COMPARISON OF SHOULDER TIP PAIN IN LOW AND STANDARD INTRA-ABDOMINAL PRESSURE IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

Hameed Khan, Muhammad Imran, Tahir Saeed

ABSTRACT

Objective: To compare the efficacy of low pressure (7-10mm Hg) versus standard pressure (12-14mm Hg) pneumoperitoneum during laparoscopic cholecystectomy.

Subjects and methods: This Randomized Control Trial study was done at from jan 2013to Dec 2013 over 90 patients in each group of symptomatic gallstones disease fulfilling the inclusion criteria were subjected to laparoscopic cholecystectomy and were followed throughout the procedure to see for any pain.

Results: A total of 180 patients underwent LC during the study period. The mean age was 40.12 years+ 10.81SD with range of 19-70 years. 81(45.00%) efficacy while standard pressure group showed 69(38.33%) efficacy. Efficacy in both the group was significant with p-value of 0.016.

Conclusions: Low pressure pneumoperitoneum is more effective than standard pressure pneumoperitoneum in terms of postoperative pain relief.

Key words: Laparoscopic cholecystectomy, gall stones, conversion, cholelithiasis.

INTRODUCTION

In 1882, Carl Langebuch (1846-1901) of Germany performed the first cholecystectomy and in 1985, Prof Dr Erich Mühe of Germany performed the first laparoscopic cholecystectomy (LC).[1] Laparoscopic Cholecystectomy (LC) is one of the most common laparoscopic surgeries performed in medical world.[2] Laparoscopic Cholecystectomy was called the 'gold standard' procedure for gallstone disease for the first time in 1989[4] and by 1992 Laparoscopic Cholecystectomy was endorsed as a legitimate tool for the treatment of symptomatic cholelithiasis due to which the number of cholecystectomies increased by 25% to 30%.[2,3]

Minimal invasiveness is one of the most important properties of laparoscopic surgery, which renders the patient a speedy recovery and thus minimizes the deterioration in patients quality of life.[4] Besides, many benefits explaining the success of Laparoscopic Cholecystectomy, like lower morbidity, shorter hospitalizations, less postoperative pain and earlier return to normal activity,[5]the early pain is the most frequent complaint after Laparoscopic cholecystectomy and the main reason for overnight hospital stay in 17-41% of the patients.[6,7]Though this postoperative pain is less intense than that after open surgery, but some patients(13%) still experience considerable discomfort due to its severness.[6]

Department of Surgery Khyber Teaching Hospital Peshawar.

Address for correspondence:
Dr. Hameed Khan
Medical Officer, Surgical D Unit, Khyber Teaching Hospital, Peshawar.
Cell No: 0332-9254731
Email Add: hameedwazir1976@gmail.com

Many researchers have directly related the pressure of the pneumoperitoneumto the postoperative shoulder tip pain and trials have been conducted where laparoscopic cholecystectomy could be carried out safely, without any prolongation of operative time, and thus the anaesthesia, and lower incidence of postoperative shoulder tip pain and analgesic requirement at pressures lower than those considered as standard for creating the pneumoperitoneum. For instance in a study conducted by Yasir M et al, the frequency of pain reduced from 28% to 10 % in standard vs. low pressure cholecystectomy.[8]

The etiology and exact mechanism of post-laparoscopic pain is currently still not understood clearly.[9,10] Most authors believe that it is an irritation of the phrenic nerve causing referred pain of C_4 projected to the shoulder.[9]Certain factors may influence the degree of pain after pressure created by the pneumoperitoneum, and the temperature of insufflated gas.[6]Using a CO_2-elicited pneumoperitoneum is appeared to be the current gold standard for surgical management of cholelithiasis and low pressure CO_2-elicited pneumoperitoneum has been shown to not only significantly reduce the level of postoperative pain but accelerate patient's recovery as well. Patients have experienced shoulder pain less frequently (7%) after low pressure CO_2-elicited pneumoperitoneum LC (93% Effectiveness) as compare with gasless Laparoscopic cholecystectomy (28%). The average pain score at 12 hours for patients who underwent LPLC was 54.2 ± 8.5 with a minimum 38 and a maximum 69 on Visual Analogue Score of 0-100 mm, while it was observed 62.2 ± 12.0 with a minimum of 35 and maximum

of 100 in patients who underwent SPLC. This difference observed was statistically significant.[11]Pappas-Gogos G et al. refers that Jackson et al. found the amount of residual gas correlated with the postoperative pain which shows that the total volume of CO_2 may also be a more important factor for postoperative pain.[12]Low pressure pneumoperitoneum tended to be better than standard pressure pneumoperitoneum in terms of lower incidence of shoulder tip pain with efficacy of 72.1% vs 55.7% respectively, but this difference did not reach to statistical significance following elective laparoscopic cholecystectomy.[13]

OBJECTIVE

To compare the efficacy of low pressure (7-10mm Hg) versus standard pressure (12-14mm Hg) pneumoperitoneum during laparoscopic cholecystectomy.

HYPOTHESIS

Low pressure pneumoperitoneum is more effective than standard pressure pneumoperitoneum in terms of postoperative pain relief.

MATERIAL AND METHODS

This randomized control study was conducted after approval from the ethical board of the institution. All admitted patients as well as patients from out-departments with the gall stone were recruited for the study. The diagnoses of Cholelithiasis were based on Ultrasound examination and the evaluation was done clinically. The patient was recruited after written informed consent is obtained and the ASA level was assessed. All included patients was admitted and subjected to detailed history and examination. The purpose and benefits of study and complete procedure of laparoscopic cholecystectomy using CO_2-elicited pneumoperitoneum as well as the postoperative effects were explained to the patients in details. The patients were randomly allocated in two groups by lottery method. Patients in 'Group-A' was subjected to low pressure pneumoperitoneum and patients in 'Group-B' was subjected to standard pressure pneumoperitoneum. The postoperative shoulder tip pain of less than 3 on visual analogue score observed 24 hours was considered effective. All the laparoscopic surgeries were carried out under the supervision of highly experience surgeon who has extensive experience in laparoscopic surgery.

Patient having acute cholecystitis needs emergency cholecystectomy, Empyema or mucocele of gall bladder, history of ERCP and acute gallstones pancreatitis were excluded because these were the confounders of our study.

RESULTS

A total of 180 patients were undergo through laparoscopic cholycestectomy, which were divided in two equal groups low & standard pressure. Patients in Group A were managed with (7-10mm Hg) and the patients in Group B with (12-14mm Hg) of pressure.

Sex wise distribution shows that out of 90 patients 24(26.7%) were male and 66(73.3%) were female while group B contains 30(33.3%) male and 60(66.7%) were female. The whole Male to female ratio was 0.43:1. Sex distribution among the groups was insignificant with p-value=0. 329.

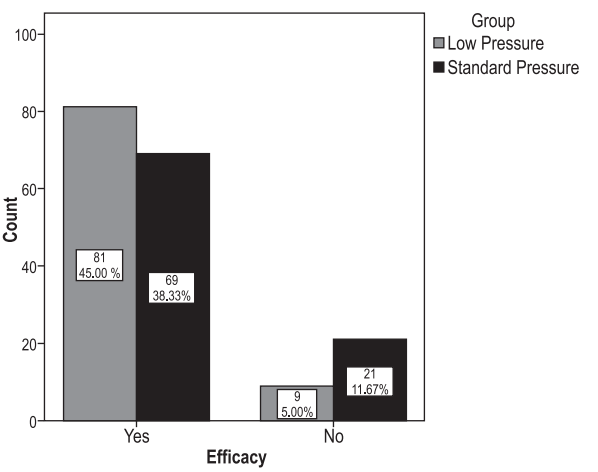
Average age was 40.12 years+ 10.81SD with range of 19-70 years. Low Pressure contained 20(22.2%) patients in less than 30 years, 58(64.4%) patients 31-50 years and 12(13.3%) patients between the ages of

Table no: 1. Age wsie distribution of efficacy

	Efficacy		Total	p-value
	YES	NO		
Age (in years) <= 30	32 86.5%	5 13.5%	37 100.0%	0.315
31 - 50	95 84.8%	17 15.2%	112 100.0%	
51+	23 74.2%	8 25.8%	31 100.0%	
Total	150 83.3%	30 16.7%	180 100.0%	

Table no: 2. Gender wsie distribution of efficacy

	Efficacy		Total	p-value
	YES	NO		
Gender Male	43 79.6%	11 20.4%	54 100.0%	0.383
Female	107 84.9%	19 15.1%	126 100.0%	
Total	150 83.3%	30 16.7%	180 100.0%	



Graph no: 1. Efficacy wise distribution of patients in both the groups

more than 50 years. While Standard Pressure group contained 17(18.9%) patients in less than 30 years, 54(60.0%) in 31-50 years and 19(21.1%) patients with age more than 50 years. The age distribution among the group was also insignificant with p-value 0.374.

Low pressure group showed 81(45.00%) efficacy while standard pressure group showed 69(38.33%) efficacy. Efficacy in both the group was significant with p-value of 0.016. (Graph 1).

Age wise distribution of efficacy shows that efficacy was greater in younger age group and decreases with the increase of age. But efficacy was insignificant over age with p-value=0.315. (Table 1).

When efficacy was stratified among the gender it showed insignificance with p-value=0.563. (Table 2)

DISCUSSION

Cholelethiasis is a common disease with a prevalence of 10-15% in the USA and about 16% in Pakistan[2,3]. Patients mostly remain asymptomatic but symptoms appear when any complication develops[3]. Symptomatic gall stone disease can end up with its complications without prompt surgical intervention.

Cholecystectomy was performed by open technique for management of gall stones disease which remained the gold standard for the management of gall stones for about a century[14]. But now this is the era of minimally invasive or key hole surgery and performing laparoscopic cholecystectomy for GBS has revolutionized its management.[15,16]

LC became an attractive treatment modality for cholelithiasis because of less scarring, shortened hospital stays, earlier returns to usual activities.[17]

Our study population was younger, mean age 40.65 years ±10.35SD. Daradkeh[18] reported mean age of 47.2 years, whereas Bingener et al [19] 40 years.

"The higher the pressure, the better the view" used to be the axiom invoked by surgeons who needed adequate exposure for laparoscopic procedures. However, the maintenance of elevated intra abdominal pressure for the duration of the procedure is associated with numerous undesirable consequences including post operative shoulder tip pain. Laparoscopic cholecystectomy results in less postoperative pain and reduced analgesic consumption as compared with open cholecystectomy. Nonetheless, pain after laparoscopy may be moderate or even severe for some patients, and may require opioid treatment. Interestingly, the type of pain after laparoscopy differs considerably from that seen after laparotomy. Indeed, whereas laparotomy results mainly in parietal pain (abdominal wall), patients complain more of visceral pain after operative laparoscopy. Shoulder pain is a common complaint following laparoscopic surgery, initially being recognized by gynaecologists during early experience with laparoscopic sterilization. The incidence varies, but is common, being experienced in approximately one third of patients following laparoscopic cholecystectomy. The pain usually lasts 2-3 days. The results of this study demonstrate the effectiveness of low pressure pneumoperitoneum created during laparoscopic cholecystectomy in reducing both frequency and severity of shoulder tip pain.[20] In our study the frequency of shoulder tip pain after standard pressure laparoscopic cholecystectomy was significantly higher as compared to low pressure laparoscopic cholecystectomy.

Out of 90 patients 21(11.67%) complained of shoulder tip pain after standard pressure laparoscopic cholecystectomy as compared to 9(10.4%) patients out of 90 in low pressure laparoscopic cholecystectomy. The incidence of shoulder tip pain was 2.2 times lower after low pressure laparoscopic cholecystectomy than standard pressure laparoscopic cholecystectomy ($p < 0.05$).[21,22] These results are consistent with the findings of M Barczynski et al.[23] In their study 8 patients (10.81%) out of 74 in the low pressure group complained of shoulder tip pain as compared to 18 patients (24.32%) in the standard pressure laparoscopic cholecystectomy. The shoulder tip pain being 2.2 times lower in low pressure as compared to standard pressure laparoscopic cholecystectomy. The studies conducted by Sarli L et al, Faisal Bilal Lodhi et al and Sandhu T et al demonstrated similar results.[24,25]

Esmat et al.[26] (2006) concluded that post operative shoulder tip pain was significantly less in low pressure laparoscopic cholecystectomy as compared to standard pressure laparoscopic cholecystectomy.

Shoulder pain is a frequent postoperative observation after laparoscopy and its incidence varies from 35% to 80% and ranges from mild to severe. In some cases it has been reported to last more than 72 hours after Laparoscopic cholecystectomy.[6]

Due to a decrease in the effective working space in low pressure pneumoperitoneum, the major concern of low intra abdominal pressure would have been the operative time and conversionto open surgery. In our study however the operative time in the two groups were comparable statistically, although the mean operative time in group B was less than group A.

CONCLUSION

In accordance with earlier studies we conclude that use of simple expedient of reducing the pressure of the pneumoperitoneum to 8mmHg results in a significant reduction in both the frequency and the severity of postoperative shoulder tip pain. It decreases the analgesic demand, reduces the hospital stay and hence improves the quality of life in the early stage of postoperative rehabilitation. On the basis of these results, the widespread use of low pressure pneumoperitoneum during laparoscopic cholecystectomy is recommended.

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