

Pain Intensity after Laparoscopic Cholecystectomy with Intraperitoneal Irrigation as Well As Periportal Infiltration of Bupivacaine Versus Without Bupivacaine

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Abstract

Objective: To compare the effectiveness of bupivacaine as intraperitoneal irrigation and local infiltration at port sites in terms of postoperative pain reduction to a control group that did not receive any bupivacaine injection.

Methodology: This study was carried out in the general surgery department of Liaquat University Hospital Hyderabad/Jamshoro from 2018 to 2019. Patients of uncomplicated gallstone disease, aged more than 12 years old admitted through the outpatient department, as well as from casualty department, undergoing laparoscopic cholecystectomies were included. Patients were randomly divided into two groups. At the end of surgery, the study group received bupivacaine as intraperitoneal irrigation and local infiltration bupivacaine in the port sites while the control group didn't receive bupivacaine, admitted in the department of surgery, who came for uncomplicated gallstone disease as assessed preoperatively. Patients were assessed for postoperative pain up to 48 hours after surgery and pain was evaluated by visual analogue scale. All the information was collected via study proforma. SPSS version 26 was used for the data analysis.

Results: There was no difference between the two groups preoperatively in terms of demographic and laboratory data. The two groups were observed with similar operation time, blood loss without any postoperative mortality. The pain intensity, as rated by visual analog rating scales, was significantly less in the group receiving bupivacaine than in the control group. It was observed that there were significantly lower pain scores in the patients undergoing LC with local anesthesia, at different time interval as compared to the control patients ($p < 0.01$). Regarding analgesia, the number of analgesia needed, were lower in patients undergoing LC with local anesthesia infiltration and irrigation than control group ($p < 0.010$). The test group patients had a shorter hospital stay than controls.

Conclusion: It was concluded that irrigation of bupivacaine in peritoneal cavity and infiltration around the ports in LC patients significantly reduces the severity of postoperative pain and the analgesic requirement as compared to the control LC patient whom not received infiltration and irrigation with bupivacaine.

Keywords: Bupivacain, Postoperative pain, laparoscopic cholecystectomy

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Introduction

The treatment of non-malignant gallbladder pathologies with laparoscopic cholecystectomy (LC) is now extremely common.¹ When compared to open cholecystectomy, the advantages of laparoscopic surgery include a shorter hospital stay and less postoperative pain.^{1,3} Despite

improvements in laparoscopic cholecystectomy procedures, post-laparoscopic procedure pain is still a significant issue, and the majority of individuals need analgesics postoperatively.³ Due to postoperative pain, approximately 17–41% of LC participants must stay in the hospital for at least 24 hours, and their recovery takes a very lengthy time.¹ Pain after laparoscopic

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cholecystectomy is multidimensional and characterized by upper abdomen and, in specific, tip pain of the shoulder.⁴

This pain developed due to the surgical trauma to wall of abdomen at the sites of the ports, chemical irritation by carbon dioxide, stone and/or bile spillage of due to accidental gallbladder perforation, blood vessels rupture as a results of rapid stretching of the peritoneum, traumatic grips on nerve, and the abdominal wall distension.^{4,5} Low-pressure laparoscopic cholecystectomies (LPLC) have been tried as a way to reduce post-operative pain.⁶ A recent systematic review revealed that LPLC decreased the pain, although several of the randomized control studies had a significant probability of bias and the entire level of evidence was inadequate.⁶ Poor anxiousness and pain management issues prolong the healing process and raise the risk of adverse consequences. There seem to be numerous ways to manage post-operative pain, depending on the patient's preferences and risk evaluation. Which include regional, neuraxial and systemically opioid and non-opioid painkillers.⁷ Because using local anesthetics has fewer medication-related side effects, improves recovery of the patients, and reduces hospital stays, it is being promoted as a way to lessen postoperative pain and drug consumption.^{7,8} Although over the past few years, peritoneal cavity irrigation with different local anesthetic medications for post-LC analgesia has become increasingly popular in recent years.¹

Recently it has been observed that the Bupivacaine works well to lessen postoperative discomfort while also extending the period when rescue analgesia is necessary. Additionally, it lessens the likelihood of shoulder pain, although it has little effect on nausea and vomiting following surgery.⁹ On the other hand, according to a carefully executed randomized research showed that bupivacaine irrigation at the gallbladder bedpost LC has no impact on pain management.¹⁰ After taking above recent controversial findings and recommendation for more studies, this study has been conducted to evaluate the effeteness of bupivacaine as intraperitoneal irrigation and local infiltration at the port sites in terms of decreases in post operative pain at tertiary care Hospital.

Material and Method

This case control study was carried out in the general surgery department of Liaquat University Hospital Hyderabad Jamshoro from 2018 to 2019. This study included 150 patients with uncomplicated gallstone

disease who were admitted through the outpatient department as well as the casualty department and had laparoscopic cholecystectomies. Patients who were allergic to local anesthetic and those who developed complications during LC that required conversion, as well as those who had chronic pain diseases other than gallstone disease, were also excluded from the study.

Detailed history was taken from all the patients with special regard to the abdominal pain or pain in right hypochondrium, lump in right hypochondrium, vomiting, dyspepsia and fever. A detailed clinical examination of the patient was done. The site of right hypochondrium was especially examined for the assessment of murphy's sign, palpable mass and visceromegaly were recorded in proforma. A systemic review was also done to see any co-morbidity. All patients underwent for base line and specific investigations especially ultrasound of abdomen as diagnostic modality and for the assessment of uncomplicated gallstone disease. Patients were randomly divided into two groups. At the end of surgery, the study group received bupivacaine as intraperitoneal irrigation and local infiltration bupivacaine in the port sites while the control group didn't receive bupivacaine, admitted in the department of surgery, who came for uncomplicated gallstone disease as assessed preoperatively. Patients were assessed for postoperative pain up to 48 hours after surgery and pain was evaluated by visual analogue scale. All the information was collected via study proforma. SPSS version 26 was used for the data analysis.

Results

The 150 cases of cholelithiasis were operated. Out of 150 patients included in this study, 22 were male and 128 were females, the male to female ratio was 1:5.8. There was wide variation in age, ranging from a minimum of 16 years to 60 years. The mean age was 32.68 ± 5.42 year and most common age group was 31-45 years. (Table I)

The severity of the postoperative pain score (VAS) in both groups is shown in Table II. In 24 hours agonizing pain (VAS 9-10) was felt in most of the patients of control group as compared to the bupivacaine treated patients (test patients). *Extreme* amount of *pain* was observed after 12 h in 13 controls as compared to 3 in test patients, indicated the significant analgesic effect of bupivacaine ($p < 0.01$). While dreadful pain was felt after 12 h in 22 patients of control group as compared to 9 test patients. It was observed that after 12 h the analgesic effects were

decreased, so there is no significant difference in VAS of control and test patients. It was clearly observed that the bupivacaine treated patients have less pain score in initial twelve hours as compared to control patients.

Variables		N	%
Age groups	16-30 years	36	24.0%
	31-45 years	87	58.0%
	46-60 years	27	18.0%
Gender	Male	22	14.7%
	Female	128	85.3%

Time interval	Cases		Control		Cases		Controls	
	<i>Extreme (7,8) VAS</i>		<i>Uncomfortable VAS (3,4)</i>		<i>No pain (0) VAS</i>			
OR	10	2	11	13	6	17		
6 h	15	1	25	12	3	14		
12 h	16	5	20	13	3	13		
24 h	6	4	24	21	2	6		
48h	11	6	21	27	2	6		

Rescue analgesic	Control group (n=75)	Bupivacaine group (n=75)	p-value
Once in 6 hours	75(100)	55(73.3)	0.001
Twice in 12 hours	58(77.3)	18(24)	0.004
Thrice in 24hours	23(30.7)	12(16)	0.001
Up to 12 hours	4(5.33%)	15(20.0%)	<0.01
12 to 24 hours	38(50.6%)	52(69.3%)	<0.01
24 to 48 hours	33(44.2%)	8(10.6%)	<0.01

A first dose of postoperative analgesia was required within 6 h in all 75 control patients as compared to 55 test patients. 2nd dose within 12h was required in 58 control patients while in bupivacaine group it was needed by 18 cases. The 3rd dose was required after 12h in 23cases of control group while in bupivacaine group only 12 patients were needed analgesics. Table III

The duration of hospital stay was longer for control group as compared to bupivacaine treated patients, ($p < 0.01$). Table III

Discussion

Laparoscopic cholecystectomy is one of the most common day-case surgeries where tissue injury is minimal. However, the existing postoperative pain is an important factor that can delay the patient's postoperative function and discharge from the hospital, especially in day-case departments. Unlike open surgery, laparoscopic cholecystectomy procedure requires very few incisions and has benefits such as less pain, a shorter hospital stay

due to less tissue damage, and a swift return to everyday life due to fast recovery. There is a probability that combined methods of analgesia are more effective to reduce the postoperative pain. This study showed that pain reached a peak within the first few hours following the operation but diminished during the next 48 h, demonstrated by the distribution of the pain score and parenteral analgesic requirement. Our results were consisted with other reported study stated that incisional pain is more intense than visceral pain and is dominant during the first 48 h after LC.¹¹⁻¹³ The results of this study

shows that intraperitoneal irrigation of bupivacaine along with infiltration in all ports decreases the pain in first 24 hours and there will be less analgesic consumption as well. We found a significant reduction in visceral pain intensity in patients who received intraperitoneal instillation of bupivacaine during the first three hours compared to control group. In our study first 24 hours agonizing pain was felt in 74.7% patients of controls and 16% of test patients. These results are also supported by Akter B et al, who observed that the Bupivacaine port-site infiltration reduces postoperative pain after laparoscopic cholecystectomy.¹⁴ In a previous study Lee et al had studied that the bupivacaine infiltration at the site of ports and intra-peritoneal irrigation before and after surgery. In that study, incisional somatic pain dominated and incisional pain was lower in patients in whom pre-incisional injection of bupivacaine given at the port site. Peritoneal irrigation didn't decrease visceral pain. They had recommended pre-incisional bupivacaine to decrease somatic pain after surgery.¹⁵ Consistently, Ahmed T et al observed that, following laparoscopic cholecystectomy, combination of port site infiltration and intraperitoneal irrigation of the gallbladder bed with bupivacaine considerably reduced early postoperative pain, which may account for the patients' earlier discharge and lower use of rescue analgesics.¹⁶

In our study, the sex ratio showed a predominance of females. Out of 150 patients included in this study 22 were male and 128 patients were female, with male to female ratio of 1:5.8. The ratio is not consisted with other

study who reported male to female ratio 3:17.¹⁷ The under-study subjects have age ranged from 16 to 60 years with mean age of 32.7 ± 5.42 years. Whereas maximum number of cases were seen in 3rd and 4th decade and least number was seen in 6th decade. The other researcher conducted laparoscopic cholecystectomy on patients with mean age of 44.26 ± 13.13 years.⁷

Several investigators have proposed that the combination of somato-visceral local anesthetic treatment reduces incisional, intra-abdominal, and shoulder pain in laparoscopic cholecystectomy. The incidence of right shoulder pain in our study was significantly lower only in those who received intraperitoneal bupivacaine. Therefore, we believe that intraperitoneal instillation of bupivacaine after the removal of the gallbladder is recommended as it decreases the incidence of acute right shoulder pain in patients. This is consisted with previous study.¹⁸⁻²⁰

Pain can prolong hospital stay and lead to increased morbidity, which is particularly important, now a day many hospitals are performing LC operation as a day-case procedure.³ The hospital stays in this study ranged from 12 to 48 hours. Up to 12 h 4% of control and 20% of test patients were discharge from the hospital. About 50% of controls and 70% of test patient were released from hospital, while 40% controls and 10% test patients required longer stay (24-48h). There is strong compelling evidence for a postoperative analgesic effect of intraperitoneal local anaesthetics after laparoscopic cholecystectomy. We did not observe any adverse effect related to the use of local anaesthesia and these findings were similar to other studies.^{14,16} Generally, the present study confirms earlier evidence that in patients with gall bladder stones undergoing LC, use of local anaesthesia is very effective in reducing postoperative pain without any additional adverse effects.

Conclusion

It has been concluded that the use of bupivacaine in the peritoneal cavity and infiltration around the ports (ports used for surgery) significantly reduces the severity of post-operative pain and the analgesic requirement. This technique is safe and effective for pain control and easy to perform in appropriate patients undergoing laparoscopic cholecystectomy. It improves early mobilization of patients and thereby decreases the hospital stay. The use of intraperitoneal local anaesthetics

deserves further study, especially in light of the availability of potent and less toxic derivatives of Bupivacaine.

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