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Comparision of Ropivacaine Plus Magnesium Sulphate With Plain Ropivacaine In Ultrasound Guided Supraclavicular Brachial Plexus Block A Randomized Controlled Study"

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Abstract
AIM OF THE STUDY
To compare the effect of addition of magnesium sulfate with Ropivacaine versus plain Ropivacaine under ultrasound guided supraclavicular block for patients undergoing elective upperlimb surgeries a randomized control study
MATERIALS AND METHODS:
A total of 40 patients, divided randomly by computer allocated numbers into two equal groups. Group I receiving 20 ml of 0.75% Ropivacaine + 0.5 ml Magnesium sulphate Group II receiving 20 ml of 0.75% Ropivacaine + 0.5 ml saline. These patients were posted for elective upper limb surgeries. Onset, duration of sensory and motor blockade, perioperative hemodynamics, VAS score 0, 2,4,6,12,24 hours and for any complications, were monitored
OBSERVATION AND RESULTS
In group I, the mean duration of motor blockade was 422.70±21.24 minutes and in group II was 270.60±37.88 minutes, the P value was <0.001 and is statistically significant. VAS score at 6 hours in group I, was 0.0 and 1.25±0.79 in group II and the P value was <0.001, which is statistically significant. Demand analgesia in group I was 618.50±27.00 minutes vs. 401.50±57.33 minutes and the P value was <0.001 and was statistically significant. Perioperative, postoperative hemodynamics was not significant for both the groups.
CONCLUSION:
The addition of magnesium has proved to be a better adjuvant in this study, since it prolonged the duration of sensory and motor blockade significantly. Hence magnesium sulphate added to Ropivacaine for ultrasound guided supraclavicular brachial plexus block provides better postoperative analgesia.
Keywords; *Ropivacaine, MgSO4 adjuvant, USG guided supraclavicular block duration*

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I. Introduction

Regional anaesthesia allows the patient to remain conscious and can avoid airway manipulation and ventilation management, less interference with the vital centres and fewer side effects. In the last decade, image guided peripheral nerve block with ultrasound has become the norm of anaesthesiologists. To increase the efficacy of peripheral nerve blocks, various adjuvants (fentanyl, morphine,dexmeditomidine, dexamethasone)have been added.

AIM OF STUDY
To compare the effect of addition of magnesium sulfate with Ropivacaine versus plain Ropivacaine under ultrasound guided supraclavicular block for patients undergoing elective upperlimb surgeries a randomized control study
SAMPLE SIZE
Formula used to calculate sample size comes around 18 patients in each and adding 10% drop out rate added comes to 20 patients in each group

STUDY PERIOD: January 2019 to august 2019 at Coimbatore medical college hospital.

INCLUSION CRITERIA

1.Age group 20-60 years
2.ASA physical status I,II of both sex
3.Elective surgery of upper extremity ,< 3hrs duration

EXCLUSION CRITERIA

1. ASA III, IV patients
2. Patients with coagulopathy
3. Psychiatric illness
4. Peripheral neuropathy
5. Patient refusal , allergy to Ropivacaine
6. Not meeting the inclusion criteria

II. Materials And Methods

After obtaining institutional ethical committee approval and getting informed consent from the patients were fasted overnight had been sited 18G venflon iv fluids started were given xylocaine test dose and hooked on to routine monitors in OT (ASAI,II) who are undergoing elective upper limb surgeries (hand, elbow and forearm) were randomly allocated by computer into Ropivacine with magnesium Group(I) and Ropivacine Group(II) . . All study patients were administered USG guided supraclavicular block with Ropivacine 20ml + 0.5 ml MgSO4(150 mg) and 20 ml of Ropivacine +0.5 ml saline.

ROPIVACAINE

Ropivacaine was developed after bupivacaine was noted to be associated with cardiac arrest, particularly in pregnant women. Ropivacaine was found to have less cardio toxicity than bupivacaine in animal models. Ropivacaine hydrochloride is a local anaesthetic belonging to the amino amide group. The name Ropivacaine refers to both the racemate and the marketed S- enantiomer. Ropivacaine HCl is chemically described as S-[-]-1-propyl-2,6- ipecoloxylidide hydrochloride monohydrate. Ropivacaine blocks the generation and conduction of nerve impulses, presumably by increasing the threshold for electrical excitation in the nerve, by slowing the propagation of nerve impulse, and by reducing the rate of rise of the action potential. Ropivacaine is extensively metabolised in the liver and excreted in the urine. The mean half-life is 1.8 ± 0.7 hrs. After intravascular administration and 4.2±1 h after epidural administration. Ropivacaine is indicated for regional anaesthesia and acute pain management.

Contraindication: hypersensitivity to amide group which is rare.

MAGNESIUM SULPHATE:

Magnesium sulfate is an inorganic salt with the formula MgS04.7H20. Magnesium is the second most plentiful cation of the intracellular fluids. It is essential for the activity of many enzyme systems and plays an important role with regard to neurochemical transmission and muscular excitability.

Technique: For the supraclavicular block, patient is positioned by lying flat with head turned to 40 degrees to opposite side and arm by side of patient. After painting and draping the ultrasound probe of 10-15 MHZ is used to visualize the brachial plexus. The ultrasound probe is positioned in supraclavicular fossa and moved laterally in order to locate subclavian artery. Once the artery is visualized the area lateral and superficial to it is explored until plexus is visualized as honeycomb appearance. The first rib and pleura should be seen clearly. The needle is entered by the in plane technique. Distinct pop is felt and seen when sheath is entered. Then assistant is asked to aspirate and inject the local anaesthetic. The spread of local anaesthetic can be immediately visualized by USG. The VAS score, hemodynamics, demand analgesia are followed for 24 hours.

The distribution of patients as follows.

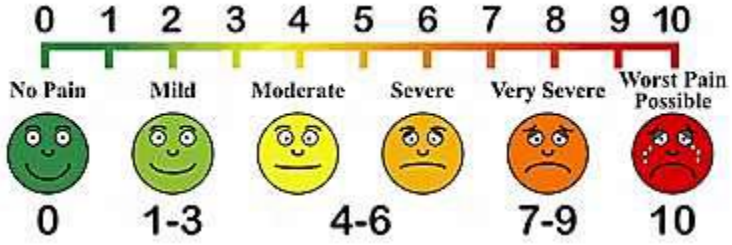
DIAGNOSIS	Ropivacaine+MgSO4		Ropivacaine+saline	
	number	percentage	number	percentage
# bb forearm	4	20 %	2	10 %
# radius	4	20 %	3	15 %
# ulna	0	0 %	2	10 %
Contracture release	2	10 %	3	15 %
crush injury	2	10 %	2	10 %
Flexor injury	0	0 %	1	5 %
galazzei #	1	5 %	0	0 %
forearm injury	1	5 %	0	0 %
raw area	5	25 %	6	30 %

Tendon injury	1	5 %	2	10 %

Procedure undergone includes wound debridement , exploration , flap cover, open reduction and internal fixation(ORIF) and SSG

Parameters studied include intraoperative, postoperative hemodynamics, onset of sensory and motor block, duration of block, any complication , intraoperative , postoperative VAS score, time for postoperative demand (rescue) analgesia and no of analgesia required in 24 hours.

VAS SCORE



III. Observation And Results

DURATION OF SENSORY AND MOTOR BLOCKADE
AND USE OF RESCUE ANALGESIC AMONG THE TWO GROUPS

DURATION	ROPIVACINE+MGS04	ROPIVACINE+NS	P VALUE
SENSORY block	519.50+29.64 mins	341.0+48.55 mins	<0.001
MOTOR block	422.70+21.24 mins	270.60+37.88 mins	<0.001
RESCUE ANALGESIA	618.50+27.00 mins	401.50+57.33 mins	<0.001

In group I, the mean duration of sensory blockade was 519.50±29.64 mins and in group II, the mean duration was 341.0±48.55 minutes. The P value was <0.001 and was statistically significant.

In group I, the mean duration of motor blockade was 422.70±21.24 minutes in group II was 270.60±37.88 minutes The P value was <0.001 and was statistically significant.

VAS SCORE AND RESCUE ANALGESIC USED

Parameters	Ropivacaine+ MgSO4	Ropivacaine+NS	P value
VAS at 6 hour	0	1.25+0.79	<0.001
VAS at 9 hour	0.95+0.22	3.0+0.0	<0.001
VAS at 12 hour	3.0+0.0	3.0+0.0	NA
Total rescue analgesic used	150+0.0 mg diclofenac	210+30.78 mg diclofenac	<0.001

The VAS score at 6 hours in group I, was 0.0±0.0 and the VAS score at 6 hours in group II, was 1.25±0.79 and the P value was <0.001, which is statistically significant. The VAS score at 6 hours in group I, was also shows that those patients did not have pain.

The VAS score at 9 hours in group I, was 0.95±0.22 and the VAS score at 9 hours in group II, was 3.0±0.0 and the P value was <0.001, P value was <0.001, which is statistically significant.

The VAS score at 12 hours in group I, was 3.0±0.0 and the VAS score at 12 hours in group II, was 3.0±0.0 and the P value was not applicable, since the values are the same.

In group I, **the time** at which rescue analgesic given was 618.50±27.00 minutes and in group II, the time at given was 401.50±57.33 minutes and the P value was <0.001 and was statistically significant.

The rescue analgesic usage for 24 hours in group I, was 150 ± 0.0 mg of Inj. Diclofenac sodium and the rescue analgesic usage for 24 hours in group II, was 210 ± 30.78 mg and was statistically significant. The usage of rescue analgesic was lesser in the magnesium group which is attributed to the prolonged duration of sensory block by magnesium.

In group I, the mean systolic BP was 122.75±5.14 mmHg and in group II, the mean systolic BP was 124.30±4.82 mmHg with a P value was 0.332 which is statistically insignificant. The diastolic BP, pulse rate, spo2 were also not significant

IV. Discussion

Ropivacaine is a safe, long acting of anaesthesiologist. Ropivacaine was used along with an adjuvant magnesium sulphate which is cheaper and devoid of side effects. Vershaw verma etal [1] showed in their study.. Magnesium as an adjuvant enhances the analgesic properties of established analgesics. It blocks the NMDA receptors in the CNS, it exert its effect. The primary hypothesis for the analgesic properties of magnesium on peripheral nerves is surface charge theory. Akutagawa et al , showed that modulation of the external magnesium ion concentration bathing a nerve bundle resulted in enhancement of the nerve blockade due to local anaesthetics.

Magnesium sulphate added to local anaesthetics for ultrasound guided supraclavicular brachial plexus block provides better postoperative analgesia. Kasturi and Mukherjee [8] also proves the same.

V. Conclusion

1.Magnesium sulphate is a cheap promising adjuvant ,when combined with Ropivacaine in USG guided supraclavicular block.

2.The magnesium has proved to be a better adjuvant in this study, since it prolonged the duration of sensory and motor blockade significantly (upto 9hours) in our study.

3.After 12 hours there was no difference in sensory and motor block between the two groups as demonstrated by vas score.

4. No serious adverse effects are noted in this study

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