

Interventional Study to Compare Standard Four Port Vs Three Port Laparoscopic Cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is the treatment of choice for treating benign gall bladder diseases. With the advancement in technology, many refinements have been made reducing the number of ports to be used and smaller port size is desired to provide better results.

Aim: 1) To evaluate efficiency of standard four port vs three port laparoscopic cholecystectomy.

2) To evaluate the outcome in nature of operating time, conversion rate, intra-operative complications, immediate post-operative complications mainly nausea and vomiting, post-operative medication and duration of hospital stay.

Materials and Methods: This interventional study was conducted among 60 patients with known gall bladder disease in Department of General Surgery at Rajindra Hospital Patiala. Patients were randomly divided into two groups 'Group A and Group B' of 30 each. The data was entered into MS Excel Sheet and then was exported to SPSS version 20.0 for appropriate analysis.

Results: For comparison Chi-Square test was applied. The total conversion rate of the study was found to be 6.6%. The results showed statistically significance in operating time. The mean operating time in three port laparoscopic cholecystectomy was 67.5±17.22 minutes while in four port laparoscopic cholecystectomy was 41.66 ±12.8 minutes. Further in terms of acceptance of procedure by patient, more preference was among Group B patients.

Conclusion: It is found that Four port laparoscopic cholecystectomy and 3-port laparoscopic cholecystectomy are

equally good procedures in the hands of experienced surgeons. The complications rates were less and the results were not significant.

Recommendation: The three-port laparoscopic cholecystectomy should be accepted and adopted only by those General surgeons who are well experienced in laparoscopic surgery and familiar with four port laparoscopic cholecystectomy as it is difficult to perform in patients with adhesions. Surgeon who performs three port laparoscopic cholecystectomy should be prepared for placement of additional port or open cholecystectomy whenever the need arises.


Keywords: Four Port Laparoscopic Cholecystectomy, Three Port Laparoscopic Cholecystectomy, Conversion Rates, Gall Bladder Disease.

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INTRODUCTION

In today's era, minimal access surgery and modern technology focus on the surgical treatment with minimal cellular and psychological trauma as these are less invasive and less complicated than conventional procedures. In addition, they offer cost-effectiveness to health services by reducing time of operation, shortening hospital stay and allowing faster recovery.¹ Laparoscopic cholecystectomy means the gall bladder surgical procedure is to be performed purely through laparoscope.² In 1992, National Institute of Health Consensus (NIH) Development Conference accepted Laparoscopic Cholecystectomy as treatment of choice for cholelithiasis and is considered as the

"Gold standard" for treatment of gall stones these days. It is also well accepted procedure for most of the other gall bladder diseases.³ Ever since the first laparoscopic cholecystectomy, there has been an evolution of the technique with attempts at continuous improvement in terms of better outcomes, patient satisfaction, cosmesis, reduced post-operative complications, post-operative hospital stay and economically.⁴ Reduction in the port size and their number has been suggested as a method for reduction of post-surgical pain and duration of hospital stay. The most practical option suggested by previous literature is by reduction of number of the ports from four to three.⁵ As experience

of surgeon increases, more refinement in performing the laparoscopic cholecystectomy which also includes the reduction in number of ports to be used during surgery, according to the experience of surgeon.⁶

This study, aimed to find out the feasibility of three port laparoscopic cholecystectomy over four port laparoscopic cholecystectomy in terms of operating hours, conversion rates, post-operative pain and various other complication, hospital stay days and aesthetics.

MATERIALS AND METHODS

This study was conducted from June 2019-November 2019 among the patients admitted for Lap Cholecystectomy in department of Surgery at Rajindra Hospital, Patiala. Among all admitted patients during the study time with documented benign gall bladder disease, which was confirmed on ultrasound, a total of 60 patients fulfilled the inclusion criteria.

A predesigned and pretested proforma was used to evaluate the status of patient undergoing Lap Chole.

A total of 60 patients were included in the study. There were 30 each in groups operated with three port Lap Chole and Four port Lap Chole, respectively. The patients were randomly divided into two groups.

Group A: Patients undergoing three-port Lap Chole.

Group B: Patients undergoing four-port Lap Chole.

Inclusion Criteria

1. All patients with known benign gall bladder disease (cholelithiasis and chronic cholecystitis)
2. Patients with age > 18 years
3. Patients fit for general anesthesia (ASA Grade 1 and 2) giving valid consent.

Exclusion Criteria

1. Patients who did not give consent for participation in the study.
2. Patients not fit for general anesthesia.
3. Patients with associated co-morbidity like portal hypertension, acute pancreatitis, unknown coagulopathies, diabetes mellitus and immune- compromised patients
4. Having Acute cholecystitis
5. Perforated gall bladder
6. Suspected/ proven malignancy.
7. Choledocholithiasis.
8. History of previous abdominal surgeries and,

OPERATIVE TECHNIQUE

Standard Four-Port Technique: All operations were done under general anesthesia. Nasogastric tube was inserted in patients with distended stomach. Veres needle was inserted through stab incision given supraumbilically. Once the needle entered the free peritoneal cavity, it was attached with CO₂ insufflator to create pneumoperitoneum and inflated until the pressure was 10mmhg. The veres needle was removed and at same site a 10mm trocar with safety was inserted. Telescope is inserted through this 10 mm umbilical port (camera port). Another 10 mm working port was inserted in epigastric port 5 cm below the xiphisternum (main working port), one 5 mm port in the right midclavicular line 5 cm below the right costal margin (accessory working port) and another 5 mm port i.e., the fourth port in the right anterior axillary

line at the level of umbilicus was inserted. After port placement, posterior dissection of Calot's triangle was started followed by anterior dissection. Cystic artery was either cut after ligating with the clips or coagulated with cautery / harmonic scalpel. Then gallbladder was removed using hook dissector from epigastric port.

In three-port technique the fourth port used for retraction of gall bladder was not used otherwise the procedure remains the same as the standard technique.

RESULTS

In our study among 60 patients, it has been observed that gall bladder diseases were commonly present among patients between 4th to 6th decade of life. Our youngest patient was 23 years of age while 65 years being the oldest.

Mean age of patients in group A was 45±14.27 and mean age of patients in group B was 50.93±10.45.

Table 1 shows the rate of conversion to four port laparoscopic cholecystectomy among 60 patients.

In group A, it is observed that among 10 patients (33.33%) surgery was completed in less than an hour, while 15 (50%) were operated within time period of 60 to 90 minutes, in 4 patients (13.33%) surgery was prolonged for up to 2 hours while in only 1 patient (3.33%) surgery took more than 2 hours.

Further, In Group B, among 1 patient (3.33%) surgery was completed in less than 30 minutes whereas among 25 patients (83.33%) it was within an hour. In 4 patients (13.33%) surgery was prolonged for upto 90 minutes.

The mean operative time in three port laparoscopic cholecystectomy was 67.5±17.22 and in four port laparoscopic cholecystectomy was 41.66±12.8minutes.

While performing laparoscopic cholecystectomy in group A we found that rupture of gall bladder occurred in 1 patient (3.33%) and 1 patient (3.33%) got liver laceration while separating gall bladder from liver bed.

Whereas, in group B, rupture of gall bladder occurred in 2 patients (6.67%) and none patient developed liver laceration while separating gall bladder from liver bed. There was no other injury seen to cystic duct, cystic artery, and surrounding structures in any case in both groups.

While assessing Post-operative complications, among 60 patients 4 (13.33%) patients had nausea and vomiting post operatively in group A, whereas in group B only 2 (6.66%) patients had nausea and vomiting and 2 (6.66%) complained of nausea only post operatively.

The results of the findings were not significant statistically (p=0.236).

Post operatively in group A, 28 patients (93.33%) required up to 4 injections of analgesia (diclofenac) and only 2 (6.67%) required up to 5-6 injections. Whereas in group B, 25 patients (83.33%) required up to 4 injections of analgesia (diclofenac) and 5 (16.67%) required up to 5-6 injections.

On assessing the acceptance among patients for choice of procedure, it was assessed that in group A, only 25 patients (83.33%) had very good acceptance while procedure and 5 (16.67%) had good acceptance. This is in contrast where in group B all patients had very good acceptance for the procedure. None of the patient in either groups had poor acceptance for the procedure.

Table 1: Rate of conversion to four port laparoscopic cholecystectomy in group A & to open cholecystectomy in group B

No. of pts covered	GROUP-A		GROUP-B	
	No. of Patients converted to 4 port	%age	No. of Patients converted to Open Cholecystectomy	%age
Conversion	4	13.33%	0	0.00%

Table 2: Comparing the duration of Operation time in Group A and B

Duration of Operation (in mins)	GROUP-A		GROUP-B		Total	
	No. of Patients	%age	No. of Patients	%age	No. of Patients	%age
<30	0	0.00%	1	3.33%	1	1.67%
31-60	10	33.33%	25	83.33%	35	58.33%
61-90	15	50.00%	4	13.33%	19	31.67%
91-120	4	13.33%	0	0.00%	4	6.67%
>120	1	3.33%	0	0.00%	1	1.67%
Total	30	100%	30	100%	60	100%
Mean±SD	67.5±17.22		41.66±12.8		54.58±19.93	
p-value	<0.001					
Significant	S					

Table 3: Intraoperative complications in group A and B

Intraoperative Complications	GROUP-A		GROUP-B	
	No. of Patients	%age	No. of Patients	%age
Absent	28	93.34%	28	93.33%
Gall Bladder Perforation	1	3.33%	2	6.67%
Liver Laceration	1	3.33%	0	0%
Total	30	100%	30	100%

Table 4: Post-operative complications in group A and B

Post-operative complication	GROUP-A		GROUP-B	
	No. of Patients	%age	No. of Patients	%age
Nausea	0	0.00%	2	6.66%
Nausea & Vomiting	4	13.33%	2	6.66%
No Complications	26	86.67%	26	86.67%
Total	30	100%	30	100%
Chi-square	2.667			
p value	0.263			

Table 5: Analgesia Requirement in Group A and B

Analgesia Requirement (in days)	GROUP-A		GROUP-B	
	No. of Patients	%age	No. of Patients	%age
3-4	28	93.33%	25	83.33%
> 5	2	6.67%	5	16.67%
Total	30	100%	30	100%
Mean	3.30±0.79		3.83±1.23	
p-value	>0.05			
Significant	NS			

Table 6: Post-Operative Stay in Group A and B

Post-Operative Stay	GROUP-A		GROUP-B	
	No. of Patients	%age	No. of Patients	%age
1	0	0.00%	2	3.33%
2	25	83.34%	24	81.67%
3	3	10.00%	2	8.34%
4	1	3.33%	1	3.33%
5	1	3.33%	1	3.33%
Total	30	100%	30	100%
Mean	2.26±0.69		2.16±0.74	
p-value	0.590			
Significant	NS			

Table 7: Acceptance of Group A and B

Acceptance	GROUP-A		GROUP-B	
	No. of Patients	%age	No. of Patients	%age
Very good	25	83.33%	30	100%
Good	5	16.67%	0	0%
Fair	0	0%	0	0%
Poor	0	0%	0	0%
Total	30	100%	30	100%
p-value	0.01			
Significant	S			

DISCUSSION

The operative technique which we followed was like the usual 4-port technique, but it was without the lateral most fourth port usually needed for retraction of gall bladder. Comparison of both procedure was done.

The same technique had been used by Tagaya et al⁷, Leggett et al⁸ and Trichak et al⁹. In our study on 60 patients intraoperatively in group A, 5 patients (16.67%) had adhesions either with duodenum or colon or omentum or in the Calot's triangle. 5 patients (16.67%) had adhesions along with thickened gall bladder. In group B, 2 patients (6.67%) had adhesions either with duodenum or colon or omentum or in the Calot's triangle. 3 patients (10%) had adhesions along with thickened gall bladder. 3-port laparoscopic cholecystectomy had to be abandoned in four (13.33%) of these cases and converted to 4-port laparoscopic cholecystectomy due to more adhesions. The operation was completed successfully in all these 4 cases using the fourth port. None of the case from both the groups was converted to open cholecystectomy. Thus, total conversion rate of our present study is 6.6%. Pandey et al¹⁰ reported that in group 2 (three port LC) 3 cases (5%) converted to four port LC and there was no conversion (open) reported in group 1 (four port LC). While performing laparoscopic cholecystectomy in group A, in 1 patient (3.33%) rupture of gall bladder occurred and in 1 patient (3.33%) liver laceration occurred while separating gall bladder from liver bed. In group B 2 patient (6.67%) rupture of gall bladder occurred and no patient had liver laceration while separating gall bladder from liver bed. There was no injury to cystic duct, cystic artery and surrounding structures in any case in both the groups. Harsha et al¹¹ reported 13% gall bladder perforations which were more than

present study. Mean operative time in four-port laparoscopic cholecystectomy was 41.66±12.8 mins and in three-port laparoscopic cholecystectomy was 67.5±17.22 minutes. Minimum time taken to perform four-port laparoscopic cholecystectomy was 30 mins and to perform three-port laparoscopic cholecystectomy was 50 minutes.

Trichak et al⁹ reported mean operative time as 57.05 mins and as 59.22 mins for 4-port laparoscopic cholecystectomy and 3-port laparoscopic cholecystectomy respectively. The mean value for the hospital stay in 3-port laparoscopic cholecystectomy group was 2.26±0.69 days as compared to 2.10±0.74 days in 4 port laparoscopic cholecystectomy group.

CONCLUSION

Laparoscopic cholecystectomies performed by both methods are equally good procedures in the hands of experienced surgeons with comparable operating hours, conversion rate, intra and post-operative complications, mainly nausea and vomiting, post-operative pain medication requirement and in hospital stay. In our study, four port Lap Chole took less time and was more accepted as a mode of procedure by the patients.

RECOMMENDATIONS

The three-port laparoscopic cholecystectomy should be accepted and adopted by those who are well experienced in laparoscopic surgery and are familiar with four port laparoscopic cholecystectomy as it is difficult to perform in patients with adhesions. Surgeon who performs three port laparoscopic cholecystectomy should be prepared for placement of additional port or open cholecystectomy whenever the need arises.

REFERENCES

1. Peter W. Principles of laparoscopic and robotic surgery. In: Bailey and Love's: Short Practice of surgery. (23rd edn). London: Arnold Publisher; 2000; 1296.
2. Massachusetts Medical Society. A prospective analysis of 1518 laparoscopic cholecystectomies. The Southern Surgeons Club. N Engl J Med. 1991; 324(16): 1073-8.
3. De U. Evolution of cholecystectomy: A tribute to Carl August Langenbuch. Indian J Surg. 2004; 66(2): 97-100.
4. Mouret P. From the first laparoscopic cholecystectomy to the frontiers of laparoscopic surgery; the future perspectives. Dig Surg. 1991; 8: 124-5.
5. Kumar P, Rana AKS. Three-port versus four-port laparoscopic cholecystectomy: a comparative study at a tertiary care centre in North India. Int Surg J. 2018; 5(2): 426-32.
6. Sreenivas S, Mohi RS, Singh GT, Arora JK, Kandwal V, Chouhan J. Two-port mini laparoscopic cholecystectomy compared to standard four-port laparoscopic cholecystectomy. J Minim Access Surg. 2014; 10(4): 190-6.
7. Tagaya N, Kita J, Takagi K, Imada T, Ishikawa K, Kogure H et al. Experience with three-port laparoscopic cholecystectomy. J Hepatobiliary Pancreat Surg. 1998; 5(3): 309-11.
8. Leggett PL, Churchman-Winn R, Miller G. Minimizing ports to improve laparoscopic cholecystectomy. Surg Endosc. 2000; 14(1): 32-6.
9. Trichak S. Three-port vs standard four-port laparoscopic cholecystectomy. Surg Endosc. 2003; 17(9): 1434-6.
10. Pandey MC, Mishra SP, Nagar HS, Rawat HS, Shrivastava RK. Three port versus four port cholecystectomy- a retrospective descriptive study. J. Evolution Med. Dent. Sci. 2018; 7(10): 1178-81.
11. Harsha HS, Gunjiganvi M, Singh CA, Moirangthem GS. A study of three-port versus four-port laparoscopic cholecystectomy. Journal of Medical Society. 2013; 27(3): 208.

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