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ORIGINAL ARTICLE

COMPARISON OF THE EFFECTS OF LIGNOCAINE, LIGNOCAINE PLUS PARACETAMOL, LIGNOCAINE PLUS TRAMADOL IN INTRAVENOUS REGIONAL ANESTHESIA

Amar Parkash Kataria[1], Mandip Kaur[2], Anju Bala[3], Harcharan Singh[4], Jugal Kumar[5], Radhe Sharan[6]

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ABSTRACT: INTRODUCTION: Intravenous regional anesthesia is simple, effective technique for upper limb orthopedic surgeries however adjuncts are required to improve its efficacy. **AIMS:** To compare the effects of adding paracetamol and tramadol as adjunct to lignocaine in intravenous regional anesthesia on onset and regression of sensory and motor blockage, analgesic requirements, duration of analgesia and side effects. **PATIENTS AND METHOD:** A randomized study was carried out on ninety patients who were undergoing upper limb orthopedic surgery, divided in to three groups: group I (L) received 3mg/kg lignocaine 0.5% diluted up to 40 ml with normal saline, group II (LP) received 3mg/kg lignocaine 0.5% with 300mg paracetamol diluted up to 40 ml with normal saline, group III (LT) received 3mg/kg lignocaine 0.5% with tramadol 100mg diluted up to 40 ml with normal saline. Sensory and motor block onset, regression time, intraoperatively and postoperatively VAS score, duration of analgesia, total analgesic consumption in first 24 hr and side effects noted**.** Analysis of data based on chi square test and post hoc test. P value < 0.05 considered significant. **RESULTS:** A total of ninety patients were included in study. The mean age of patients in group I was 32.60±14.8 years, in group II was41.67±16.6 years while in group III was 38.73±13.3 years. Tramadol with lignocaine was found to be significantly better as compared to paracetamol and lignocaine alone had early onset and delayed offset of sensory and motor block. The tramadol group required significantly less number of rescue analgesics in first 24 hours as compared to the other two groups. **CONCLUSION:** We concluded that as adjuvant tramadol group was accompanied by more rapid onset, longer duration of analgesia provides better quality of anesthesia and lesser number of patients require rescue analgesia intraoperatively as well as postoperatively without any significant side effects.

KEYWORDS: Intravenous regional anesthesia, Tramadol, Paracetamol, Postoperative Pain.

INTRODUCTION: IVRA was first described by August Bier in 1908 for short operative procedures on upper arm surgeries.[1] It became popular in 1960s when lidocaine was used.[2] It is simple to administer, cost effective, reliable[3] and has minimal interference with the normal metabolic processes of the body. It lacks the complications associated with the general anesthesia. Limitations of IVRA include slow onset, local anesthetic toxicity, poor muscle relaxation, tourniquet pain, minimal post-operative analgesia.[4] To remove these limitations various adjuvants has been added like fentanyl, tramadol, clonidine, dexamethasone, NSAIDS like ketorolac,[5] acetyl-salicylate, and muscle relaxants.[6]

Tramadol[7] acts at the μ-opioid receptors, releases serotonin and in addition it interferes with neurotransmitter reuptake. Paracetamol[8] inhibits prostaglandin synthesis and by modulating cannabinoid receptors exhibits local antinociceptive effects.

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The study have been done to compare and evaluate tramadol or paracetamol to lignocaine in IVRA, on onset, regression time for sensory and motor block, intra-operative as well as post-operative analgesia.

MATERIAL AND METHODS: After approval of the ethical committee, a prospective, randomized double blind study done on 90 patients of age 18-65 years of ASA grade I, II, III were divided in to three groups randomly of 30 each after taking written informed consent. Lignocaine used was preservative free.

Group I (L): 3 mg/kg lignocaine 0.5% diluted up to 40 ml with normal saline.

Group II (LP): 3 mg/kg lignocaine 0.5% with 300 mg paracetamol diluted up to 40 ml with normal saline.

Group III (LT): 3 mg/kg lignocaine 0.5% with 100 mg tramadol diluted up to 40 ml with normal saline.

After confirming fasting, pre-operative investigations, pre- anesthetic check-up patients were taken up for surgery. Patients with coagulation disorders like sickle cell disease, Raynaud's disease and history of any drug allergy were excluded from the study. A randomization list was generated and identical syringes containing each drug were prepared by personnel blinded to study. No premedication as analgesics, sedatives or antisialogogues was given before operation.

After assessing baseline vitals as noninvasive blood pressure, ECG, pulse rate, peripheral oxygen saturation, one cannula was inserted on operative hand and other on the opposite hand for injection of drugs and crystalloid infusion. The operative arm was exsanguinated with esmarch bandage. After applying pneumatic"double" tourniquet the proximal cuff was inflated to 250 mm Hg. Before injecting local anesthetic by inspection, by absence of radial pulse, circulatory isolation of arm was confirmed. Then patients were injected with one of the study drug.

After injection sensory block was assessed in sensory distribution of median, ulnar, radial nerves of hand by pinprick method. Motor function was assessed by flexion and extension of wrist and fingers of the patients. After achieving sensory and motor block the distal tourniquet was inflated to 250 mm Hg then proximal tourniquet was deflated, and operation was started.

After tourniquet application tourniquet pain was assessed at 10 min intervals by visual analogue scale (0 = no pain and 10 = worst pain). If VAS >3 inj butorphanol 0.5 mg was given and requirement for rescue analgesic doses was recorded.

The tourniquet was neither deflated before 30 min nor inflated more than 90 min of local anesthetic injection. After the completion of surgery, the tourniquet deflation was done by cyclic deflation technique. Sensory and motor block recovery time was noted.

Postoperatively VAS score was measured for surgical pain every hourly after tourniquet deflation until 4 hours than 4 hourly till 12 hours and at 24 hours. Rescue analgesia in terms of inj diclofenac 75 mg IM was given if VAS > 3. Total number of rescue analgesic required in first 24 hours were recorded. Intraopertatively as well as postoperatively any local or systemic complications noted.

Statistical analysis was performed with SPSS 17.0 version. Statistical analysis for comparisons with 'chi-square' test and ' post-hoc' test was done. P value of <0.05 assumed significant. Based on duration of analgesia power of study was > 90%.

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RESULTS: All the groups were comparable with regard to age, sex, weight, ASA, duration of surgery. There was no significant difference among groups when compared for MAP, pulse rate, oxygen saturation, sedation score intraoperatively as well as post-operatively.

The onset of sensory and motor block was significantly lower in group LT and group LP than group L (<0.001). The recovery of sensory as well as motor block was delayed in group LT and group LP than group L (<0.001). There was significant difference among group LP and group LT when compared for onset as well as offset of sensory and motor block.

Intraoperatively VAS score was high in lignocaine group at 20 min, 30 min, 40 min, 50 min. Intraoperatively the total number of doses of rescue analgesic was significantly more in group L than group LP and group LT respectively. Postoperatively VAS score was significantly lower at 30 min, 1 hour, 2 hours, in LT group than group LP and group L. The total number of inj diclofenac use was less in group LT and group LP than group L. Total duration of analgesia was significantly higher in group LT than group LP and group L. There were no significant side effects seen in three groups.

DISCUSSION: Surgical trauma causes mechanical damage to nerve endings which results in postoperative pain. Due to inflammation release of endogenous chemical mediators occur which cause activation of nociceptors. If these nociceptive pathways blocked prior to surgical stimuli, the changes will be diminished or prevented. IVRA, a venous technique where anesthetics acts at the peripheral nerve endings and anaesthetizes the major nerve trunks, therefore it could be described as "peripheral nerve block". NSAIDS, in addition to lignocaine minimizes the activation of peripheral nociceptors.

The current study concluded that addition of either tramadol or paracetamol to lidocaine in IVRA lead to early onset as well as delayed offset of sensory and motor block. In Yasser M et al study[9] using 100 mg tramadol with 3 mg/kg 0.5% lidocaine in IVRA showed significantly early onset time and delayed recovery time of sensory and motor block than lignocaine group. In Sen et al[10] study on addition of paracetamol to lignocaine 3 mg/kg in IVRA lead to early onset of motor block and delayed offset of sensory and motor block than lignocaine group. Our results were in accordance with results of these studies.

In present study in tramadol group and paracetamol group the requirement of rescue analgesic was less intraoperatively and postoperatively than lignocaine group. Tramadol group has lower VAS score than paracetamol and lignocaine group postoperatively. Chakole V et al[11] conducted a study with lignocaine 0.5% and tramadol 100 mg demonstrated that postoperatively consumption of rescue analgesic doses was significantly lower in tramadol group than lignocaine group. Ko MJ et al[12] study concluded that addition of acetaminophen to lidocaine for IVRA reduces postoperative analgesic consumption. The results were in accordance with our study.

Duration of analgesia was significantly higher in tramadol group than paracetamol and lignocaine group. Dubey et al[13] showed on addition of lidocaine to tramadol result in prolonged duration of analgesia. Goel et al[14] also demonstrated tramadol in addition to lidocaine result in significantly longer pain free interval than lignocaine group. The results were in accordance with our study.

CONCLUSION: Addition of tramadol 100 mg or paracetamol 300 mg to lignocaine 3 mg/kg 0.5% shortens the onset time of sensory and motor block, prolongs the recovery of sensory and motor

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block. However, tramadol group was accompanied by more rapid onset, longer duration of analgesia provides better quality of anaesthesia and lesser no. of patients require rescue analgesia intra-operatively as well as post-operatively.

	Group I (L)	Group II (LP)	Group III (LT)	P value
Age (yr)	32.60±14.8	41.67±16.6	38.73±13.3	0.62
Sex (M:F)	23:7	20:10	23:7	0.60
Weight (kg)	67.0±5.6	68.87±4.9	68.80±5.1	0.3
ASA (Mean ± SD)	1.57±0.67	1.60±0.62	1.63±0.61	0.92
Duration of surgery (min)	41.63±7.2	40.57±7.8	40.57±7.9	0.82

Table 1: Demographic Data

p> 0.05; NS.

	Group I (L)	GroupII (LP)	GroupIII (LT)	p value
Sensory block onset(min)	4.88±0.46	4.35±0.43	2.25±0.43	0.000*
Sensory block recovery(min)	4.93±0.52	7.1±0.80	7.80±0.61	0.000*
Motor block onset(min)	11.28±0.48	7.2±0.59	4.76±0.48	0.000*
Motor block recovery(min)	4.91±0.45	7.1±0.59	9.56±0.72	0.000*
Intraoperative analgesic consumption (Mean±SD)	0.47±0.62	0.1±0.34	0.07±0.25	0.001*
Postoperative analgesic Consumption (Mean±SD)	3.20±0.40	2.2±0.4	1.60±0.49	0.001*
Duration of postoperative analgesia (in hr)	1.43±0.56	1.90±0.60	8.00±2.77	0.000*

Table 2: Sensory and Motor Block onset and recovery time.

p> 0.05; NS: *p< 0.05;S; p<0.001;HS

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Time	Group I (L) Mean±SD	Group II (LP) Mean±SD	Group III (LT) Mean±SD	p value
20 min	0.97±0.96	0.27±0.45*	0.2±0.45*	0.000*
30 min	2.07±0.58	1.47±0.93*	1.33±0.66*	0.01*
40 min	2.78±0.69	1.79±0.72*	1.75±0.67*	0.000*
50 min	3.20±0.67	2.44±0.72*	2.38±0.71*	0.004*

Table 3: Intraoperative VAS score

p> 0.05; NS: *p< 0.05; S;* p<0.001; HS.

Time	Group I (L) Mean±SD	Group II (LP) Mean±SD	Group III (LT) Mean±SD	p value
30 min	1.63±0.49	0.43±0.72*	0	0.000*
1 hr	3.53±0.6	1.73±1.43*	1.13±0.7*	0.000*
2 hrs	3.33±0.54	3.27±1.0*	2.10±0.4*	0.000*
3 hrs	2.37±0.85	2.43±0.72	2.27±0.45	0.64
4 hrs	2.67±0.60	2.67±0.54	2.77±0.93	0.82
8 hrs	3.63±0.71	3.40±0.85	3.03±1.1*	0.04*
12 hrs	3.13±0.86	3.13±0.97	3.03±0.9	0.89
24hrs	3.20±0.66	2.97±0.32	2.9±0.18	0.06

Table 4: Postoperative VAS score

p> 0.05; NS: *p< 0.05; S;* p<0.001;HS

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AUTHORS:

1. Amar Parkash Kataria
2. Mandip Kaur
3. Anju Bala
4. Harcharan Singh
5. Jugal Kumar
6. Radhe Sharan

PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.
2. Junior Resident, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.
3. Senior Resident, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.
4. Associate Professor, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.
5. Senior Resident, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.
6. Associate Professor, Department of Anaesthesiology & Intensive Care Unit, Government Medical College, Amritsar.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Mandip Kaur,
Vill. Daulatpura,
P. O. Jhanduke,
Bathinda, Punjab.
E-mail: drmandip24@gmail.com

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