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Analyzing Efficacy Of 0.75% Ropivacaine Hydrochloride through Supraclavicular Block among Orthopedic Surgeries.

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Abstract: *One of the commonest injuries particularly with growing industralization as well as mechanization of agriculture is upper arm injury. For such injuries various types of Brachial plexus blocks are in use now-a-days, Supraclavicular Block is a better approach. The present study has undertaken to know the efficacy of ropivacaine through Supraclavicular block among Orthopedic upper limb surgeries mainly by notifying the onset and duration of sensory and motor blockade. 35 patients undergoing orthopedic surgeries were selected for doing this study, belonging to ASA grade 1 and 2 between 20-60 years age of either sex were included in the study. Under aseptic precautions either Ropivacaine was injected into supraclavicular brachial plexus. Onset and duration of sensory blockade was observed after injecting Ropivacaine by noting pin prick sensation, it was 11.95±7.4 and 589.1±131.5 respectively. Motor blockade onset and duration was assessed by looking for loss of finger movements, it was 15.45±2.4 and 473.8±187.2. Duration of Analgesia after giving ropivacaine injection was 654.13±176.12. Among various complications, only Tachycardia has noted in two cases after injecting ropivacaine.*

Keywords: *Motor Blockade, Ropivacaine Hydrochloride, Sensory Blockade, Supraclavicular Block*

I. Introduction

Regional Anesthesia may be defined as the application of a local anesthetic agent to a nerve trunk far away from the effected region to block the nerve impulses reversibly to the part innervated. The interruption of impulses may be sensory, motor or both.

The need for regional anesthesia increased particularly in developing countries because of the lack of trained personnel in general anesthesia, lack of proper monitoring devices and apart from it, it has an advantage over general anesthesia in certain situations like a patient who has systemic diseases, its minimal influence on cardio respiratory status and its inexpensiveness.

Brachial plexus block anesthesia is one of the types of regional anesthesia namely, a nerve conduction block. The frequent use of continuous spinal technique suggested the use of similar procedure for brachial plexus block. Brachial plexus block can be employed in soft tissue surgery, bone surgery and in plastic surgery.

Ropivacaine has potential of long duration of action and it is a pure S-enantiomer only. Ropivacaine cause failure of sodium ion channel permeability to slow the rate of depolarization, such that threshold potential is not reached and thus action potential is not propagate.

Ropivacaine has been shown to have an increased therapeutic index (ratio between local anesthetic and toxic effects) in laboratory, animal and human volunteer studies [1-4]. Ropivacaine has lesser toxicity and high plasma protein binding capacity [5,6] when compared to other drugs like bupivacaine, tetracaine. Ropivaciane has been reported to be a suitable local anesthetics for brachial plexus block at doses of 2.5-2.6 mg/kg without evidence of central nervous system or cardiovascualr system toxicity [7].

One of the commonest injuries particularly with growing industralization as well as mechanization of agriculture is upper arm injury. This is the reason, Supraclavicular block approach has selected to do this study.

The present study has undertaken to know the efficacy of ropivacaine through Supraclavicular block among orthopedic upper limb surgeries mainly by notifying the onset and duration of sensory and motor blockade.

II. Materials And Methods

This is a observational study done for one year (2010) in Department of anesthesiology, Government General Hospital, Siddhartha Medical College, Vijayawada. Ethical Committee has approved for doing this study. Informed consent has taken from all the patients.

35 patients undergoing orthopedic surgeries were selected for doing this study, belonging to ASA grade 1 and 2 between 20-60 years age of either sex were included in the study. Patients with local infection, pneumothorax, peripheral neuropathy, severe liver or kidney disease, history of previous adverse reactions to local anesthetic drugs and coagulopathy.

Patients were explained about the procedure and its benefits and disadvantages. All the patients were pre medicated night before the surgery with tab. Diazepam 10 mg, and tab. Ranitidine 150 mg.

Before injecting 0.75% Ropivacaine, the patient was explained about the accidental paraesthesias that may occur during the introduction of needle. Under aseptic precautions either Ropivacaine was injected into supraclavicular brachial plexus.

As soon as the block was given patient were kept comfortably with arm by the side. Electrocardiogram, blood pressure, pulse rate, respiratory rate and arterial saturation were noted every 5 minutes. Signs for drug toxicity were observed. Onset of sensory, motor block were tested every one minute interval for a maximum of 35 minutes. All patients were under observation for 24 hours. All the observed characteristics were analyzed.

III. Results

A total of 35 cases of patients were included in this study. Patients with ASA grade I and II with the age group of 20 to 60 years were studied.

Male predominance was noticed among patients undergoing orthopedic upper limb surgeries about 74.2%. Most of the studied patients were in the age group of 20-30 years (Table No:1).

Onset and duration of sensory blockade was observed after injecting Ropivacaine by noting pin prick sensation, it was 11.95±7.4 and 589.1±131.5 respectively. Motor blockade onset and duration was assessed by looking for loss of finger movements, it was 15.45±2.4 and 473.8±187.2 (Fig.1).

Duration of Analgesia after giving ropivacaine injection was 654.13±176.12. Quality of blockade was assessed among various orthopedic surgeries (Table No:2). Quality of blockade was expressed in terms of complete blockade, incomplete blockade and failure. Most of the surgeries got complete blockade with ropivacaine about 60%. Only 3(8.5%) failure cases were noted in 35 patients, majority was both bone fractures of forearm.

About 26 patients needed further supplementation of drugs along with ropivacaine. Drug supplemented was Inj. pentazocin 30mg and Inj. promethazine 25 mg

Only Tachycardia has noted in two cases after injecting ropivacaine, no other complication was noted. These patients were supplemented with inj.midazolam 1.5mg.

IV. Figures And Tables

Table no:1 Age and Sex distribution of Study group

Age in years	Males	% of Males	Females	% of Females	Total	Percentage
20-30	14	53.8	5	55.5	19	54.2
31-40	4	15.3	2	22.2	6	17.1
41-50	7	26.9	2	22.2	9	25.7
51-60	1	3.8	0	0	1	2.8
Total	26	100	9	100	35	100

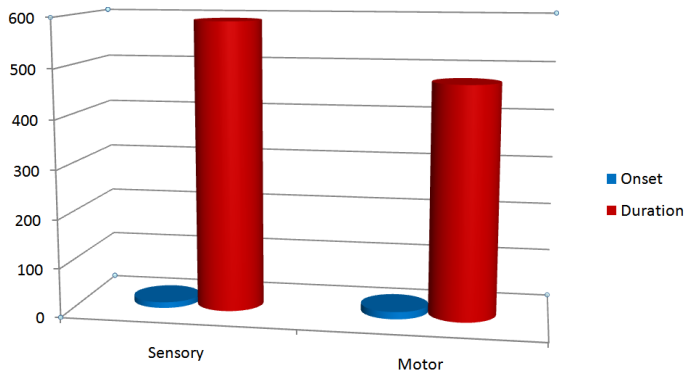

Fig No:1 Onset, Duration of Sensory and Motor Blockade

Table No:2 Assessment of Quality of Blockade among orthopedic upper limb surgeries

Diagnosis & treatment	Quality of blockade		
	Complete	Incomplete	Failures
# BB, Forearm - ORIF DC plating Radius & Ulna	6	2	1
# dislocation of MCP-ORIF K-wire fixation	5	2	0
# Olecranon - ORIF recon plating	2	0	0
Galazzezia # - ORIF DC plating of Radius	1	1	1
# Ulna - ORIF DCP	2	4	0
# Radius - ORIF DCP	2	1	0
Benett # - ORIF K-wire fixation	1	0	0
Colles # - ORIF + Ellis plating	2	1	0

# BB forearm - ORIF DCP and bone grafting	0	0	1
Total	21	11	3

BB- Both bone fracture; ORIF - Open Reduction Internal Fixation; DCP - Dynamic Compression Plate.

V. Discussion

The selection of optimal long acting local anesthetic and concentration for brachial plexus block must take into consideration the available anesthetics, the time to onset, duration of blockade and side effects of each drug and dose. A drug that has a fast onset, long duration and a minimal toxicity profile could be an advantage. Ropivacaine offers a good advantage for long acting local neural blockade.

Among nerve conduction blocks the axillary, infraclavicular and paravertebral routes were found to be more difficult than and not as satisfactory as supraclavicualr route. Abbas A [8] described a single injection technique of blocking the plexus through supraclavicular approach.

Onset and duration of sensory blockade was observed after injecting Ropivacaine by noting pin prick sensation, it was 11.95±7.4 mins and 589.1±131.5mins respectively. Motor blockade onset and duration was assessed by looking for loss of finger movements, it was 15.45±2.4 mins and 473.8±187.2 mins. Duration of Analgesia after giving ropivacaine injection was 654.13±176.12 mins.

Jigisha PB et al [9] reported that mean onset time of sensory block and motor block was 7.4 min and 10.6 min respectively, where ropivacaine has faster onset of time. Hickey R et al [10] and Klein et al [11] also documented that man onset of sensory and motor block was <6 min and 7-9 min respectively. Mean time of Onset and duration of sensory and motor block varies from study to study, this is may be because of various concentration of ropivacaine or different routes of nerve blockade.

Many studies observed that giving Brachial plexus block with ropivacaine provides faster onset of sensory and motor block, good postoperative analgesia and lesser complications when compared to bupivacaine [12-14]. So the present study has done on ropivacaine to know the efficacy of sensory and motor blockade among orthopedic upper limb surgeries.

In this study, Quality of blockade was expressed in terms of complete blockade, incomplete blockade and failure. Most of the surgeries got complete blockade with ropivacaine about 60%. Only 3(8.5%) failure cases were noted in 35 patients, majority was both bone fractures of forearm

Various studies has done on different concentrations of ropivacaine as a local anesthetics . Hickey R et al [7] suggested that no evidence of central nervous system or cardiovascular toxicity was reported with 2.5-2.6 mg/kg of ropivacaine. Upper extremity surgeries was acceptable clinically with Low dose Ropivacaine under general anesthesia [15]. The use of the conventional dose of ropivacaine would have increased the occurrence of adverse events, such as prolonged numbness and delayed sensory and motor recovery, even though a higher dose of ropivacaine or bupivacaine (0.5% at 30 mL) has not been reported to induce any critical events when used for BPB [16,17]. In the present study 0.75% ropivacaine used as a local anesthetic, no complications were noted other than tachycardia.

Peer and colleagues compared the pharmacokinetic profile of ropivacaine for brachial plexus blockade in healthy patients suffering from uremia and showed that even high doses of ropivacaine were well tolerated by patients with renal failure. Himat Vaghadia et al documented that no patients in ropivacaine group developed convulsions but had two failures and supplemented with general anesthesia. Stephen M Klein et al reported resuscitation after ropivacaine induced ventricular fibrillation was sucessful.

VI. Conclusion

Ropivacaine has a better advantage over many other local anesthetics like bupivacaine, lignocaine. AMong various brachial plexus approach supraclavicular is better approach. Ropivacaine has a faster onset of sensory and motor blockade and higher duration of analgesia. Less failure cases was noted. Among postoperative complications only tachycardia was observed. 0.75% Ropivacaine is the better drug as a long acting local anesthetic for all bone surgeries.

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