ORIGINAL RESEARCH

Effect of intraperitoneal injection of a local anaesthetic on postoperative pain relief following laparoscopic cholecystectomy

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ABSTRACT

Background: To determine the effect of intraperitoneal local anaesthetic instillation on postoperative pain relief following laparoscopic cholecystectomy.

Methods: In this randomised controlled study, 64 patients with gallstones were randomly assigned to one of two groups for laparoscopic cholecystectomy. Group A received intraperitoneal irrigation of the diaphragmatic surface and gallbladder fossa with 0.5% bupivacaine, whereas Group B received no intraperitoneal medication.

Results: In the bupivacaine group, there were 27 female patients and 5 male patients with an average age of 46.12 years, whereas in the control group, there were 28 female patients and 4 male patients with an average age of 45.36 years. At 8, 16, and 24 hours, the mean VAS scores in the bupivacaine group were 3.875, 2.5625, and 0.75, while they were 6.50, 3.25, and 0.875% in the control group. Females tended to have higher VAS scores. In the first eight- and sixteen-hours following surgery, the control group required more analgesia than the experimental group (87.50% and 56.25 %, respectively). 24 hours after surgery, the need for post-operative analgesia was nearly equivalent in both groups. In the first eight hours after surgery, pain relief was greater in the bupivacaine group, 31.25 versus 12.5%.

Conclusion: Intra-peritoneal instillation of Bupivacaine decreases early post-operative VAS scores and pain intensity after 8 and 16 hours, but it has no long-term effect on post-operative pain alleviation and does not reduce the need for analgesics.

Keywords: Bupivacaine, Diaphragmatic surface, Gall bladder fossa, Post-operative pain relief, Laparoscopic Cholecystectomy

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INTRODUCTION

Cholelithiasis is found in a substantial number of asymptomatic individuals. The incidence of gallstones varies between 2 and 6% worldwide.[1] 1-2% of gallstone patients incur complications during their lifetime.[2] Laparoscopic cholecystectomy (LC) is currently regarded as the treatment of choice for patients with cholilithiasis. Even with comprehensive selection criteria, it is feasible, safe, and highly patient-satisfying. The management of postoperative pain may be enhanced.[3] Despite the fact that postoperative pain after laparoscopic cholecystectomy (LC) is significantly less than after open cholecystectomy (OC), recent studies have shown that patients may experience significant postoperative pain after LC. The postoperative shoulder and visceral abdominal pain that patients experience still causes avoidable distress.[4]Agents such as non-steroidal anti-inflammatory drugs (NSAIDS), infiltration of wound with local anaesthetics (LA), and intermittent intramuscular narcotics are currently utilised with varying degrees of efficacy in the postoperative pain management following laparoscopic surgery.[2] After LC, intraperitoneal irrigation of the diaphragmatic surface and gallbladder fossa with normal saline, bupivacaine, or lignocaine may effectively control visceral abdominal discomfort.[4]Patients receiving intraperitoneal instillation have lower pain scores than those receiving local instillation or oral analgesia. Significantly fewer patients with intra-peritoneal instillation (35%) required additional rescue analgesia than those with local/no instillation (84%). After laparoscopic cholecystectomy, the combination of pre-incisional local infiltration and intra-peritoneal

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instillation of 0.25 percent levobupivacaine provides superior postoperative analgesia.[5]This study aimed to determine the effect of intraperitoneal local anaesthetic instillation on postoperative pain relief following laparoscopic cholecystectomy.

MATERIALS AND METHODS

For a period of one year, this randomised controlled study was conducted at the Surgery Department of tertiary care centre. We chose 64 individuals with gallbladder disease. This included 64- 55 females and 9 males. An informed consent was received from all patients before enrolment in the study. These 64 patients diagnosed with gallstones were divided into two groups (each containing 32 patients) for laparoscopic cholecystectomy.Group A received intraperitoneal irrigation of the diaphragmatic surface and gallbladder fossa with 0.5% injection bupivacaine peri operatively after gall bladder removal, whereas Group B received no injection. Inclusion criteria included age between 20 and 60 years and the presence of cholilithiasis on ultrasound in all patients. Patients with a history of upper abdominal surgery, upper GI malignancy, obstructive jaundice, or hepatobiliary pathology, bleeding diathesis, Hepatitis B or C infection, hypersensitivity to the drug to be used in the procedure, anticoagulant use, and cardiac history were excluded.Patients were randomly assigned to one of two categories using a computer-generated list. Just after laproscopic cholecystectomy, 20ml of 0.5% bupivacaine injection was injected intraperitoneally into the diaphragmatic surface and gallbladder fossa of Group A patients, while Group B (control) patients did not receive any injection. Immediately following surgery, all patients received an intramuscular injection of 1 mg/kg of body weight of Tramadol Hydrochloride. The patient is then evaluated using a visual analogue scale for post-operative pain and the need for post-operative analgesia every eight hours for the first twenty-four hours in the post anaesthesia care unit.Intramuscular Tramadol Hydrochloride (1 mg/kg) was administered if analgesia was required every 8 hours. Mean and standard deviation were calculated using descriptive statistics for numerical variables such as age and VAS. The frequency and percentages of categorical variables such as gender, post-operative pain alleviation, the need for post-operative analgesia, and pain intensity were presented. The Chi-square test was used to compare both groups' pain relief. A P-value 0.05 was considered significant.

RESULTS

In the first 8 and 16 hours of surgery, VAS scores are typically higher in the control group, whereas they are higher in the bupivacaine group after 24 hours. At 8, 16, and 24 hours, the mean VAS scores in the bupivacaine group were 3.875, 2.5625, and 0.75, while they were 6.55, 3.25, and 0.875% in the control group (Table 1)Initial pain intensity was reduced in the bupivacaine group during the first eight and sixteen hours compared to the control group. In the bupivacaine group, 14 patients experienced mild pain, while 18 patients experienced moderate-to-severe pain after the first eight hours. In the control group, 5 patients experienced mild pain, while 27 patients experienced moderate-to-severe pain after the first eight hours. 24 hours after surgery, there was no significant difference between the two groups in terms of pain scores and intensity. 20 patients in the bupivacaine group had no pain after 24 hours, while 18 patients in the control group had no pain after 24 hours. 24 hours after surgery, 12 patients in the bupivacaine group and 14 patients in the control group reported mild-to-moderate discomfort. VAS scores tend to be higher in females (mean VAS at 8, 16 and 24 hrs were 5.32, 2.98, and 0.67, respectively) than in males (mean VAS at 8, 16 and 24 hrs was 4.35, 2.5, and 0.45, respectively). In the first eight hours following surgery, 87.5% (34 patients) of the control group required analgesia, compared to 56.25 % in the bupivacaine group.The need for post-operative analgesia 24 hours after surgery differs slightly between the two categories. 24 hours after surgery, it was 0% in the bupivacaine group versus 6.5% in the control group. Indirectly, the need for additional postoperative analgesia reflects the postoperative pain alleviation at the corresponding time after surgery. In our study the post-op pain relief in 1st 8 hrs &16 hrs were better in the bupivacaine group i.e. 31.25% (bupivacaine group) vs. 12.5% (controls) & 68.75% (bupivacaine group) vs. 43.75%(controls) respectively, these differences were statistically significant with p-values of 0.005 & 0.043 respectively. 24 hours after surgery, pain relief was nearly identical in both groups: 100% in the bupivacaine group and 93.75% in the control group. This difference was not statistically significant with a p-value of 0.15.

Table 1: Comparing mean VAS

Groups	VAS (8 hrs) Mean+SD	VAS (16 hrs)Mean+SD	VAS (24 hrs) Mean+SD
A(n=32)	3.875+0.8706	2.5625+1.0453	0.75+0.984
B(n=32)	6.5+1.437	3.25+1.218	0.875+1.008

DISCUSSION

Since its development in the 1980s, laparoscopic cholecystectomy has supplanted open cholecystectomy worldwide due to its less post-operative pain, early mobilisation, and shorter post-operative hospital stay.[6] In the past, conditions such as acute cholecystitis were deemed contraindications for laparoscopic cholecystectomy because the technique

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was difficult to acquire during its developmental phase. As the technique developed, surgeons began conducting laparoscopic cholecystectomy on patients with acute cholecystitis.[7] Laparoscopic cholecystectomy is the preferred treatment for cholelithiasis with symptoms. Although laparoscopic cholecystectomy has distinct advantages over open surgery, postoperative pain remains an issue. Pain can lengthen hospital stays and increase morbidity, which is especially essential now that many centres perform this operation as an outpatient procedure. Females have a lower pain threshold and lower tolerance for excruciating stimuli, according to the available evidence.[8,9]A meta-analysis of 24 studies revealed that the administration of intra-peritoneal LA significantly improves postoperative pain relief.[10] Although statistically significant, this difference is marginally smaller than that found in a 2000 meta-analysis.[11] In seven out of thirteen studys, pain relief was enhanced in favour of the treatment group, according to this review. However, they were unable to identify a significant effect of intra-peritoneal LA on the total amount of postoperative analgesia administered. This could be explained by the fact that the effects of LA only last for the first few hours.[10] Indirectly, the need for additional postoperative analgesia reflects the postoperative pain alleviation at the corresponding time after surgery. These differences were statistically significant with pvalues of 0.005 & 0.043 for the 1st 8 & 16 hours, respectively. 24 hours after surgery, pain relief was nearly identical in both groups: 100% in the bupivacaine group and 93.75% in the control group. This difference was not statistically significant with a p-value of 0.15.

In a randomised study, Bisgaard et al. administered a near-maximal dose of local anaesthetic or a placebo.[12] The port incisions were injected with ropivacaine (or saline), and ropivacaine (or saline) was injected intra-peritoneally at multiple locations. Both treatment groups were administered NSAIDs, paracetamol, and opioids as needed. During the first few postoperative hours, the local anaesthetic regimen substantially diminished incisional pain. There were no analgesic effects on visceral pain or shoulder pain, but overall pain was reduced substantially during the first two postoperative hours, and the need for opioids decreased during the first three postoperative hours. The findings were subsequently replicated in by Lee et al in a study of low methodologic quality, stating that there were no analgesic differences between incisional versus intra-peritoneal local anaesthetic regimens.[13] In a study conducted by Rehan AG et al., it was discovered that infiltration of 0.25 percent bupivacaine at port sites, under the right hemi diaphragm, and on the gall bladder bed reduced post-operative pain in the first 24 hours. It also substantially reduced the need for analgesics in the first 24 hours after surgery.[14]The study by Bhardwaj et al. demonstrated that intra-peritoneal instillation of bupivacaine with adrenaline reduces VAS for up to 8 hours postoperatively and VRS for up to 4 hours.The postoperative analgesic requirements are also lower, but there is no difference between the two groups in terms of shoulder discomfort.[15] According to the above discussion, factors which may influence the intra-peritoneal analgesia are dose and concentration of local anaesthesia, site of instillation, timing of instillation, pneumoperitoneum, volume of residual CO2, spillage of blood and bile, degree of non-visceral pain.

CONCLUSION

Intraperitoneal instillation of Bupivacaine reduces early post-operative VAS scores and pain intensity, but it has no long-term effect on post-operative pain alleviation and does not reduce the need for analgesics. According to our study, there is a statistically significant difference between conventional intramuscular post-operative analgesia and instillation of injection Bupivacaine in the diaphragmatic surface and gallbladder fossa in terms of early pain alleviation and use of analgesics following laparoscopic cholecystectomy.

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