ORIGINAL ARTICLE

Lignocaine Alone Vs Lignocaine plus Ketorolac in Reducing Perioperative Pain in Intravenous Regional Anesthesia

Kiran Ghori[1], Mirza Sijeel Ahmad[2*], Abu Sufyan[3], Tarique Ahmed Maka[4]

ABSTRACT

Objective: To compare the efficacy lignocaine alone with lignocaine plus ketorolac in intravenous regional anesthesia technique in terms of mean pain and time for analgesia.

Study Design: Randomized controlled trial.

Place and Duration of Study: The study was carried out at Department of Anesthesia, KRL Hospital, Islamabad from April 2017 to October 2017.

Materials and Methods: Sixty consecutive patients undergoing ambulatory hand/forearm surgery, who fulfilled inclusion criteria. They were divided into two equal groups of 30 patients in each. In "Group A" Lignocaine only and in "Group B" Lignocaine plus ketorolac was used for intravenous regional anesthesia (IVRA).

Results: Pain relief was better in Group B as shown by comparison of pain in Group A at 10, 20, 30, 40 and 60 minutes was as 0.13±0.35 v/s 0.27±0.52, *p* value was 0.24, 0.23±0.43 v/s 1.60±0.50, *p* value was 0.000, 1.27±0.45 v/s 1.53±0.51, *p* value was 0.03, 1.23±0.43 v/s 2.67±0.48, *p* value was 0.0001 and 1.27±0.45 v/s 3.53±0.68, *p* value was 0.0001 respectively.

Conclusion: Lignocaine plus ketorolac in intravenous regional anesthesia technique was significantly better when compared with lignocaine alone in terms of mean pain and time for analgesia.

Key Words: *Intravenous Regional Anesthesia, Lignocaine Alone, Lignocaine Plus Ketorolac, Perioperative Pain.*

How to cite this: *Ghori K, Ahmad MS, Sufyan A, Maka TA. Lignocaine Alone Vs Lignocaine plus Ketorolac in Reducing Perioperative Pain in Intravenous Regional Anesthesia. Life and Science. 2022; 3(3): 105-109. doi: http://doi.org/10.37185/LnS.1.1.204*

Introduction

Intravenous regional anesthesia (IVRA) is commonly used technique for ambulatory upper limb surgeries and reduction of closed fracture, because of rapid induction along with muscle relaxation and fast recovery.[1] Lignocaine 0.5% is probably the local anesthetic most chosen for this technique because it has intermediate duration of action with rapid onset and topical anesthetic activity.[2] The inability to provide effective postoperative analgesia is one of the major disadvantages of IVRA. Control of postoperative pain is a very important factor in evaluating an adjuvant to anesthetic in IVRA as tourniquet pain is limiting factor in long duration procedures. Several agents such as opioids including morphine and fentanyl, clonidine, and ketorolac, muscle relaxants(cisatracurium), ketamine, and alkalinization by bicarbonate, have been used as adjutants to local anesthetics in IVRA to improve postoperative analgesia and reduce the amount of local anesthetic used.[3]

There is no consensus as to which agent is more effective in reducing perioperative pain. The rationale of this study is to find potent agent that is more effective in reducing perioperative pain.

Materials and Methods

This trial was conducted from 14th April 2017 to 14 October 2017 at Department of Anesthesia of KRL Hospital, Islamabad after taking permission from hospital ethical committee. Sample size collected by

[1]*Department of Anesthesia*
KRL Hospital, Islamabad
[2]*Department of Anesthesia/Surgery*[3]
Combined Military Hospital (CMH), Multan
[4]*Department of ENT*
Combined Military Hospital (CMH), Mangla

Correspondence:
Dr. Mirza Sijeel Ahmad
Consultant, Anesthesia
Combined Military Hospital (CMH), Multan
E-mail: sijeel.ahmad1@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: Apr 24, 2021; Revised: Jan 13, 2022
Accepted: Jun 22, 2022

WHO calculator. Non-probability consecutive sampling was used for data collection. Patients both male and female, undergoing elective or emergency hand or forearm surgeries, between ages 20 years to 50 years, ASA I and ASA II were included in the study. Patients diagnosed with sickle cell disease, Reynaud's disease, scleroderma, known allergy to local anesthetics, severe hypertensive or peripheral vascular disease, local infection, skeletal muscle disorders or Paget's disease, history of fits, cardiac arrhythmia and intravenous regional anesthesia converted to general anesthesia, were excluded in the study.

All Patients (sixty in total) fulfilling the inclusion criteria were briefed about the procedure and informed written consent was taken. Patients were randomly divided in to two groups (30 patients in each group) by lottery method i.e., Group A and Group B. Group A was given lignocaine (40ml of 0.5%) plus 1 ml normal saline only while Group B was given lignocaine (40ml of 0.5%) and ketorolac 1 ml (30mg). Standard monitoring as per protocol was employed throughout the procedure. Similar standard procedure adopted in both groups for administration of regional anesthesia. The patient lied supine and baseline vital signs assessed after selection of suitable vein. Intravenous access in the non-operated extremity was also secured and ECG monitoring applied. Double pneumatic cuffs of the tourniquet were checked for air leaks before placing on padding layer of cotton high on the upper arm and an IV cannula was inserted into a peripheral vein of the operative limb. The proximal cuff was inflated by 50 to 100 mmHg above systolic arterial blood pressure. After reaching the correct pressure, 40ml of 0.5% lignocaine plus 1 ml normal saline was injected slowly via the cannula in Group A and 40ml of 0.5% lignocaine with ketorolac (30 mg) 1 ml was injected via the cannula in Group B.

Sensory block was tested with pinprick cutaneous test and then distal cuff was inflated and proximal cuff was deflated. For statistical purpose highest pain scores were analyzed with visual analogue score in 10 minutes, 20 minutes, 30 minutes, 40 minutes, and 60 minutes after distal tourniquet inflation. Registrar anesthesia recorded the severity of pain. Time for first request of analgesia was also calculated.

Intraoperative and postoperative rescue analgesia was provided with Nalbuphine 2 mg boluses whenever the patient complained of pain with VAS >5.

Data Analysis

All the information including name, age, gender, surgical procedure, duration of procedure and tourniquet time and time for request of first analgesia was recorded on a predesigned Performa. The data was analyzed using SPSS 17. Descriptive statistics such as mean and standard deviation was calculated for age, pain, time for analgesia, duration of procedure. Frequencies were calculated for gender. The pain, time for first analgesia was recorded based on visual analogue scale; was compared using independent sample t- test. *P* value of less than 0.05 or equal to 0.05 was considered statistically significant. Effect modifiers like age, surgical procedure, duration of procedure, gender, ASA (I, II), was controlled by stratification. Post stratification independent sample t-test was applied.

Results

A total of 60 cases (30 in each group) fulfilling the inclusion/exclusion criteria were enrolled to compare the lignocaine alone with lignocaine plus ketorolac in intravenous regional anesthesia technique in terms of mean pain and time for analgesia.

Age distribution showed 20%(n=6) in Group-A and 36.67%(n=11) in Group-B were between 20-35 years of age whereas 80%(n=24) in Group-A and 63.33%(n=19) in Group-B were between 36-50 years of age, mean$\pm$sd was calculated as 37.3$\pm$9.29 years in Group-A and 36.53$\pm$10.16 years in Group-B. Gender distribution showed that 63.33% (n=19) in Group-A and 60% (n=18) in Group-B were male whereas 36.67% (n=11) in Group-A and 40% (n=12) in Group-B were females.

Hand surgery in Group-A was recorded in 30% (n=9) and 20% (n=6) were in Group-B whereas 70% (n=21) in Group-A and 80% (n=24) in Group-B had forearm injury. Mean duration of surgery was 38.10+2.34 minutes in Group-A and 38.47+1.55 minutes in Group-B, *p* value was 0.7.

Mean duration of analgesia was 32.90$\pm$2.92 in Group-A and 721.20$\pm$30.01 in Group-B, *p* value was 0.0001. Table No 1.

Comparison of pain in both groups in Group-A and B at 10, 20, 30, 40 and 60 minutes was as 0.13$\pm$0.35 v/s

Table 1: Duration of Analgesia (n=60)				
Duration of analgesia (minutes)	Group-A (n=30)		Group-B (n=30)	
	Mean	SD	Mean	SD
	32.90	2.92	721.20	30.01

P value=0.0001

0.27±0.52, *p* value was 0.24, 0.23±0.43 v/s 1.60±0.50, *p* value was 0.000, 1.27±0.45 v/s 1.53±0.51, *p* value was 0.03, 1.23±0.43 v/s 2.67±0.48, *p* value was 0.0001 and 1.27±0.45 v/s 3.53±0.68, *p* value was 0.0001 respectively. Table no 2.

Table 2: Comparison of Pain in Both Groups by Using Visual Analogue Score (0-10 VAS) (n=60)					
Pain in both groups (time)	Group A (n=30)		Group B (n=30)		*P* value
	Mean	SD	Mean	SD	
10	0.13	0.35	0.27	0.52	0.24
20	0.23	0.43	1.60	0.50	0.000
30	1.27	0.45	1.53	0.51	0.03
40	1.23	0.43	2.67	0.48	0.0001
60	1.27	0.45	3.53	0.68	0.0001

The data was stratified for age, gender, ASA, and type of surgery in table no 3 and table no 4 respectively.

Table No 3: Stratification for Age Regarding Pain Score (n=60)					
	Age: 20-35 years				
Pain in both groups (time)	Group-A (n=30)		Group-B (n=30)		*P* value
	Mean	SD	Mean	SD	
10	0.08	0.29	0.25	0.58	0.36
20	0.25	0.45	1.56	0.51	0.0001
30	1.33	0.49	1.56	0.51	0.23
40	1.17	0.39	2.69	0.48	0.0001
60	1.25	0.45	3.63	0.62	0.0001
	Age: 36-50 years				
10	0.17	0.38	0.29	0.47	0.43
20	0.22	0.41	1.64	0.50	0.0001
30	1.22	0.43	1.50	0.52	0.10
40	1.26	0.63	1.50	0.52	0.21
60	1.28	0.46	3.43	0.76	0.0001

Discussion

Control of postoperative pain is a very important factor in evaluating an adjuvant to anesthetic in IVRA. This study was planned to compare the effects of lignocaine alone and lignocaine plus ketorolac in intravenous regional anesthesia to improve perioperative analgesia and tourniquet pain.

The findings of our study agree with Hosam A. Atef stated that total dose of analgesia given to patients in 24 hours in the control group was significantly higher

Table 4: Stratification for Gender Regarding Pain Score (n=60)					
	Male				
Pain in both groups (time)	Group-A (n=30)		Group-B (n=30)		*P* value
	Mean	SD	Mean	SD	
10	0.16	0.37	0.28	0.57	0.45
20	0.19	0.37	1.50	0.51	0.0001
30	1.26	0.45	1.39	0.50	0.42
40	1.21	0.42	2.83	0.38	0.0001
60	1.23	0.43	3.67	0.59	0.0001
	Female				
10	0.09	0.30	0.25	0.45	0.33
20	0.36	0.50	1.75	0.45	0.0001
30	1.27	0.47	1.75	0.45	0.02
40	1.47	0.47	2.42	0.51	0.0001
60	1.36	0.50	3.33	0.78	0.0001

than the patients who were given ketorolac as adjuvant with 40ml of 0.5% lignocaine. ketorolac and control group showing VAS at 10,20, 30, 40,50, 60 minutes as on 10 minutes 0, 20 minutes 0 vs 2(0-3) *p* value 0.02, 30 minutes 1(0-1) vs 2(1-3) *p* value 0.01, 40 minutes 1(0-1) vs 3(1-4) *p* value <0.001,50 minutes 1(0-1) vs 3(2-4) *p* value <0.001, 60 minutes 1(0-2) vs 4(2-5) *p* value <0.001. Mean analgesia requirement was 31.5%±10.6 in ketorolac with lignocaine and 735.6±94.8% in lignocaine only.[4] Ismail et al., stated that premedication with 10mg oral melatonin provided anxiolysis, enhanced perioperative analgesia, decreased the intraocular pressure (IOP), and improved the operating conditions during cataract surgery under topical anesthesia.[5] Number of previous studies[6-9] have reported a significantly lower pain scores in the melatonin group compared with the control group. In another clinical study, it was found that a pre-emptive oral dose of 6mg of melatonin reduced the pain scores and pethidine requirements in the first post-operative 24 hours in patients undergoing abdominal surgery.[6]

Two further studies[7,8] Pre-operative oral melatonin 6mg, the night before and 1 hour before surgery, decreased pain scores and tramadol consumption and enhanced sleep quality and sedation scores during the post-operative period in patients undergoing elective prostatectomy. The second study Caumo et al., investigated ASA I/II patients (n=59), who were randomized to receive either oral melatonin (5mg), oral clonidine (100µg) or placebo

both the night before and one hour prior to anesthesia. The melatonin and clonidine groups had lower anxiety scores, lower pain scores and lower morphine consumption in the first 24 hours postoperatively. Ketorolac added to IVRA at a dose up to 20mg reduced tourniquet pain, but the potential of ketorolac in causing a wound hematoma by localized platelet inhibition had not yet been examined by any published Study.[9]

Alyazed M et al showed that the addition of ketorolac or nitroglycerin to lignocaine for IVRA improved the quality of intraoperative and postoperative analgesia. They reported that the nitroglycerin fastened the onset time for sensory and motor block, but ketorolac was superior in delaying the onset of tourniquet pain and prolonging the duration of postoperative analgesia.[10] Modir S et al., in their study compared the analgesic effects of ketorolac and lignocaine, demedetomidine and lignocaine in IVRA. The results of this showed that ketorolac-controlled pain during surgery and pain after tourniquet deflation better in patients.[11] In another comparative study using tramadol and ketorolac in intravenous regional anesthesia concluded that upper arm regional anesthesia with addition of tramadol 500 mg or ketorolac 30mg to 100 mg of lignocaine (40 ml of 0.5%) provide a safe better and effective analgesia both intraoperatively and postoperatively.[12]

Another study conducted on role of addition of dexamethasone and ketorolac in intravenous regional anesthesia to improve tourniquet tolerance and postoperative analgesia in hand and forearm surgery and they found that there was improved tourniquet tolerance and prolonged analgesia less need of analgesic tablets during first 24 hours with addition of dexamethasone and ketorolac in lignocaine.[13] Seyfi S et al., compared analgesic effects of lignocaine ketorolac to lignocaine alone and found that postoperative pain score during first 24 hours after surgery in the ketorolac group was always lower than the lignocaine group. It was indicated that ketorolac group experienced better quality of analgesia than the lignocaine group and amount and duration of pain after opening tourniquet was lower.[14,15]

Conclusion

Lignocaine plus ketorolac in intravenous regional anesthesia technique was significantly better when compared with lignocaine alone in terms of mean pain and time for analgesia.

REFERENCES

1. Hassani E, Mahoori A, Aghdashi MM, Pirnejad H. Evaluating the quality of intravenous regional anaesthesia following adding dexamethasone to lidocaine. Saudi J Anaesth. 2015: 9: 418–21.
2. Asgher M, Ghauri A, Abdullah M, Abassi T. Intravenous regional anesthesia; to compare the analgesic effects of combination of 0.5% lidocaine plus ketorolac in intravenous regional anesthesia technique with those of lidocaine 0.5% alone to prevent postoperative pain. Professional Med J. 2012: 19: 710-14.
3. Hassanein A. Dexmeditomidine versus ketorolac as adjuvants for intravenous regional anesthesia. Ains Shams Journal of Anesthesiology. 2016: 9: 92-8.
4. Atef HM. Melatonin versus Ketorolac as an Adjuvant in Lidocaine Intravenous Regional Anesthesia. Med J Cairo Univ. 2014; 82: 419-25.
5. Ismail SA, Mowafi HA. Melatonin provides anxiolysis, enhances analgesia, decreases intraocular pressure, and promotes better operating conditions during cataract surgery under topical anesthesia. Anesth Analg. 2009; 108: 1146-51.
6. Radwan K, Youssef M, El-Tawdy A, Zeidan M, Kamal N. Melatonin versus Gabapentin. A comparative. 2010.
7. Borazan H, Tuncer S, Yalcin N, Erol A, Otelcioglu S. Effects of preoperative oral melatonin premedication on postoperative analgesia, sleep quality and sedation in patients undergoing elective prostatectomy: A randomized clinical trial. J. Anesth. 2010; 24: 155-60.
8. Caumo W, Torres F, Moreira NL, Auzani JA, Monteiro CA, Londero G, et al. The clinical impact of preoperative melatonin on postoperative outcomes in patients undergoing abdominal hysterectomy. Anesthesia & Analgesia. 2007; 105: 1263-71.
9. Reuben SS, Steinberg RB, Kreitzwr JM, Duprat RM. Intravenous regional anesthesia using lidocaine and ketorolac. Anesth Analg. 1995; 81: 110-13.
10. Elyazed M, Ghaffar M. Nitroglycerine and ketorolac as an adjuvant to lidocaine for intravenous regional anesthesia in patients undergoing forarm and hand surgery: AAMJ: 2014: 12: 154-76.
11. Modir H, Yazdi B, Taubi H, Eraghi MG, Behrouzi A, Modir H. Analgesic effects of ketorolac / lidocaine compared to dexmedetomidine/lidocaine in intravenous regional anesthesia: ATMPH. 2017: 10: 715-20.
12. Suresh T, Gopichand K. Intravenous regional anesthesia using tramadol hydrochloride and ketorolac. SJAMS. 2016: 4: 2762-6.
13. Akram M, Farooqi F, Irshad M, Hassan S, Awais S. Role of addition of dexmethasone and ketorolac to ligonocaine intravenous regional anesthesia (BIER'S BLOCK) to improve tourniquet tolerance and postoperative analgesia in hand and forearm surgery. JPMA. 2015: 65: 127-8.
14. Seyfi S, Banihashem N, Baijani A, Tailiki KH, Daghmehchi M.

Analgesic effects of lidocaine ketorolac compared to lidocaine alone for intravenous regional anesthesia. Caspian J Intern Med: 2018: 9: 32-7.
15. Modir H, Yazdi B, Taubi H, Eraghi MG, Behrouzi A, Modir H. Analgesic effects of ketorolac / lidocaine compared to dexmedetomidine/lidocaine in intravenous regional anesthesia. ATMPH. 2017: 10: 715-20.

……