

## EFFECT OF DEXAMETHASONE AS AN ADJUVANT IN SUPRACLAVICULAR BLOCK IN ORTHOPEDIC PATIENTS UNDERGOING ELBOW, FOREARM AND HAND SURGERY

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**Abstract:** *Supraclavicular blocks in orthopedic patients are considered to be of utmost importance and significance for attaining optimal results. The procedure is considered to obtain muscle relaxation and maintain stable hemodynamics. Moreover, they provide extended post-operative analgesic effects with the least reported adverse effects. The current study observed dexamethasone's effects as an adjuvant therapy along the conventional anesthetic drugs among orthopedic patients undergoing elbow, forearm and hand surgeries. This study was conducted at the Department of anesthesiology, Aziz Bhatti Shaheed teaching hospital Gujrat, Pakistan, from 1st June 2022 to 30th October 2022. A Sum of sixty (n=60) patients of age group 18-65 years was designated into groups A and B. One group was administered conventional anesthetic drugs, and the other group was administered dexamethasone as adjuvant therapy. Patients were observed for the onset of sensory blockade, motor blockade and duration of the sensory blockade and motor blockade with the help of the Lovett rating scale and sensory score. Findings of the study reported significant differences in the onset and duration of sensory and motor blockade among group B compared to group A. It reported the onset was faster in group B ( $p < 0.05$ ) and longer in duration in group B ( $p < 0.05$ ). Moreover, the visual analog score (VAS) score at 9 hours remained significantly lower among the group receiving adjuvant therapy. No adverse effects were reported among the patients receiving the therapy. The present study suspects the beneficial role of dexamethasone as adjuvant therapy for the group of patients. It concluded that the patients receiving the adjuvant therapy reported faster onset of sensory and motor blockade, which also lasted for longer. Therefore, dexamethasone is reported to have a prolonged anesthetic effect if administered as an adjuvant therapy among orthopedic patients.*

**Keywords:** Hemodynamics, Dexamethasone, Lovett rating scale, Sensory score, Visual analog score

### Introduction

With the recent advancements in the field of medicine and surgery. Several new techniques have been introduced among the individuals undergoing surgical interventions to study and relate the effects of different medicines and the injectables being introduced among those individuals (Sane et al., 2021), which supraclavicular block remains as one of the excellent methods for attaining optimal operating conditions among the upper limbs or extremities (Moges et al., 2022). The technique is considered simple and safe for surgical or post-operative analgesic analysis (Kapukaya et al., 2022). The technique is considered best for the optimal region vision from the mid-level humerus leading down to the hand. The humerus is the bone that anatomically forms the upper arm and helps it join the other proximal regions (Sivashanmugam et al., 2021). The

said technique is responsible for complete muscular relaxation and maintaining a stable hemodynamic environment along the sympathetic block. The technique also helps post-operative analgesia with the least reported side effects. Moreover, it is also reported to offer better preservation of mental activities among elderly individuals and lower aspiration risks that may lead to pharyngeal or laryngeal reflexes. The said technique can avoid difficulties in the intubation process and other post-operative complications. It resolves the analgesic issues the patient would undergo before or after the surgical intervention (Yuan et al., 2021). Numerous adjuvant therapies have been introduced among the patients, including opioids, i.e., morphine, tramadol, sufentanil and other blockers like choline are used as adjuvant anesthetic drugs (Shin et al., 2017). The use

of steroids is appreciated as an adjuvant therapy among local anesthetic patients. The application of dexamethasone has gained popularity among patients with supraclavicular block. Steroids are believed to have nerve blocking effects by inhibiting neurotransmission (Zheng, 2009).

Among the other surgical approaches, the supraclavicular block is one of the most accurate and reliable methods for the shoulders performing below the mid-level humerus segment of bones. The current study aims to evaluate the effects of dexamethasone as an adjuvant supraclavicular block in patients undergoing orthopedic surgeries in lower arm segments, including the elbow, forearm and hand.

### Methodology

The randomized controlled study would be allocated with sixty (n=60) patients, aged 18-65 years, both males and females, undergoing elbow, forearm and hand surgery under the supraclavicular block. This study was conducted at the Department of anesthesiology, Aziz Bhatti Shaheed teaching hospital Gujrat, Pakistan, from 1st June 2022 to 30th October 2022. All of the procedures were approved by the research, and the ethical committee and patients were provided with informed consent before they were included in the following study. All of the patients were then equally divided into two groups such as thirty (n=30) in each Group A and B. Patients in Group A received their common anesthetic drugs (150mg of bupivacaine 0.5%) in 2 ml of normal saline while the patients in Group B along with the common anesthetic drugs received 2 ml of dexamethasone (8mg) as an adjuvant therapy along the bupivacaine as in A group. All patients who refused to sign the consent form had diabetes, renal or liver diseases, pregnancy, or other allergies. It was excluded from the current study, whereas patients undergoing a surgical procedure with an incision of 2-5cm were expected to be included in the current study. Anesthesiologists performing the block remain blinded about the study drug.

Vital stats of the patients, including their diastolic and systolic blood pressures, heart rate, and saturation of dissolved oxygen, were recorded before the block and later at regular intervals. The patient was laid in a supine position without any pillow to perform the supraclavicular block. The upper limb was anesthetized and adducted with the head tilted to 30° towards the contralateral side. Once when the

drug was injected into the selected area, patients were observed for motor and sensory blockers at median, radial, ulnar and musculocutaneous nerves at regular intervals such as., five, ten, fifteen, twenty, twenty-five, thirty, forty-five, sixty, seventy-five, ninety and one hundred twenty minutes and after thirty minutes, three, six and twelve hours of the surgery. The 23-G hypodermic needle pinpricked patients to check the sensory blockage. Palmer surfaces of the index and little fingers were used to check the median and ulnar nerves in hand; similarly, the dorsal surface of the thumb indicated the status of radial nerves.

### Sensory scores and Lovett rating scale

Sensory scores were then used to check the level of sensations after the pinprick. At the same time, the Lovett rating scale was used to assess the motor blockade range from 0 to 6, where 0 indicated complete paralysis and 6 as normal muscular force and vice versa (Azimaraghi et al., 2015; El-Baradei and Elshmaa, 2014).

### The onset of sensory blockade

The onset of sensory blockade was considered as the time that is the interval between the completion of injection and loss of the pain after pinpricking the palmar surfaces of the index and little fingers, dorsal surface of the thumb and around the region of the injury site of the patients.

### The onset of motor blockade

The onset time of motor block is the interval that can be defined as the time between complete paralysis and completion of the anesthetic injection.

### Duration of sensory blockade

Duration of the sensory blockade is considered as the period that represents the time interval between the onset of the sensory blockade and returning of normal sensation.

### Duration of motor blockade

Duration of motor blockade remains the period between the time of complete paralysis and the time complete motor functions are recovered.

### Other observations

Other observations include noting the time when the first analgesic was administered and counting the total need of the analgesics in the last 12 hours of the procedure. A Specialized scale known as the visual analog scale (VAS) was used to assess the intensity of pain where 0 is no pain, and 10 represents the worst possible pain among the patients. If the scale score exceeds 4, the effects of studied analgesics

were terminated, and patients were rescued by administering other analgesics like diclofenac sodium. Any other incidence of the side effects anticipated were noted during the assessed procedure.

**Statistical Analysis**

The sample size was calculated with the help of previously conducted studies, as reported (Jarbo et al., 2005; Shrestha et al., 2003). All findings were reported in Mean ± Standard deviation (SD). Statistical analysis was performed by SPSS v.21. The significance level was considered significant if the p-value was reported to be less than 0.05.

**Results**

Demographic variables among the patients who underwent surgery were separated into groups A and B, as reported in table 1. While the characteristics of the supraclavicular block in groups A and B were reported in table 2, representing the onset of sensory and motor blockade and the duration of the reported blockades. VAS score also shows lower uses of analgesics among the individuals provided with the adjuvant therapy, as shown in Table 2. A comparison of heart rate and diastolic and systolic blood pressure in groups A and B can be seen in Figures 1,2, and 3. The study results represent a significant decrease in the response time at the onset of sensory and motor blockade to 6.8 minutes and 10.42 minutes in patients with dexamethasone as adjuvant therapy, respectively. Not only this, but the findings of the study report also prolonged anesthetic effects in terms of the duration of sensory and motor blockade after the surgical interventions among the patients.

**Table 1: Demographic Data**

Variables	Group A (n=30)	Group B (n=30)
Age (years)	43.1±14.8	46.1±13.5
Sex Male/Female	19/11	20/10
Weight (kg)	62.43±2.77	64.43±3.53
Surgery Duration (min)	65.4±3.4	65.03±4.24

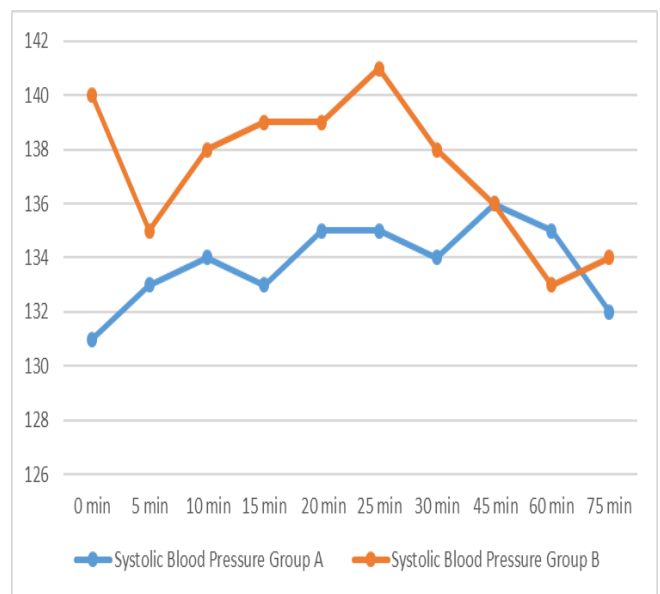
**Table 2: Supraclavicular Block Characteristics**

Variables	Group A (n=30)	Group B (n=30)	p-value
The onset of Sensory blockade (min)	10.47±0.92	6.80±0.65	0.001

The onset of Motor blockade (min)	14.83±0.78	10.42±0.57	0.007
Duration of Sensory blockade (min)	645.23±2.85	902±2.54	0.004
Duration of Motor blockade (min)	523.83±2.27	797.09±5.46	0.009
No. of required analgesics	7	0	0.000

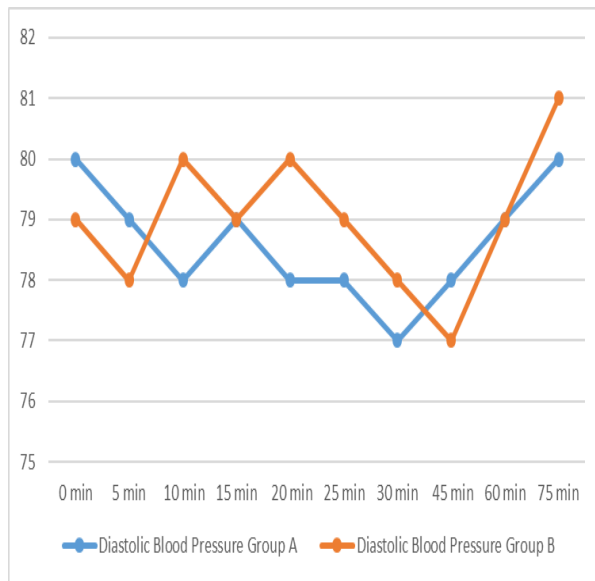


**Figure 1 Comparison of heart rates between the groups**



**Figure 2 Comparison of Systolic blood pressure**

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**Figure 3 Comparison of Diastolic blood pressure**

### Discussion

Orthopedic elbow, forearm and hand surgeries are reported to relieve severe post-operative pains. As the number of surgeries has increased dynamically over the last few years, it has raised the need for developing techniques that could ease the situation among the patients undergoing the said surgeries. Nowadays, another technique is reported to provide optimal operative conditions, among which supraclavicular block of the upper limb is of great significance. The block is prepared with anesthetic agents to allow easier homeostasis during post-operative surgical procedures. For the said interventions, anesthesiologists and surgeons should have a prolonged blockade of sensory and motor neurons (Choi et al., 2014). Literature reports the direct effect of dexamethasone on terminating the nerve impulse as it is reported to inhibit the C-fibre transmission. A study represents lower dose administration of dexamethasone and anesthetics among orthopedic surgery patients to have their respective benefits (Persec et al., 2014).

At the same time, lower incidence of complications especially related to the altered heart rate and other adverse effects were reported among the studies in which dexamethasone was administered as an adjuvant therapy to patients undergoing elbow, forearm and hand surgeries (Shrestha et al., 2007). Other pharmaceutical effects of dexamethasone include its significant role in the patient's heart rates (Sharma et al., 2018). Moreover, single-dose

administration of dexamethasone reported rare cases with any of the described adverse effects, which states the use of the drug is safe in prolonged use. Studies have been conducted that determine the role of the said parameters at regular intervals right after the administration of the drug and several hours after surgery completion. Literature indicates no such cases with impaired cardiac output among the patients administered with the dexamethasone adjuvant to the other anesthetic drugs administered to the group of patients (Tandoc et al., 2011). The current study's findings were in favor of all the reported studies and represented similar findings. Furthermore, the current study also supports the use of said therapeutic option among surgical patients to achieve more significant results and prolonged state of anesthesia and less use of analgesia among the patients undergoing the surgical treatment.

### Conclusion

Patients were administered dexamethasone as adjuvant therapy, and the results indicated a significant role among the patients. The adjuvant therapy group reported early onset of sensory and motor blockade that lasted for an even more extended period of time. Therefore, it can be concluded as the use of adjuvant therapy could significantly improve the anesthetic effects among the patients undergoing the said surgeries.

### Conflict of interest

The authors declared absence of conflict of interest.

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