DOI Number: 10.5958/2321-1024.2019.00033.3

Original Research Article

Intra-Peritoneal Bupivacaine Instillation for Post-Operative Pain Relief after Laparoscopic Cholecystectomy: A Prospective Study

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Abstract

Background: Pain relief remains milestone achievement ascribed to laparoscopic cholecystectomy. Post laparoscopic cholecystectomy patient still complains of port site/incisional pain, shoulder pain and vague upper abdominal pain. A simple method of portal or incisional infiltration and intra-peritoneal spraying of a local anesthetic agent over gall bladder fossa can reduce postoperative pain.

Method: This study was conducted to determine whether Bupivacaine wash at gall bladder fossa and infiltration of local anesthetic at trocar sites has any effect in postoperative pain relief. This prospective study was conducted on 68 patients, where 20 ml of normal saline wash was given in group A and 20ml of 0.25% bupivacaine wash was given in group B at the gall bladder fossa and in both the groups, the same local anesthetic was infiltrated at the port sites and the outcomes was studied.

Results: Pulse rate and blood pressure were significantly low in group B than group A. The median pain score was significantly low in group B than group A. Also, the total number of analgesic doses used in group B was significantly less than the group A.

Conclusions: Instillation at gall bladder fossa and infiltration to the port sites using 0.25% bupivacaine is an effective method of postoperative pain relief after laparoscopic cholecystectomy.

Keywords: *Bupivacaine wash, Normal saline wash, Post-operative analgesia, Laparoscopic cholecystectomy.*

Introduction

Laparoscopic cholecystectomy has become the procedure of choice for symptomatic cholelithiasis. This procedure returns the patient to full activity within 1 week when compared to open cholecystectomy where the return to full activity is around 1 month. It has improved surgical outcome in terms of reduced pain and early return to activity compared to conventional cholecystectomy.[1,2] In laparoscopic cholecystectomy, pain is derived from multiple sites, port site pain (somatic), deep intra-abdominal pain (visceral), and shoulder pain (due to phrenic nerve irritation). [5,6] Pain management with multiple analgesic and opioids has been reported with variable success.[1,2,4]

The various methods used with variable success are NSAID'S[7], infiltration of wound with local anaesthetics[8] and intermittent intramuscular narcotics[9]. Considering the variable results obtained by various authors and availability of few studies, [11,12,13,14] the present study was conducted in patients undergoing laparoscopic cholecystectomy where 20 ml of normal saline wash was given in group A and 20ml of 0.25% bupivacaine wash

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was given in group B at the gall bladder fossa and both in the groups, the same local anesthetic was infiltrated at the port sites and the outcomes were studied.

Aims and Objectives

1. To study the post-operative pain relief in patients undergoing laparoscopic cholecystectomy for symptomatic gall stone disease, who have received intra-peritoneal lavage with 20 ml of normal saline at the gall bladder fossa and port site infiltration with the local anaesthetic.

2. To study the post-operative pain relief in patients undergoing laparoscopic cholecystectomy for symptomatic gall stone disease, who have received intra-peritoneal lavage with 20 ml of 0.25% bupivacaine at the gall bladder fossa and port site infiltration with local anaesthetic.

3. To compare the outcomes between two set of patients.

Method

Study design

This prospective study was conducted in tertiary centre, R.L Jalappa Hospital, Kolar, Karnataka, India. Study was conducted for 12 months between January 2018 to December 2018, on 68 patients undergoing laparoscopic cholecystectomy after obtaining the consent.

Inclusion criteria

Patients with gallstone disease who underwent standard 4 port laparoscopic cholecystectomy above 18 years of age who were willing to participate in the study.

Exclusion criteria

Documented allergy to bupivacaine or after skin testing, history of cardiovascular disease which required treatment, history of chronic pain disease other than that related to gallstone, and pregnant patients

Method

Two 10mm ports, umbilical and epigastric port and two 5mm working ports were inserted after induction of general anesthesia. Patient was placed in head up and slight tilt on left side. A Veress needle was used to create pneumoperitoneum with CO2 insufflator to create a pressure of 10mmHg at a flow rate of 1litre/min.

The patients were randomized into 2 groups of 34 cases each. In group A, 20ml of normal saline was instilled at gall bladder fossa. In group B, 20ml of 0.25% bupivacaine was instilled in gallbladder fossa after removal of gall bladder. In both the groups the same local anesthetic was infiltrated at port sites. 15 ml of 0.5% bupivacaine was taken and diluted with 15 ml of distilled water to make it 30 ml of 0.25% concentration. 20 ml was used for intra-peritoneal lavage and 10 ml was used for infiltration at port sites.

Postoperatively the patients were assessed for pain using Wong Baker Faces pain rating scale as shown in **figure 1**, also other parameters like heart rate, blood pressure, and total number of analgesic doses used were assessed. The above parameters were assessed at 1, 3, 6, 12 and 24 hours in post-operative period. First dose (rescue) analgesia was used when the pain score was above 6. The analgesic used was, injection diclofenac sodium 75mg intramuscularly, given after test dose.

Figure 1

Results

Statistical analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test** was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. **Independent t test or Mann Whitney U test** was used as test of significance to identify the mean difference between two quantitative variables and qualitative variables respectively. **Paired t test or Wilcoxon Signed rank test** is the test of significance for paired data such as before and after surgery for quantitative and qualitative data respectively.

Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs such as bar diagram.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software: MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Table 1: General profile of subject's comparison between two groups

		Group				P value
	Bupivacaine wash		Normal Saline wash			
	Count	%	Count	%		
Age	<30 years	10	29.4%	5	14.7%	0.363
	31 to 40 years	13	38.2%	14	41.2%	
	41 to 50 years	2	5.9%	4	11.8%	
	51 to 60 years	6	17.6%	5	14.7%	
	61 to 70 years	3	8.8%	3	8.8%	
	>70 years	0	0.0%	3	8.8%	
Sex	Female	21	61.8%	27	79.4%	0.110
	Male	13	38.2%	7	20.6%	
Diagnosis	Calculous cholecystitis	3	8.8%	1	2.9%	0.587
	Cholelithiasis	30	88.2%	32	94.1%	
	Chronic cholecystitis	1	2.9%	1	2.9%	

In Bupivacaine wash group, majority were in the age group 31 to 40 years (38.2%), 61.8% were female, 88.2% had Cholelithiasis. Similarly in Normal saline wash, majority were in the age group 31 to 40 years (41.2%), 79.4% were female, 94.1% had Cholelithiasis.

There was no significant difference in age, sex and diagnosis between two groups. This ensures age and sex matching between two groups.

Table 2: Vital signs comparison between two groups

	Group				P value
	Bupivacaine wash		Normal Saline wash		
	Mean	SD	Mean	SD	
PR	85.29	6.40	92.18	6.41	<0.001*
SBP	126.06	10.12	134.35	12.65	0.004*
DBP	81.00	7.73	86.24	9.30	0.014*

In Bupivacaine wash group, mean Pulse rate was 85.29 ± 6.40 bpm, mean SBP was 126.06 ± 10.12 mmhg, mean DBP was 81.00 ± 7.73 mmhg.

In Normal Saline wash group, mean Pulse rate was 92.18 ± 6.41 bpm, mean SBP was 134.35 ± 12.65 mmhg, mean DBP was 86.24 ± 9.30 mmhg.

The pulse rate and blood pressure were significantly lower in group B than in group A.

Table 3: Pain Score at operative site comparison between two groups at different time intervals

Pain score at operative site	Group						P value
	Bupivacaine wash			Normal Saline wash			
	Mean	SD	Median	Mean	SD	Median	
1 hour	7	1	6	7	1	8	0.034*
3 hours	6	1	6	7	1	8	0.006*
6 hours	6	2	6	7	1	7	0.033*
12 hours	4	1	4	5	1	4	0.013*
24 hours	2	1	2	3	1	4	<0.001*

In the Bupivacaine wash, pain score at operative site, at baseline was 6, at 3 hours was 6, at 6 hours was 6, at 12 hours was 4 and at 24 hours was 2.

In Normal Saline wash, Median pain score at baseline was 8, at 3 hours was 8, at 6 hours was 7, at 12 hours was 4 and at 24 hours was 4.

The Median pain score was significantly less in Bupivacaine wash (group B) as compared to normal saline wash (group A)

Table 4: Pain score at Shoulder Site comparison between two groups at different time intervals

Pain score at Shoulder Site	Group						P value
	Bupivacaine wash			Normal Saline wash			
	Mean	SD	Median	Mean	SD	Median	
3 hours	0	1	0	1	1	0	0.023*
6 hours	0	1	0	1	1	0	0.023*
12 hours	0	1	0	0	1	0	0.102
24 hours	0	0	0	0	1	0	0.079

In the study, the Median Shoulder pain score was significantly low in group B as compared to group A at 3 hours and 6 hours. At 12 hours and 24 hours there was no significant difference in Shoulder pain score between two groups.

Table 5: First dose of Analgesic and Number of Doses comparison between two groups

	Group						P value
	Bupivacaine wash			Normal Saline wash			
	Mean	SD	Median	Mean	SD	Median	
First dose of Analgesic	3.2	0.8	3	1.4	0.6	1	<0.001*
No of doses	1.8	0.4	2	3.1	0.3	3	<0.001*

In group B, mean first dose of analgesic used was 3.2 hours and in group A was 1.4 hours. There was significant difference in mean first dose of analgesic used between two groups.

In group B, mean number of analgesic doses used was 1.8 and in group A was 3.1. The total number of analgesics used was significantly high in group A as compared to group B.

Discussion

Laparoscopic cholecystectomy is one of the most common elective laparoscopic surgeries done in our institute. We observed that post-operatively majority of the patients complain of abdominal pain, incisional pain at port sites and right shoulder tip pain. Often there is need of intravenous and intramuscular analgesic.

In present study the pulse rate and blood pressure were significantly lower in group B than group A. The increase in heart rate and blood pressure in group A during early post-operative period could be due to pain.

These findings are comparable to the findings of study conducted by Rajesh kumar meena et al, where the heart rates were low in patients received 0.75% ropivacaine in comparison to the group who received 0.25% bupivacaine whereas the blood pressures were statistically insignificant in both the groups.[16]

In our study, the analgesic effect was sustained upto 6 hours with the median pain score of 6 in group B, in comparison with the group A which was 7 at 6 hours and significantly reduced, with the pain score of 2 and 4 at 24hours respectively. Thus the median pain score in group B was significantly low in group B as compared to group A in first 24 hours.

This was comparable to the study by Devalkar and Salgaonkar who found mean VAS score readings to be lower in Bupivacaine group as compared to Normal saline group and were statistically significant at 2, 4, 8, and 12 h.[17]

In present study, there was significant difference in the mean shoulder pain in the initial 6 hours, but no significant difference noted at 12 and 24 hours.

Bisguard et al has also shown that combination of local and intra-peritoneal anaesthetic is effective in decreasing incisional pain but not in visceral or shoulder pain.[18]

In Our study, mean First dose of analgesic used was 3.2 hours in group B and in group A was 1.4 hours. The mean first dose of analgesic requirement in group B was significantly lower as compared to group A.

A similar study by Sulekha et al showed on an average the frequent dosing of rescue analgesia were highest in patients who received normal saline wash as compared to those receiving 0.5% bupivacaine wash.[19]

In Our study, mean number of analgesic doses used was 1.8 in group B and 3.1 in group A. There was significant difference in mean number of analgesic doses between two groups.

A study done by Rafaei et al revealed that the number of patients who needed postoperative analgesia with bupivacaine was significantly lower than control.[20] Goldstein et al recorded that morphine consumption at wake-up and over the first 24 hours, was significantly lower with bupivacaine and ropivacaine when compared with normal saline.[21]

Scheinin et al conducted a study, they found that while using 10ml of 0.15% bupivacaine with adrenaline (150mg) intra-peritoneally, there were no side effects such as circumoral numbness, tinnitus, muscle twitches or cardiac arrhythmias.[22]

In our study also there was no incidence of these above mentioned side effects.

Conclusion

From our study, the pain score and the total number of analgesic doses used was significantly low in patients receiving bupivacaine wash as compared to those receiving normal saline wash. Thus, we conclude that intra-peritoneal instillation and port site infiltration of 0.25% bupivacaine is a safe and effective method of achieving post-operative analgesia after laparoscopic cholecystectomy.

Conflict of Interest: Authors & Co-authors declare that no conflict of interest was there, during the conduct of the study.

Funding: Authors & Co-authors declare that no funding or financial support was provided by any sources, during the conduct of the study.

Ethical Committee Approval: Ethical committee clearance from Institutional Ethical Committee (IEC) was taken prior to the start of the study.

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