

Comparison of postoperative pain in laparoscopic cholecystectomy with and without instillation of bupivacaine in the gall bladder bed

ABSTRACT: Laparoscopic surgery is a modern surgical technique in which operations in the abdomen are performed through small incisions. Cholecystectomy is the surgical removal of the gallbladder. Laparoscopic cholecystectomy is the most common laparoscopic procedure performed. The most common problem after laparoscopic cholecystectomy is the postoperative pain. One of the good procedures is to instill a local anaesthetic agent at the area from where gall bladder is removed. Inj. Bupivacaine 0.5 % is a long-acting local anaesthetic. It is effective in reducing postoperative pain after Laparoscopic Cholecystectomy.

OBJECTIVE: To compare the mean postoperative pain in laparoscopic cholecystectomy with and without instillation of 0.5% bupivacaine in the gall bladder bed.

OUTCOME MEASURE: The outcome was measured as pain post operatively at 0, 2, 4 and 6 hours by VAS. And the number of hours after which patients requested for analgesia.

MATERIAL AND METHODS:

SETTING: Department of surgery, Benazir Bhutto Hospital Rawalpindi.

DURATION: 6 months

STUDY DESIGN: Randomized Controlled Trial.

METHODS: 120 patients undergoing Laparoscopic Cholecystectomy were included in study. Patients were divided into two groups A & B. Group A (Experimental group) was given 10 ml 0.5% bupivacaine at gall bladder bed and under right hemidiaphragm at the end of surgery through laproscope port and Group B (Control group) was given 10 ml normal saline intraperitoneally at the same location. Patients were included through non probability sampling technique.

RESULTS: 100 patients (83.3%) were female and 20 patients (16.7%) were male. The demographic data including age, gender, and the average duration of surgery was not significantly different ($p > 0.05$) in Bupivacaine and Saline group. A significant difference was observed between the pain scores of Bupivacaine and Saline groups after 0 hours, 2 hours and 4 hours of surgery ($p < 0.05$). However no significant difference was observed between two groups after 6 hours of surgery ($p > 0.05$). There was also a significant difference in the number of hours after which patients requested for analgesia ($p < 0.05$). The patients of Bupivacaine group requested late for analgesia as compared to the patients of Saline group.

CONCLUSION: Intraperitoneal instillation of Bupivacaine results in good pain relief after laparoscopic cholecystectomy.

KEYWORDS: Laparoscopy, Cholecystectomy, Bupivacaine

INTRODUCTION:

Gall bladder diseases are known to the mankind for over 2000 years.() The prevalence of gallstones is highest in people of northern European descent, and in Hispanic populations and Native American populations.() However the prevalence of gallstones is lower in Asians and African Americans. In developed countries, about 10% of adults and 20% of people > 65 years have gallstones, but 80% are asymptomatic.³

A Swedish epidemiologic study found that the incidence of gallstones was 1.39 per 100 person-years.⁴ In an Italian study, 20% of women had stones, and 14% of men had stones. In a Danish study, gallstone prevalence in persons

aged 30 years was 1.8% for men and 4.8% for women; gallstone prevalence in persons aged 60 years was 12.9% for men and 22.4% for women.⁵

Methods: This was a descriptive study which was carried out for a period of one year from January 2017 to December 2017 in surgical unit of Benazir Bhutto Shaheed Hospital Abbottabad on patients who had cholecystectomy secondary to symptomatic gall stone disease diagnosed on the basis of history and ultrasonography. Gallstones were then analysed for bilirubin, cholesterol, calcium and phosphate. The data was analysed by using SPSS Version 16.00.

Results: In our research study 88% of patients were

females while 11.8% were males, the mean age being 35.81 ± 8.12 year. The frequencies of different types of gall stones were: mixed type of stones 80.0% and cholesterol stones 20.0%.()

Women are more likely to develop cholesterol gallstones than men, especially during their reproductive years, when the incidence of gallstones in women is 2-3 times that in men. The difference appears to be attributable mainly to estrogen, which increases biliary cholesterol secretion.(). Among individuals undergoing cholecystectomy for symptomatic cholelithiasis (gallstones), 8-15% of patients younger than 60 years have common bile duct stones, compared with 15-60% of patients older than 60 years of age.()

Gallstones are the pieces of solid material that form in the gallbladder. These stones develop as a result of formation of hard particles by cholesterol and pigments in the bile.() Gallstones are usually treated with surgery to take out the gallbladder. The traditional operation is called an open cholecystectomy. A newer procedure, called laparoscopic cholecystectomy, is less invasive, has fewer complications, and is used more often.() During this procedure, instruments, a light, and a camera are passed through several small incisions in the abdomen. The surgeon views the inside of the body by looking at a video monitor. This procedure is used in approximately 80% of gallbladder removals. Many laparoscopic cholecystectomies are performed on an outpatient basis, which means that the patient can go home the same day. Normal physical activity can usually be resumed in about a week.()

The intraoperative and postoperative relief of pain forms an important part of good anesthetic technique. The sensation and incidence of postoperative pain varies with the individual patient, but is largely governed by the site and nature of operation. There are various modalities available for postoperative pain relief. These range from parenteral analgesia, epidural analgesia and peripheral nerve blocks.⁹

Reduction in surgical trauma in the laparoscopic results in a reduction of postoperative pain, lessened requirements for opioids and earlier return to normal activity.⁹ Bupivacaine is prescribed for local or regional anesthesia (loss of sensation) or analgesia (decreased pain) for surgical, dental, diagnostic, and obstetrical procedures.¹⁰ Injection Bupivacaine 0.5 % is a long-acting local anaesthetic. It blocks initiation and transmission of nerve impulses at the site of application by stabilizing the neuronal membrane. The compound is ultimately metabolized in the liver.

Depending upon the site of injection and the concentration used, anaesthesia usually lasts 2-4 hours.¹¹ The reduction of pain also improves the pulmonary function of the patient.¹² The half-life of Bupivacaine in adults is 2.7 hours. The onset of action with Bupivacaine is rapid and anesthesia is long lasting. The duration of anesthesia is significantly longer with Bupivacaine than

with any other commonly used local anesthetic. It has also been noted that there is a period of analgesia that persists after the return of sensation, during which time the need for strong analgesics is reduced.¹³

In Pakistan no study was found on this topic but one study compared the effect of intraperitoneal use of bupivacaine and lidocaine and results showed that there is no significant difference between two drugs for managing pain after laparoscopic cholecystectomy.¹¹ In most of the literature the intervention with 20ml of 0.5% bupivacaine was used but no study was found on the use of 10ml of 0.5. The available literature locally related to the topic is very less. The topic has been selected for the study because the pain following laparoscopic cholecystectomy is the commonest causes of distress in patients.¹⁴ This study aimed to compare the mean postoperative pain in laparoscopic cholecystectomy with and without instillation of 0.5% bupivacaine in the gall bladder bed. The study will help to manage postoperative pain in cholecystectomy efficiently.

METHODS AND MATERIALS:

Study Design, Study Setting and Duration:

It was a Randomized Controlled Trial (RCT) conducted at Benazir Bhutto Hospital Rawalpindi, during a period of 8 months (1st August 2015 to 31st March 2016).

Sampling Technique and Sample Size:

Non-probability sampling technique was used to collect the data. Sample size was calculated by WHO calculator:

Level of significance = 0.05; Power of test = 80%; Population mean = 2.9^{15} ; Test value of mean = 4.6^{15} ; Pooled standard SD = 2.3; Sample size = 60 in each group

Sample Selection:

Inclusion Criteria:

Patient in ASA Grade I and Patients who were aged between 30 to 60 years of both gender undergoing laparoscopic cholecystectomy.

Exclusion Criteria

Patients with chronic pain syndrome; Allergy to protocol drug; Patients in whom conversion to open cholecystectomy was done for any reason; Patients with previous history of any chemotherapy or radiotherapy, any history of repeated infection, previous abdominal surgery; Patients with other hepatobiliary diseases like hepatitis, choledocholithiasis, along with cholelithiasis; H/o Bleeding diathesis; H/o Diabetes mellitus; H/o Acute cholecystitis.

Data Collection Procedure:

Before starting the data collection procedure, first of all permission was taken from the concerned authorities and ethical committee. Informed consent was taken from all patients by giving them the written informed consent form and they were asked to sign it.

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Hospital registration numbers of all patients included in the study was recorded. The demographic data including the name, age, gender and the area of residence of all patients was taken. The education status of all patients was also recorded. History of any previous chemotherapy, radiotherapy and repeated infections was taken. Patients were examined for tenderness and raised temperature. Blood sugar level (Random) and other baseline investigation like full blood count, blood urea/sugar and hepatitis B & C screening was done in addition to pre-anesthesia workup. Appropriate intravenous antibiotic prophylaxis was given to all patients. Patients were divided randomly into two groups Group A and Group B by lottery method.

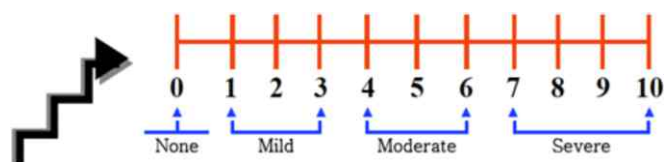
- **Group (A) – Experimental or Bupivacaine group:**

The patients of group A received 10 ml 0.5% bupivacaine at gall bladder bed and under right hemidiaphragm at the end of surgery through laproscope port.

- **Group (B) – Placebo or Saline group (Control):**

Patients of group B received 10 ml normal saline intraperitoneally at the same location.

Both groups were given routine analgesics postoperatively. The NPRS (Numeric Pain Rating Scale) for pain was used and the data was recorded and analyzed after 0, 2, 4 and 6 hours of surgery. NPRS (Numeric Pain Rating Scale) with the range of 0 to 10 is a type of pain scale that was used. Patients were asked to choose a number from 0 to 10 that best reflects level of pain.



The time after which patients requested for analgesia was also recorded and analyzed. Vital signs like heart rate, blood pressure, respiratory rate, temperature, and oxygen saturation were also continuously monitored on hourly

basis for 24 hours postoperatively. All the information was recorded by researcher on a specially designed questionnaire.

Data Analysis:

All the data was analyzed using SPSS version 18.0. For qualitative variable the gender, frequency and percentage were calculated. For quantitative variable age, pain score, mean and SD were calculated. An independent samples t-test was used to compare the demographic variables including age and gender of Bupivacaine and Saline group. Independent samples t-test was also used to compare the average duration of surgery between the two groups. The continuous variables of Pain scores after 0, 2, 4 and 6 hours, and the time of request for analgesia was tested for normality by using Kolmogorov-Smirnov test, which showed that the data was non parametric. For comparing the mean scores of non parametric variables, Mann Whitney U test was used which was intended to compare the mean pain scores after 0, 2, 4, 6 hours, and the mean time of request for analgesia between the two groups. The P-value <0.05 was considered as showing statistically significant results.

RESULTS:

A total number of 120 patients were included in this study, as 60 (50%) in Bupivacaine group and 60 (50%) in saline group. The mean age $\pm$ SD of patients was 39.17 ± 8.26 . The minimum age of patients was 26 and maximum age was 56 years. There were 100 (83.3%) female patients [51 (51%) in Bupivacaine group; 49 (49%) in Saline group], while the male patients were 20 (16.7%) [9 (45%) in Bupivacaine group; 11 (55%) in Saline group].

Comparison of Demographic Data:

The demographic profile i.e., age and gender between the Bupivacaine and Saline group was compared by using **Independent Samples t-test**, which revealed that the two groups are more or less similar and statistically no significant difference was observed between Bupivacaine and Saline group (Table 1).

Table : Demographic Data

Parameters	Bupivacaine Group (Mean $\pm$ SD)	Saline Group (Mean $\pm$ SD)	p-value	Remarks
Age	38.63 $\pm$ 8.024	39.39 $\pm$ 8.540	0.644	Insignificant
Gender	51:9	49:11	0.628	Insignificant

Duration of Surgery:

The mean duration of surgery in minutes and standard deviation in Bupivacaine group was 61.24 ± 10.742 (95% C.I: 58.59–64.14). The mean duration of surgery and standard deviation in Saline group was 60.74 ± 11.179 (95% C.I: 58.03–63.80). The minimum duration

of surgery was 45 minutes and maximum duration was one hour and 20 minutes.

An **Independent Samples t-test** revealed that there was no significant difference between the bupivacaine and saline groups in terms of duration of surgery (Table 2).

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Table : Duration of Surgery

Parameters	Mean $\pm$ SD	95% C.I		t-value (df)	p-value
		Lower Bound	Upper Bound		
Bupivacaine Group	61.24 $\pm$ 10.742	58.59	64.14	0.225 (118)	0.822
Saline Group	60.74 $\pm$ 11.179	58.03	63.80		

Pain Scores:

The pain scores of Bupivacaine and Saline group right

after the surgery, after 2, 4 and 6 hours are shown in the following Table 3.

Table : Pain Scores after 0, 2, 4 and 6 hours in Bupivacaine and Saline group

Pain Scores on NPRS	Group	Pain Score after 0 Hours	Pain Score after 2 Hours	Pain Score after 4 Hours	Pain Score after 6 Hours
		N (%)	N (%)	N (%)	N (%)
2	Bupivacaine Group	4 (100%)	0 (0%)	0 (0%)	0 (0%)
	Saline Group	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Total	4 (100%)	0 (0%)	0 (0%)	0 (0%)
3	Bupivacaine Group	25 (86.2%)	7 (70%)	2 (100%)	0 (0%)
	Saline Group	4 (13.8%)	3 (30%)	0 (0%)	0 (0%)
	Total	29 (100%)	10 (100%)	2 (100%)	0 (0%)
4	Bupivacaine Group	26 (54.2%)	34 (89.5%)	22 (78.6%)	9 (81.8%)
	Saline Group	22 (45.8%)	4 (10.5)	6 (21.4%)	2 (18.2%)
	Total	48 (100%)	38 (100%)	28 (100%)	11 (100%)
5	Bupivacaine Group	5 (19.2%)	17 (37.8%)	32 (60.4%)	26 (52%)
	Saline Group	21 (80.8%)	28 (62.2%)	21 (39.6%)	24 (48%)
	Total	26 (100%)	45 (100%)	53 (100%)	50 (100%)
6	Bupivacaine Group	0 (0%)	2 (7.4%)	4 (11.4%)	19 (40.4%)
	Saline Group	12 (100%)	25 (92.6%)	31 (88.6%)	28 (59.6%)
	Total	12 (100%)	27 (100%)	35 (100%)	47 (100%)
7	Bupivacaine Group	0 (0%)	0 (0%)	0 (0%)	5 (45.5%)
	Saline Group	1 (100%)	0 (0%)	2 (100%)	6 (54.5%)
	Total	1 (100%)	0 (0%)	2 (100%)	11 (100%)
8	Bupivacaine Group	0 (0%)	0 (0%)	0 (0%)	1 (100%)
	Saline Group	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Total	0 (0%)	0 (0%)	0 (0%)	1 (100%)

Request for Analgesia:

The frequency of hours after which patients of

Bupivacaine and Saline group requested for analgesia are shown in the following table 4.

Table : Number of hours after which patients of Bupivacaine and Saline group requested for analgesia

Patient requested for Analgesia after Hours		N	%
0	Bupivacaine Group	5	45.5
	Saline Group	6	54.5
	Total	11	100.0
1	Bupivacaine Group	4	36.4
	Saline Group	7	63.6
	Total	11	100.0
2	Bupivacaine Group	12	50.0
	Saline Group	12	50.0
	Total	24	100.0
3	Bupivacaine Group	12	35.3
	Saline Group	22	64.7
	Total	34	100.0
4	Bupivacaine Group	14	60.9
	Saline Group	9	39.1
	Total	23	100.0
5	Bupivacaine Group	9	75.0
	Saline Group	3	25.0
	Total	12	100.0
6	Bupivacaine Group	3	75.0
	Saline Group	1	25.0
	Total	4	100.0
7	Bupivacaine Group	1	100.0
	Saline Group	0	0.00
	Total	1	100.0

Hypothesis Testing:

A non-parametric **Mann Whitney U test** was conducted to compare the two groups, i-e Bupivacaine and Saline groups in terms of pain scores after 0, 2, 4 and 6 hours, and the number of hours after which patients requested

for analgesia.

The **Mann Whitney U test** revealed that there was a significant difference between Bupivacaine group (Median=4, n=60) and Saline group (Median=5, n=60) in pain scores after 0 hours, U=622.50, Z=-6.476,

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$p=0.00$, with a large effect size $r=0.6$ according to Cohen's criteria 1988.

After 2 hours of surgery, there was a significant difference between Bupivacaine group (Median=4, $n=60$) and Saline group (Median=5, $n=60$), $U=632.50$, $Z=-6.446$, $p=0.00$, with a large effect size $r=0.6$.

After 4 hours of surgery, there was a significant difference between Bupivacaine group (Median=5, $n=60$) and Saline group (Median=6, $n=60$), $U=764.00$, $Z=-5.808$, $p=0.00$, with a large effect size $r=0.5$.

However, no significant difference was observed after 6 hours between Bupivacaine group (Median=5, $n=60$) and Saline group (Median=6, $n=60$), $U=1478.00$, $Z=-1.816$, $p=0.069$.

There was also a statistically significant difference between the Bupivacaine group (Median=3, $n=60$) and Saline group (Median=3, $n=60$) in terms of number of hours after which patients requested for analgesia, $U=1410$, $Z=-2.090$, $p=0.037$ with a small effect size $r=0.2$.

Table : Mann-Whitney test to compare the pain scores after 0, 2, 4 and 6 hours and patients requested for analgesia in Bupivacaine and Saline group

		Median Pain Scores	Mann Whitney U	Z value	p-value	Effect size (r)
Pain Scores after 0 hours	Bupivacaine Group	4	622.50	-6.476	0.000	0.6
	Saline Group	5				
Pain scores after 2 hours	Bupivacaine Group	4	632.50	-6.446	0.000	0.6
	Saline Group	5				
Pain scores after 4 hours	Bupivacaine Group	5	764.00	-5.808	0.000	0.5
	Saline Group	6				
Pain scores after 6 hours	Bupivacaine Group	5	1478.0	-1.816	0.069	0.16
	Saline Group	6				
Patient requested for Analgesia after Hours	Bupivacaine Group	3	1410.0	-2.090	0.037	0.2
	Saline Group	3				

DISCUSSION:

Gallstones are hard particles that develop in the gallbladder. The gallbladder is a small, pear-shaped organ located in the upper right abdomen—the area between the chest and hips—below the liver. Gallstones can range in size from a grain of sand to a golf ball. The gallbladder can develop a single large gallstone, hundreds of tiny stones, or both small and large stones.¹⁶

The most common operation of the biliary tract performed these days is cholecystectomy, which is the second most common operation.¹⁷ Cholecystectomy effectively prevents future biliary colic but is less effective for preventing atypical symptoms such as dyspepsia.³ Laparoscopic cholecystectomy is considered the gold standard treatment for benign gallbladder disease. It is characterized by a short hospital stay and an early return to regular activity.¹⁸

The pain in the conventional cholecystectomy is a parietal pain. In laparoscopic cholecystectomy, pain is derived from multiple situations: incision pain (somatic),

deep intra-abdominal pain (visceral), and shoulder pain (visceral pain due to phrenic nerve irritation).¹⁹ In 17% to 41% of the patients, pain is the main cause for staying overnight in the hospital the day of surgery.²⁰ It is the primary reason why the patients have a longer convalescence.²¹

Laparoscopic cholecystectomy has improved surgical outcome in terms of reduced pain and convalescence compared to conventional cholecystectomy.²² It offers several advantages such as a reduction in stress response, postoperative pain, postoperative wound infection rate, intraoperative bleeding, impairment of respiratory function and pulmonary complications, short recovery time, and cosmetic appearance.²³

It is important to consider that the pain is a manifestation that varies from one person to another, depending largely on the pain threshold of each person and how each perceives pain, so today the subjective tools are being used to measure the level of pain. VAS is based on the results of each patient's verbal comments. This study indicates that it is feasible to perform this type of

procedure to have better control of postoperative pain in ambulatory laparoscopic surgery.

With the possibility that a similar beneficial effect might be achieved in laparoscopic cholecystectomy a number of studies were carried out with variable results.²⁴

Narchi P et al observed that 0.5% bupivacaine (80 ml) was effective in reducing postoperative pain after day case diagnostic laparoscopy.²⁵ In contrast Walling GLC et al (1998) could not demonstrate any effect on postoperative analgesia of bupivacaine 2ml/kg dissolved in 300 ml of isotonic saline administered intraperitoneally after laparoscopic cholecystectomy.²⁶ The effective analgesia observed by Narchi P et al, could be attributed to the larger doses of local anesthetic used by these workers. Larger doses are however not without the risk of toxicity.²⁶

In this study, the demographic data including age, gender, and the average duration of surgery was not significantly different ($p > 0.05$) in Bupivacaine and Saline group.

A significant difference was observed between the pain scores of Bupivacaine and Saline groups after 0 hours, 2 hours and 4 hours of surgery ($p < 0.05$). However no significant difference was observed between two groups after 6 hours of surgery ($p > 0.05$). The patients of Bupivacaine group suffered less pain after 0, 2 and 4 hours as compared to Saline group patients because they were administered with 10 ml 0.5% bupivacaine at gall bladder bed under right hemidiaphragm at the end of surgery through laproscope port. However after 6 hours the effect of Bupivacaine diminished and the pain scores of both groups became similar and insignificant.

There was also a significant difference in the number of hours after which patients requested for analgesia ($p < 0.05$). The patients of Bupivacaine group requested late for analgesia as compared to the patients of Saline group.

In a study conducted by Castillo-Garza G et al, a significant difference occurred in the average pain levels at 6 hours postoperatively between the control and experimental groups. But no significant difference occurred between the 2 groups during the other time intervals. The patients that needed analgesics asked for their first dose at 4 hours postoperative time. The average analgesic requirement was lower in the bupivacaine group, but this did not reach the level of statistical significance.²⁷

Alexander et al conducted a study to determine the effect of injection of a long-acting local anesthetic bupivacaine, in relation to the port sites at the level of the parietal peritoneum, in reducing postoperative pain following laparoscopic cholecystectomy. Two scores for pain, with the patient at rest, and on movement, were assessed 6 and 18 hours after surgery using a visual analogue pain scale. Median pain score was significantly higher in patients who received standard technique ($n = 40$) than in those given peritoneal injection ($n = 40$) at both 6 (rest = 3.0

versus 1.0, movement = 5.0 versus 2.9) and 18 h (rest = 1.9 versus 0, movement = 3.2 versus 1.2). Both opiate and oral analgesic requirements were reduced in patients administered peritoneal injection, although this was not statistically significant. The addition of periportal injection of bupivacaine at the level of the parietal peritoneum, performed under direct vision, reduced pain after laparoscopic cholecystectomy.²⁸

A prospective randomized trial conducted by Shibhar P et al, revealed that the VAS score for abdominal pain in study group was significantly less as compared to control group after 6 hours ($P < 0.040$), 12 hours ($P < 0.002$) and 24 hours ($P < 0.001$). At 48th hour the VAS score was not significant ($P > 0.05$). The VAS score for shoulder tip pain for study group as compared to control group was significant at 6th hour ($P < 0.012$), whereas it was not significant at 12th hours, 24th hours, and 48th hours ($P > 0.05$). At 6th hour 6.66% patients in study group and 63.33% patients in control group were given analgesic injections. P value (< 0.0001) calculated was significant between study group and control group. After 12 hours 10% patients in study group and 33.33% patients in control group were given analgesic injections. P value (0.0575) calculated was insignificant between study group and control group. After 24 hours 6.66% of patients were given analgesic injections in both groups. After 48 hours none of the patients from neither group were given analgesic injections.²⁹

A placebo-controlled double-blind randomized trial conducted by Louizos et al, revealed that the combination of preincisional local infiltration and intraperitoneal instillation of Levobupivacaine 0.25% shows an advantage for postoperative analgesia after laparoscopic cholecystectomy.³⁰

In one study where experimental group compared with patient who did not receive local anesthetics, patients given bupivacaine experienced a 36% pain reduction in less than 2 hours post operatively, a 28% pain reduction 6 hours postoperatively. a 20% pain reduction 10 hours postoperatively and a 4% reduction in next morning. So it was observed that bupivacaine reduce pain significantly during first 6 hours after laproscopic cholecystectomy.¹⁵

In the study of Bhardwaj N et al, the VAS was significantly higher in saline group compared to bupivacaine group at 1st, 4th and 8th postoperative hour ($P < 0.001$; $P < 0.05$). Although the VRS was higher in saline group compared to bupivacaine group at 1st, 4th and 8th postoperative hour the difference was statistically significant only at 1st and 4th postoperative hour ($P < 0.05$). Shoulder pain was not present in any of the patients in both the groups. The total number of patients requiring analgesics was higher for saline group than bupivacaine group ($P < 0.05$).³¹

CONCLUSION:

The intraperitoneal instillation of bupivacaine in

gallbladder bed causes good post operative pain relief in laparoscopic cholecystectomy, but its effect was limited to less than 6 hours. The technique is easy to use and is

safe because no hemodynamic instability or any other adverse effects were observed in any patient of Bupivacaine group.

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