



Clinical Outcome of Early Laparoscopic Cholecystectomy in Acute Calculus Cholecystitis in Comparison to Laparoscopic Cholecystectomy in Chronic Cholecystitis at a Tertiary Hospital

Julie¹, Usha R. Dalal¹, Ashwani K. Dalal^{1*}, Satinder Gombar²,
Uma Handa³ and Ravinder Kaur⁴

¹Department of General Surgery, GMCH, Chandigarh, India.

²Department of Anaesthesiology, GMCH, Chandigarh, India.

³Department of Pathology, GMCH, Chandigarh, India.

⁴Department of Radiodiagnosis, GMCH, Chandigarh, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author Julie designed the study. Author URD performed the statistical analysis and wrote the protocol. Author AKD wrote the first draft of the manuscript. Authors SG and UH managed the analyses of the study. Author RK managed the literature searches. All authors read and approved the final manuscript.

Article Information

Editor(s):

(1) Dr. Wagih Mommtaz Ghannam, Mansoura University, Egypt.

Reviewers:

(1) Héctor Rolando Herrera Cabral, National Hospital Itaugua, Paraguay.

(2) David Blihar, WINDREF-SGU, Grenada.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/67779>

Original Research Article

Received 17 February 2021

Accepted 27 April 2021

Published 30 April 2021

ABSTRACT

Background: The standard management of ACC is; initial control of inflammation and pain by bowel rest, intravenous hydration, parenteral antibiotics and analgesics followed by interval cholecystectomy after 6-8 weeks. Now a days, laparoscopic cholecystectomy (LC) is the gold standard surgical modality for the management of gall stones disease. LC in ACC was considered to be difficult due to adhesions and oedema thereby resulting in higher risk of complications and conversion rate. On the other hand, during the waiting period for definitive surgery, there is an increased risk of recurrent episodes of acute cholecystitis and other serious complications due to gall stones. Recent studies have shown that in experienced hands and proper patient selection, LC

*Corresponding author: E-mail: dalalakd@yahoo.com;

is feasible and safe definitive management option in ACC. This study was designed to evaluate the outcome of LC in patients of ACC.

Aims:

1. To evaluate the feasibility of laparoscopic cholecystectomy in acute calculus cholecystitis.
2. To compare the outcome with laparoscopic cholecystectomy in chronic calculus cholecystitis.

Materials and Methods: The study included 30 patients (group A) of gall stone disease admitted with acute cholecystitis in surgery emergency department of Government Medical College & Hospital, Chandigarh and the outcome of LC in this group was compared with the outcome of LC in control group of (group B) 30 cases of gall stone disease having chronic cholecystitis fulfilling the inclusion criteria during the study period.

Results: Majority of patients were in 5th and 6th decade of life and the female to male ratio was 3.5:1. Most common presentation was pain and tenderness in right hypochondrium. Duration of acute attack was, 12 hours in 2(6.6%) patients, 24 hours in 12(40%) patients, 48 hours in 9(30%) patients, 60 hours in 3(10%) patients, 72 hours in 2(6.6%) patients. In 25(83.3%) patients surgery performed within 24-48 hours, in 5(16.6%) surgery performed within 49-72 hours. The temperature was > 37.5° C in 20(66.6%) patients. Leukocytosis was >11000/mm³ in 4(13.3%) patients. The serum CRP was >5 mg/dl in all of the patients (100%) of ACC. Mean duration of surgery was 33.87±19.70 minutes in group A and 38.87±29.07 minutes in group B. LC was successful in 26(86.6%) patients in both the group. The mean VAS score at 6 hour, 24 hours and on discharge were 3.96±2.06, 1.57±0.94 and 0.34±0.48 in group A and in group B 3.65±1.87, 1.92±1.46 and 0.65±0.79 respectively. The requirement of analgesia in no. of dosages were 3.53± 2.83 in group A and 4.67± 2.77 in group B with statistically significant difference (p value 0.013). Surgical site infection was seen in 2(6.6%) patients of each group, where the laparoscopic cholecystectomy was converted to open surgery. Mean duration of post-operative stay was 1.5 days in group A and 2.3 days in group B. The mean expenditure in group A was 834.615±380.465 Rs. of patients admitted in general ward and in group B was 919±441.831 Rs. Histopathology showed acute inflammation in 24(80%) patients (first stage), xanthogranulomatous changes in 1(3.3%) patient (second stage) and fibrosing cholecystitis in 5(16.6%) patients of ACC.

Conclusion: After proper patient selection, in experienced hands early LC in ACC within 96 hours of acute attack is feasible and safe along with additional medical and socioeconomic advantages.

Keywords: Acute calculus cholecystitis; Laparoscopic cholecystectomy.

1. INTRODUCTION

Gallstones may be present in the gallbladder for decades without causing any symptoms or complications. Symptomatic gallstone disease may lead to biliary colic (1-4%), acute calculus cholecystitis (~20%), mucocele with progression to empyema and perforation, chronic calculus cholecystitis, obstructive jaundice and pancreatitis [1]. With an overall prevalence of 10% to 15% in developed countries, geographic specific prevalence is from 0 to 10% in Africa and up to 60% to 70% in certain populations, such as Pima Indians. The prevalence of cholelithiasis in India is 2-29%. According to an Italian study 20% of women & 14% of men had gallstones [2,3]

The standard management of acute calculus cholecystitis is adequate analgesia, control of inflammation followed by interval cholecystectomy after a period of 6–8 weeks. Laparoscopic cholecystectomy (LC) is the gold standard in the treatment of gallbladder stone

disease. However, there is an increased risk of various gall stones related other complications during the waiting period for definitive surgery. There is non-resolution or recurrence of cholecystitis in 2.5% to 22% of cases along with potential risk of stones migration into the common bile duct [4]. Previously definitive surgery (open / laparoscopic) was relatively contraindicated in acute calculus cholecystitis as induration, hypervascularity, abscess formation, and necrosis result in to inadequate retraction of the gall bladder (induration and necrosis) and poor delineation of ductal structure (hypervascularity and induration). In LC, all these factor leads to higher conversion rates [5]. Recent studies have reported that laparoscopic cholecystectomy is effective and safe treatment for acute calculus cholecystitis. It has been postulated that in acute calculus cholecystitis the inflammation creates an edematous plane in the gall bladder plate which facilitates its dissection from the liver bed [6]. Optimal timing for the surgery is still a matter of debate. The various

studies have shown that laparoscopic cholecystectomy can be performed safely within 72 – 96 hours of presentation [7]. The present study was aim to evaluate the outcome of laparoscopic cholecystectomy in acute calculus cholecystitis.

2. MATERIALS AND METHODS

This prospective study was carried out in the Department of Surgery in collaboration with Department of Anaesthesia, Department of Radiodiagnosis and Department of Pathology at Government Medical College & Hospital Chandigarh between of January 2016 to June 2017.

The study included 30 patients of 18-70 years of age of either sex admitted in GMCH emergency with acute calculus cholecystitis (group A) presenting within 96 hrs of acute attack. The results were compared with the control (group B) 30 cases of symptomatic gall stone disease who were admitted through OPD for elective laparoscopic cholecystectomy with symptoms for 6-8 weeks or more with history of previous attack & hospitalization for acute attacks in GMCH or elsewhere, fulfilling the inclusion criteria during study period.

The sample size was determined by taking target population of approx 100 patients presented with biliary colic in emergency on an average in previous years and approx 25 patients who fulfill the criteria of inclusion, after taking confidential interval of 95% sample size came out 29 by the sample size calculator. So the final sample decided for study group was 30 comparing with the same size of control group.

2.1 Inclusion Criteria

Group A: Patients of symptomatic gall stone disease within 96 hrs of acute cholecystitis.

Group B: Patients of symptomatic gall stone disease having symptoms for 6-8 weeks or more.

2.2 Exclusion Criteria

1. Co-existing choledocholithiasis based on imaging and biochemical criteria
2. Patients with gall bladder lump
3. Patient with pancreatitis (serum amylase & lipase \geq three times of normal)
4. Patient with previous upper abdominal surgery

5. Significant medical disease rendering patient unfit for laparoscopic surgery (uncontrolled diabetes mellitus, chronic pulmonary disease, significant cardiac disease, uncontrolled coagulopathy)
6. Patients not willing for surgery
7. The diagnosis of acute cholecystitis was based on one of the following criteria:

2.3 Clinical Criteria

- (a) Acute onset right upper quadrant pain and tenderness
- (b) Temperature $> 37.5^{\circ}\text{C}$
- (c) WBC count $> 11000/\text{mm}^3$.

2.4 Ultrasonographic Criteria

Oedematous gall bladder, presence of gall stone and pericholecystic fluid.

Written informed consent was taken from all patients for taking blood sample, laparoscopic cholecystectomy in ACC & CCC and conversion of laparoscopic to open procedure, if needed. On admission, a detailed history was taken. Thorough general physical examination and systemic examination was done for every patient. Along with USG abdomen following investigations were done; complete haemogram, coagulation profile, blood urea, serum creatinine, blood sugar, serum electrolytes, liver function test, serum amylase, lipase, C-reactive protein, urine examination, X-ray chest & electrocardiogram.

All laparoscopic cholecystectomy performed by the consultant under general anaesthesia. LC was done with 3 ports and the fourth port was inserted as and when required. In cases where the LC was not feasible, the procedure was converted to open cholecystectomy.

In the postoperative period, intravenous fluids, antibiotics, and analgesics were given. The severity of pain during hospital stay was assessed using a visual analogue scale of 0 to 10. Feeding was resumed as soon as tolerated. After discharge, patients were followed up on 8th postoperative day.

2.5 Statistical Analysis

At the end of the study the data was compiled. For quantitative data comparison, pair t test and non-parametric Wilcoxon sign rank test was

used. Qualitative data was analysed using Chi-square test or Fischer exact test. P value of less than or equal to 0.05 was taken as the cut off for statistical significance.

3. RESULTS

The study comprised 60 cases (30 in each group). The mean age was 45.30 ± 15.309 years in group A & 45.00 ± 11.528 years in group B. There were 47 female and 13 male patients with female: male ratio of 3.5:1. The difference between two groups was statistically insignificant (p value 0.745) (Table 1).

In all cases of ACC right hypochondrium pain and tenderness was present for more than 24 hours. Temperature $> 37.5^{\circ}\text{C}$ was present in 20(66.6%) patients of ACC. Mean total leukocyte count was $9210 \pm 1520/\text{mm}^3$ in group A and $7256 \pm 2503/\text{mm}^3$ in group B with statistically significant difference (p value 0.001). The normal serum CRP taken as 5 mg/dl, mean value was 24.25 ± 31.75 mg/dl in group A and 3.39 ± 3.24 mg/dl in group B with statistically significant difference (p value < 0.001). Liver functions tests were within normal range (Table 1).

On USG, thickened oedematous GB was seen in all 30 (100%) patients of group A and in 12 (40%) patients of group B. Distended GB was present in 27 (90%) patients of group A and in 14 (46.6%) patients of group B. Pericholecystic fluid was present in 23 (76.6%) patients of group A and 6 (20%) patients of group B. In each group, multiple calculi were present in 23(76.6%) patients, whereas 7(23.3%) patients had single calculus (Table 1).

Empyema GB present in 8(26.6%) patients of group A and in 2(6.6%) patients of group B. During surgery gallbladder rupture occurred in 3(10%) patients of group A and in 4(13.3%) patients of group B. Stone spillage, bile spillage occurred in 3(10%) patients of each group. Blood loss was assessed as minimal, mild, moderate and severe during the surgery (Table 2).

The volume of normal saline used for irrigation during the procedure was 195.55 ± 191.55 ml in group A and 214.33 ± 492.38 ml in group B with statistically significant difference (p value 0.044). Mean duration of surgery was 33.87 ± 19.70 minutes in group A and 38.87 ± 29.07 minutes in group B. The difference was statistically insignificant (p value 0.559) (Table 2).

Out of 30 patients of ACC, LC was performed successfully in 26(86.6%). 25(83.3%) patients were operated within 24-48 hours and 5(16.6%) patients were operated within 49-72 hours of the acute attack. There was no significant difference in the conversion rate of laparoscopic to open surgery in both the groups. In 4 patients of each group, LC was converted to open surgery (Table 2).

There was no patient who has been needed ICU care postoperatively.

VAS score on different port site was taken on different time and the difference in both the group was statistically significant (Table 3). VAS score was not taken at 1 hour because most of patients were under sedation or not able to respond well.

In present study the requirement of post operative analgesia in no. of dosages was 3.53 ± 2.83 in group A and 4.67 ± 2.77 in group B with statistically significant difference (p value 0.013) (Table 3).

Mean duration of post-operative stay was 1.5 days in group A and 2.3 days in group B. The difference was statistically insignificant (p value 0.647) (Table 3). Histopathology showed acute inflammation in 24(80%) patients (first stage), xanthogranulomatous changes in 1(3.3%) patient (second stage) and fibrosing cholecystitis in 5(16.6%) patients of ACC.

The mean hospital expenditure of general ward was 834.615 ± 380.465 Rs. in group A and 919 ± 441.831 Rs. in group B (Table 3).

4. DISCUSSION

Early laparoscopic cholecystectomy in acute calculus cholecystitis was a relative contraindication due to anticipated higher complications and conversion rates of 6% to 35% [8,9]. Recent studies have reported that laparoscopic cholecystectomy is safe & effective treatment for acute calculus cholecystitis.

Total of 60 patients there were 47 female and 13 male patients with the gallstones disease with female: male ratio of 3.5:1. The ratio came in our study comparable with the previous studies, showing the female: male ratio of 2:1 or 3:1 having gall stones [10]. There is not much difference between the duration of operating time in both the groups; however, some previous studies have reported more operating time in

acute cases. In our study the operating time is less in ACC. The possible explanation is the oedematous plane in the sub-serosal layer of gall bladder, facilitates gall bladder dissection from the liver bed, however, dense fibrosis and severe inflammation due to recurrent attacks result in longer duration of surgery in CCC [11]. In this study the blood loss is more in group B, however, no patient required blood transfusion. Previous studies have reported that blood loss is more in acute cases due to increased vascularity in acute inflammation. In our study the volume of saline used for irrigation was more in the group B, due to more oozing and bleeding from liver bed because of fibrosis and dense adhesions [12].

The pain was more on epigastric port than other port sites. The pain is less in the group A probably because of pre-operative analgesia given for treatment of ACC. Mean duration of hospital stay was longer in chronic group. Previous studies also reported longer hospital stay in the chronic group [12,13].

Total hospital stay is an important determinant of total expenditure of management. Recurrent acute attacks, during waiting period leads to repeated admissions, more chances of conversion to open cholecystectomy, longer total duration of hospital stay, more expenditure and loss of days away from work [14].

Table 1. Pre operative data

	Group A	Group B	
Sex			
Male	6 (20%)	7 (23.3%)	
Female	24 (80%)	23 (76.6%)	
Age	45.30± 15.309	45.00± 11.528	
Blood investigations			
TLC	9210±1520.51	7256±2503	0.001
ALP	100.13±32.65	107.20±37.70	0.441
CRP	24.25±31.75	3.39±3.24	<0.001
USG findings Thickened oedematous GB			
Yes	30 (100%)	12 (40%)	<0.001
No	0	18 (60%)	
Distended GB			
Yes	27 (90%)	14 (46.6%)	0.001
No	03 (10%)	16 (53.3%)	
Pericholecystic fluid			
Yes	23 (76.6%)	06 (20%)	<0.001
No	07 (23.3%)	24 (80%)	



Fig. 1. showing multiple calculi in GB lumen

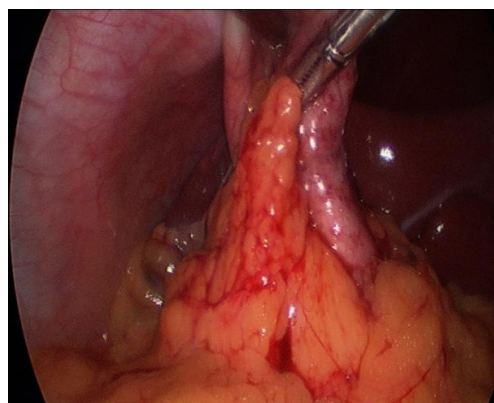


Fig. 2. Densely adhered omentum with pericholecystic fluid

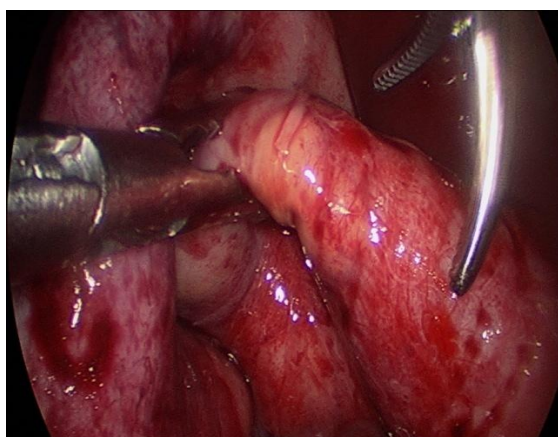


Fig. 3. Thickened edematous GB with small necrosis over the wall



Fig. 4. Post operative incision site after removal of clips

Table 2. Intra operative data

Blood loss	Group A	Group B	p value
Minimal	16(53.3%)	9(30%)	
Mild	11(36.6%)	18(60%)	
Moderate	3(10%)	3(10%)	
Severe	0	0	
Duration of surgery (in minutes)	33.87 ± 19.70	38.87 ± 29.07	0.559
Conversion to open cholecystectomy			
Male	1	2	0.754
female	3	2	

Table 3. Post operative data

	Group A	Group B	p value
VAS score at			
6hours	3.96±2.06	3.65±1.87	< 0.001
24 hours	1.57±0.94	1.92±1.46	< 0.001
On discharge	0.34±0.48	0.65±0.79	< 0.001
Epigastric port	4.96±1.79	4.96±1.75	0.000
Umbilical port	4.00±1.32	2.88±1.30	0.001
Anterior axillary	2.19±0.98	0.84±0.98	0.014
Analgesia (in no. of dosage)	3.53 ± 2.83	4.67 ± 2.77	0.013
Hospital stay (in mean days)	1.56	2.3	0.647
Total expenditure	834.615± 380.465	919±441.834	0.889

5. CONCLUSION

Early LC in ACC may be advocated as it is feasible and safe definitive surgery in the first admission in experienced hands only there by reducing the total expenditure due to repeated admissions.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Carter HR, Cox RL, Polk HC Jr. Operative therapy for cholecystitis and cholelithiasis:

- trends over three decades. *Am Surg* 1987;53:565-8.
2. Shaffar EA. Gallstone disease: epidemiology of gallbladder stone disease. *Best Pract Res clin Gastroenterol.* 2006;981-96
 3. Haldestam I, Kullman E, Borch K. Incidence of potential risk factors for gallstone disease in general population sample. *Br J Surg.* 2009;96:1315-22
 4. Ransohoff DF, Miller GL, Forsythe SB, Hermann RE. Outcome of acute cholecystitis in patients with diabetes mellitus. *Ann Intern Med.* 1987;106:829–32.
 5. Lawrentschuk N, Hewitt PM, Pritchard MG. Elective laparoscopic cholecystectomy: implication of prolonged waiting time for surgery. *ANZ J Surg.* 2003;73: 890-3
 6. Rattner DW, Ferguson C, Warshaw AL. Factors associated with successful laparoscopic cholecystectomy for acute cholecystitis. *Ann Surg.* 1993;217:233-6.
 7. Hunter JG. Acute cholecystitis revisited. *Ann Surg* 1998;227:468-9.
 8. Kum CK, Goh PM, Issac J. Laparoscopic cholecystectomy for acute cholecystitis. *Br J Surg* 1994; 81:1651-4
 9. Chandler CF, Lane JS, Ferguson P, Thompson JE, Ashley SW. Prospective evaluation of early versus delayed laparoscopic cholecystectomy for treatment of acute cholecystitis. *AM Surg.* 2000;66:896-900.
 10. Wang HH, Liu M, Clegg DJ, Portincasa P, Wang DQ. New insights into the molecular mechanism underlying effects of estrogen on cholesterol gallstone formation. *Biochem Biophys Act.* 2009;1791:1037-47.
 11. Viste A, Horn A, Ovrebo K, Christensen B, Angelsen JH, Hoem D. Bile duct injuries following laparoscopic cholecystectomy. *Scand J Surg.* 2015;104:233–7
 12. Gul R, Dar RA, Sheikh RA, Salroo NA, Mataro AR, Wani SH et al. Comparison of early and delayed laparoscopic cholecystectomy for acute cholecystitis: Experience from a single center. *North Am J Med Sci.* 2013;5:414-8
 13. Siddiqui NA, Azami R, Murtaza G, Nasim S. Postoperative port site pain after gallbladder retrieval from epigastric vs umbilical port in laparoscopic cholecystectomy: A randomized controlled trial. *Int J Surg.* 2012;213:214-6.
 14. Sutton AJ, Vohra RS, Hollyman M, Marriott PJ, Buja A, Alderson D et al. Cost effectiveness of emergency versus delayed laparoscopic cholecystectomy for acute gallbladder pathology. *BJS.* 2017;104:98-107.

© 2021 Julie et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/67779>