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A Clinical Comparative Study Between 0.5% Ropivacaine And 0.5% Ropivacaine And Dexamethasone 8mg In Supra Clavicular Brachial Plexus Block For Upper Limb Surgeries

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ABSTRACT

BACKGROUND AND AIMS:

It has been reported that dexamethasone when used as an additive in a dose of 8mg to 0.5% ropivacaine in adults increases the duration of brachial plexus block. Hence this study was conducted to evaluate the efficacy of dexamethasone in supraclavicular brachial plexus block and to compare it without dexamethasone when added to ropivacaine 0.5%

Materials and methods:

Our study was conducted in 60 ASA grade I and II patients aged between20 – 60 years of either sex posted for hand, fore arm and elbow surgeries by using peripheral nerve stimulator guided supraclavicular brachial plexus block after obtaining written informed consent and permission from institutional ethical committee.

These patients were divided into two groups. Group R (n = 30) received 25 ml of 0.5% ropivacaine plus 2ml of normal saline . Group D (n = 30) received 25ml of 0.5% ropivacaine plus 2ml of dexamethasone (8mg).

Onset of sensory block, motor block, time to peak sensory and motor block, total duration of sensory block were recorded.

Results*:*

The two groups were comparable in demographic data. Group 'D' showed early onset of sensory and motor block (p<0.001)which was highly significant. Duration of sensory and motor block were significantly prolonged in Group 'D' (p< 0.001) which is highly significant.

Conclusions:

In our study we found that 8mgof dexamethasone as an adjuvant to 0.5% ropivacaine significantly prolongs the duration of brachial plexus block when compared to 0.5% ropivacaine alone.

Keywords*: Brachial block, Dexamethasone, 0.5% ropivacaine, nerve stimulator*

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I. Introduction

Brachial plexus anesthesia is a well tried and well known regional anesthetic technique for patients undergoing upper limb surgeries (1). It is unique because, it provides excellent analgesia, good operating conditions, reduced blood loss, early ambulation and good postoperative analgesia. Various pharmacological agents such as opioids, midazolam, α2 agonists and dexamethasone have been used as an adjuvants for prolonging the duration of blockade for long surgical procedures and also into postoperative analgesia (2). Use of steroids as an adjuvant to local anaesthetic drug in brachial plexus block is gaining popularity. Dexamethasone has been studied as an adjuvant to local anaesthetics in peripheral nerve blocks (3, 4). In our study we are comparing the efficacy of dexamethasone 8mg added as an adjuvant to 0.5% ropivacaine alone.There is paucity of literature when using dexamethasone as an adjuvant to 0.5% ropivacaine. Ropivacaine is unique because it produces more sensory blockade when compared with other agents like bupivacaine, levobupivacaine thus allowing early ambulation

II. Materials and Methods:

This study was conducted in the department of anesthesiology G.G.H Guntur attached to Guntur medical college, Guntur from Jan 2016 to June 2016. Our study was conducted in 60 ASA grade I and II patients aged between 20 to 60 years of either sex posted for hand, forearm and elbow surgeries using peripheral nerve stimulator guided supraclavicular brachial plexus block after obtaining written informed consent and permission from institutional ethics committee.

60 patients were divided randomly into two groups
Group R (n= 30) patients received 25ml of 0.5% ropivacaine plus 2ml of normal saline.
Group D(n = 30) patients received 25ml of 0.5% ropivacaine plus 2ml of dexamethasone (8mg)

Exclusion criteria: ASA class III, IV and V, infection at the site of injection, presence of coagulopathy, hypersensitivity to either ropivacaine or dexamethasone and non-co-operative patient.

Patient was shifted to operation room and large bore 18g IV cannula was placed on the non-operating hand, and started ringer lactate infusion. Base line vital parameters such as HR, NIBP and SPO2 were noted before instituting the block. Patient was placed in supine position and a rolled towel was kept in the interscapular region and was asked to turn their head to the other side of the block placement site. The site was cleaned with 5% povidine iodine solution. Theinterscalene groove was identified and traced below to a level which is one finger breath above the clavicle. A skin wheal was raised with 0.5% lidocaine. A 5cm 22 G insulated nerve stimulator needle was attached to a nerve stimulator and with current set to give 1mA (5) . The needle was inserted almost perpendicular with slight angulation towards the contralateral nipple. The desired response in the form of twitching the fingers. After obtaining the desired response, the current was reduced to 0.5mA and if the response was persisting then the drug was injected after negative aspiration for blood, small increments of 5ml to a total of 27ml.

The sensory block was assessed by pinprick method each minute after the block. The palmar surface of the index and little finger were used to assess the median and ulnar nerves respectively. The radial nerve was assessed by testing the dorsal surface of the thumb

The sensory block was graded as follows: (6)

Grade 0: normal sensation to pinprick
Grade 1: dull sensation to pinprick
Grade 2: no sensation felt

The onset of sensory block was defined as the time interval between drug administration and onset of grade 1 sensory block in the hand.
Full sensory block was defined as complete loss of pinprick sensation.
Duration of sensory block was defined as the time interval between complete sensory block and return of normal sensation.

Motor block was assessed by Bromage scale

0	Normal motor function with full extension and flexion of elbow, wrist and fingers
1	Decreased motor strength with ability to move fingers only and or wrist only
2	Complete motor block, with inability to move elbow, wrist and fingers.

On set of motor block was defined as the time between completion of injection of LA and complete paralysis (9). Whereas duration of motor was taken as the time interval from complete paralysis to complete recovery of motor function. Post-operative pain was assessed with numeric rating scale 0-10 every hour for period of 24 hours (10). When the rating score ≥5 it was taken as a termination of analgesic action and injection tramadol 100mg IV given as a rescue analgesia. The side effects such as nausea, vomiting, seizures, respiratory problems intraoperatively and any neuropathies postoperatively observed.

Vital parameters such as HR, SBP, DBP, SPO2 were recorded every 15min after institution of the block for initial two hours. After two hours observation vitals were recorded every 4^{th} hourly till 12 hours and after which every 12^{th} hourly for 24 hours

The mean onset, time and duration of sensory and motor block were noted along with the time and dose of first rescue of analgesia.

Statistical analysis: The observation were analyzed appropriately by using student's unpaired t-test and chi-square test. A p value <0.05 is considered as statistically and p-value <0.001 is highly significant.

Table 1

		Group R N= 30	Group D N= 30	p-value
1	Onset of sensory block in min	4.11 ± 0.28	3.42 ± 0.54	<0.001
2	Onset of motor block in min	5.69 ± 0.30	4.73 ± 0.78	<0.001
3	Time to peak sensory block in min	18.92 ± 0.18	18.23 ± 0.81	<0.001
4	Time to peak motor block in min	23.45 ± 0.51	22 ± 1.08	<0.001
5	Total duration of sensory block (min)	353 ± 15.13	643 ± 34	<0.001
6	Total duration of motor block (min)	273.83 ± 13	623 ± 23	<0.001

Table 2 Demographic data

Parameters	Group R	Group D	P value
Age	38.17 ± 11.72	39.77 ± 11.61	>0.05
Gender M/F	21/9	20/10	>0.05
Weight (kgs)	64.23 ± 7.92	63.77 ± 6.74	>0.05

There was no significant difference in the demographic profile among the groups regarding age, sex, and body weight.

Fig 1

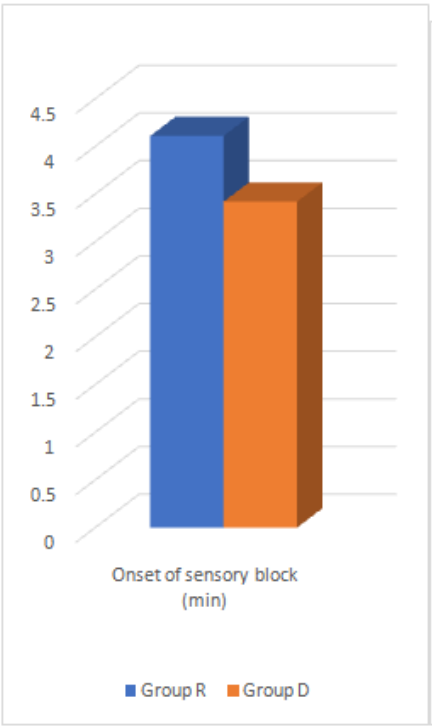


fig 2

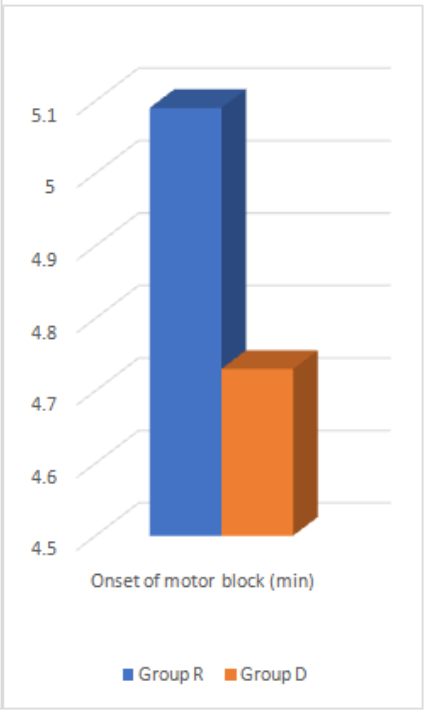


Fig 3

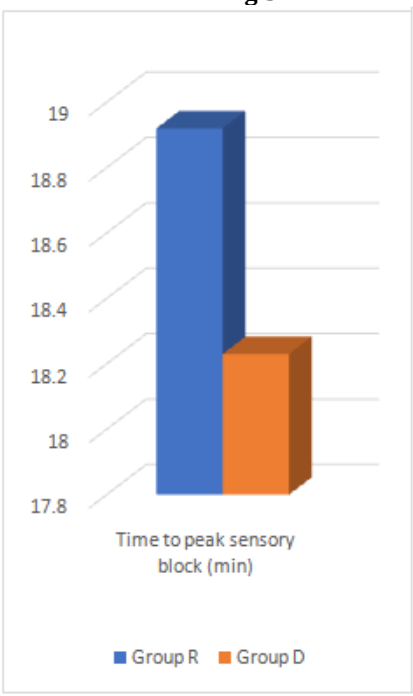


fig 4

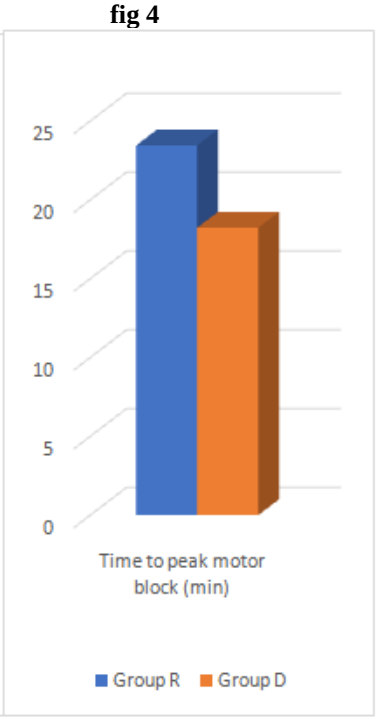


Fig 5

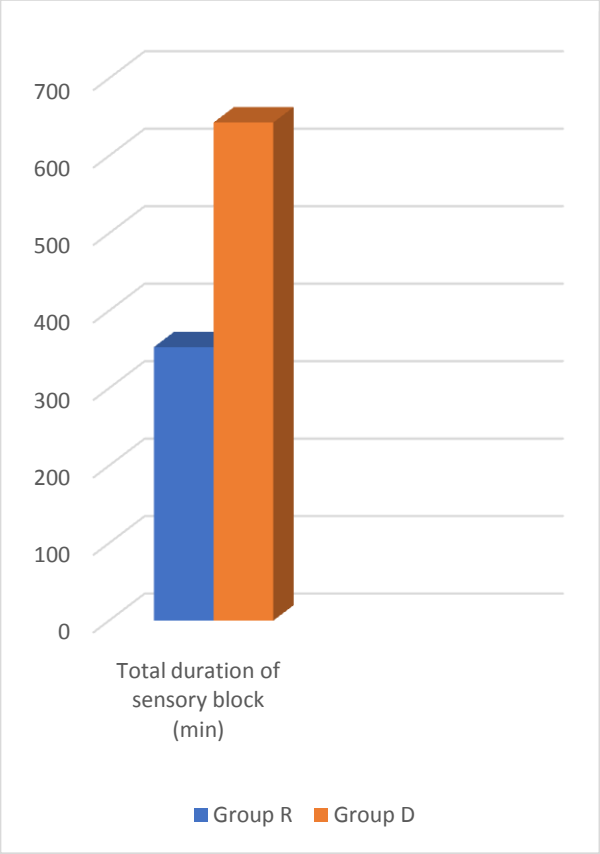
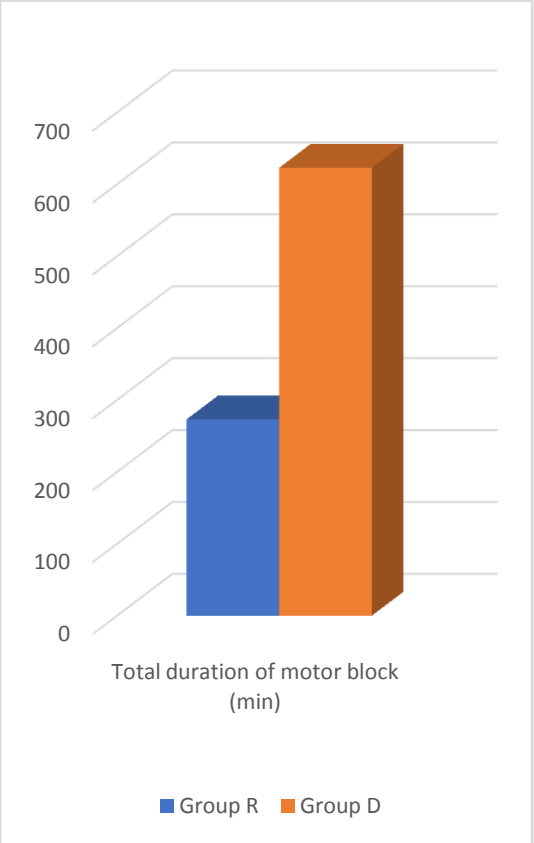


Fig 6



III. Results

The block was successful in all the patients who enrolled for completion of the study. Demographic parameters such as age, sex, weight, and duration of the surgical procedure between the two groups were compared. (Table 1)

In the group 'R' the request for first rescue analgesic was earlier when compared to group 'D'. The total duration of the sensory block in the group 'R' was 353 ± 15.13 minutes where as in group 'D' it was 643 ± 34 (fig5). This explains that the request for first rescue analgesic was earlier in the group 'R' when compared to group 'D'. The difference in both groups was highly significant ($p<0.001$) (Table 1). The total duration of motor block in group 'R' was 273.83 ± 13 whereas it was 623 ± 23 in group 'D' (fig 6). The difference in both groups was highly significant ($p< 0.001$) (Table 1).

In our study the onset of both motor and sensory block was delayed in group 'R' when compared to group 'D' (fig 1 & fig 2). The difference in both groups i.e. group 'R' and group 'D' was highly significant ($p<0.001$). (Table 1).

In group 'D' the duration sensory and motor block was significantly prolonged.

All the blocks were successful and there were no instances of patchy or failed blocks. The intraoperative working conditions in the both groups were excellent. The intra and post-operative hemodynamic parameters were comparable between the two groups. No adverse effects were noted during the perioperative period.

IV. Discussion

Brachial plexus block is an easy, reliable and safe regional anesthetic technique for upper limb surgeries. By using a peripheral nerve stimulator the brachial plexus is more reliably blocked thus obviating the need for a general anesthetic technique.

Many adjuvants to local anesthetics such as α2 agonist: clonidine, dexmedetomidine, opioids:butorphanol, buprenorphine, tramadol, fentanyl, bicarbonate, hyaluronidase, neostigmine, etc. have been studied in brachial plexus block, but each of the molecules have their unwanted effects.

(7) As an advancement, dexamethasone, which is a long acting glucocorticoid has proven to be an adjuvant of versatile efficacy in brachial plexus block (8). It produces vasoconstriction and reduces the

absorption of Local anesthetics and there by prolongs the action of Local anesthetics (9). Several other studies have reported the prolonged duration of sensory and motor block when dexamethasone was used as an adjuvant with bupivacaine and lidocaine in brachial plexus block.

(7) Kumud et al in 2014 studied the efficacy of dexamethasone as an adjuvant to 0.5% ropivacaine for brachial plexus block, where they observed earlier onset times of sensory and motor blockade with dexamethasone-ropivacaine combination as compared to ropivacaine with NS which is very much similar to our study. The earlier onset of action might be due to synergism of dexamethasone with Local anesthetics on blockade of nerve fibers.

Ahmad et al in 2013 conducted same study and found that duration of effective sensory blockade was prolonged with 0.5% ropivacaine and dexamethasone combination (11). In our study also we found that the duration of effective sensory block with ropivacaine and dexamethasone lasted for 643 ± 34 minutes. The total duration of motor blockade lasted for 623 ± 23 minute in group 'D' and 273.83 ± 13.11 minutes. In the group 'D' the duration of sensory and motor blockade were prolonged with a highly significant p-value <0.001.

Islam et al in 2011 concluded that adding dexamethasone to local anesthetics in brachial plexus block, the onset occurs significantly earlier and duration is markedly prolonged. No unwanted side effects were noted. This is comparable to our study where we had a significant prolongation of ropivacaine and dexamethasone combination. (13)

Shreshtha et al confirmed that addition of dexamethasone leads to significantly earlier onset of action and extended duration of analgesia in brachial plexus block without any adverse effects (12).

V. Conclusion

Dexamethasone (8mg) when used as an adjuvant to 0.5% ropivacaine not only hastens the onset of sensory and motor block but also effectively enhances the duration of sensory and motor blockade and enhances the duration of postoperative analgesia without any untoward events.

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