Original Article

Intravenous Lidocaine Versus Normal Saline in Patients Undergoing Laparoscopic Surgery; A Comparison of Mean Consumption of Postoperative Analgesia Requirement

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Objective: To compare the mean postoperative opioid consumption in patients with and without use of perioperative intravenous lidocaine undergoing laparoscopic surgery

Methods: This Randomized controlled trial was conducted in Department of Anesthesiology, Lahore General Hospital. A total of 100 cases undergoing laparoscopic surgery were included through Non-probability, Purposive sampling.Informed consent and demographic information were obtained. Patients were randomly divided in two equal groups by using lottery method. In group A, patients were given intravenous 1.5mg/kg bolus of lidocaine followed by 2mg/kg/hr infusion of lidocaine till end of procedure and in group B, normal saline was given in same volume to the patients. All surgeries were performed by the same surgical team and most of the procedures were completed within 60 mins. The infusion was continued for one hour to those patients whose surgery was completed earlier than an hour. Postoperative opioid consumption was noted till 24 hours. All the information was recorded on a proforma. Data was entered and analyzed through SPSS 16. Both groups were compared for mean consumption of postoperative opioid by using t-test taking P-value<0.05 as significant.

Results: In this study, the mean age of patients was 49.34±10.30 years. Out of 100 patients, there were 20 (20%) male and 80 (80%) females.In lidocaine group, the total mean opioid consumption during 24 hours after surgery was 81.80±17.01mg whereas with Normal Saline was 89.35±17.74mg. There was significant difference found between both groups (p-value=0.032) for total opioid consumption where patients in lidocaine group has less consumption of opioids.

Conclusion: It was concluded from results of the study that total opioid consumption is less whenlidocaine infusion was used during surgery.

Keywords: intravenous Lidocaine, Postoperative Opioid consumption, post-operative Pain, Analgesia.

Introduction

Effective pain control is an essential component of the care bundles of the postsurgical patients. Inadequate pain relief apart from being inhumanecan lead to increased morbidity or mortality. [1] Management of postoperative pain relieves suffering and leads to early mobilization, early discharge, reduced hospital costs, and increased patient satisfaction. Pain control regimens should not be standardized; rather they should be tailored according to the needs of the individual patient. While using different regimen for postoperative pain relief the age, medical, physical & psychological condition and type of surgical procedure should be kept in mind. The major goal in the management of postoperative pain is to minimize the dose of analgesicsand hence to reduce the side effects. This goal is best accomplished with multimodal and preemptive analgesia.[2,3] An alternative approach to improve postoperative recovery is toadminister intravenous lidocaine infusion. Lidocaine has analgesic, anti-hyperalgesic and anti-inflammatory properties and italso enhances the return of bowel function after surgery. This study demonstrated that perioperative IV infusion of lidocaine improved quality of postoperative analgesia, reduced postoperative opioid requirements, shortens the duration of hospital stay and facilitated the rehabilitation phase in patients undergoing laparoscopic abdominal surgery.[4] One study conducted on 63 patients reported that patients in the lidocaine group required less opioids, 6.2±1.43mm as compared to normal saline group 8.6±2.48mm. They concluded that perioperative systemic lidocaine has beneficial postoperative analgesic effects in patients undergoing outpatient laparoscopic surgery.[5] Another study conducted on 64 patients, reported that Lidocaine had no effect on opioidconsumption.[4] Rationale of this study was to mean consumption of postoperative analgesia by

using intravenous lidocaine in the perioperative period versus normal saline in patients undergoing laparoscopic surgery. In the literature there is controversy regarding the beneficial use of perioperative IV infusion of lidocaine in patients undergoing laparoscopic surgery. The previous studies were done on small sample size but we took a large sample size to get more precise results. Through this study, we intended to confirm, that the use of perioperativelidocaine infusion could prove beneficial on laparoscopic surgeries. In addition we may also be able to develop a new way of cutting down the consumption of opioid and hence avoid their side effects and prove cost effectiveness by early discharge of the patients.

Methods

The study design is randomized controlled trial in Department of Anesthesiology,Lahore General Hospital / PGMI, Lahore. Sample size of 100 cases; 50 cases in each group, was calculated with 95% confidence level, 80% power of test and taking magnitude of mean consumption of postoperative analgesia i.e. 6.2±1.43 with perioperative I/V lidocaine and 8.6±2.48 with normal saline in patients undergoing laparoscopic surgery. Sampling technique is Non-probability, Purposive sampling.

Inclusion Criteria:

Patients of age range 20-60years undergoing laparoscopic cholecystectomy

ASAI, II

Weight of the patient from 50 to 90 kg

Exclusion Criteria:

Patients with history of allergy to local anesthetics or use of an opioid analgesic or corticosteroids.

Pregnant females.

Data Collection Procedure:

He After taking approval from hospital ethical committee, 100 patients fulfilling the inclusion and exclusion criteria were admitted from outpatient department of Lahore General Hospital, Lahore. Informed consent was obtained and patient demographic information (name, age, contact) was recorded. Patients were randomly divided in two equal groups by using lottery method. All subjects were premedicated with midazolam 0.04 mg/kg before induction. Propofol 1.5 to 2.5 mg/kg was administered for induction of anaesthesia and atracurium 0.5 mg/kg IV for neuromuscular blockade. Anaesthesia maintenance was achieved through isoflorane titrated to maintain MAC around 1. In group A, patients were given intravenous 1.5mg/kg bolus of lidocaine followed by 2mg/kg/hr infusion of lidocaine till end of procedure and in group B, normal saline was given in same volume to the patients. All patients were evaluated hourly after surgery by researcher himself. In PACU, subjects were asked to rate their pain at rest on arrival and at regular intervals on a 0 to 10 pain numeric rating scale (NRS) , where 0 means no pain and 10 was the worst pain imaginable .Postoperative opioid i.e. nalbuphine 2mg bolous was administered for pain > 4 on pain numeric rating scale (NRS) until it was less than 4. It was measured in milligrams of postoperative nalbuphine required during first 24 hours of surgery. All this information was recorded on proforma.

Data Analysis:

Data was entered and analyzed through SPSS 16. Quantitative variables like age and total consumption of postoperative opioid was calculated as mean±SD. Gender was also presented as frequency and percentage. Both groups were compared for mean consumption of postoperative opioid by using t-test. P-value<0.05 was considered as significant.

Results

In this study we included 100 patients undergoing laparoscopic surgery with the mean age of 49.34±10.30 years**.** The minimum and maximum ages of the patients were recorded as 28 and 67 years respectively (age range = 39 years). **Table 1**

The mean age of the patients randomized to

Table-1: Descriptive Statistics of age of the patients.

	Age (Years)
N	100
Mean	49.34
SD	10.30
Minimum	28
Maximum	67
Range	39

Table-2: Descriptive Statistics of age of patients with respect to study groups.

Age (Years)		Age (Years) Lidocaine	Normal Saline
	N	50	50
	Mean	53.14	45.54
	SD	10.04	9.18

Table-3: Descriptive Statistics of total consumption of patients with respect to study groups at different follow-up times

Opioid Consumption at	Group		T-test	P-value	Significance
	Lidocaine (n=50)	Normal Saline (n=50)			
Hour 1	13.56±4.84	9.88±2.19	4.900	0.000	Significant
Hour 4	14.28±4.68	14.80±5.16	0.528	0.599	Insignificant
Hour 6	12.96±3.77	13.68±3.99	0.927	0.356	Insignificant
Hour 8	10.12±3.01	11.34±4.51	1.591	0.115	Insignificant
Hour 10	8.44±2.85	12.04±2.87	6.291	0.000	Significant
Hour 12	8.64±2.90	10.56±2.71	3.421	0.001	Significant
Hour 18	7.56±3.29	8.60±2.37	1.815	0.073	Insignificant
Hour 24	5.36±2.27	7.92±1.94	6.074	0.000	Significant

Lidocaine was 53.14±10.04 years whereas the mean age of patients randomized to Normal saline was 45.54±9.18 years. **Table 2**

Out of 100 patients, there were 20 (20%) male and 80 (80%) females. The male to female ratio was noted as 1:4. **Figure 1**

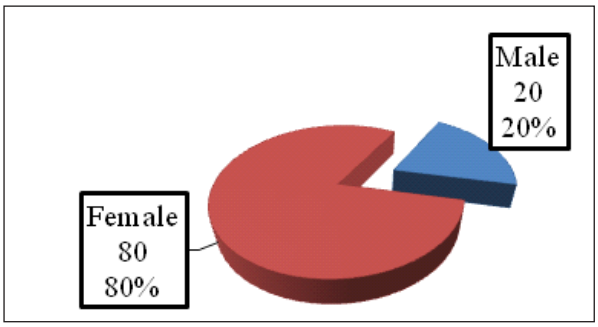

Fig-1: Distribution of Gender of Patients.

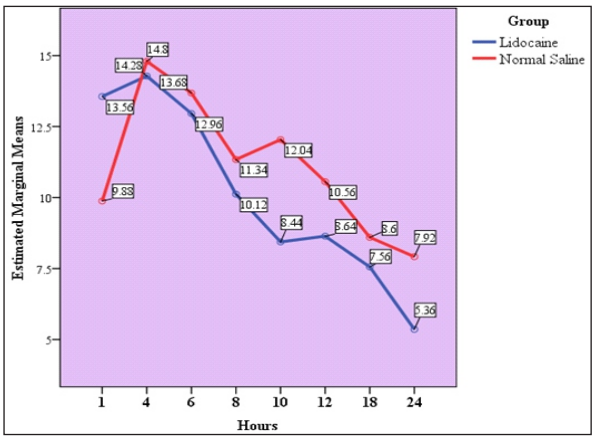

Fig-2: Descriptive Statistics of opioid consumption at different follow-ups with respect to Study Group.

Opioid consumption, during 1st hour was 13.56±4.8mg with Lidocaine and 9.88±2.19mg with normal saline. During 4th, 6th and 8th hour, the mean consumption was 14.28±4.68mg, 12.96±3.77mg and 10.12±3.01mg with lidocaine and 14.80±5.16mg, 13.68±3.99mg and 11.34±4.51mg with normal saline. During 10th, 12th and 18 hour, the mean consumption was 8.44±2.85mg, 8.64±2.90mg and 7.56±3.29mg with lidocaine and 12.04±2.87mg, 10.56±2.71mg and 8.60±2.37mg with normal saline. At 24th hour, the mean consumption was 5.36±2.27mg with lidocaine and 7.92±1.94mg with normal saline. **Table 3** The figure below shows the pattern of opioid consumption between both groups. There was significant difference observed for opioid consumption between both groups and normal saline showed more consumption of opioids as compared to lidocaine group. **Figure 1** In lidocaine group, the total mean opioid consumption during 24 hours after surgery was 81.80±17.01mg whereas with Normal Saline was 89.35±17.74mg. There was significant difference found between both groups (p-value=0.032) for total opioid consumption where patients in lidocaine group has less consumption of opioids. **Table 4**

Table-4: Comparison of total consumption of patients with respect to study groups.

Total opioid consumption	Study Group	
	Lidocaine	Normal Saline
N	50	50
Mean	81.80	89.35
SD	17.01	17.74

t-test = 2.175 / p-value = 0.032 (Significant)

	F	Sig.
Lidecaine - Normal Saline	2.450E3	0.000

Discussion

We conducted this randomized trial with patients undergoing laparoscopic surgeries and calculated total consumption of opioids after 24 hours.With lidocaine, the total mean opioid consumption was 81.80±17.01mg whereas with Normal Saline was it was 89.35±17.74mg. There was significant difference found between both groups (p-value=0.032) for total opioid consumption where patients in lidocaine group has less consumption of opioids. KoppertW and his associates in their study also reported that total consumption of analgesic was 103.1±72.0mg with lidocaine and 159.0±73.3mg with placebo / normal saline. This was significant difference which was observed between both these groups after 72 hours. While after 24 hours total consumption with lidocaine was 54mg while with placebo was 74mg (p-value<0.05). The authors concluded after completion of study that IV lidocaine may have a true preventive analgesic activity, most likely by preventing the induction of central hyperalgesia in a clinically relevant manner. [6]

Kim TH and his collegues also agree with our hypothesis and reported that total analgesia consumption after 24 hours of procedure with lidocaine was 0.54g while with placebo, it was 0.95g and total analgesia consumption hours of procedure with lidocaine was 2.5g while with placebo, it was 3.5g after 48. This was also significantly higher consumption of analgesic in placebo group as compared to lidocaine. The authors concluded that Lidocaine administration in laparoscopy settings reduces postoperative pain when given intravenously and it was recommended that intravenous administration of lidocaine is not only effective, but is also a safe procedure and it can be a better alternative for reducing the pain of patients who are undergoing laparoscopic surgery.[7] A randomized trial conducted by De Oliveira et al., also reported that subjects in the lidocaine group required less oral opioids, median difference of -10 (95% CI, 0 to -30) (oral milligrams morphine equivalents), than the saline group (P = 0.01).[8] The study by McKay et al., involved a variety of ambulatory procedures. Lidocaine was given as an initial IV bolus dose of 1.5 mg/kg after induction of anaesthesia followed by an infusion of 2 mg/kg/hour until 1 hour after arrival in the PACU. In patients receiving lidocaine a 50% reduction in morphine requirement was demonstrated in the PACU, but no difference in opioid consumption was found after discharge from the PACU.[9]

The benefit of a continuous small-dose lidocaine infusion during surgery was confirmed by Groudineet al. Their study was targeted to reach an early hospital discharge in patients undergoing radical retropubic prostatectomy. All patients received ketorolac as standard pain medication, and morphine was additionally applied for breakthrough pain and for those patients not receiving ketorolac. They found that perioperative administration of lidocaine resulted in a faster return of bowel function and less overall pain, which resulted in a shorter hospital stay (4 ± 0.7 days versus 5.1 ± 2.9 days; $P < 0.05$).[10]

But in a randomized controlled trial, conducted by Wuethrich et al., found that Lidocaine had no effect on readiness for discharge, opioid consumption, postoperative sedation, PONV, return of bowel function and plasma concentrations of C-reactive protein, procalcitonin and cortisol. Thus they concluded that Systemic perioperative lidocaine administration over 24h did not influence the length of the hospital stay, readiness for discharge, opioid consumption, return of bowel function or inflammatory and stress responses after laparoscopic renal surgery.[11]

Researchers have noted that the analgesic effects of intravenous lidocaine were readily observed despite the postoperative administration of paracetamol and a non-steroidal anti-inflammatory drugs, each of which reduces postoperative opioid consumption and pain scores during mobilization.[12,13,14] The analgesic effect of lidocaine might thus have been even greater in the absence of these nonopioid analgesics. Postoperative fatigue was significantly reduced, not only during the lidocaine infusion, but also after its interruption. The improved postoperative analgesia and the reduced opioid consumption may have contributed to this beneficial action.[4,15]

Conclusion

It was concluded from results of this study that total opioid consumption is reduced with infusion of IV lidocaine intraoperatively and can help in recovery from surgery. Thus we have proved that infusion of of lidocaine can be beneficial and now we can implement a new way to manage the patients without much consumption of opioid.

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