



Evaluation of the effect of local anesthetic wound infiltration and intra peritoneal instillation on pain after laparoscopic cholecystectomy

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Abstract: Background: Laparoscopic cholecystectomy (LC) is one of the most common operations in the last decade it achieves superior outcomes in postoperative pain, recovery time, cosmetic issues, and morbidity . LC is associated with less postoperative pain than open cholecystectomy, Postoperative abdominal and shoulder pain after LC is a considerable cause of patients distress, and is the primary reason for prolonged convalescence and overnight hospital stay after . many methods have been tried to treat postoperative pain. As, non-steroidal anti-inflammatory drugs, local infiltration with local anesthetics, epidural and intrathecal opioids and local anesthetics, intercostal nerve blocks as well as intraperitoneal routes that in turn have been explored with local anesthetics and opioids. intraperitoneal instillation (IPI) of a saline and local anesthesia (LA) solution decreases the overall pain sensation after laparoscopic cholecystectomy, Other reported benefits of IPI of LA in laparoscopy is earlier discharge , decreases opioid consumption and postoperative nausea and vomiting and improves pulmonary function during the postoperative. **Patient and methods;** 74 patients divided into 2 groups each consists of 37 patients, 1st group the control group .the 2nd group received intraperitoneal lidocaine 2% in the undersurface of diaphragm and at the gall bladder bed , and infiltration around the incisions. Results , there is significant improvement in the pain scores in patients who received local anesthetics in the 1st 24 hours postoperative. Conclusion, local anesthetic intraperitoneal instillation and infiltration around wounds decreases the post-operative pain and improves patients recovery in cases of laparoscopic cholecystectomy.

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Key words : local anesthetic , laparoscopic cholecystectomy , pain intraperitoneal

Laparoscopic cholecystectomy has become one of the most widely performed ambulatory surgery ^[1,2], in the past 2 decades, it has been the recommended procedure for management of symptomatic gallstones ^[3]. Laparoscopic cholecystectomy (LC) is a surgical procedure that achieves superior outcomes in postoperative pain, recovery time, cosmetic issues, and morbidity ^[4,5]. LC is associated with less postoperative pain than open cholecystectomy, Postoperative abdominal and shoulder pain after LC is a considerable cause of patients distress, although less than that happens after an open cholecystectomy ^[6,7], it is the primary reason for prolonged convalescence and overnight hospital stay after LC in most patients ^[8,9]. Abdominal pain consists of two components: visceral pain associated with tissue injury due to gallbladder

dissection and the stretching of nerve endings in the peritoneal cavity; and parietal pain related to the incisional trauma at the port sites. Shoulder pain is referred by diaphragmatic stretching ^[4,8]. many multimodal methods have been tried to treat postoperative pain. Such as parenteral analgesics as non-steroidal anti-inflammatory drugs (NSAIDs), ^[10] local infiltration with local anesthetics, ^[11] epidural and intrathecal opioids and local anesthetics, and intercostal nerve blocks as well as intraperitoneal routes that in turn have been explored with local anesthetics and opioids. It is also possible, however, to instill local anesthetic solutions into the peritoneal cavity, thereby blocking visceral afferent signaling and potentially modifying visceral nociception and downstream illness responses.

intraperitoneal instillation of a saline and local anesthesia (LA) solution decreases the overall pain sensation after laparoscopic cholecystectomy [12,13]. Other reported benefits of IPI of LA in laparoscopy is earlier discharge [14], decreases opioid consumption and postoperative nausea and vomiting and improves pulmonary function during the postoperative period. However, 33–50 % of patients still suffer from shoulder pain (SP) after laparoscopic cholecystectomy [15]. Thus, multimodal analgesic treatment remains crucial to facilitate fast recovery [16].

Patients and methods

This is a comparative study, carried out in Zagazig university hospitals general surgery department. We assigned patients undergoing elective cholecystectomy for symptomatizing gall bladder stone into two groups the first group will not receive any local anesthetic the second group will receive intraperitoneal local anesthetic, at the gall bladder bed and around the incision sites.

Inclusion criteria;

Only female patients in the age group of 18–65 years conferring to Grade I or II of the American Society of Anesthesiologists (ASA) physical status classification system, undergoing elective uncomplicated LC for symptomatic cholelithiasis by the research group surgeons, were included in this study.

We excluded; from this study all patients who refused consent, those with American Society of Anesthesiologists class >II, patients with acute cholecystitis, gall bladder malignancy or cholangitis, patients with a history of long term need for analgesic use, those with allergy to local anesthetics, those with history of obstructive jaundice and/or requiring preoperative investigations as cholangiogram, MRCP or common bile duct exploration; those who had stone spillage during the procedure, and those requiring conversion to open procedure or re-exploration patients with GIT bleeding, non symptomatizing gall stones, patients with morbid obesity, patients who needed drain insertion (assuming that this predicted an intra-operative complication) were also excluded. Male patients are known to have better pain tolerance than female patients, so they were excluded, Patients who were not able to tolerate oral feeds (with or without postoperative nausea/vomiting) or having urinary retention at any point of time in the 24-hour

postoperative period or who could not be ambulated at least once in the evening were excluded from final analysis so that the effect of pain alone could be studied.

Randomization; was performed by computer-generated envelopes. The operating room nursing staff opened these envelopes just before the procedure.

Implementation; After patient counseling in the out patients, standard preoperative investigations were done, patients informed and consented, then patients underwent the standard four-port cholecystectomy as performed routinely.

We subsequently randomized patients either not to receive any local anesthetic (1st group) or to receive local anesthetic (2nd group).

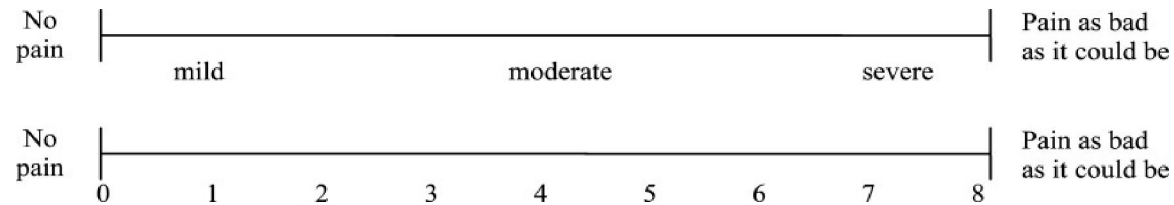
The second group immediately received local anesthetic after the insertion of first port and creation of pneumoperitoneum; we sprayed the local anesthetic agent over the diaphragm on both sides and around the gallbladder. The patient was then kept in a head down position for 10 min. Patients were given 10 mL lidocaine 2%, diluted in 10 mL normal saline. After completion of the procedure, we removed the gallbladder in a bag to prevent bile spillage, local anesthetic sprayed over the gall bladder bed, we closed the wound as per routine, and wounds were infiltrated with lidocaine 2% after closure of the wounds. The same group of surgeons performed all surgeries. And the maximum dose of lidocaine 2% was (4mg/kg).

we used one scale for pain assessment, the Visual Analogue Scale (VAS) which consists of a straight line with the endpoints defining extreme limits such as 'no pain at all' and 'pain as bad as it could be' (Fig. 1) The patient is asked to mark his pain level on the line between the two endpoints. The distance between 'no pain at all' and the mark then defines the subject's pain. If descriptive terms like 'mild', 'moderate', 'severe' or a numerical scale is added to the VAS, one speaks of a Graphic Rating Scale (GRS) (Fig. 2). A line-length of 10 or 15 cm showed the smallest measurement error compared to 5- and 20-cm versions and seems to be most convenient for respondents [17]. Patients were taught about the usage of the subjective pain scales and how to convey them to the investigator they self-reported the intensity of pain at 1, 4, 8, 12, 24 h and 7 days following LC using (VAS)

Fig 1 Visual Analogue Scale (VAS)



Fig 2 Examples of Graphic Rating Scale (GRS)



We didn't use any objective pain measurement for the fear of bias as the the 1st group receive no local anesthetic injection .

Postoperative analgesia , we used diclofenac sodium 75mg as the standard post-operative analgesia given every 12 hours , and ketorolac 30 mg IV if needed , patients started ambulation after 3-4 hours postoperative and started oral fluids when intestinal sound were heard .

Statistical methods

At the end of the study all data collected including demographic data operative data and post-operative data including the reported data of VAS the normally distributed continuous data were compared using the two-sample t test (data summarized using the mean \pm standard deviation). Analysis was carried out using IBM SPSS Statistics (Statistical Package for Social Sciences) software version.

Results

This study was carried out in zagazig university hospitals general surgery unit, over a period between,

September 2018 and February 2019. Total number of patients recruited in this study was 74 patients, divided into two groups each 37 patients, the first is the control group where no lidocaine 2% provided to any of them neither local nor intraperitoneal. The second group received lidocaine 2% injection around the wounds at the end of the procedures, over the under surface of the diaphragm and at the gall bladder bed.

Throughout the demographic criteria of the two groups , all patients were female , the age range between 19 and 56 with mean age 32.8 years \pm SD 9.88 years, in the 1st group. in the 2nd group mean 32.57 \pm SD 9.92, P = 0.9, no significant difference noted between both groups , the mean of BMI was 28.2 \pm SD 2.97, in the first group and mean 28.4 \pm SD 2.83 in the second group p = 0.77 no significant difference . there is no significant difference between both groups regarding ASA classification and educational level .

The operative and postoperative data of the two groups was as in table (1),

Table (1) operative and post-operative data

| | 1 st group mean \pm SD | 2 nd group mean \pm SD | P value |
|----------------------|-------------------------------------|-------------------------------------|---------|
| Operative time | 48.5 \pm 7.08 | 49.5 \pm 7.78 | |
| VAS 2 hours | 8.83 \pm 1.089 | 6.57 \pm 0.93 | < 0.001 |
| VAS 4 hours | 7.46 \pm 1.04 | 5.57 \pm 0.96 | < 0.001 |
| VAS 8 hours | 5.72 \pm 0.902 | 3.7 \pm 0.81 | < 0.001 |
| VAS 12 hours | 3.78 \pm 0.78 | 3.46 \pm 0.96 | < 0.05 |
| VAS 24 hours | 2.67 \pm 0.78 | 2.51 \pm 0.83 | = 0.37 |
| VAS 1 week | 0.46 \pm 0.59 | 0.27 \pm 0.5 | = 0.07 |
| NO of analgesic dose | 2.16 \pm 0.69 | 2.11 \pm 0.7 | = 0.73 |

the operative time in the first group mean was 48. SD 7.08, and the second group mean 49.5 SD 7.78. $p=0.58$ denoting no significant difference, regarding results of visual analogue scale, the mean of the score after 2 hours of the first group was 8.38 with SD 1.089 and the second group mean was 6.57 and SD 0.93, with highly significant difference in between both groups patient has less pain score in the second group.

the mean of the score after 4 hours of the first group was 7.46 with SD 1.04 and the second group mean was 5.57 and SD 0.96, with highly significant difference in between both groups patient has less pain score in the second group.

the mean of the score after 8 hours of the first group was 5.72 with SD 0.904 and the second group mean was 3.7 and SD 0.83, with highly significant difference in between both groups patient has less pain score in the second group.

the mean of the score after 12 hours of the first group was 3.78 with SD 0.76 and the second group mean was 3.46 and SD 0.96, with significant difference in between both groups patient has less pain score in the second group.

the mean of the score after 24 hours of the first group was 2.67 with SD 0.78 and the second group mean was 2.51 and SD 0.83, with no significant difference in between both groups.

the mean of the score after one week of the first group was 0.46 with SD 0.59 and the second group mean was 0.27 and SD 0.53, with no significant difference in between both groups. The average need of analgesic doses was $2.16 \pm SD 0.69$. and in the second group mean was $2.11 \pm SD 0.7$. with no significant difference in between both groups.

the size of the stone more or less the same between both groups

Discussion

Post laparoscopic cholecystectomy pain may hinder the smooth outcome of one of the most frequent operations, many approaches took place to improve the post laparoscopic cholecystectomy pain, including standard opioid and non-opioid analgesics (NSAIDs)^[9], epidural anesthesia/ analgesia^[18,19], the use of short-term operative site drains^[20], intra peritoneal irrigation

with saline^[21-22] or local anesthetic^[23,24,25] administration of systemic corticosteroid^[26], or opioid analgesics^[27].

In order to reduce post-operative pain and enhance postoperative recovery intra-operative local anesthetics have been used to reduce the port site pain, later on the intraperitoneal use of local anesthetics was mentioned by Griffin et al.^[28], but didn't applied in a wide manner till the end of the last century, Intra-peritoneal use of local anesthetics is a practical and effective method to decrease postoperative pain because of its physiological effect, simplicity of administration, less side effects and low cost.

Many papers have been published on the topic of intra-peritoneal local anesthetic use with considerable variability in their findings. For example, Gupta in his review of 31 randomized trials found that in 19 trials there was a statistically significant reduction in the intensity of post-operative pain when intraperitoneal local anesthetic was used^[23].

Boddy et al.^[9] in their meta-analysis of 24 randomized trials found 12 studies with a statistically significant reduction in the magnitude of post-operative pain when intra-peritoneal local anesthesia used during LC.

Mitra et al.^[29] analyzed 41 randomized trials and found that 30 studies showed a significant reduction in post-operative pain after LC.

All these studies shows a wide range of the response to local anesthetic use either intraperitoneal instillation or subcutaneous infiltration, also, they were heterogeneous in the type of local anesthetic used, concentration and amount, they didn't consider patient variability in pain tolerance,

The sample size in studies in the field has ranged from 12 to 75 subjects within clinical trials published to date on the topic of intra-peritoneal administration of local anesthetics for LC^[30].

In this study we recruited 74 female patients with symptomizing gall stones, with the exclusion of male gender as they have a higher pain tolerance, also we excluded all patients in need for drainage or underwent any postoperative distention, urine retention, vomiting or any other complication not to add bias to the study, we used VAS (visual analogue scale to assess post operative pain with all its components, as it is The methods most commonly used to reliably assess pain after LC^[31,26], we used lidocaine 2% solution as it the most commonly used local anesthetic injection in our locality, We monitored postoperative pain at 2, 4, 6, 12, 24 h and 7 days after surgery. not like the time intervals described by other authors^[31, 32]. As we

noticed that after one hour the patients were not fully cooperative with the study personnel .

the demographic data of the study patients was more or less similar to those of other studies apart from exclusion of male gender , Usage of local anesthetics can significantly reduce pain after LC [9,23]. throughout this study we noted that there is a significant reduction in the means of the VAS results after 2 , 4 , and 8 hours when local anesthetic was used intraperitoneal, and with subcutaneous infiltration also there is significant improvement in the pain scales after 12 hours , later on after 24 hours and on the follow up after one week we noted no difference between the readings of VAS , in both groups , as the local anesthetic effected is abolished by time. in the post-operative period.

Infiltration of port-site incisions alone was not effective in controlling pain after LC in the study by Verma et al. [19].

following LC, opioid analgesia is commonly used as ‘rescue analgesia’ [33,34]. no patients required any during this trial . this trial was not designed for differentiation between the three components of post LC pain (wound ,visceral and shoulder pain) rather than to evaluate the local anesthetic use.

Conclusion ;

Throughout this study we can conclude that the implication of lidocaine 2% port site injection cystic plate and diaphragmatic surface spray reduce the pain following laparoscopic cholecystectomy in symptomatizing gall stones hence improving patient discomfort and recovery.

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