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Analgesic effect of perioperative intravenous infusion of lignocaine in laparoscopic cholecystectomy surgeries: a randomised controlled double blinded interventional study

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Abstract

Background: Aims of this study the analgesic effect of perioperative intravenous lignocaine Infusion for postoperative analgesia in laparoscopic cholecystectomy

Methods: Patients were randomly divided into 2 groups. (40 patients in each group)**.** Group A (n=40): patients received 6ml of normal saline as bolus over 10 min, followed by 6ml/hr infusion till the end of 1st postoperative hour. Group B (n=40): patients received preservative free Lignocaine (2%) 1.5mg/kg IV bolus (diluted with normal saline to make a total volume of 6 ml) slowly over 10 minutes and thereafter infusion at a rate of 1.5mg/kg/hr. prediluted in normal saline to make a volume of 6ml/hr. till the end of 1st postoperative hour.

Results: In group A, mean duration of postoperative analgesia was 56.15 ± 13.61 min and in group B, mean duration of postoperative analgesia was 334.35 ± 42.47 min. Mean duration of post-op. Analgesia is more in Group B than in Group A which is statistically significant.

Conclusion: Administration of lignocaine as bolus dose 1.5mg/kg followed by perioperative intravenous infusion in dose 1.5mg/kg/hr, provides a better postoperative analgesia and increases the duration of pain free period after laparoscopic cholecystectomy.

Keywords: Lignocaine, Laparoscopic cholecystectomy, Post-op.

Introduction

Laparoscopic cholecystectomy surgeries are done with minimal access and minimal invasiveness, yet patients may experience moderate to severe pain postoperatively. Pain may be at incision site (incisional pain), or it may be visceral/abdominal pain due to parietal peritoneum stretching caused by creation of pneumoperitoneum and also due to release of inflammatory mediators[1]

Various agents like opioids, NSAIDS, local anaesthetics (for local infiltration into trocar site / incision site and for intraperitoneal infiltration) have been used with various success rates for postoperative analgesia in laparoscopic surgeries[2].

While opioids remain the mainstay for postoperative analgesia but their use is associated with side effects like sedation, post-op nausea vomiting, respiratory depression etc. Although, NSAIDS are very effective but are also associated with side effects. So, search of an ideal agent for postoperative analgesia in laparoscopic surgeries is still going on. With this vision we planned to study the analgesic effects of perioperative intravenous infusion of lignocaine in laparoscopic surgeries.[3]

Lignocaine is a commonly used Amide type synthetic local anesthetic agent. It has rapid onset of action and relatively intermediate duration of action and is used for local infiltration, topical anaesthesia, peripheral nerve blocks, spinal anaesthesia, epidural anaesthesia, intravenous regional anaesthesia. It is used as an antiarrhythmic agent for treatment of ventricular dysrhythmias.[3]

Lignocaine alters the signal conduction in neurons by blocking voltage gated Na^+ channels in neuronal cell membrane, It blocks influx of Na^+ ions through these channels by reducing the permeability of the channel for Na^+ ions, which slows the rate of depolarization of membrane and doesn't allow the membrane to reach its threshold potential and no action potential is generated, therefore propagation of action potential is abolished[4-5]. Lignocaine when given intravenously suppresses neuronal excitability in dorsal horn neurons, depresses spike activity, amplitude, and conduction time in both myelinated A delta fibers and unmyelinated C fibers, and decreases the neural response to post-operative pain by blockade or inhibition of nerve conduction, Thus, Lignocaine may be helpful to reduce the postoperative pain when given as intravenous infusion perioperatively[6].

Materials and Methodology

Study Location: The study was conducted in the Department of Anaesthesiology, general surgery operation theatre (OT-2), at S.M.S. Medical College and Attached Group of Hospitals, Jaipur with due permission from institutional ethics committee and Research Review Board and with written informed consent.

Study Design: Hospital-based, randomized, controlled, double blind, interventional study.

Sample Size: The sample size of 40 cases in each group was required at 95% confidence & 80% power to verify the expected minimum difference of 275.3(±372.46) minutes in mean duration of pain free period in both study groups as per seed article. This sample size was adequate to cover all other study variables too.

Randomization: 80 eligible cases were divided into two study groups using computer generated random number table and the random numbers were kept in sequentially numbered opaque envelopes. Envelope was opened and patient was allocated to one of the two groups (according to random number table) before shifting the patient inside the operation room.

Double Blinding: The anaesthesiologist who gave study drug was different from the anaesthesiologist who observed study data variable. The patients were told that some special type of drug was given to them but they were not told which drug was given to them.

Study Groups: Patients were randomly divided into 2 groups. (40 patients in each group)

- Group A (n=40): patients received 6ml of normal saline as bolus over 10 min, followed by 6ml/hr infusion till the end of 1st postoperative hour.
- Group B (n=40): patients received preservative free Lignocaine (2%) 1.5mg/kg IV bolus (diluted with normal saline to make a total volume of 6 ml) slowly over 10 minutes and thereafter infusion at a rate of

1.5mg/kg/hr. prediluted in normal saline to make a volume of 6ml/hr. till the end of 1st postoperative hour.

Eligibility Criteria

Inclusion criteria

1. Female Patients with ASA grade I and II.
2. Patients who gave written informed consent.
3. Age groups 20 to 50 years.
4. Weighing 40 to 70 kg.
5. Scheduled for elective laparoscopic cholecystectomy.

Exclusion criteria

1. Patients with history of allergy to anaesthetic agents used in study.
2. Patients with pre-existing cardio-pulmonary, renal, hepatic, or endocrine disease.
3. Patients with anticipated difficult tracheal intubation i.e. Mallampati class 3 or more, restricted neck movement or restricted mouth opening.
4. If laparoscopic procedure necessitated to convert in open cholecystectomy during surgery.
5. If surgical time exceeded 180minutes.
6. Patients intubated after more than 1 attempt or more than 45 seconds were excluded from the study.

Statistical Analysis

- All separate values were calculated as mean and standard deviation (SD). Independent continuous data was analyzed by paired t-test. Independent categorical data was analyzed by student's t-test accepting one- tailed alpha error of 5%.
- A sample size of 40 patients was calculated to achieve a power of 80 % with a significant difference in hemodynamic parameters between the two groups. P<0.05 was considered as significant and p < 0.001 as highly significant.

Results

Table 1: Distribution of demographic variable

Variable	Group A	Group B	p-value
Mean age	36.20 ± 8.62 Yrs	31.05 ± 7.81Yrs	>0.05
Mean weight	54.22 ± 8.12 Kg	53.13 ± 7.25 Kg	>0.05
Mallampati Class (I:II)	16:24	25:15	>0.05
Mean duration of surgery	50.43 ± 10.62 minutes	49.43 ± 8.26 minutes	>0.05

- Mean age of individual in group A was 36.20 ± 8.62 years.
- Mean age of individual in group B was 31.05 ± 7.81 years.

The difference in age showed no statistically significant (NS) difference between the two groups with p>0.05

Table 2: Postoperative mean NRS Score at Different Time Intervals

	Group A		Group B		Result (P value)
	Mean	SD	Mean	SD	
POST OP 15 MIN	1.55	0.60	1.00	0.00	p<0.001
POST OP 30 MIN	2.15	0.66	1.00	0.00	p<0.001
POST OP	2.28	1.07	1.00	0.00	p<0.001

45MIN					
POST OP 1 HR	1.93	1.21	1.08	0.25	0.025
POST OP 2HR	0.00	0.00	1.95	0.45	p<0.001
POST OP 4 HR	-	-	2.73	0.45	-
POST OP 6 HR	-	-	1.13	1.47	-

The results were compared by chi square test. The difference in NRS scores showed statistically significant difference between the two groups at different intervals. (p<0.05)

Mean values of NRS scores are lower in Group B than in Group A at different time intervals which is statistically significant.

Table 3: Mean duration of postoperative analgesia (in min)

	Group A		Group B	
	Mean	SD	Mean	SD
Mean Time Of First Rescue Analgesia (in min)	56.15	13.61	334.35	42.47
Median	55		340	
Result (P value)	p<0.001 (S)			

In group A, mean duration of postoperative analgesia was 56.15 ± 13.61 min

In group B, mean duration of postoperative analgesia was 334.35 ± 42.47 min

Unpaired t test showed statistically significant difference between the two groups with p value of <0.001.

Mean duration of post-op. Analgesia is more in Group B than in Group A which is statistically significant.

Discussion

Postoperative pain is a major concern for anaesthesiologists, because poor management of pain may lead to many adverse outcomes like compromised respiratory functions in postoperative period, delayed return of bowel function to normal, paralytic ileus, delayed wound healing, longer hospital stay etc. laparoscopic cholecystectomy surgeries are less invasive and causes less postoperative pain, yet substantial postoperative pain may be present to the patient in the form of incisional pain or visceral pain due to peritoneal stretching by pneumoperitoneum. various agents like opioids, NSAIDS, local anaesthetics, have been used to treat postoperative pain but all these are associated with unavoidable side effects.

When we gave lignocaine as perioperative intravenous infusion in laparoscopic cholecystectomy surgeries in our study, we found that there were statistically significant lower pain scores in postoperative period and pain free period was longer than normal saline group. Intravenously given lignocaine suppresses neuronal excitability in dorsal horn neurons, depresses spike activity, amplitude, and conduction time in both myelinated A delta fibers and unmyelinated C fibers, and decreases the neural response to postoperative pain by blockade or inhibition of nerve conduction[7]

Similarly, several studies suggest that lignocaine used as perioperative intravenous infusion in low doses, consistently improved postoperative pain scores in patients undergoing open or laparoscopic abdominal surgeries. In addition to improved analgesia, perioperative lignocaine infusion also reduced 24-hr opioid consumption, shortened the duration of postoperative ileus by an average of 8hr and decreased the incidence of postoperative nausea and vomiting

(PONV) by 10 to 20% and also reduced the length of hospital stay by an average of 8 hr and up to 24 hr[8-11].

Conclusion

Administration of lignocaine as bolus dose 1.5mg/kg followed by perioperative intravenous infusion in dose 1.5mg/kg/hr, provides a better postoperative analgesia and increases the duration of pain free period after laparoscopic cholecystectomy.

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