

EFFECTIVENESS OF INTRA-PERITONEAL ADMINISTRATION OF 0.5% BUPIVACAINE IN POSTOPERATIVE ANALGESIA AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Objective: To compare the effectiveness of 0.5% bupivacaine spray versus no spray in the gall bladder bed after laparoscopic cholecystectomy in terms of postoperative pain in first 24 hours.

Study Design: Randomized control trial.

Place and Duration of Study: Surgical ward, Combined Military Hospital, Rawalpindi from Jan 2011 to Jun 2011.

Material and Methods: A total of 62 patients were included in this study and they were randomly divided into two equal groups. At the end of laparoscopic cholecystectomy, 0.5% bupivacaine was sprayed in gall bladder bed in a dose of 2 mg/ kg body weight in group-A whereas group B did not receive any intraperitoneal local anesthetic agent. Results were compared and *p*-value calculated.

Results: Mean age of the patients was 42.3 ± 3.9 and 43.1 ± 2.9 years in group-A and B, respectively. In Group-A, 11 patients (35.5%) and in group-B, 13 patients (41.9%) were male while 20 patients (64.5%) in group-A and 18 patients (58.1%) in group-B were female. Comparison of pain at 8 hours, postoperatively showed that in group-A, pain was reported in 8 patients (25.8%) and in group-B, in 24 patients (77.4%). Results were statistically significant with $p < 0.001$. Similarly comparison of pain at 24 hours revealed that in group-A, pain was reported in 9 patients (29.0%) and in group-B, in 21 patients (67.7%). Results were statistically significant with *p*-value 0.002.

Conclusion: Intraperitoneal spray of 0.5% bupivacaine solution is effective in producing effective post-operative analgesia after laparoscopic cholecystectomy.

Keywords: Bupivacaine, Laparoscopic cholecystectomy, Postoperative pain.

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INTRODUCTION

Gallstones disease has worldwide prevalence and the incidence is 1-3 % per year¹. Cholecystectomy is the treatment of choice for symptomatic gallstones because it removes the organ that contributes to both the formation of gallstones and the complications ensuing from them. Laparoscopic cholecystectomy has become gold standard in recent times. Where laparoscopic cholecystectomy has greatly reduced hospital stay, morbidity, cost and convalescence time² post-operative pain still remains a problem requiring parenteral

analgesia³.

After cholecystectomy, the postoperative pain can be of two types; parietal and visceral. After conventional open cholecystectomy, the pain is mainly of parietal nature owing to the big abdominal incision, whereas postoperative pain after laparoscopic cholecystectomy is mainly of visceral nature^{3,4}. It often affects the right sub-diaphragmatic region and is also referred to the right shoulder in approximately 12 to 60% of the patients⁴. Relief of this pain is of utmost significance to achieve the true benefits of laparoscopic cholecystectomy.

The intra-peritoneal administration of local anesthetic agents has been vastly studied but still remains a controversial issue⁴. A lot of methods

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have been used for intra-peritoneal analgesia such as packing the raw area with local anesthetic soaked tabotamp⁴, local anesthetic soaked surgical⁵ intraperitoneal aerosolization⁶, intraperitoneal plus periportal injection⁷, intraperitoneal administration alone and even continuous delivery through Q-pump system^{8,9}. Some studies show significant pain relief³⁻⁷. (26.67% with bupivacaine vs 66.67% in controls)⁴ whereas others profess little or no use of such agents^{8,9} (mean visual analog score 2.4 with bupivacaine vs 2.5 without bupivacaine).

The objective of this study was to find out an optimal method for postoperative pain relief after laparoscopic cholecystectomy in our setup. Since our setup serves as tertiary care center for the military population and civilians from Rawalpindi, Islamabad, Northern areas and AJK, this study may help us in making protocols for postoperative pain relief and save precious resources spent in pain management.

MATERIAL AND METHODS

Both male and female patients between 20 to 60 yrs of age and having symptomatic gallstones were included in the study. Patients having complicated gallstones (acute cholecystitis, choledocholithiasis, pancreatitis), diabetes mellitus, chronic renal failure, bleeding disorders, immuno-compromised, previous abdominal surgeries, pregnancy and bile leak during surgery were not included in the study. Permission from hospital ethical committee was obtained (approval attached). A written informed consent was taken from each patient included in the study. Sixty two patients fulfilling the inclusion criteria were selected and randomly divided into two equal groups, A and B. Hospital registration number, name, age, gender, address and phone number (optional) were noted. General anesthesia was given by same anesthetist in all cases. Induction was done with fentanyl¹, Propofol and atracurium with dosage according to the weight of patient. Maintenance anesthesia was with mixture of air, oxygen and sevoflurane. Pneumoperitonem was achieved with Veress

needle through periumbilical incision and maintained at a pressure of 12mm of mercury during whole procedure. All of the operations were performed by the same surgeon using standard four port laparoscopic cholecystectomy technique. At the end of laparoscopic cholecystectomy, 0.5% bupivacaine solution was sprayed in gall bladder bed in a dose of 2mg/kg body weight in group-A whereas group-B did not receive any intraperitoneal local anesthetic agent. Parenteral postoperative analgesia was given with intravenous ketorolac 30mg at 8 hours only, in both groups. Patients in both groups were kept in hospital for at least 24 hours.

Postoperative pain was assessed and scored in both the groups using visual analogue score from 0-10 at 8 and 24 hours, VAS above 4 will be significant. Any patient requiring analgesic onwards from 8 hours postoperative fell in the category of pain and was recorded in the proforma. All the information was recorded on a specially designed proforma. Follow up was ensured by recording contact numbers of patients. Control of bias and confounding factors was done by strictly following the exclusion criteria. All the data had been analysed using Statistical Package for Social Sciences (SPSS) version 14.0. Descriptive statistics were applied to summarize the data. Mean and standard deviation (\pm SD) were calculated for all the quantitative variables i.e. age. Frequency and percentages were calculated for qualitative variable i.e. pain and gender. Comparison of pain was done using Chi-square test and the level of significance was kept below 0.05.

RESULTS

A total of 62 patients (31 patients in each group) were included in the study. Patients age ranged from 31 to 60 years with mean age of 42.3(\pm 3.9) and 43.1(\pm 2.9) years in group-A and group-B respectively (table-1). In Group-A, 11 patients (35.5%) were male whereas 20 patients (64.5%) were female and in group-B, 13 patients (41.9%) were male and 18 patients (58.1%) were female (table-2). In group-A, 8 patients (25.8%)

developed pain after 8 hours whereas 24 patients (77.4%) had pain in group-B, with p -value < 0.001 (table-3). Similarly comparison of pain at 24 hours revealed that 9 patients (29.0%) had pain in group-A, whereas in group-B 21 patients (67.7%) developed pain, with p -value 0.002 (table-4).

and hospital stay which contributes to unanticipated admission after ambulatory surgery. Pain also contributes to postoperative nausea and vomiting. Thus, the establishment of laparoscopic cholecystectomy as an outpatient procedure has accentuated the clinical

Table-1: Distribution of cases by age among two study groups.

Age (Year)	Group-A 0.5% bupivacaine		Group-B without intraperitoneal local anesthesia	
	No.	%	No.	%
20-30	09	29.0	07	22.6
31-40	10	32.2	11	35.5
41-50	09	29.2	10	32.1
51-60	03	09.6	03	09.3
Total	31	100.0	31	100.0
Mean ± SD	42.3 ± 3.9		43.1 ± 2.9	

Group-A = Given 0.5% bupivacaine

Group-B = No intraperitoneal

Table-2: Distribution of cases by gender among groups.

Gender	Group-A N=31	Group-B N=31
	n (%)	n (%)
Male	11 (35.5)	13 (41.9)
Female	20 (64.5)	18 (58.1)

Table-3: Comparison of pain among groups.

	Group-A (N=31)	Group-B (N=31)	p-value
	n (%)	n (%)	
Yes	08 (25.8)	24 (77.4)	0.001
No	23 (74.2)	07 (22.6)	
Pain at 24 hours			0.002
Yes	09 (29.0)	21 (67.7)	
No	22 (71.0)	10 (32.3)	

DISCUSSION

The development of minimal invasive surgery has revolutionized surgical procedures and in this process has influenced the practice of anesthesiology as well^{10,11}. The advantages of laparoscopic surgery include reduced overall adverse events, shorter hospital stay and rapid return to normal activities. The success in healthy adult patients has led to the introduction of more extensive laparoscopic procedures in older and sicker patients, as well as in pregnant and pediatric patients¹². Laparoscopic cholecystectomy is commonly performed in our practice. Postoperative pain is the most common complication of laparoscopic surgery, including cholecystectomy^{13,14}. Pain, prolonged recovery

importance of reducing early postoperative pain and nausea¹⁵. Improved postoperative pain management using opioid-sparing regimens may facilitate a high success rate of outpatient laparoscopic cholecystectomy¹⁶. This study was designed to compare the effectiveness of 0.5% bupivacaine solution spray in the gall bladder bed at the end of surgery versus no spray in terms of post-operative pain relief in first 24 hours.

Early pain after laparoscopic cholecystectomy is multifactorial and complex. It includes different pain components due to different pain mechanisms. Abdominal wall penetration by trocars produces somatic pain; rapid distension of the peritoneum by CO2

insufflation results in tearing of blood vessels, traction of nerves, and release of inflammatory mediators producing visceral pain; inflammation or local irritation around the gallbladder bed, liver, diaphragm or peritoneum, or both, secondary to gallbladder removal and abdominal muscle distension add to tissue injury and produce visceral pain. Shoulder pain results from peritoneal insufflation especially when an exaggerated Trendelenburg position is used¹⁷.

Because postoperative pain following laparoscopic cholecystectomy is multifactorial, multimodal therapy may be necessary to optimize pain relief. The present study shows that the best therapy that significantly decreases pain over the first 24 hours postoperatively, as compared with the control group, is a 0.5% bupivacaine solution sprays. Bupivacaine solution spray (0.5%) has proven effective in decreasing the number of patients who needed rescue analgesics as compared with that in the control group.

Bupivacaine is an amide-type local anesthetic that is capable of producing prolonged analgesia. The recommended dose for infiltration is a maximum of 2 mg/kg. Narchi et al showed that intraperitoneal instillation of 100 mg of bupivacaine did not result in toxic plasma concentrations¹⁰. The absence of toxicity was confirmed by Deans et al who determined plasma concentrations after instillation of 1.5 mg/kg bupivacaine in the preperitoneal space during hernia repair¹⁸. Results of present study are comparable with above mentioned studies. In our study, intraperitoneal bupivacaine reduced postoperative pain significantly at 8 and 24 hours. Similarly, there is no adverse effect of bupivacaine encountered in our study.

CONCLUSION

Intraperitoneal instillation of 0.5% bupivacaine

solution produces effective post-operative analgesia after laparoscopic cho-lecystectomy.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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