclavicular brachial plexus block for upper limb surgery. *Journal of Pharmacology and Pharmacotherapeutics*, 13(1), 59-65.
- [12] Dhumane, P., & Shakir, N. (2016). Supraclavicular Brachial Plexus Block with and without Dexamethasone as an Adjuvant to local anaesthetics: a Comparative Study. *International Journal of Biomedical and Advance Research*, 7(9), 456-459.
- [13] Sharma, A., & Kumar, R. (2019). Assessment of efficacy of Dexamethasone as an adjuvant to Bupivacaine for spinal anesthesia. *Journal of Advanced Medical and Dental Sciences Research*, 7(8), 218-222.
- [14] Rubab Rasheed & Manisha Nagpal (2023). Psychosocial issues in Parents and Patients with Thalassaemia. *Dinkum Journal of Medical Innovations*, 2(05):188-193.
- [15] Hoq, N., & Al Maruf, A. (2018). Dexamethasone added to bupivacaine prolongs the duration of analgesia for supraclavicular brachial plexus block. *Bangladesh Journal of Medical Science*, 17(2), 296.
- [16] Pani, N., Routray, S. S., Mishra, D., Pradhan, B. K., Mohapatra, B. P., & Swain, D. (2017). A clinical comparison between 0.5% levobupivacaine and 0.5% levobupivacaine with dexamethasone 8 mg combination in brachial plexus block by the supraclavicular approach. *Indian journal of anaesthesia*, 61(4), 302-307.
- [17] Thomas, S. M., Anjali, A., Desai, J. B., & Thakkar, S. (2021). A Comparative Study Between Magnesium Sulphate Versus Dexamethasone as an Adjuvant to Bupivacaine in Supraclavicular Brachial Plexus Block. *Indian Journal of Forensic Medicine & Toxicology*, 15(3).

- [18]Arjun, B. K., Chetan, L., Nagaraj, A. S., Nagesh, A., & Babu, M. N. (2019). Comparison of Dexamethasone 4 mg and 8 mg as an Adjuvant to 0.5% Bupivacaine in Supraclavicular Brachial Plexus Block for Upper Limb Surgeries--A Randomised Clinical Study. *Journal of Evolution of Medical and Dental Sciences*, 8(41), 3084-3089.
- [19]John Petter (2023). Anti-Depressant Consumption, Patterns, Prevalence, and Risk Considerations among Women in the Fertile Age Range. *Dinkum Journal of Medical Innovations*, 2(03):85-90.
- [20]Rai, S., & Kedareshvara, K. S. (2018). To compare efficacy of bupivacaine and bupivacaine with dexamethasone for supraclavicular brachial plexus block in patients undergoing upper-limb surgeries: A one-year randomized controlled trial. *Indian Journal of Health Sciences and Biomedical Research* kleu, 11(1), 65-69.
- [21]Youssef, M. Y., Elsayed, S. F., Abd El-Mottalb, E. A., & Tarabai, G. A. (2020). Efficacy of adding ketamine, dexamethasone, and epinephrine with bupivacaine in ultrasound-guided supraclavicular brachial plexus block. *Research and Opinion in Anesthesia & Intensive Care*, 7(2), 188-196.
- [22]Ali, B. H., Hussain, M. F., & Isa, R. J. (2020). Comparative Study Between Dexmedetomidine and Dexamethasone as Adjuvants to Bupivacaine in Supraclavicular Brachial Plexus Block. *Systematic Reviews in Pharmacy*, 11(11).
- [23]Abdallah, F. W., Johnson, J., Chan, V., Murgatroyd, H., Ghafari, M., Ami, N., ... & Brull, R. (2015). Intravenous dexamethasone and perineural dexamethasone similarly prolong the duration of analgesia after supraclavicular brachial plexus block: a randomized, triple-arm, double-blind, placebo-controlled trial. *Regional Anesthesia & Pain Medicine*, 40(2), 125-132.
- [24]Knezevic, N. N., Anantamongkol, U., & Candido, K. D. (2015). Perineural dexamethasone added to local anesthesia for brachial plexus block improves pain but delays block onset and motor blockade recovery.
- [25]Raj, S. A., Singh, D. R., Charles, S. A. J., & Krishnaveni, N. (2017). Efficacy of tramadol or dexamethasone as an adjuvant to levobupivacaine in ultrasound-guided supraclavicular plexus block for upper limb surgery: a randomized double-blinded controlled study. *Anesthesia Essays and Researches*, 11(3), 567-571.
- [26]Shrestha, B. R., Maharjan, S. K., Shrestha, S., Gautam, B., Thapa, C., Thapa, P. B., & Joshi, M. R. (2007). Comparative study between tramadol and dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block. *JNMA J Nepal Med Assoc*, 46(168), 158-64.
- [27]Pathak, R. G., Satkar, A. P., & Khade, R. N. (2012). Supraclavicular brachial plexus block with and without dexamethasone—a comparative study. *International journal of scientific and research publications*, 2(12), 1-7.
- [28]Sarah Gul Rehman & Deepak Singh (2023). Thalassaemia Consequences and Survival Rates in South Asian Kids and Adults. *Dinkum Journal of Medical Innovations*, 2(05):194-200.
- [29]Kim, D. H., Liu, J., Beathe, J. C., Lin, Y., Wetmore, D. S., Kim, S. J., ... & Memtsoudis, S. G. (2022). Interscalene brachial plexus block with liposomal bupivacaine versus standard bupivacaine with perineural dexamethasone: a noninferiority trial. *Anesthesiology*, 136(3), 434-447.
- [30]Choi, S., Rodseth, R., & McCartney, C. J. L. (2014). Effects of dexamethasone as a local anaesthetic adjuvant for brachial plexus block: a systematic review and meta-analysis of randomized trials. *British journal of anaesthesia*, 112(3), 427-439.

- [31] Moges, K., Tadesse, Y., & Fentie, F. (2022). RETRACTED: The postoperative analgesia efficacy of dexamethasone added to bupivacaine versus bupivacaine alone in ultrasound-guided supraclavicular brachial plexus block for upper limb orthopedic surgeries, Ethiopia: An observational prospective cohort study. *SAGE Open Medicine*, 10, 20503121221126687.
- [32] Alarasan, A. K., Agrawal, J., Choudhary, B., Melhotra, A., Uike, S., & Mukherji, A. (2016). Effect of dexamethasone in low volume supraclavicular brachial plexus block: A double-blinded randomized clinical study. *Journal of Anaesthesiology Clinical Pharmacology*, 32(2), 234-239.
- [33] Dar, F. A., Najjar, M. R., & Jan, N. (2013). Effect of addition of dexamethasone to ropivacaine in supraclavicular brachial plexus block. *Indian Journal of Pain*, 27(3), 165-169.
- [34] PARAMASwAmy, R., VENKATA MAHIPATH, S. R. R., DuRAiRAj, A. R., & Sundaramurthy, N. (2018). Comparison of Dexamethasone and Ketorolac as an Adjuvant To Bupivacaine in Axillary Brachial Plexus Blocks for Isolated Hand and Forearm Injuries: A Randomised Double-Blind Prospective Study. *Journal of Clinical & Diagnostic Research*, 12(1).
- [35] Khaleeq, S., Azam, M., Siddiq, S., Shahid, A., Butt, Z., & Asad, N. (2020). Comparison of dexmedetomidine and dexamethasone as adjuvant to bupivacaine in supraclavicular brachial plexus block. *Annals of Punjab Medical College*, 14(2), 122-125.