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Comparative Evaluation of Ropivacaine and Ropivacaine with Dexamethasone in Ultrasound Guided Brachial Plexus Block

Kota Raju[1], Priyanka Priyadarshini C[2]

[1,2]Assistant Professor, Department of Anesthesia, Gandhi Medical College and Hospital, Musheerabad, Secunderabad, Telangana 500003, India.

ABSTRACT

Introduction: The use of interscalene block as the primary anaesthetic technique avoids the complication associated with general anaesthesia. the present study is undertaken to study the effect of adding Dexamethasone as adjuvant to Ropivacaine. *Aims:* Aim is to study the comparison between ropivacaine and ropivacaine with dexamethasone in ultrasound guided brachial plexus block. *Materials and methods:* The present study was undertaken at Gandhi hospital, Secunderabad during the period of March 2019 to October 2019. The patients were randomised into 2 groups with 30 patients in each group. Group R – 30 ml of Ropivacaine 0.5% + 2ml Normal Saline and Group RD – 30 ml of Ropivacaine 0.5% + 2ml (8mg) dexamethasone. *Results:* Block was successful in 90% patients in Ropivacaine group and 93.3% in Ropivacaine + Dexamethasone. The difference was not statistically significant (p = 0.640)**.** There were no statistically significant differences in demographic profile of patients in either group in terms of age, body weight, or gender ratio (p >0.05). There were no statistically significant differences in patients posted for surgery in either group (P value – 0.726). There was no significant difference between 2 groups in terms of ASA grading (p = 1.000). Duration of sensory block, motor block in Ropivacaine group and Ropivacaine + Dexamethasone group is highly significant (p < 0.001). Duration of analgesia in Ropivacaine group was 628.88 ± 65.11 min whereas in Ropivacaine + Dexamethasone it is 1051 ± 61.36 min, which is statistically highly significant (p < 0.001). The hemodynamic parameters were statistically insignificant in both the groups since (p > 0.05). *Conclusion:* Addition of Dexamethasone to 0.5% Ropivacaine for interscalene brachial plexus block increases duration of sensory block, motor block as well as duration of analgesia.

Keywords: Dexamethasone; Ropivacaine; Interscalene brachial plexus block

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Introduction

Pain is "an unpleasant sensory or emotional experience associated with actual or potential tissue damage, or described in terms of such damage". It is an unpleasant effect associated with significant psychological and physiological changes during surgery and post-operative period.[1] This can be overcome by the use of suitable drugs and techniques. Regional anaesthetic techniques have specific advantages for administration of analgesic supplements both intraoperatively and postopeatively. An ever increasing demand for

Corresponding Author: Priyanka Priyadarshini C, Assistant Professor, Department of Anaesthesia, Gandhi Medical College and Hospital, Musheerabad, Secunderabad, Telangana 500003, India.
E-mail: drcpriyanka@gmail.com
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regional anaesthesia from patients and surgeons matches the growing realization that regional anaesthesia can provide superior pain management and perhaps improve patient outcomes to meet evolving expectations for ambulatory, cost-effective surgery. Our aging population presents with an increasing range of co-morbidities, demanding a wider choice of surgical anaesthesia options including the use of a variety of regional techniques in conjugation with general anaesthesia to optimize clinical care, while at the same time reducing the risks of complications. Thus, the practice of regional anaesthesia remains an art for many practitioners and consistent success with these techniques often appears to be limited to anaesthesiologists who are regional anaesthesia enthusiasts. Regional Anaesthesia in the form of interscalene approach to the brachial plexus is often used for orthopaedic surgeries of the upper limb. It is often used either as an adjuvant to general anaesthesia or as the primary method of anaesthesia. With the introduction of newer and safer local anaesthetics with better advantages, regional anaesthesia has taken over asthe principle technique for upper limb surgeries. The use of interscalene block as the primary anaesthetic technique avoids the complication associated with general anaesthesia.[2]

There are many advantages of brachial plexus block for upper limb surgeries over general anaesthesia, namely effective analgesia with good motor blockade, awake patient, extended post-operative analgesia, early ambulation, early resumption of oral feeding, minimal number of drugs used so that polypharmacy is avoided, no airway manipulation and less incidence of post-operative nausea and vomiting Various approaches of brachial plexus block have been used for upper limb surgeries, namely[3] as Interscalene approach, Supraclavicular approach, Infraclavicular approach and Axillary approach. The principal indication for an interscalene block is surgery on the shoulder or manipulation of the shoulder. Blockade occurs at the level of the upper and middle trunks. Although this approach can also be used for forearm and hand surgery, blockade of the inferior trunk (C8 through T1) is often incomplete and requires supplementation at the ulnar nerve for adequate surgical anaesthesia in that distribution. Recent reports provide evidence that a low interscalene block (below c6, just superior to clavicle) may provide sufficient anaesthesia and analgesia for procedures of the lower arm.[4] Long acting local anaesthetic agent, Bupivacaine, is frequently used for brachial plexus anaesthesia. Its cardiac and central nervous system toxic effects in some patients prompted the researchers to develop new local anaesthetic agent with a profile similar to Bupivacaine without considerable toxic effects. One such possible replacement for Bupivacaine is Ropivacaine. This favorable clinical profile has prompted many clinicians to switch from Bupivacaine to Ropivacaine for all types of neural blockade. However, with clinical use, it was discovered that Ropivacaine's latency of sensory analgesia was approximately two thirds that of Bupivacaine, therefore it was not as effective in promoting prolonged post-operative analgesia. In an attempt to increase the duration of post-operative analgesia, various adjuvant drugs were used along with local anaesthetic agents. However, the glucocorticoid; Dexamethasone when used as adjuvant along with ropivacaine appears to be effective in prolonging the duration of analgesia and intensity of block obtained from interscalene approach using Ropivacaine, with the effect being stronger with Ropivacaine. Hence, the present study is undertaken to study the effect of adding Dexamethasone as adjuvant to Ropivacaine.

Materials and Methods

The Prospective randomised comparative study during the period of March 2019 to October 2019

Inclusion Criteria - Age 18 to 65 years, ASA grade I and II, Scheduled for upper limb orthopaedic procedures

Exclusion Criteria - Age group less than 18 years and more than 65 years, Patient belonging to ASA grade III, IV, hypersensitivity to local anaesthetics, Infection at the site of block, coagulopathy (abnormal BT, CT) or patient on anticoagulants therapy, severe systemic disorder (respiratory, cardiac, hepatic, renal diseases neurological, psychiatric, neurovascular disorders and contralateral diaphragmatic paralysis), morbid obesity and who are on corticosteroids for 2 weeks or longer within 6 months of surgery and chronic opioid use (>30mg oxycodone equivalent per day.

Based on previous studies it was anticipated that mean deviation of analgesic effect is 11 hours with standard deviation of 5 hours.For purpose of this study, a difference of atleast 4 hours in duration of analgesic effect between 2 groups is considered significant In order to detect this difference, required sample size is 26 at 5% (0.05) level of significance and 80% power of test. Approximately 60 patients will be enrolled in study to arrive at 52 evaluable cases. 26 in each group assuming a drop out of 15% either due to incomplete data or lower

enrollment.

Group R: - 30ml of 0.5% Ropivacaine + 2 ml of normal saline

Group RD: - 30ml of 0.5% Ropivacaine with 8mg of Dexamethasone-2ml

The study protocol was approved by institutional ethical committee and approval for study and written informed consent.

Pre-Anaesthetic evaluation

All the patients underwent thorough pre anesthetic evaluation on the day prior to surgery. All systems were examined including airway and the surface anatomy where the block was going to be given, and the procedure to be carried out was explained and informed written consent taken. They were informed about development of paresthesia. Patients were reassured to alleviate their anxieties. All the patients were kept nil per oral as per the fasting guidelines. All of them received drugs Tablet. Alprazolam 0.5mg on the night before surgery and Capsule Omeprazole 20mg on the day of surgery.

All basic investigations were done. Next day on arrival of patients in the operating room, an 18 gauge intravenous cannula was inserted under local anaesthetic infiltration on the non-operating hand and an infusion of Ringer lactate was started. The patients were connected to multiparameter monitor (Phillips Intellivue MX450) which records pulse rate (PR), noninvasive measurements of systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP), continuous electrocardiogram (ECG) monitoring using lead II and oxygen saturation (SpO2). The baseline blood pressure and heart rate and oxygen saturation were recorded.

The anaesthesia machine, emergency oxygen source, pipeline O2 supply, working laryngoscope, appropriate size endotracheal tubes along with connectors, functioning suction apparatus with suction catheter, Airways (oropharyngeal), Intravenous fluids Anesthetic agents– Thiopentone, ketamine, diazepam, succinylcholine Resuscitation drugs- Hydrocortisone, atropine, adrenaline, aminophylline, mephentermine, calcium gluconate and sodium bicarbonate.

Patient is placed in supine position, with the head facing away from the side to be blocked. A slight elevation of head end of bed is often more comfortable for the patient and it allows for better drainage and less prominence of neck veins.

Procedure

Parts are prepared with iodine solution. Transducer is placed in transverse plane to identify carotid artery. Once artery is identified transducer moved slightly laterally across the neck. The goal is to identify the scalene muscles and the brachial plexus sandwiched in between them. Needle is then inserted in-plane towards brachial plexus, in a lateral to medial direction. As needle passes through prevertebral fascia certain "give in" is often appreciated. After careful aspiration to rule out intravascular needle placement, 1 to 2ml of local anaesthetic is injected to document proper needle placement. Injection of several milliliters of local anaesthetic often displaces brachial plexus away from needle. An additional advancement of needle 1 to 2 mm toward brachial plexus may be beneficial to assure a proper spread of local anaesthetic. Whenever needle is further advanced or multiple injections used, assure that high resistance to injection is absent to decrease risk of intrafascicular injection. The spread of drug can be visualized. Throughout the procedure patient was observed for development of toxicity and immediate side effects like hypotension.

After the block was given patient was evaluated for onset of sensory and motor block, quality of sensory and motor block, overall quality of block, duration of sensory and motor block, duration of analgesia, side effects and complications. Assessment was done every 3 minute till development of sensory and motor block. At the end of 30 min if block was inadequate it was considered unsatisfactory or failure. The block was supplemented with general anaesthesia in case of failure. In the post-operative period patient pain was assessed by VRS score. If VRS >2 patient was administered rescue analgesia with tramadol 50mg IV and the study concludes at this point. At every assessment patient was observed for development of any adverse effects.

Statistical methods

Continuous variables (age, weight) were presented as Mean + SD. Fisher exact test was used wherever necessary. Statistical software OPEN EPI was used for data analysis.

p value of < 0.05 – Statistically significant

Results

There were no statistically significant differences in demographic profile of patients in either group in terms of age, body weight, or gender ratio ($p > 0.05$).

Table 1: Demographic characteristics of study population

Variable	Ropivacaine	Ropivacaine + Dexamethasone	*p* Value
Age(years)	40.33±12.82	41.73±12.69	0.672
Sex(M/F)	18(60%)/12(40%)	20(66.6%)/10(33.3%)	0.592
Weight(kg)	64.63±7.08	66.9±6.77	0.209
Duration (in mins)	78.66 ± 13.45	78.5 ± 11.68	P=0.960)

Table 2: Diagnosis of patients and ASA grade distribution in study

Diagnosis	Ropivacaine		Ropivacaine + Dexamethasone	
	NO	%	NO	%
Humerus proximal #	12	40%	10	33.3%
Humerus shaft #	8	26.6%	7	23.3%
Humerus with implant	10	33.3%	13	43.3%
ASA Grade				
1	23	76.6%	23	76.6%
2	7	23.3%	7	23.3%

Table 3: Onset and duration of Sensory and motor block in study

Onset	Ropivacaine (min)	Ropivacaine + Dexamethasone (min)	P value
Sensory block	12 ± 1.70	11.53 ± 1.66	0.310
Motor block	15.6 ± 1.66	14.78 ± 1.61	0.056
Duration of block(in minutes)			
Sensory	586.88 ± 63.64	1024.96 ± 58.27	0.000
Motor	534.25 ± 56.41	984.39 ± 57.89	
Duration of analgesia	628.88 ± 65.11	1051 ± 61.36	0.000

The average age was 40.33 ± 12.82 years in R group and 41.73 ± 12.69 years in RD group. Average body weight 64.63 ±7.08 kg in R group and 66.9 ± 6.77 kg in RD group. Both the groups had predominantly male patients. The duration surgery in both the groups was insignificant (p = 0.960) (Table 1)

There were no statistically significant differences in patients posted for surgery in either group (p value – 0.726). Implant removal was done for patients with implant insitu. Open reduction internal fixation with plating for fractures (Table 2).

There was no significant difference between 2 groups in terms of ASA grading (p = 1.000). Onset of sensory block in Ropivacaine group was 12 ± 1.70 min whereas in Ropivacaine + Dexamethasone group it was 11.53 ± 1.66 min, which was not statistically significant (p > 0.05) Onset of motor block in Ropivacaine group was 15.6 ± 1.66 min whereas in Ropivacaine + Dexamethasone it was 14.78 ± 1.61 min, which was not statistically significant (p > 0.05).

Duration of sensory block in Ropivacaine group was 586 ± 63.64 min whereas in Ropivacaine + Dexamethasone group it is 1024 ± 58.27 min, which is highly significant (p < 0.001). Duration of motor block in Ropivacaine group was 534.25 ± 56.41 min whereas in Ropivacaine + Dexamethasone group it is 984.39 ± 57.89 min, which is highly significant (p < 0.001).

Table 4. Overall quality of block in present study

Overall quality of block	Ropivacaine		Ropivacaine + Dexamethasone	
	NO	%	NO	%
Satisfactory block	27	90%	28	93.3%
Unsatisfactory block	3	10%	2	6.66%
Complete failure	0		0	

Table 5. Comparison of basal and post block values of hemodynamic parameters

Parameters	Ropivacaine	Ropivacaine+ Dexa	*p* value
Pulse/min(B)	77±6.16	78.3±5.48	0.391
MAP mmHg(B)	91.93±5.52	92.2±4.90	0.841
SpO2%(B)	99.26±0.94	99.3±0.83	0.861
Pulse/min(PB)	78.6±5.80	79.6±5.73	0.504
MAP mmHg(PB)	90.6±6.28	92.06±5.41	0.338
SpO2%(PB)	99.43±0.81	99.33±0.71	0.613

Duration of analgesia in Ropivacaine group was 628.88 ± 65.11 min whereas in Ropivacaine + Dexamethasone it is 1051 ± 61.36 min, which is statistically highly significant ($p < 0.001$) (Table 3).

Block was successful in 90% patients in Ropivacaine group and 93.3% in Ropivacaine + Dexamethasone. The difference was not statistically significant ($p = 0.640$) (Table 4).

The hemodynamic parameters were statistically insignificant in both the groups since ($p > 0.05$). (Table 5).

Discussion

In recent years, there has been a growing interest in the practice of regional techniques and, in particular, peripheral nerve blocks for surgical anaesthesia and postoperative analgesia. The development of local anaesthetic agents with lower toxicity and long duration of action had contributed to this change. Compared with general anaesthesia, regional anaesthesia is associated with multiple benefits including reduced morbidity and mortality. After going through the relevant literature regarding the use of Dexamethasone as an adjuvant to local anaesthetics, it was hypothesised that addition of Dexamethasone to Ropivacaine for interscalene brachial plexus block, will be effective in prolonging the duration of analgesia

In our study, the drugs selected for brachial plexus block were Ropivacaine and Dexamethasone. Bupivacaine and Ropivacaine are being regularly used for brachial plexus block for upper limb orthopaedic surgeries in our hospital. Ropivacaine has a higher toxic threshold, produces less cardiac and central nervous system effects compared to Bupivacaine and hence selected as the local anaesthetic for our study. In an attempt to increase the duration of post-operative analgesia, various adjuvant drugs are used along with local anaesthetic agents. Adjuvants include Epinephrine, Clonidine, Opioids, Ketamine and Midazolam. But all have met with limited success and the increase in the incidence of side effects were noted. Dexamethasone, as an adjuvant appears to be effective in prolonging the duration of analgesia of nterscalene block, with the effect being stronger with Ropivacaine. Despite concern surrounding 'off label' use of perineural adjuvants, the safety profile of dexamethasone is promising.[5] Additionally, orticosteroids have a long history of safe use in the epidural space for the treatment of radicular pain arising from nerve root irritation[6] and dexamethasone specifically has been studied as an adjuvant to epidural local anaesthetics.[7] In fact, the use of dexamethasone as an adjuvant to local anaesthesia for nerve blocks is discussed in prominent textbooks.[8,9] Hence in our study Dexamethasone was selected as an adjuvant to Ropivacaine for studying the effectiveness in prolongation of the duration of analgesia.

The prolonged sensory and motor block provided by Ropivacaine 0.5% or 0.75% for axillary, interscalene and subclavian perivascular brachial plexus block for upper limb surgery could be favourably compared with Bupivacaine 0.5% with similar quality of regional anaesthesia. Klein S M et al[11] conducted a study to compare 0.5% Bupivacaine and 0.5% and 0.75% Ropivacaine for interscalene brachial plexus block. In all three groups, the mean onset of motor and sensory block, Mean duration of analgesia was not statistically significant. Casati A et al[12] conducted a study with 20ml of 0.5%, 0.75%, 1% Ropivacaine or 2% mepivacaine. ostoperative analgesia was similar with the three Ropivacaine concentrations. Hence in our study we selected 0.5% as the concentration of Ropivacaine.

Various text books[13] have given 25-40ml as volume of local anaesthetics required for interscalene block. Radiographic studies suggest a volume to anaesthesia relationship, with 40ml solution associated with complete brachial plexus blockade. Volume used by various authors as K.C. Cummings et al. – 30ml, Dar F A et al. – 30ml, Kumar S et al. – 30ml, Klein S M et al.[11] – 30ml and Casati A et al.[12] – 20ml. In our study 30ml of 0.5% Ropivacaine was chosen, keeping in mind that it should not exceed the safe dose of 3ml/kg body weight. Dexamethasone 8mg was selected as all literature available used 8mg as dose in their study.

In our study onset of sensory block in Ropivacaine group was 12 ± 1.70 min and in Ropivacaine + Dexamethasone group it was 11.53 ± 1.66 which was stastically insignificant. Similar observations were found in the studies conducted by Ganvit K S et al.[14] and Kumar S et al.[15] where there was no statistically significant difference between the onset of sensory blockade among Ropivacaine group and Ropivacaine+Dexamethasone group which corelates with our study. Our study does not concur with the study conducted by Dar F A et al.[16] who have found a significant difference between the two groups regarding the onset of sensory block. In their study onset of sensory block has been defined as complete loss of sensation to touch in all the dermatomes. They have not separately studied the time taken for onset and maximum sensory blockade. In our study we have used loss of

sensation to pin prick as the end point unlike loss of touch sensation as the end point taken in their study. However in the study conducted by Cumming K C et al.[17] Kawanishi R et al.[18] Casati A et al., [12] onset of sensory blockade is not been documented. Hence we cannot compare our findings with that study.

In our study onset of motor block in Ropivacaine group was 15.6 ± 1.66 min and in Ropivacaine+ Dexamethasone group it was 14.78 ± 1.61 min which is statistically insignificant. Similar observations were found in the studies conducted by Ganvit K S et al.[14] and Kumar S et al.[15] where there was no statistically significant difference between the onset of Motor blockade among Ropivacaine group and Ropivacaine+Dexamethasone group which concurs with our study. Similar study conducted by Dar F A et al. who have found a significant difference between the two groups regarding the onset of Motor block. Onset of Motor block has been defined by Modified Bromage scale. In our study we have used Lovett Rating scale. Hence probably the difference and does not concurs with the study. However in the study conducted by Cumming KC et al.[17] Kawanishi R et al.[18] Casati A et al.[12] onset of Motor blockade is not been documented hence we could not compare our findings with that study.

In our study the duration of motor block was 534.25 ± 56.41 min in Ropivacaine group and 984.39 ± 57.89 min in Ropivacaine+Dexamethasone group which was statistically highly significant. Duration of sensory block in Ropivacaine group was 586.88 ± 63.64 min whereas in Ropivacaine+Dexamethasone it was 1024.96 ± 58.27 min which was statistically highly significant. The studies conducted by Ganvit K S et al.[14] Dar F A et al.[16] and Kumar S et al.[15] there were statistically highly significant difference in the duration of Motor and Sensory blockade between Ropivacaine and Ropivacaine+Dexamethasone group for brachial plexus block. Hence our study concurs with the above studies with respect to duration of motor and sensory blockade.

In our study the duration of analgesia was 628.88 ± 65.11 min in Ropivacaine group and 1051.07 ± 61.36 min in Ropivacaine+Dexamethasone group which was statistically highly significant. The studies conducted by Cummings KC et al.[17] Kawanishi R et al.[18] Ganvit KS et al[14] and Dar F A et al.[16] there was statistically highly significant difference in the duration of analgesia between Ropivacaine and Ropivacaine+Dexamethasone group for brachial plexus block. Hence our study concurs with the above mentioned studies in respect to duration of analgesia In Cummings KC et al.[17] Dexamethasone significantly prolonged the duration of analgesia of both Ropivacaine [median (inter-quartile range) 11.8 (9.7, 13.8) vs 22.2 (18.0, 28.6) h, log-rank p = 0.001] and Bupivacaine [14.8 (11.8, 18.1) and 22.4 (20.5, 29.3) h, log-rank p = 0.001]. Dexamethasone prolonged analgesia more with Ropivacaine than Bupivacaine (Cox's model interaction term $p¼$ = 0.0029). In Dar F A et al.[16] Demographic data and surgical characteristics were similar in both groups. The sensory and motor block onset time was earlier in group RD as compared to group R (Ropivacaine and Ropivacaine + Dexamethasone values are 17.5 ± 4.2 vs 14.6 ± 3.31, 20.67 ± 3.03 vs 18.01 ± 4.51 respectively) (p < 0.05). Sensory and motor blockade duration were longer in group RD than in group R (Ropivacaine and Ropivacaine+Dexamethasone values are 7.5 ± 0.55 vs 12.3 ± 0.40, 6.4 ± 0.30 vs 8.2 ± 0.50 respectively) (p < 0.001). Duration of analgesia was longer in group

RD than in group R (Ropivacaine and Ropivacaine+Dexamethasone values are 8.30 ± 0.40 vs 14.50 ± 0.30 respectively) (p < 0.001). The 24 hour Visual Analog Scale was more in group R as compared to group RD. The quality of anaesthesia was excellent in both the groups. The above study has used Visual Analog Scale, in our study Verbal Rating Scale was used for pain assessment. In Ganvit KS et al. The onset and peak of sensory blockade of RD vs R (4.3min vs 4.5 min, 9.3 min vs 9.07min) respectively and onset and peak motor blockade of RD vs R (6.6min vs 6.8min, 12.9min vs 13.1min) respectively were statistically insignificant, duration of sensory and motor blockade were significantly longer in the dexamethasone group (10.17 ± 1.13 vs. 6.5 ± 0.6 hrs and 8.35 ± 0.81 vs. 7.42 ± 0.78 hrs, respectively) than in the control group (p = 0.001). There were no side effects or complications observed in either group. Intraoperative and postoperative patient vital parameters such as heart rate, blood pressure and oxygen saturation were stable. Total mean duration of post-operative analgesia in group RD was 21.3 hrs and in group R was 10.24hrs which is statistically highly significant. In contrast to our study in the above study both onset and peak of motor and sensory block was assessed. In Kawanishi R et al[18] Perineural dexamethasone 4 mg significantly prolonged the duration of analgesia. The median duration of anaesthesia was longer in group Dperi (18.0 hours, interquartile range [IQR] 14.5–19.0 hours) than in group C (11.2 hours, IQR 8.0–15.0 hours). The median duration of anaesthesia was 14.0 hours (IQR 12.7–15.1 hours) in group Div. Significant differences were observed between group Dperi and C (p = 0.001). Kaplan– Meier curves for the first analgesic request with patients

not receiving any analgesics after 20 hours showed significant differences between groups Dperi and C (p = 0.005), and between groups Dperi and Div (p = 0.008), but not between groups C and Div (p = 0.411).

The block was satisfactory for 90% in Ropivacaine group and 93.33% in Ropivacaine +Dexamethasone group. The remaining patients who had unsatisfactory block, were administered general anaesthesia and were excluded from the study. There was no statistically significant differencebetween two groups in terms of overall quality of blockade.

The incidence of adverse events in either group was nil. As care was taken not to exceed safety margin of Ropivacaine which was 3mg/kg body weight Hemodynamic parameters like Pulse, Blood pressure and Spo2 were stable in study population without

Conclusion

There was no statistically significant difference in demographic data, duration of surgery, and hemodynamic parameters between the study groups. No statistically significant difference in onset of sensory and motor block and quality of overall block between 2 groups. There was statistically highly significant difference in between the groups in terms of duration of sensory and motor block and duration of analgesia. Hence it can be concluded that addition of Dexamethasone to 0.5% Ropivacaine increases the duration of sensory and motor block as well duration of analgesia in comparison to Ropivacaine alone in inter scalene brachial plexus block for upper limb surgeries.

From our study we conclude that addition of Dexamethasone to 0.5% Ropivacaine for interscalene brachial plexus block increases duration of sensory block, motor block as well as duration of analgesia. But there was no difference in onset of sensory and motor block, nor did it Improve the overall quality of block.

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