



LAPAROSCOPIC CHOLECYSTECTOMY; OPERATIVE TIME AND POSTOPERATIVE PAIN FOR THREE PORT VERSUS FOUR PORT LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT... Introduction: Since the first laparoscopic cholecystectomy (LC) was reported in 1990, it has widespread acceptance as a standard procedure using four trocars. The fourth (lateral) trocar is used to grasp the fundus of the gall bladder to expose calot's triangle. With increasing surgeon experience, LC has undergone many refinements including reduction in port number and size. Three port LC has been reported to be safe and feasible in many clinical trials. **Objectives:** To compare the operative time and of three ports versus four port laparoscopic cholecystectomy. **Study Design:** Randomized Controlled Trials. **Setting:** Surgical Departments, Allied & Civil Hospitals Faisalabad. **Period:** 15-09-2010 to 15-03-2011. **Material and Methods:** 132 Patients who underwent elective laparoscopic cholecystectomy were randomized to undergo either the 4-port. (Group A) or the 3-port LC (group B). 66 patients in each group. **Results:** Mean Operative time was 25.14 ± 4.19 minutes in group A and 25.35 ± 4.34 in group B. (p value-0.774). Mean VAS score at 12th postoperative hour was 5.37 ± 0.993 in group A and 4.52 ± 0.986 in group B. (p value <0.0001). **Conclusion:** Three port Laparoscopic cholecystectomy did not affect, operative time. However it resulted in less early postoperative pain in three port LC.

Key words: Three Port Laparoscopic Cholecystectomy, Conventional Laparoscopic Cholecystectomy, VAS Score.

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INTRODUCTION

The first successful Laparoscopic cholecystectomy was performed in France by Philip Mouret of Lyon in 1987,¹ In April 1989 annual meeting of Society of American Gastrointestinal Surgeons Endoscopic Surgeons (SAGES) was held and Laparoscopic cholecystectomy (LC) was considered as new gold standard for elective management of cholelithiasis and chronic cholecystitis in all age groups.²

It has been proved that in experienced hands LC decreases post-operative pain, reduces hospital stay and has decreased morbidity as compare to OC.³ There is also decreased incidence of wound infection and post-operative ileus in patients undergoing LC.⁴ Despite of all these advantages LC has some disadvantages as increased chance of bile duct injury, risk of conversion to open, need of trained manpower and expensive equipments.⁵ It is important that

need for conversion to open surgery is neither a failure nor a complication but an attempt to avoid complications and ensure patient's safety.⁶ Since its foundation, there have been many changes and improvements in this technique. Traditional Laparoscopic cholecystectomy is performed using four port technique.⁷ The forth trocar is used to retract the liver for better exposure of calot's triangle (French technique) or to grasp the fundus of the gall bladder pulling upward and out ward to exposed the calot's triangle (American technique). With experience many surgeons found that the most lateral port plays a minor role in the operation and therefore decide to omit and perform the operation with only three ports.^{9,10} Reducing the size or number of ports did not affect the safety of the procedure and further enhanced the advantages.⁷

Three port cholecystectomy poses no increased risk to the patient but offer potential for shorter

operative time, shorter hospital stay with faster recovery⁸, less individual port site pain, reduction in post-operative analgesia requirements with fewer surgical scars as compared to standard four port technique.⁹ Cooperative manipulation of the surgical instruments is very important for exposing calot's triangle and dissecting the gall bladder from the gall bladder bed in three port LC.⁹

Since 2000 our institution has routinely performed Laparoscopic cholecystectomy using conventional four port technique by all the consultants of surgery of Allied and D.H.Q hospital Faisalabad. However when we performed three port Laparoscopic cholecystectomy on limited scale it has been shown to be safer with decrease in operative time, hospital stay, post-operative pain and scars than conventional four port Laparoscopic cholecystectomy.

Our study is oriented to document these encouraging results like faster recovery with less post-operative pain and without increasing operative time by three ports so it could be recommended as a safe alternative of four port Laparoscopic cholecystectomy. We sought to investigate the outcome in term of technical feasibility and benefit of three port LC versus standard four port LC in our setup. Technical feasibility defined as performance of the LC without much difficulty by using the 3-port technique. The need of a fourth port considered a failure of the 3-port technique and the reason behind it is discussed herein. Benefits measured by operative time and assessment of post-operative pain score using 10-cm visual analogue scale (VAS) at 12th postoperative hours.

AIMS AND OBJECTIVE

The objective of our study is to: Compare the operative time and VAS score of three ports versus four port laparoscopic cholecystectomy.

OPERATIONAL DEFINITIONS

Laparoscopic cholecystectomy

Removal of gall bladder by laparoscopy.

Three Port Cholecystectomy

Three ports cholecystectomy involves insertion of 1st port 10mm trocar around the umbilicus using open method (Hasson technique) for viewing video(Olympus), a second 10mm trocar 3 cm below the xiphisternum and a third 5mm port at the right hypochondrium in the ant axillary line 3 cm below the costal margin.

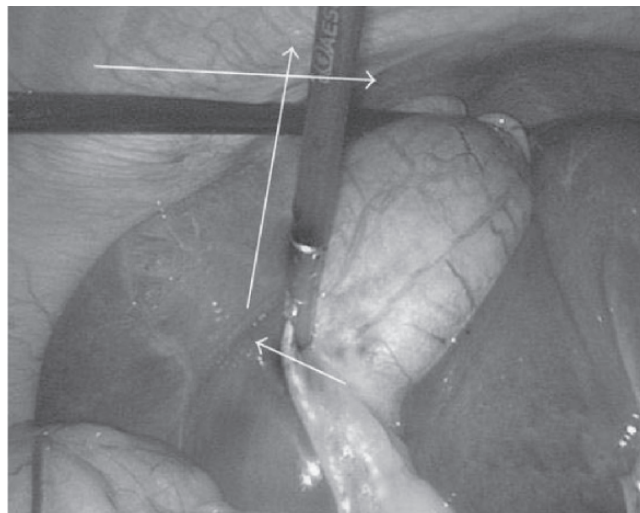


Figure-1. Traction of gallbladder in four port LC

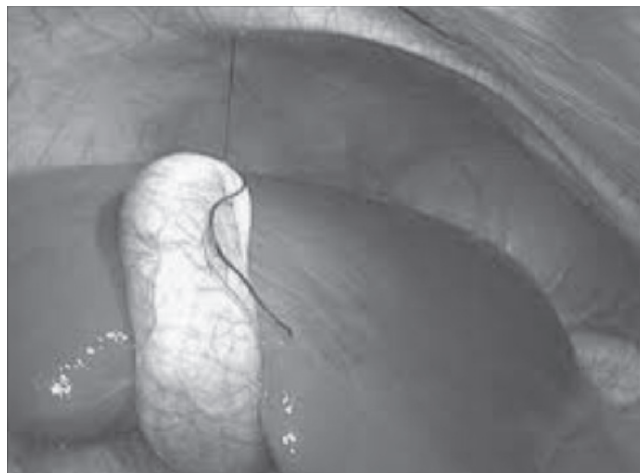


Figure-2. Suture traction in three port laparoscopic cholecystectomy

Four Port Cholecystectomy

It means Traditional laparoscopic cholecystectomy with fourth port of 5mm size in sub costal area in right midclavicular line.

Operative Time

It is time from the beginning of the insufflation up to the closure of the skin in minutes.

Post-operative Pain

Pain will be assessed after 12 hours on the first day after operation by Pain score using the 10cm visual analog scale (VAS) and 0 is minimum and 10 is maximum.

Material and Methods

Setting

Surgical unit 3 at Allied Hospital Punjab medical college Faisalabad.

Duration of Study

Six months (from 15-09-2010 to 15-03-2011)

Study Design

Randomized Controlled Trial.

Sample Size

132 (66 in each group)

Sampling Technique

Consecutive non-probability sampling.

Inclusion Criteria

(1) Patient with ultrasonographically diagnosed cases of cholelithiasis having indication for cholecystectomy. (2) 20 to 60 year's age.

Exclusion Criteria

(1) Acute cholecystitis.

(2) Common bile duct obstruction. (3) Concomitant medical illness/es like chronic obstructive airway disease, Ischemic Heart Disease (IHD), Hypertension (HTN), Diabetes Mellitus (DM), and patients who refuse laparoscopic cholecystectomy were not included in this study.

Clinical Assessment

All Patients were admitted throughout patient department. They were clinically evaluated. Detailed history was taken. Patients were asked about any previous surgery, bleeding disorder or symptoms of malignancy. Detailed clinical examination of all patients was done to rule out jaundice, any mass in right hypochondrium and signs of cirrhosis or portal hypertension.

Fitness for anesthesia was assessed by thorough history and clinical examination especially the cardiovascular and respiratory systems.

Investigations included Hb, TLC, DLC, ESR, blood sugar random, blood urea, urine routine examination, liver function tests (L.F.Ts), HBsAg and anti-HCV tests. X ray chest and ECG were done for fitness of anesthesia in every patient. USG was done in all patients for the confirmation of diagnosis of cholelithiasis, to exclude CBD obstruction or acute cholecystitis.

All the patients who fulfill the criteria were told about study. They were provided with details of three and four port cholecystectomy along with risk benefit ratio (duration of procedure, chances of complication, hospital stay and pain) to get informed consent. A written informed consent was taken from these patients. Study is approved by institutional review board. Injection ceftriaxone 1gm (3rd generation cephalosporin) was given to all patients at the time of induction of anaesthesia. LC was done by consultants who were well trained in laparoscopic surgery, VAS assessed at 12th postoperative hour.

SURGICAL PROCEDURE

All patients included in this study were randomly divided into two equal groups A and B, 66 patients in each group, based on computer generated table, numbers assigned either Group A or Group B by randomization. Patients in either group were explained the nature of a particular procedure adopted for them and informed consent was obtained. After induction of anaesthesia, they were set in supine position with 20 degree tilted on right side with head up position. Closed technique was used for pneumo-peritoneum. Carbon dioxide insufflation was done at a slow rate (1.5 liter/min). After lifting the abdomen a 10mm trocar was introduced.

In group A, Three other ports were passed as operating port near xiphoid process, infundibular port and fundic port with the help of this laparoscopic vision. In group B, Three ports cholecystectomy, a **second** 10mm trocar 3 cm below the xiphisternum and a **third** 5mm port at

the right hypochondrium in the ant axillary line 3 cm below the costal margin were made.

Post-operative Analgesia was given to all patients to keep them free of pain in form of injection Diclofenac Sodium 75mg deep intragluteally 12 hourly and if needed narcotic analgesic Nalbuphine along with antiemetic.

Data Analysis

All the data will be entered in SPSS version 10 and will be subjected to analysis. Descriptive statistics will be used to calculate mean and standard deviation for Quantitative Variables like age, operative time, and post-operative pain score. Independent t- test will be used to compare pain, operative time between the two groups. P value < 0.05 will be taken as significant.

RESULTS

In a period of 6 months, 132 patients of symptomatic cholelithiasis were selected for the study. 66 patients (group A) underwent traditional 4 ports LC and 66 patients (group B) were operated with three port LC technique. All patients were operated by a single consultant surgeon. The numbers of patients were equal in both groups. Statistical analysis was done after entering data in SPSS version 10. Demographic data were comparable for both groups.

Gender

There were 56 (84.8%) female out of 66 patient in group A and 51 (77.3%) female in group B. Out of total 132 patient there were only 25 (18.9%) male out of which 10 were in group A and 15 were in Group B. (Table-I&II)

Age

Mean age was 41.79 ± 10.21 in group A and 40.29 ± 9.52 in group B. This was not significant variable between the groups. ($p=0.384$) as shown in Table-III. The youngest patient was 20yr old. Maximum Patient was in age range from 31 to 50 yrs. i.e, 89 patients out of 132 (67.6%) (Table-IV)

Operative Time

Mean Operative time was 25.14 ± 4.19 minutes in group A and 25.35 ± 4.34 in group B. Unexpectedly

it is somewhat higher in three port LC. Actually in two cases of group B, the liver and gallbladder hindered the operative field. These two cases LC completed by retraction of gallbladder fundus to the anterior abdominal wall using a prolene stitch no 1. In these two particular cases, the operative time was long i.e, 36 min. So this increase the mean operative time of group B. However, this was also not a significant variable between two groups ($p=0.774$). (Table-V)

The interesting point in this study was that, operative time in females is less than the operative time in males. Like in group A mean operative time in males was 26.60 ± 4.95 while in female mean operative time was 24.87 ± 4.04 . (Table-VI). Similarly in Group B mean operative time in males was 26.33 ± 4.28 and in females was 25.06 ± 4.35 . (Table-VI).

VAS Scale

There was significantly higher mean VAS score in group A than group B. It was 5.37 ± 0.993 in group A and 4.52 ± 0.986 in group B. (p value <0.0001) Shown in Table-VII.

Gender	Frequency	Percentage
Male	25	18.9%
Female	107	81.1%

Table-I. Gender distribution in total 132 patient

Gender	Group A(66 patient)	Group B(66 patient)
Male	10 (15.15%)	15 (22.73%)
Female	56 (84.85%)	51 (77.27%)

Table-II. Gender distribution in group A and B

	Mean age (min-max)	Standard deviation	p-value
Total (n=132)	41.04 (20-65)	9.862	0.384
Group A (n=66)	41.79 (20-65)	10.21	
Group B (n=66)	40.29 (22-60)	9.524	

Table-III. Age distribution (in years)

Age groups	Group A	Group B	Total
<=30	12 (18.2%)	13 (19.7%)	25 (18.9%)
31-40	23 (34.8%)	23 (34.8%)	46 (34.8%)
40-50	20 (30.3%)	23 (34.8%)	43 (32.8%)
51+	11 (16.7%)	7 (10.6%)	18 (13.6%)

Table-IV. Age range

	Mean operative time(min-max)	Standard deviation	p-value
Group A	25.14 min (18-35)min	4.194 min	0.774
Group B	25.35 min (18-36)min	4.335 min	

Table-V. Operative time distribution in both groups

Operative Time in Minutes		Mean Operative Time (Min-Max)	Standard Deviation
In Group A	Males	26.60 min (20-35)min	4.926 min
	Females	24.87min (18-35)min	4.042 min
In Group B	Males	26.33 min (21-36)min	4.28 min
	Females	25.06 min (18-34)min	4.349 min

Table-VI. Operative time distribution according to gender

	Mean VAS (Min-Max)	Standard Deviation	P-value
Group A n=65	5.37 (3-7)	0.993	<0.001
Group B n=65	4.52 (3-6)	0.985	

Table-VII. Vas pain scale distribution

DISCUSSION

Gallstones are a major cause of surgical morbidity as well as admissions.¹¹ The estimated prevalence of GS disease in Pakistan is 15%⁶ and may be responsible for 22% admissions in a surgical unit.¹² Since the introduction of laparoscopic cholecystectomy (LC) in 1987, it is gold standard treatment for gallstones and numerous advances have been made in the technique.¹

Three trocars (ports) techniques take a similar time to perform and cause less postoperative pain than the standard four-port laparoscopic cholecystectomy.^{13,14,15,16}

The use of fourth trocar which is generally used for fundic retraction in the American technique seemed unnecessary by some surgeons while others used sutures to retract the gallbladder.⁷ Regarding the cosmetic impact, abundance of one small scar (5 mm) seemed to be of little consideration.¹⁷

Age is one of the critical factors affecting the morbidity and mortality rates.¹³ In retrospective study by Jatzko GR, Lisbog PH and associates age has been identified as the only significant factor in increasing the morbidity rate after laparoscopic cholecystectomy.¹⁸

Age has never been a contraindication for laparoscopic Cholecystectomy.

However the mean age in our study was 41.04 ± 9.86 and the youngest patient was 20 year old. Maximum Patient was in age range from 31 to 50.i.e, 89 patients out of 132(67.6%)

In case of Gender distribution the result of this study are consistent with previously published studies. In our study female predominance was observed with 107 (81.1%) females and 25(18.9%) male out of total 132 patients. This was similar observation as in study conducted by Bohlouli M et al; in 2008 in which the females were 89.5% and 10.5% were male.¹⁹

Cerci C et al, in his randomized study published in 2007,¹ and S. Trichak et al, in his prospective randomized work 2003 found that there was no difference between the two groups in success rate, operative time, number of oral analgesic tablets, visual analogue score, however the three port required fewer analgesic injections in early post-operative period($p=0.024$)¹⁰

Dhafir Al-Azawi et al, in his retrospective non randomized review published in 2007 reporting no significant difference in operating time of two technique in his work ($p=0.4$).⁷

In our study the mean operative time was 25.14 ± 4.15 in group A and in group B it was 25.35 ± 4.335 . This difference was not significant (p value 0.774).

Unexpectedly it is somewhat higher in three ports LC. One explanation for this is that, in two cases of group B, the liver and gallbladder hindered the operative field. These two cases LC completed by retraction of gallbladder fundus to the anterior abdominal wall using a prolene stitch no 1. In

these two particular cases, the operative time was long i.e, 36 min. So this increase the mean operative time of group B.

This fact has been supported by A I Nafeh MD et al, a prospective controlled study published in 2005 who studied 60 patient and in his study the mean operative time in three port was 65 ± 22.94 min compared to 62 ± 20.24 minutes in four port group. The mean operative time was longer in the three port group but the difference was not significant ($p < 0.05$). This is because a similar long operative time of 122 min noted in one case of study by A I Nafeh MD et al in which he used suture retraction of gallbladder.¹⁷

But Manoj Kumar et al, presented a clinical trial in 2007 showing that the 3-port group had a significantly shorter mean operative time than did the 4-port group ($47.3 \text{ min vs } 60.8; p = 0.04$).⁹ The interesting point in our study was that, operative time in females is less than the operative time in males. Like in group A mean operative time in males was 26.60 ± 4.95 min while in female mean operative time was 24.87 ± 4.04 min.

Similarly in Group B mean operative time in males was 26.33 ± 4.28 min and in females was 25.06 ± 4.35 min. No study in past commented on this interesting point. The reason for this was that the males are the earning person of their families and usually they postponed their surgery even after many attacks of acute cholecystitis. so most of them has adhesions and difficulty in dissection.

This fact also contributes in increasing mean operative time in group B in our study because in Group A there were 10 male while in group B there were 15 male.

A I Nafeh MD et al and Dhafir Al-Azawi et al, expressed post operative pain in their studies by the number of intra-muscular analgesic injection and it was significantly less in three port group with $p < 0.05$. The average verbal score of three port LC was found to be significantly lower than four port patients $p = 0.003$ in Dhafir Al-Azawi et al, work. In our study we found that there was significantly higher mean VAS score in group A

(four port) than group B (p value 0.0001). It was 5.37 ± 0.993 in group A and 4.52 ± 0.986 in group B (three port).

Manoj Kumar et al, reports a randomized trial in 2007 and found that Visual analog scores in the postoperative period at 12 hours were 2.19 in three port and 2.91 in four port group. This suggest that there was a significant difference in the 2 groups in the early post operative period, but later on the VAS score are closed in the 2 groups with no significant difference. Parkpoom Manositisak et al in 2010 have also confirmed that there were no difference in operating time, hospital stay and postoperative complication ($p > 0.05$). In three port group post-operative pain and hospital cost were less than four port Group significantly ($p < 0.05$).²⁰

Daisuke Hashimoto et al also show that after three port LC, analgesia requirement was less frequent than those after four port LC in his study, although it was not significant.

In our study, we came to know that the three port LC technique was not difficult to master and could be safely performed by trained personnel. This study has shown comparable results to those of other studies done in past and has confirmed the safety of the procedure. However the sample size in our study was small, to further evaluate these results, study with large number of patients required.

CONCLUSION

In this study it appears that the use of three port technique in LC did not affect the operation time. This technique has similar clinical outcome to those of the conventional four port LC technique. This procedure has advantages including less post-operative pain and better post-operative recovery.



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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Mudassar Jabeen	Data collection, methodology and discussion.	
2	Bushra Jamil	Literature review.	
3	Shehzad Amjad Khan	Reveiw and Data analysis.	