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Original Research Paper

Effect of installing xylocaine solution on the surgical bed on postoperative pain after laparoscopic cholecystectomy Baghdad/2022

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ABSTRACT:

Background: Although the popularity of laparoscopic cholecystectomy is increasing, postoperative pain is still a significant problem that affects the patient's experience and the duration of hospital stay. This study aims to evaluate the effectiveness of the perioperative use of intraperitoneal lidocaine. **Methods**: Patients who underwent laparoscopic cholecystectomy were randomly assigned to either undergo intraperitoneal lidocaine administration (the lidocaine group) or normal saline administration. One hundred patients were evaluated (control group). The VAS was used to evaluate postoperative pain at 2, 6, 12, and 24 hours after the procedure. **Results**: The severity of postoperative pain was significantly reduced in the lidocaine group at 2, 6, and 12 hours. Moreover, the lidocaine group demonstrated reduced opioid consumption and faster return of bowel function than the control group. **Conclusion**: The local administration of intraperitoneal lidocaine is a safe and effective method that is associated with decreased pain, earlier return of bowel function, and reduced consumption of opioids.

Keywords: xylocaine solution, laparoscopic cholecystectomy, Baghdad

INTRODUCTION:

Laparoscopic cholecystectomy is preferred because it results in shorter hospital stays, less visible scarring, and a speedier recovery time[1]. As a result, it is now the first line of defense against benign biliary illness.[2]. Although patients experience far less pain than they would with an open technique, it may still be severe enough to slow recovery and prevent early release from the post-anesthesia care unit.[3,4] as pain has been found to be the most important independent predictor of recovery time[5]. Pain after laparoscopy might manifest as tenderness in the shoulder, discomfort in the abdomen, or both..[6] In addition, opioids, both parenteral and oral, are often used to treat this kind of pain. Constipation, postoperative nausea and vomiting (PONV), drowsiness, and respiratory depression are all adverse effects of these medicines that might cause a patient to stay in the hospital longer than necessary after surgery.[7] Local anesthetics are one of the most significant types of medications used in perioperative treatment due to their widespread availability and low risk of complications during administration. The fundamental benefit of local anesthetic drugs is that they work immediately on the tissue to which they are given, unlike systemically injected opioids, which may have unpleasant side effects. Local anesthetics are one of the most significant types of medications used in perioperative treatment due to their widespread availability and low risk of complications during administration. The fundamental benefit of local anesthetic drugs is that they work immediately on the tissue to which they are given, unlike systemically injected opioids, which may have unpleasant side effects. Their use as an effective adjunct in postoperative multimodal analgesia has been reported for decades in laparoscopic gastric procedures[8], gynecological surgery[9], and open abdominal surgery[10]. To alleviate pain after abdominal surgery and speed up the healing process, local anesthetics are often injected under the skin or given via an epidural catheter.[11].

Local anesthetic solutions may also be injected into the peritoneal cavity to alter visceral nociception and subsequent inflammatory responses by inhibiting visceral afferent signals.[12]. Lidocaine was administered intraperitoneally for the pain control in this trial. Lidocaine acts as a local anesthetic by blocking voltage-gated sodium channels (VGSCs), which in turn temporarily halts action potential propagation but quickly restores normal function. Inhibiting polymorphonucleocyte and neutrophil priming and lowering the production of pro-inflammatory mediators including IL-4, IL-6, and tumor necrosis factor-alpha (TNF-) are other mechanisms by which lidocaine dampens the inflammatory response[13].

METHODS:

One hundred ASA 1-2 patients were included in the study after obtaining written informed consent and approval from the hospital's ethics committee. All patients underwent general anesthesia. Patients were monitored by continuous assessment of vital signs, pulse oximetry, electrocardiography, and urine output. All surgeries were conducted by the same senior surgeon aided by the same surgical team. The 4-trocar technique was used for all patients. The patients were positioned in the reverse Trendelenburg position (at an angle of 30 degrees), with the table sloped to the left. A 1-mm trocar was inserted after the Veress needle was placed at the supra-umbilical site. CO2 gas was used to insufflate the peritoneum at 15mmHg. The other ports were inserted under laparoscopic guidance. An 11-mm trocar was used to produce an epigastric port at the right border of the falciform ligament, and a 5-mm trocar was inserted into the upper right abdominal wall between the midclavicular and midaxillary lines, two fingerbreadths below the right costal margin. Calot's triangle was revealed by electrocautery and blunt dissection, and clipping and transection were postponed till then. After dissecting the gallbladder from the liver bed using a Hook bovie, it was extracted via the umbilical port. Safe CO2 removal after surgery was achieved by manually compressing the abdomen via open trocars. The surgeon used a suction-irrigation tube to splash either 200 ml saline containing 200 mg lidocaine (lidocaine group) or the same amount of normal saline (control group) beneath the right diaphragmatic region at the conclusion of the laparoscopic surgery. After which patients were positioned with their heads tipped downward so that the test solution could penetrate deeper into the tissues. Postoperatively, each patient was asked to assess their postoperative pain using the visual analogue scale (VAS score) at 2, 6, 12, and 24 hours. Rescue analgesia was given when requested in the form of tramadol injection. The time to first request of analgesia and the total number of analgesia requests were recorded. Other parameters included: duration of hospitalization, time until return of bowel function, and incidence of postoperative nausea and vomiting.

Microsoft Excel 2019 was used for data input. A social science statistical program was used for the analysis (SPSS version 26). The Mann-Whitney U test was used to analyze the continuous variables. The relationship between category variables was tested using Fischer's exact test. The cutoff for declaring statistical significance was set at a two-tailed p value of less than or equal to 0.05.

RESULTS:

There were no significant differences between the two study groups in terms of age, gender, BMI, duration of surgery, and duration of hospitalization; as shown in table (1).

Table (1): Comparison of age, gender, BMI, duration of surgery and hospital stay between the two study groups.

Parameter	Lidocaine group	Control group	P value
Age (years)	**42.4 ± 5.4**	**40.8 ± 5.1**	0.244
Gender (F:M)	**39:11 (3.5:1)**	**35:15 (2.3:1)**	0.495
BMI (kg/m^2)	**26.1 ± 6.0**	**27.2 ± 3.8**	0.279
Duration of surgery	**72.6 ± 6.0**	**72.5 ± 6.8**	0.679
Hospital stay	**27.4 ± 1.6**	**28.2 ± 2.1**	0.583

Concerning postoperative pain assessment, The mean VAS pain scores in the lidocaine group were significantly lower than that in the control group at 2 hours (lidocaine **3.43 ± 0.37** vs. control 4.51 ± 0.17, p value < 0.001), 6 hours (lidocaine 3.54 ± 0.54 vs. control 4.29 ± 0.48, p value < 0.001) and 12 hours (lidocaine 3.80 ± 1.03 vs. control 3.16 ± 1.4, p value = 0.003). The difference was not statistically significant at 24 hours; as shown in table (2).

Table (2): VAS scores at different times.

VAS score	Lidocaine group	Control group	P value
2-hr postoperative	**3.43 ± 0.37**	4.51 ± 0.17	**<0.001**
6-hr postoperative	3.54 ± 0.54	4.29 ± 0.48	**<0.001**
12-hr postoperative	3.80 ± 1.03	3.16 ± 1.4	**0.003**
24-hr postoperative	2.39 ± 0.47	2.56 ± 0.67	0.104

The mean time to first request of tramadol was significantly longer in the lidocaine group than the control group (lidocaine 172.6 minutes ± 16.0 vs. control 63.4 minutes ± 8.2, p value < 0.001). The number of requests to analgesia was also lower in the control group than the lidocaine group (lidocaine 1.30 ± 0.50 vs. control 1.54 ± 0.64, p value = 0.049); as shown in table (3).

Table (3): Opioid consumption in both study groups.

Opioid use	Lidocaine group	Control group	P value
Time to first dose of tramadol (min)	172.6 ± 16.0	63.4 ± 8.2	**<0.001**
Number of requests to analgesia during 24 hours	1.30 ± 0.50	1.54 ± 0.64	**0.049**

Time until return of bowel function was significantly longer in the control group than the lidocaine group (lidocaine 24.3 hours ± 2.18 vs. control 26.9 hours ± 5.48, p value = 0.002); as shown in table (4).

Table (4): Time until return of bowel function in both study groups.

Time until return of bowel function	Lidocaine group	Control group	P value
First flatus (hours)	24.3 ± 2.18	26.9 ± 5.48	0.002
Defecation (hours)	39.2 ± 6.14	41.1 ± 4.96	0.078

There was no significant difference in the incidence of postoperative nausea (lidocaine 46% vs. control 52%, p value = 0.689) and vomiting (lidocaine 38% vs. control 42%, p value = 0.419) between the two study groups; as shown in table (5).

Table (5): The incidence of PONV in both study groups.

Postoperative nausea and vomiting (PONV)	Lidocaine group	Control group	P value
Nausea	23 (46.0%)	26 (52.0%)	0.689
Vomiting	19 (38.0%)	21 (42.0%)	0.419

DISCUSSION:

The pain experienced following a laparoscopic cholecystectomy is attributed to three causes: The first is parietal pain, which is somatic in nature and results from the trocar holes. The second kind of discomfort is diaphragmatic irritation from dissolvable CO2 and surgical manipulation, which causes visceral pain. While the third is shoulder-tip pain, which results from the excitement of the phrenic nerve and the subsequent fast distension of the peritoneum (which is linked to nerve and blood vessel injury, and the release of inflammatory mediators).[14] This research set out to determine how well intraperitoneal lidocaine worked for individuals having laparoscopic cholecystectomy. In addition to decreasing nociception when it is absorbed from the peritoneal cavity, intraperitoneal lidocaine blocks free afferent nerve terminals in the peritoneum. It is possible that local anesthetic is absorbed systemically from the peritoneal cavity, also contributing to decreased nociception. After a bolus instillation into the peritoneum, local anesthetic may be detected in the serum circulation within 2 minutes. It is also known that

local anesthetics have anti-inflammatory actions[8]. Chemical peritonitis in an animal model was suppressed by intraperitoneal administration of lidocaine and bupivacaine [15]. The value and effectiveness of preemptive analgesia can also be measured by the need for postoperative analgesia. The current study has demonstrated that that the use of intraperitoneal lidocaine after laparoscopic cholecystectomy significantly reduced the postoperative pain (as assessed by VAS score) and decreased opioid consumption. These findings are in concordance with several studies; such as those by (Elhakim et al.)[6] and (Young Yang et al.)[16]. It is noteworthy to mention that opioid usage is influenced not only by the degree of pain, but also by other psychological factors such as anxiety and anticipation of recovery; and thus, it can be considered as a measure of the overall level of patient satisfaction, instead of being a mere measure of pain intensity. (Young Yang et al.) have demonstrated that satisfaction score of patients who received intraperitoneal lidocaine was significantly higher than the control group.[16] Concerning return of bowel function, it was faster in the lidocaine group. The accelerated return of bowel function can be attributed to the reduced consumption of tramadol[17]. Young Yang et al. also reported a tendency for decreased time to bowel movement and start of diet in patients who received intraperitoneal and intravenous lidocaine; however, their findings were not statistically significant.[16] Our study demonstrated no significant difference in hospital stay between the two groups. This is because a number of variables, including the removal of surgical drains and the presence of fever, contribute to the duration of hospitalization after surgery. Moreover, the incidence of postoperative nausea and vomiting was not significantly different between the two groups, which is also in concordance with Elhakim et al.[20-44], as the pathophysiology of PONV is complex involving multiple pathways, receptors, and factors.[18] It is worth mentioning that laparoscopic surgeries in general and laparoscopic cholecystectomy in particular, are associated with higher incidence of PONV.[19] However, the meta-analysis by Kahokehr et al. has proven that intraperitoneal lidocaine significantly reduces PONV.[8]

CONCLUSION:

In conclusion, the local administration of intraperitoneal lidocaine is a safe and effective method that is associated with decreased pain, earlier return of bowel function, and reduced consumption of opioids. Hence, we recommend its use in multimodal management of pain after laparoscopic cholecystectomy.

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