

THREE-PORT VERSUS FOUR-PORT LAPAROSCOPIC CHOLECYSTECTOMY - A TWO YEARS EXPERIENCE AT COMBINED MILITARY HOSPITAL MALIR CANTT KARACHI

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ABSTRACT

Objective: To compare the safety, outcome and advantages of three port laparoscopic cholecystectomy vs. four port laparoscopic cholecystectomy.

Study Design: Prospective descriptive study.

Place and Duration of Study: The study was done at Combined Military Hospital Malir Cantt Karachi starting, from Mar 2013 to Oct 2015.

Material and Methods: Total 200 patients who had undergone gall bladder removal laparoscopically were studied. Complication rate, duration of operation, insertion of 4th port, converting laparoscopic method to open, duration of hospital admission, early return to work and need of analgesics were studied in patients with three ports laparoscopic cholecystectomy (LC) vs. four ports LC.

Results: A total of 200 patients who had removal gall bladder laparoscopically, three-port LC were performed in 117 (58.5%) patients and four-port LC was performed in 83 (41.5%) patient. There was no significant difference with respect to complication rate, converting to open technique and duration of operation were comparable to four ports LC. One patient required 4th port in left hypochondrium for liver retractor to retract enlarged left liver lobe.

Conclusion: LC using three ports can be performed safely when done by experts in this method. The said procedure has significant benefits over the conventional four-port method with respect to decreased use of pain killers and duration of hospital admission.

Keywords: Four-Port, Laparoscopic cholecystectomy, Three-Port.

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INTRODUCTION

Laparoscopy cholecystectomy (LC) was first practiced and introduced in 1987, since then this method has been regarded as gold standard for cholelithiasis producing symptoms¹. Many changes and improvement have been made till now in the technique of cholecystectomy. Traditionally four ports are inserted to perform LC². Many researchers have reduced the size and number of ports and have shown that it was a safe method; instead it had significant benefits over conventional laparoscopic methods of removing gall bladder³. Advantages of these changes are decreased discomfort and need of pain killers⁴. Some have used 3-ports and some have used two ports for removing gall bladder using small instruments^{3,5} and later is named as

mini-lap, claiming that these techniques required same time to complete the procedure successfully and resulted in less pain postoperatively while comparing to traditional four-port LC⁴. Some have even proposed even newer technique named needlescopic cholecystectomy to be practiced in future with the help of ultra thin scopes⁶. The insertion of 4th trocar laterally in traditional method required for grasping and lifting gall bladder upward and towards right shoulder has been challenged by many authors worldwide^{7,8}. Researchers have proved that three-port procedure for LC is safe³, required less postoperative analgesia. In our comparative research the benefits, safety and outcome of three-trocar are weighed over four-trocar LC in symptomatic cholelithiasis.

PATIENTS AND METHODS

In this prospective descriptive study we studied 200 patients who underwent LC between

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March 2013 and October 2015 at Combined Military Hospital Malir Cantt Karachi. Using non-probability convenience sampling technique sample size was calculated with the help of online sample size calculator⁹ with prevalence of 10.2%¹⁰ for cholelithiasis in Karachi population, precision of 5% and confidence interval of 95% the sample size came out to be 141.

graphy (ERCP), were included in study after ERCP.

In the three port technique 10 mm trocars (Bladeless trocar - Aesculap B. Braun Melsungen AG) was introduced just below the umbilicus by open technique using smile incision (Hasson's) for the zero degree camera (Aesculap B. Braun Melsungen AG). After insufflating carbon

Table-I: Frequency chart of female and male patients.

	Female	Male	Total	p-value
Three Ports	94 (47%)	23 (11.5%)	117 (58.5%)	(p>0.05)
Four Port	67 (33.5%)	16 (8%)	83 (41.5%)	
Total Patients	161 (80.5%)	39 (41.5%)	200	

Table-II: Difference in verbal pain scale between two groups during first 48 hours.

	Low Pain Scale (Grade 1-2) Mild Pain Tramal used 100 – 250 mg	High pain Scale (Grade3-4) Moderate to severe Tramal used 300 – 350mg	Total	p-value
Three port	96 (62.7%)	21 (44.6%)	117	0.03
Four port	57 (37.3%)	26 (55.4 %)	83	
Total	153	47	200	

p-value<0.05: There is significance difference in Verbal pain Score between 3 and 4 port technique.

Table-III: Operating time and hospital stay.

	Mean Operating Time (Min)	Mean Length of Hospital Stay (Days)
Three-port	46.0 ± SD 11.0	2.6 ± SD 1.08
Four-port	47.5 ± SD 16.6	3.6 ± SD 1.42
p-value	0.4431 (>0.05)	0.0001 (<0.05)
	There is no Significant difference in Operating Time	There is significant difference in length of Hospital Stay

Table-IV: Complication rate in two groups.

	Three-Port (n=117)	Four-Port (n=83)
Conversion to open	3 (2.06%)	2 (2.4%)
Port site bleeding	1 (0.9%)	2 (2.4%)
Wound infection	0	0
Pleural effusion	0	0
Abdominal pain	3 (2.5%)	3 (3.6%)
Jaundice	0	0

Two consultant surgeons performed the surgical procedure. Those patients who gave the consent for laparoscopic surgery (three or four-port) were included in the study. Written consent was taken and cases were booked for LC. Patients with choledocholithiasis were referred to gastroenterologist Civil Hospital Karachi for Endoscopic Retrograde Cholangio-Pancreato-

dioxide and camera insertion abdominal cavity was visualized, another 10 mm trocar was introduced in the epigastrium corresponding to inferior edge of liver under direct vision; and in the end, a trocar measuring 5 mm in size lateral to third port. The primary surgeon performed surgery while standing left to the person being operated and the camera man on surgeon's left;

liquid crystal display LCD display was placed opposite to the surgeon and the Operation theater (OT) assistant alongside the monitor. Using his/her right hand surgeon inserted the marry land through the epigastrium port and with left hand grasping Hartman’s pouch of gall bladder through third port, moving the infundibulum medially and laterally to dissect and visualize cystic duct and artery. The clips were applied to cystic duct and artery separately and both were divided respectively. Then dissection was carried out using diathermy hook to remove gall bladder from liver bed while securing hemostasis and freed gall bladder was removed through umbilical trocar using improvised endo-bag

tailed Student t-test was applied to compare the mean of continuous variables between three trocar and four trocar procedures with *p*-value of <0.05 regarded as significant. Statistical evaluations were performed using excel 2010 and online calculators¹³.

RESULTS

In this prospective study a total of 200 cases with cholelithiasis had their gall bladder removed via laparoscopic technique. Out of these, 161 women (80.5%) and 39 were men (19.5%). Three-port LC performed in 117 (58.5%) patients and four-port LC was performed in 83 (41.5%) patients (table-I). The age of the patients was varying between 17–75 years (mean 46). Out

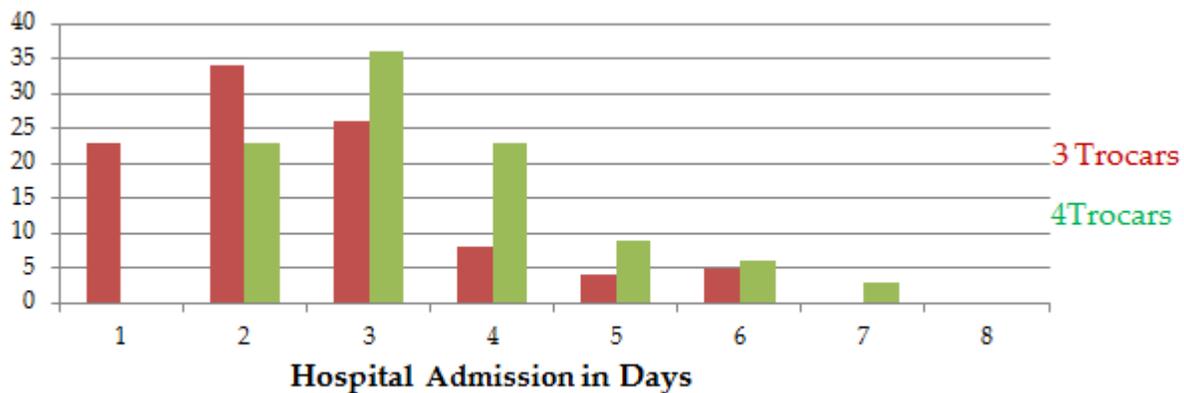


Figure-1: Bar chart showing difference in hospital stay between 3-port and 4-port laparoscopy.

made of sterilized surgical gloves. The conventional four-port laparoscopic cholecystectomy was done using additional fourth port lateral to 3rd port¹¹.

At the completion of procedure and recovery from the anesthesia the patients were shifted to the surgical intensive care center (SITC). Patients were given pain killers (tramadol and/ diclofenac) as per their complaint of discomfort and verbal pain score¹². Aggregated dose of analgesics needed by patients was summed up on second post operative day after the completion of 48 hours. Patients were shifted to in patient ward on next day. When the patient became pain free they were discharged.

Descriptive statistics was used to describe age, gender, frequency and percentages. Two

of 13 patients who underwent pre-operative ERCP due to choledocholithiasis, 3 patients required additional of 4th trocar due to adhesions post ERCP and one patient required fourth port in left hypochondrium for liver retractor to retract enlarged left of liver.

The mean dose of tramadol used to relieve pain during initial two days of the three-port procedure was 200 mg and in four-port procedure was 304.7 mg. Degree of pain had a considerable association with which type of procedure was done table-II. In three port LC the mean verbal pain score was considerably lower than the 4th port LC *p*=0.0001, table-II.

In three-port LC procedure, average duration of operation was 46 minutes while in four ports it was 47.5 minutes. The difference in

operating time between the two procedure was not significant ($p=0.7471$). The difference in duration of hospital admission was considerable, in three port method average duration of hospital was 2.6 days and in four port it was 3.6 days $p=0.0001$, table-III and fig-2.

Regarding complications related to both methods of LC, none of the patients in any groups had common bile duct injury while other complications are listed in table-III and table-IV.

DISCUSSION

So far LC procedure has gone through evolutions ranging from four port lap chole, single incision laparoscopic surgery (SILS), mini-

Regarding complications, Myir et al showed no difference between three and four-port LC, similarly in our study none of the patients developed biliary tract injuries or death with 3-port or 4-port LC hence it is safe to go for three ports LC. In both techniques other complications like port site bleeding and hematoma were not frequently found. None of the patients developed pleural effusion¹⁷.

There was no change in the rate of converting the procedure to open in both techniques of LC or while comparing to other published studies elsewhere^{14,18,19} and there was no significant difference in the operating time as

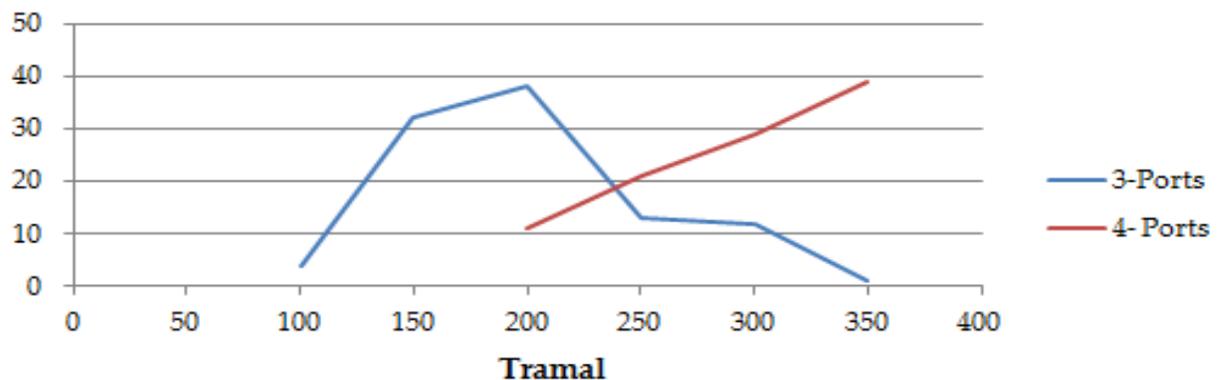


Figure-2: Difference in tramadol requirement between 3 ports and 4 ports.

lap and three ports LC¹⁴. The number of researchers have practiced three-port technique so far at different centers in the world¹⁵.

In this study we have compared the safety and the benefits of three ports LC in patients with symptomatic gall stone disease over four port LC in our set up. The fourth trocar is usually used for retraction of fundus of gall bladder and this procedure is regarded as the American technique. According to some experts the fourth port is unnecessary³, while others replaced fourth port with sutures for fundic retraction⁸. Chalkoo M. studied the safety and difference in analgesia requirement in the three port technique¹⁶, though no difference in post-operative hospital stay was found but in our study there is significant difference in hospital stay between three-port vs. four-port LC (fig-1).

a result of three port technique, also when compared to other studies²⁰.

The commonly prescribed analgesics after both techniques were diclofenac and pethidine in other studies²¹. Because pethidine causes more vomiting and unwanted sedation, we used tramadol in place of pethidine. Requirement of tramadol was less in those with three-port procedure as compared to those who underwent four-port procedure. While diclofenac use was not related to the number of ports used (fig-2).

In our study patients were admitted one day before the procedure as per protocol therefore the hospital stay is longer as compared to other study performed by Shireen et al at Ayub Medical College²². In patients with three port method, as in other studies, there is improved length of hospital admission in contrast to four-port LC,

which is the cost-effective benefit of this technique; because of less pain and therefore fewer requirements of analgesics^{17,22}. In our limited retrospective study of one center, we conclude the safety of three ports in LC it had no effect on rate of converting to open and duration of operation.

CONCLUSION

LC using three ports can be performed safely when done by experts. The said procedure has significant benefits over the conventional four-port method with respect to decreased use of pain killers and duration of hospital admission.

CONFLICT OF INTEREST

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

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