



Surgery

THREE PORT VERSUS FOUR PORT LAPAROSCOPIC CHOLECYSTECTOMY : A COMPARATIVE STUDY

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ABSTRACT **Aims & Objectives:** To compare three port- laparoscopic cholecystectomy (3 LC) with four port- laparoscopic cholecystectomy in term of safety, efficacy, post-op pain, hospital stay and complication rates.

Material & Methods: The present study was conducted in the department of Surgery, S.N. Medical College, Agra (U.P.). Total 104 adult patients of cholelithiasis with chronic cholecystitis were included in the study. These 104 patients were randomly divided into two group (I & II) consisting of 52 patients in each group. Study was conducted for a period of 1 year from Jan. 2017 to Jan. 2018.

Group-I: performed 3 port LC (3 port- laparoscopic cholecystectomy)

Group-II: performed 4 port LC (4 port- laparoscopic cholecystectomy).

The present study is being conducted to compare the various merits and demerits of 3 port LC and 4 port LC performed by same surgical team in the same scenario in our setup in our medical college.

Results: Statistically significant different was found between the two group in term of visual analogue score for pain at 6 and 24 hr, analgesic requirement, duration of hospital stay and back to work and cosmetic outcome all being less in the three port LC group. Result of other variable were comparable in the two groups.

Conclusion: Three port laparoscopic cholecystectomy resulted in less port site pain and better cosmetic outcome require fewer analgesic, fewer surgical scar and without increase in complication with shorter duration of hospital stay.

KEYWORDS : Laparoscopic Cholecystectomy, Cholelithiasis, Chronic Cholecystitis, 3 Port, 4 Port

INTRODUCTION:

Cholelithiasis refer to the presence of abnormal concretions (gall stone) in the gall bladder about 10-20% of American adult have Gall stones. Third National Health & nutrition examination survey estimated that 6.3 million men & 14.2 million women aged 20 to 74 year in United state had Gall stone disease. Gall stone disease is most common biliary pathology.^{1,3}

In India peoples living in North Indian River plain are highly susceptible to the formation of gall stone disease so that cholecystectomy is single most commonly performed surgical procedure in this part of the world.^{4,5}

Gall stones are more frequent in diabetic patients than in non diabetic patients.

The incidence in diabetics ranges from 6.0 to 35.5% (average 25.1%).

Warren reported an incidence of 31% in 453 diabetic patients over thirty years, compared with 21% in 500 non-diabetic patients. Gall stone disease commonly seen in fatty, fertile, female with age around forty year.

In India gall stone disease is more common in North India as compare to South Indian.

1st LC was performed in 1987 by Phillip Mourel & later established by Dubois & Perissat in 1990.

In India, first case was performed by T.E. Udwardia and in Mumbai in 1991.

Now laparoscopic cholecystectomy considered as the GOLD STANDARD for treatment of gall stone disease and other gall bladder disease.^{6,7} Traditionally laparoscopic cholecystectomy (LC) was performed by four port:

- (i) First port – 10 mm, Supra umbilical port for camera.
- (ii) Second port – 10 mm, Epigastric port working port.

(iii) Third port – 5 mm in Right mid clavicular line sub-costally.

(iv) Fourth port – 5 mm in Anterior axillary line at the level of umbilicus.

With increasing experience and advancement in the technique, laparoscopic cholecystectomy has undergone many improvement including smaller port-size and decrease in number of port.

Fourth port is used to grasp the fundus of gall bladder so as to expose the Calot's triangle. Many experienced surgeon are performing 3-Port LC without introducing Fourth port with lesser post-operative pain, cosmetically batter and good outcome.⁸

Many studies have shown that less port operative pain and less duration of hospital stay is associated with decrease in either size of port or number of ports.

Three port- laparoscopic cholecystectomy-
First port – 10 mm, umbilical port for camera.
Second port – 10 mm, Epigastric port.

Third port – 5 mm in Right mid clavicular line sub-costally.
USG provided a rapid, risk free, cost effective method of screening large populations.

METHOD:

This study was conducted on a total 104 patients who underwent LC in our hospital from Jan. 2017 to Jan. 2018. Patients having gall stone disease and gall bladder polyp confirmed on USG were included in this study.

INCLUSION CRITERIA:

- Symptomatic Gall stone disease confirmed on USG.
- Gall bladder polyp confirmed on USG.

EXCLUSION CRITERIA:

- Not willing to be the part of study.
- Patients having CVD stone, jaundice.

- Patients having portal hypertension, cirrhosis of liver, coagulopathy.
- Patients having acute pancreatitis, generalized peritonitis.
- Suspected or proven malignancy.
- Those who are not fit for general anaesthesia.

A fully informed written consent was taken from all patients. All 104 patients was randomly divided into two groups-

- Group-A: Three port-LC group
- Group-B: Four port LC group.

All laparoscopy cholecystectomy procedure were preformed by same surgery team in same scenario.

Pre operative work up was done and patients were admitted on day prior to surgery.

DEMOGRAPHIC DETAIL:

Variables		3LC (Group-A)	4LC (Group-B)	Total
Mean Age	(Age range in years)	43.1 (30-55)	44.2 (30-55)	43.65 (30-55)
Gender	Males n(%)	12 (23%)	8 (15.35%)	20 (19.2%)
	Females n(%)	40 (76.9%)	44 (84.6%)	54 (80.3%)
Mean weight	(Weight range in kg)	64.2 (38-92)	66.1 (40-96)	65.15 (38-96)
Ultrasound	Single calculus n (%)	12 (23%)	10 (19.2)	22 (21.1%)
	Multiple calculus n (%)	38 (73%)	41 (8.8%)	79 (75.9%)
	Polyp n (%)	2 (3.84%)	1 (1.92%)	3 (2.88%)
Acute symptoms	N (%)	3 (5.7%)	2 93.84%)	5 (4.77%)
Chronic symptoms	N(%)	49 (94.23%)	50 (96.1%)	99 (95.16%)

OPERATIVE DETAILS:

Three port laparoscopy cholecystectomy

- First port – 10 mm, umbilical port for camera.
- Second port – 10 mm, Epigastric port/working port.
- Third port – 5 mm in Right mid clavicular line sub-costally.

- Though third port a grasping forceps was inserted to hold infundibulum and moving the gall bladder as its requirement to visualize the Calot’s triangle.
- The operating surgeon performed the procedure from left side of the patient and assistant holding the camera on same side.
- After port placement, posterior dissection of Calot’s triangle was started, after completing posterior dissection anterior dissection was done.
- A large window between cystic duct and artery was made.
- Junction of CBD and cystic duct was identified.
- After that 2 proximal and one distal gray LIGA CLIP was applied by applicator over cystic duct.
- Cystic duct was cut off between LIGA CLIP clip.
- Cystic artery was identified and it separated from adjacent tissue and applying two proximal and one distal yellow liga clip over cystic artery.
- Cystic artery was either coagulated or cut-off between clips.
- After that gall bladder was removed from liver bad by using hook dissector and haemostasis was maintained by cautery.
- The gall bladder was extracted through epigastric port.
- If post operative bleeding or bile spillage was expected then drain was put in sub hepatic pouch of Moisson’s through 5 mm port and was positioned under vision.
- Ports were closed by 3-0 ethion after infiltrating 5% bupivacaine.
- Operating time starts from supra umbilical incision to skin closure.

FOUR PORT LAPAROSCOPIC CHOLECYSTECTOMY:

- In addition to above mentioned ports another 5 mm port was inserted in anterior axillary line in right flank region.
- Grasper was introduced through this port to grasp the fun dus of

gall bladder to fascilitate the dissection of calot’s triangle and also provide traction to gall bladder.

- Rest of the procedure was same as in 3 port LC.

Comparative Study:

Group A & B were compare by following parameter:

- Duration of surgery
- Intra operative variable
 - Intra operative bleeding
 - intra operative complications
 - Bile leakage
- Conversion of 3-pot LC into 4 port LC
- Conversion of 4 port LC into open cholecystectomy
- Postoperative variable
 - port site pain
 - Analgesic requirement (in term of diclofenac ampules)
 - Post operative complication
 - Early ambulation/back to work
 - Cosmesis

Duration of Surgery:

Starts from supra umbilical incision to skin closure

TABLE-1 Comparison OfTime

Time	3 LC	Range	4LC	Range	P VALUE
Operative time	45.02±12.0	30-60	41.60±13.2	25-90	0.1
VAS 6 hrs	5.4±0.6	3-7	6.4±0.9	5-8	0.0001
VAS 24 hrs	2.6±0.4	1-3	3.2±.6	3-6	0.0001
Diclofenac ampules	3.2±1	3-5	4.2±.6	3-7	0.0001
Return to normal activity (hrs)	4.26±0.7	4-6	5.6±0.9	5-8	0.0001
Duration of hospital stay	40.2±10.2	30-70	45.6±5.6	36-54	0.001

TABLE-2: Post Op Complication

COMPLICATION	3 LC (Group-A)	4 LC (Group-B)	P VALUE
Wound infection	3	2	1.0
Hematoma	2	2	
Pain	1	4	
Pain site hernia (after 1 month)	0	0	
None	46	44	
Mean±SD	10.4±19.93	10.40±18.82	

- The average operative time was slightly more in 3 port LC group as compared to 4 port LC group is statistically insignificant.
- Pain at 6 hr and 24 hour after operation was found to less in 3 port group than four port group and result were significant.
- Mean visual analogue scale (VAS) score was used for pain.
- Number of diclofenac ampules required in the three port was less than 4 port LC statistically significant.
- Return to normal activity was significantly less in 3 port LC.
- In post operative complication the difference in two groups was statistically significant.

DURATION OF SURGERY

TABLE-3: Intra-operative Variables/complication

Complications	3LC (Group-A)		4 LC (Group-B)		P value
	No.	%	No.	%	
Bleeding from cystic	3	5.76	5	9.61	1.000
			6	10.40±17.17	
Bile duct injury	2	3.84	3	5.76	

Visceral organ injury	1	1.92		2	3.84		
Others	1	1.92		1	1.92		
None	45	86.53		41			
Amount of bleeding							
<10 ml	35	67.30	17.33±16.26	30	57.69	17.33±12.50	1.000
10-20 ml	14	26.92		17	32.69		
>20 ml	3	5.76		5	9.61		

- No statistically significant difference was seen in two groups (p value = 1.000)
- Conversion of three port to four port technique and its reason.
- Conversion to open cholecystectomy and its reason.

Conversion Rate:

TABLE-4: Conversion Rate In 3lc And 4 Lc Group

Conversion	3LC (Group-A)		4 LC (Group-B)		P value
	No.	%	No.	%	
Open	2	3.84	5	9.61	1.0
4 port	3	5.76	-	-	
None	47	90.38	47	90.38	
	17.33±25.70		17.33±25.81		

IN 3 LC group 47 cases were completed successfully without any need for conversion 3 cases were converted to 4 LC procedure, 2 cases were converted to open procedure.

In the four port group 5 cases were converted into open procedure.

This result was statistically not significant.

TABLE-5: Cosmetic Outcome

Outcome	3 LC (Group-A)		4 LC (Group-B)		P VALUE
	No.	%	No.	%	
Good	46	88.46	32	61.53	1.0
Average	5	9.61	18	34.61	
Poor	1	1.92	2	3.84	
	17.33±17.62		17.33±15.01		

Cosmetic outcome in 3 port LC is significant better than 4 port laparoscopy.

DISCUSSION:

- Laparoscopy cholecystectomy is considered to be the procedure of choice of elective cholecystectomy.⁹
- Some experienced surgeon observed that LC can be performed safely in the majority of cases by 3 port method. It is safe and requires conversion to four port method in only a minority of cases.¹⁰
- In most of the cases the fascia was not closed and no port site hernia was seen on follow up of these patients.¹¹ Three port LC offer significant improvement. In port related complication, but is still not widely used due to lack of standardization of instrument and significantly long learning curve.¹¹
- The complications arising from dropped gall stones in LC patients resulted in abscess formation or inflammatory mass containing Gall stone.¹²
- Morishita et al. reported that spilled stone floating free in peritoneal cavity may migrate to the pelvic area and become embedded there in the cul-de-sac causing severe reaction due to subsequent inflammatory reaction, the fertility may be adversely affected in female.
- Diclofenac and pethidine were the most common post operative analgesics prescribed after LC, vomiting and excessive sedation are known side effect of pethidine.¹³
- Post operative pain and analgesic requirement were significantly less in the three port group when compared with four port group.¹⁴ Hospital stay was significant less in three port group as compared with four port group.¹⁴
- Three port LC is technically feasible, is safe achieve good results and is similar to those achieved with the four port technique and less number of scar, and 50 has better cosmetic appearance and was less expensive. Hence, we recommended it as a routine procedure in elective LC.⁹

- The most important aspect of any surgical procedure is its safety and complications some surgeons have expressed concern about the safety of the three port technique, arguing that it may lead to a higher % of bile duct injury.¹⁵
- In our study the process of pneumo peritoneum creation in both these groups was done either by open or closed method randomly as the two methods are equally effective and feasible as evidenced in literature.¹⁶
- It was concluded that patient characteristics indicates a type of laparoscopic cholecystectomy procedure i.e. easy, difficult or very difficult. Pre-operative prediction of a difficult laparoscopic cholecystectomy can help the surgeon to better prepare for risk factors or intra-operative complications and can help to predict the risk of conversion to open cholecystectomy.¹⁷
- Both three-port and four-port cholecystectomies are equally good procedures in the hands of experienced laparoscopic surgeons. The complications, operative time, hospital stay, cosmesis, and disability days were comparable in both groups. The four-port technique should be accepted and adopted only by beginners in minimal access surgery. The operator who performs three-port LC should be prepared for placement of an additional port or conversion to open laparotomy whenever complication arises.¹⁸
- Three-port procedure is safe and appears to be more cost effective than four-port LC. If LC is performed by an experienced surgeon, it can be started with three port, if required, a fourth port can be inserted.¹⁹

CONCLUSION:

- It is recommended that three port method of laparoscopic cholecystectomy is a safe procedure with no extra complication in the hands of an experienced surgeon.
- Secondly it is recommended that the surgeon should not hesitate to put fourth port to ensure safe completion of surgery.
- The conversion should not be taken as failure of method but as a method for safe completion of the procedure.

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