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3 Port Versus 4 Port Laparoscopic Cholecystectomy

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Abstract

Background: *The most prevalent and significant cause of biliary tract disorders is cholelithiasis. Laparoscopic cholecystectomy is currently the most effective method of treating gallstones. Laparoscopic cholecystectomy outcomes are improved with a reduction in port size or number.*

Objectives: *To determine feasibility of three port lap cholecystectomy over four port lap cholecystectomy regarding post-op pain, duration of surgery, hospital stay and complications.*

Methods: *It was a hospital based prospective study conducted for a period of 2 years among total of 80 patients who underwent laparoscopic cholecystectomy in our hospital. The study included all individuals with symptomatic gallstone disease and gall bladder polyps confirmed by ultrasonography to have bases larger than 1 cm in diameter. Those who refused to participate in the study, were jaundiced, had radiologically visible CBD stones, or were deemed unfit for laparoscopic surgery were also excluded from the study. Patients in Group A underwent a three-port laparoscopic cholecystectomy, while those in Group B underwent a traditional four-port laparoscopic cholecystectomy. SPSS was used for analysis.*

Results: *the study was female preponderance comprising 60% of total patients but it was not significant. The most common age group was found to be 41-50 years. The mean operative time for 3 port is 46.07±11.93 and for 4 port is 42.1±15.12 which shows duration of surgery was marginally higher in 3 port method but it was not significant. The duration of hospital stay was slightly higher in 4 port method but it was significant ($p<0.05$). VAS was higher in 4 port. A high complication rate was seen in 4 port method.*

Conclusion: *To guarantee the safe completion of surgery, it is advised that the surgeon not hold back when inserting the fourth port. The three-port technique's key benefits are that it is less painful, less complications, and leaves fewer scars.*

Keywords: *Cholelithiasis, Laparoscopic cholecystectomy, three port lap cholecystectomy, four port lap cholecystectomy.*

Introduction

The most prevalent and significant cause of biliary tract illness is cholelithiasis **[**1**]**. It has a variety of clinical characteristics, from the asymptomatic stage through Gall stone pancreatitis with extremely severe gangrenous cholecystitis. Choledocholithiasis and biliary pancreatitis are two documented side effects of gallstone disease. Cholecystectomy is a surgical treatment for gall stone disease. The most common surgery performed globally today **[**2–3**]** and the gold standard treatment for gallstones, laparoscopic cholecystectomy offers a number of benefits. Any reduction in the size or quantity of the stab incisions (ports) may yield improved outcomes benefits of laparoscopic cholecystectomy were also added. Smaller does not always equate to better, according to some surgeons **[**4**]**. While plenty others showed that better outcomes can be achieved by minimizing the number and size of port incisions **[**5**]**. The number of ports decreases which reduces a number of site-related issues. We seek to determine whether a three-port lap cholecystectomy is more feasible than a four port lap cholecystectomy in terms of post-operative discomfort, length of the procedure, rate of conversion, length of hospital stay, and complications.

Laparoscopic cholecystectomy has been the most widely approved way of treating cholelithiasis since the National Institutes of Health Consensus (NIH) Development Conference in September 1992, and it is currently regarded as the "Gold standard" for the treatment of gallstones. In most cases of the other gall bladder illnesses, it is also the preferred surgery. **[**6**]** .It has been suggested that reducing the size and quantity of ports could lessen post-operative pain and hospitalization time. This prospective comparative study was carried out to assess and compare the safety outcome and benefits of three-port and four-port laparoscopic cholecystectomy in terms of the following factors: the length of the procedure, the frequency and type of complications, the post-operative pain, and length of the hospital stay.

Materials and Methods

It was a hospital based prospective study conducted for a period of 2 years among total of 80 patients who underwent laparoscopic cholecystectomy in our hospital.

The study included all individuals with symptomatic gallstone disease and gall bladder polyps confirmed by ultrasonography to have bases larger than 1 cm in diameter. Those who refused to participate in the study, were jaundiced, had radiologically visible CBD stones, or were deemed unfit for laparoscopic surgery were also excluded from the study. Acute pancreatitis, widespread peritonitis,

cirrhosis of the liver, substantial portal hypertension, uncorrectable coagulopathies, ASA-grade IV for general anesthesia, and patients with suspected or confirmed cancer were all excluded.

All patients provided a signed consent after being fully informed. Two distinct groups, A and B, were formed by sequentially dividing all of the patients. Patients in Group A underwent a three-port laparoscopic cholecystectomy, while those in Group B underwent a traditional four-port laparoscopic cholecystectomy. The same surgical team carried out each procedure. The patients' demographic information and ultrasound results were recorded.

Surgical Technique-

Three Port Method

One 5mm trocar (right mid clavicular subcostal area) and two 10mm trocars (in the epigastrium for the working port and supraumblical region for the camera port) were placed. The infundibulum was then held while being moved back and forth or to the right and left to reveal the Calot's triangle using a gripping forceps that was placed through the third port. The epigastric port was utilized to insert the tools needed for the dissection procedure. The Calot's triangle and the gall bladder's separation from the liver bed were then dissected. In a unique approach, the grasping forceps' shaft was manipulated in the opposite direction from the movement of the jaw to withdraw the liver. Similar exposure was practically obtained by this method in the Calot's triangle area.

Four Port Method

In addition to the ports stated above, a further 5mm port was put in the right flank's anterior axillary line. In order to simplify the dissection of the Calot's triangle and provide the gall bladder traction, this was employed to grab the fundus of the gall bladder. The remaining steps were the same as those described for the three-port approach. Patients were released either that evening or the following morning.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 22.0 software (Mac, and Linux). The findings were present in number and percentage analyzed by frequency, percent, and Chi-squared test. Chi-squared test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

Results

Age(years)	3 port	4 port	Number of patients	p-value
11-20	0	0	0	0.21
21-30	1(4.7%)	8(14.5%)	9	
31-40	8(38.1%)	5(9.1%)	13	
41-50	8(38.1%)	25(38.1%)	33	
51-60	0	13(23.6%)	13	
61-70	4(19%)	8(14.5%)	12	
Total	21	59	80	
Males	12	20	32	0.11
Females	18	30	48	

Table 1 Age and Gender wise distribution of study participants

As per table 1 the study was female preponderance comprising 60% of total patients but it was not significant. The most common age group was found to be 41-50 years comprising 38% of patients followed by 51-60 but it was not significant (p>0.05).

Time(min)	3 port	4 port	Number of patients	p-value
30-40	0	0	0	0.11
41-50	3(14.2%	3(5.45%)	6	
51-60	0	13(23.6%)	13	
61-70	17(80%	12(18.1%)	29	
71-80	1(4.7%)	11(18.1%)	12	
81-90	0	17(29.9%)	17	
91-100	0	3(5.45%)	3	
Total	**21**	**59**	**80**	
Duration of hospital stay (days)	4.5±1.2	5.4±1.4	-	0.01*

Table 2- Operative time and Hospital stay

As per table 2 the mean operative time for 3 port is 46.07±11.93 and for 4 port is 42.1±15.12 which shows duration of surgery was marginally higher in 3 port method but it was not significant. 61-70 minutes is the most common time duration in both methods, followed by 81-90 minutes. The duration of hospital stay was slightly higher in 4 port method but it was significant. (p<0.05) this can be due to most of the patients are from remote areas who cannot make follow up are discharged after suture removal.

Analgesic requirement (hours)	3 port	4 port	Number of patients
up to 12hrs	0	0	0
13-24	2(9.5%)	10(18.1%)	12
25-36	18(85.7%)	6(10.9%)	24
37-48	1(4.7%)	39(63.6%)	40
49-72	0	4(7.27%)	4
Total	**21**	**59**	**80**

Table 3- VAS score and Post-Operative analgesic requirement

The three port group's mean analgesic requirement was 35.42 hours, while the conventional group's mean was 43.20 hours. When comparing the visual analogue pain scale ratings, the 3 port group had five patients with a VAS of 7-8 right away, but not a single patient had a pain level between 7-8 after the procedure had been done for 24 hours. In contrast, no patient in the 4-port group had any pain scores between 7-8 after 24 hours following surgery, but 22 patients in that group had a VAS of 7-8 right away.

Complications	3 port	4 port	p-value
Wound infection	2	3	0.15
Wound hematoma	0	0	
Abdominal pain	1	1	
Wound site hernia	0	0	
Fever	1	2	

Table 4- Post-Operative complications

As per table 4 the most common post-operative complication seen was wound infection in 5 patients followed by fever in 3 patients. Out of 80 patients only 11 patients has shown complications with no mortality but this was not significant.

Discussion

Gallstone disease is a global health problem. The incidence is 10–20% of the whole adult population, making laparoscopic cholecystectomy one of the most frequently performed operations in the world. The gold standard for the surgical management of gallbladder illness is laparoscopic cholecystectomy. a shorter stay in the hospital and quick. Some benefits of laparoscopic cholecystectomy include quicker return to normal activity and job, reduced postoperative pain, quicker healing, lower cost, and better cosmetic results.

In our study, the age incidence ranged from 21 to 68 years, with a mean of 46.38 years.

Gallstone prevalence was reported by Barbara et al [7] a peak in 50 to 60 years. Further research on Ranshoff and Gracie [8] produced a similar conclusion. The six and seven decades had the highest age incidence, according to Leon Morgenstern [9]. This is consistent with Malhotra's observations [10], which imply that Cholelithiasis is more common in younger people in our region than it is in western countries [11]. In our study, there were 55 female patients and 21 male patients. In each age category, more women than men were present. Our study's male to female ratio is 1:2.61, which compares favorably to the research by Kimura K et al. [12].

According to all research, women are more likely than men to have cholelithiasis. The presence of estrogen in females increases the release of cholesterol in bile and the intestinal transit time of bile salts, which further increases intestinal bile salt absorption, are the causes of the increased incidence. [13] Jeffrey et al.

In our study, 71% of patients with three ports and 70% of patients with four ports had surgeries that lasted longer than 70 minutes. Four port had a mean time of 75.54 minutes, whereas three port averaged 66.90 minutes. The fact that the mean operating time for the three-port approach was lower and did not agree with earlier investigations was also intriguing. [14,15]. Patients in our study who underwent the three port approach had a mean hospital stay of 4.66 days, compared to individuals who got the traditional technique stayed on average for 5.30 days. In the 3 port category, 42.86% of patients were released before the fourth post-op day, compared to only 34.55% of patients in the 4 port category. These numbers were comparable to the study of Kumar et al. [16] that was published.

At 24 hours following surgery, 50.2% of patients who had undergone the three port procedure had a VAS of less than 6, compared to 42.9% of patients who had after 24 hours following surgery, the VAS for the traditional approach was 6. The three port approach had better results since it lessened pain and hence required fewer painkiller injections to regulate it.

These numbers were comparable to the study that Kumar et al.[16]

Conclusion

The 3-port laparoscopic cholecystectomy procedure appears to be secure and to produce comparable clinical results to the traditional 4-port laparoscopic procedure for cholecystectomy. A good option in the field of minimally invasive laparoscopic cholecystectomy is the 3-port laparoscopic cholecystectomy procedure. To guarantee the safe completion of surgery, it is advised that the surgeon

not hold back when inserting the fourth port. The three-port technique's key benefits are that it is less painful, less complications, and leaves fewer scars.

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