



## RESEARCH ARTICLE

### THE ROLE OF EARLY LAPAROSCOPIC CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS

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#### ABSTRACT

Acute cholecystitis is a relatively common complication of gallstones. It can lead to significant morbidity and mortality from potentially life-threatening complications such as empyema, gallbladder gangrene and gallbladder perforation. It presents as a surgical emergency and usually requires hospitalization for management. Laparoscopic cholecystectomy is advocated for acute cholecystitis; laparoscopic cholecystectomy is the most common surgical operation done by surgeon. It has become the gold standard in the treatment of symptomatic gallstones. The introduction of laparoscopic cholecystectomy in surgical practice was pioneered by Mouret in 1987. It rapidly replaced "traditional" open cholecystectomy as the curative treatment of cholelithiasis. The major advantages of laparoscopic cholecystectomy (LC) include less postoperative pain, less time required for hospitalization, recovery and better cosmetic results. The common opinion about treatment of acute cholecystitis is initially conservative treatment due to preventing complications of inflammation and following laparoscopic cholecystectomy after 6-8 weeks. However, with the increase of laparoscopic experience in recent years, early laparoscopic cholecystectomy has become more common.

**Aims of the study:** The aims and objectives of this study to evaluate the results of early laparoscopic cholecystectomy in patients with acute cholecystitis with cholelithiasis.

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## INTRODUCTION

Laparoscopic cholecystectomy is the most common laparoscopic surgery performed in the world (National Institutes of Health Organization, Gallstones and Laparoscopic Cholecystectomy, 1992). The initial treatment of acute calculus cholecystitis includes GIT rest, intravenous fluid, correction of electrolyte imbalance from repeated vomiting, good analgesia, and intravenous antibiotics. Following this treatment, patients with uncomplicated disease are managed on outpatient basis and are called for elective laparoscopic cholecystectomy after a period of 6-8 weeks. In the past Laparoscopic cholecystectomy is avoided for acute cholecystitis due to concerns about the potential hazards of complications, especially common bile duct injury and duodenal injury and high rate conversion to open cholecystectomy (Cuschieri et al., 1991). Some studies, however have shown that early laparoscopic cholecystectomy

can be done during acute cholecystitis (Lai et al., 1998; Johansson et al., 2002). Two approaches for the treatment of acute cholecystitis with gall bladder stone.; the first approach is early (within 7 days of onset of symptoms) (Siddiqui, 2008; Sinha, 2002; Johansson et al., 2003) laparoscopic cholecystectomy (LC) as definitive treatment after establishing diagnosis and surgical fitness of the patient in the same hospital admission. The second approach is conservative treatment which is successful in about 90% of the cases and then delayed cholecystectomy is performed in the second hospital admission after an interval of 6-12 weeks. The choice of approach depends upon hospital infrastructure, surgical experience, and patient's condition. In the presence of acute inflammation, LC becomes more difficult because of edema, exudate, adhesions with other structures like intestine, CBD, distension of gallbladder, friability of tissues, unclear and distorted ductal and vascular anatomy, hypervascularity, congestion, and dissemination of infection. These risk factors predispose for suboptimal outcome and high conversion rate to open cholecystectomy (Graves et al., 1991). Delayed cholecystectomy potentially increases the chance of further gallstone-related complications during the waiting interval like

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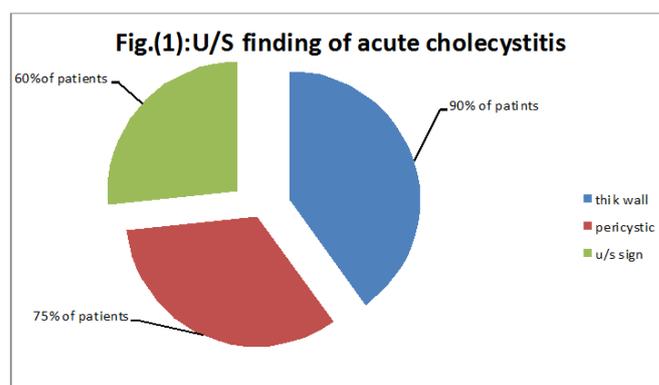
another attack of acute cholecystitis obstructive J, pancreatitis and thus additional hospital admission (Järvinen, 1980). Cholecystectomy is the definitive treatment for patients with acute cholecystitis. Until the 1980s, urgent open cholecystectomy had proved to be beneficial for the management of acute cholecystitis in terms of reducing the morbidity rate and shortening the hospital stay in comparison with conventional conservative treatment with subsequent interval open cholecystectomy (Järvinen, 1980; Norrby, 1983). In the past, in the early days of laparoscopic cholecystectomy (LC), acute cholecystitis was a contraindication of LC, and many surgeons have believed that it was a matter of skill and training until now. Thereafter, LC for acute cholecystitis started with the increases in laparoscopic experience and has been generally performed (Cooperman, 1990). In the case of LC after the acute phase, the accepted timing has generally been considered to be 6 weeks to 8 weeks after the onset of symptoms to allow resolution of the acute inflammation of the gallbladder and released of adhesion between gall bladder and other structures (Cuschieri, 1993). The incidence of gallstones is 10-15% and the lifetime recurrence rate of symptoms or complications in such patients is about 35% (Schirmer, 2005). The general view in the treatment of acute cholecystitis (AC) is to firstly administer conservative therapy to prevent possible complications associated with inflammation and then after 6 to 8 weeks, to perform laparoscopic cholecystectomy (Cuschieri, 1993). Although over 70% of such patients respond to medical therapy within the first 24 to 48 hours, LC is the definitive treatment method for treatment of symptomatic gallstone disease. In the past, open surgery was recommended considering the complications associated with operation and prolonged hospitalization (Järvinen, 1980). However, the recently increasing laparoscopic experience and the favorable results of the meta-analyses published on this prompts surgeons to perform early LC intervention (Siddiqui *et al.*, 2008; Terho *et al.*, 2016).

## Patients and Methods

This study was performed in Aswan university hospital and Sohag Hayah international hospital between July 2014 and July 2017, on 150 patients admitted to general surgery, departments with acute cholecystitis in were included in this study. The study population included patients between 20 and 70 years of age with acute calculus cholecystitis (ASA grade 1–3) presenting to surgery. An early laparoscopic cholecystectomy (ELC), within 7 days from onset of symptoms. Abdominal ultrasonography was done for all patients admitted with the provisional diagnosis of acute cholecystitis, pericholecystic fluid collection, and positive Murphy's sign. Diagnosis of acute cholecystitis was based on the following four diagnostic criteria: acute upper abdominal pain with tenderness under the right costal margin, fever more than 37.5°C, leukocytosis more than 10,500/mm<sup>3</sup>, and ultrasonographic evidence of acute cholecystitis (thickened gallbladder wall, edematous gallbladder wall, presence of gallstones, Murphy's sign and pericholecystic fluid collection) (Table-1), (Fig.1,2).

**Table 1. Preoperative U/S finding**

Characteristics	Number	%
Thick-wall gallbladder	135	90%
Pericholecystic fluid collection	75	75%
Ultrasound Murphy's sign	90	60%



**Fig. 2. U/S picture of acute cholecystitis showed thick wall and pericystic fluid collection**

All of the patients received prophylactic ceftriaxone (1gram, every 12hours) and metronidazole (500mg, every 8hours). Patients were studied preoperatively with complete investigations, complete blood count, liver functions test, kidney function test, coagulation profile. A postoperative histopathology study was performed on every gallbladder removed. Patients were excluded from the study if they had a significant medical illness that rendered them unfit for laparoscopic surgery, Patients of acute cholecystitis with ASA grade >3, and who had pancreatitis and common bile duct stones. Informed consent was obtained from every patient for lap chole and conversion to open. In the early stage of acute cholecystitis, laparoscopic cholecystectomy was performed within 72 h of admission. Laparoscopic cholecystectomy was performed using the standard 4 ports technique.

## Surgical technique

The nature of the surgery, chance of conversion to open cholecystectomy, and the benefits likely to be achieved from LC were explained to the patients and the relatives in detail. After obtaining an informed written consent. The surgery was performed under general anaesthesia using endotracheal intubation in supine position. Nasogastric tube was inserted to decompress the stomach. Pneumoperitoneum was created by blind puncture with Veress needle through a supraumbilical incision or left upper abdomen. In some times confirmation of the intraperitoneal location of the needle tip is made by the saline drop test; once the needle is confirmed to be in the right position, the peritoneal cavity is insufflated, using carbon dioxide. To prevent problems of venous return, the abdominal pressure was maintained between 10mm Hg and 14mm Hg. the pressure should never exceed 15 mm Hg. Four laparoscopic ports were made. The epigastricport was 10 mm for dissection or the suction and retrieval of specimen. 10 mm port was made for telescope through supraumbilical region. Two5 mm

ports were placed one in one in right upper quadrant, and another in right flank at level of umbilicus were used for grasping forceps. Operator access ports of 10mm and 5mm in diameter were inserted into the epigastrium and the right hypochondrium. Adhesions if present were cleared and gallbladder exposure was first undertaken; then the positions of gallbladder, the first part of the duodenum, common bile duct, Calots' triangle, and portahepatis were ascertained. The fundus of the gallbladder was grasped with the forceps inserted via a 5-mm port placed at the right iliac fossa. If it were difficult to grasp the gallbladder due to inflammation and the thickness of the wall, gallbladder decompression would be performed using an aspiration needle. On the occasion of severe inflammation and adhesion, blunt dissection with a suction device was very useful to keep a clear field and dissect tissues safely without injury of important structures. The cystic artery and cystic duct were freed from the surrounding tissue at Calot's triangle, and the critical view of safety established by Strasberg was attempted to be created in each case. After complete separation of the cystic duct and artery. Both elements were then clipped and divided (Fig.3). Gallbladder was dissected off its bed by a monopolar cautery hook.

At the completion of the procedure, the gallbladder was placed into a retrieval bag if needed and extracted through the epigastric port, which was enlarged if necessary. Hemostasis was achieved in the gallbladder bed and after a thorough saline lavage, a suction drain was left in place if. When required, the conversion to open procedure was performed through a right subcostal incision. A drain was routinely inserted to assess intraperitoneal bleeding and bile leakage postoperatively, and removed on the postoperative day. The pathological diagnosis was routinely performed to confirm acute cholecystitis



Fig.5. Patchy of gangrene of gall bladder and aspiration of bladder content

RESULTS

This study was performed in Aswan university hospital between July 2014 and July 2017, on 150 patients admitted to general surgery, departments with acute cholecystitis in were included in this study. An early laparoscopic cholecystectomy (ELC), within 7 days from onset of symptoms done for the patients The total number included in this study were 150 patients of which 30 patients male (20%) and 120 patientsfemale (80%). The ages of the patients included in this study varied from (20-70) years with the highest age incidence between (41-60) (Table-2), (Fig.6). All of them were fit for general anaesthesia and surgery. About 25 patients were diabetic (16.6%) but controlled with insulin treatment and 10 patients were morbid obesity but without any respiratory distress. Most of patients had high WBC, moderate fever except the patient with empyema or gangrenes had high grade fever.

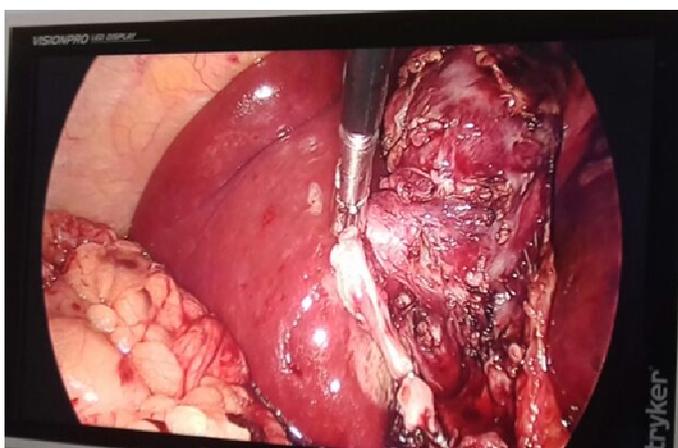


Fig. 3. Clipping and dissection of gall bladder.

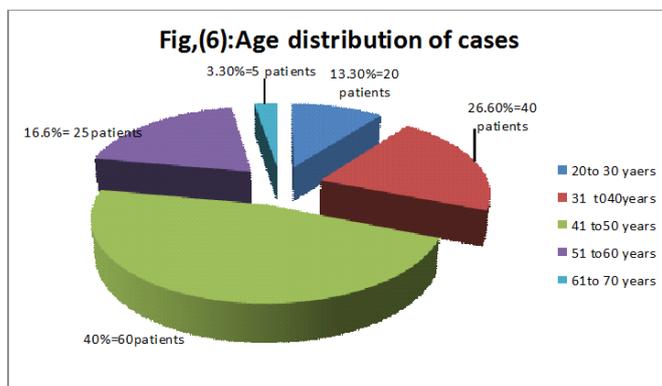


Table 2. Distribution of gall bladder stone according to different age groups About 40% of the studied cases in the age group 41-50 and 3.3% were in the age group 61-70

Age in years	No. of cases	Percentage (%)
20-30	20	13.3%
31-40	40	26.6%
41-50	60	40%
51-60	25	16.6%
61-70	5	3.3%



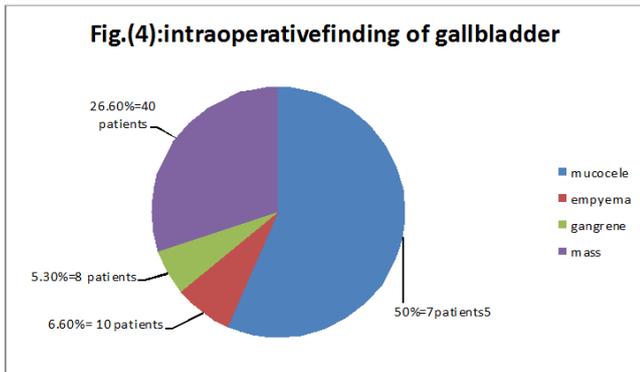
Fig.4. Patchy of gangrene of gall bladder

Eights patients (5.3%) had patchy gangrenesgall bladder. In the most patients (75pateints) the gallbladder presented with muoccele (50%with). About ten patients presented empyema (6.6%) and 40 patients had gall bladder phlegmen due to adhesion and inflammation (Table-3) (Fig.4,5,6).

In those patients where tense empyema or mucocele existed, aspiration with a Veress needle was done to enable adequate grasper function and good holding of gallbladder.

**Table 3. Intraoperative finding of gall bladder**

Characteristics	Number	%
Mucocele	75patients	50%
Empyema	10 patients	6.6%
Gallbladder phlegmon	40patients	26.6%
Patchy gangrene	8 patients	5.3%



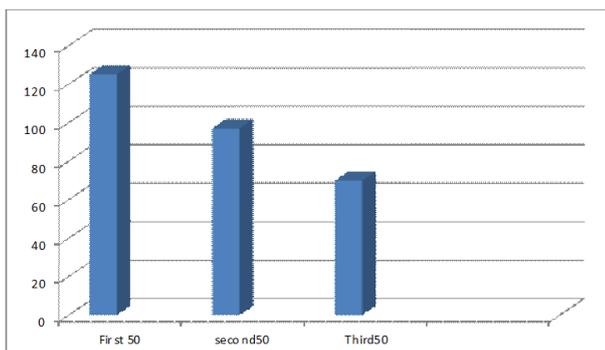
All patient classified into three groups, each contained 50 patients. The operative time was longer in the first group and decreased in second and third groups. Operative time was ranging between (60-130) minutes with a mean time 85 minutes. The operative time for the first 50 cases is longer due to early learning (130minutes) but with more experience the operative time was decreased in the second and third groups (Table-4) (Fig.7).

**Table 4. The average operative times**

Operative time in minutes	Operative time Mean ±SD	F	P
1 <sup>st</sup> 50	125	12.5	
2 <sup>nd</sup> 50	96.9	25.8	3.9 <0.01**
3 <sup>rd</sup> 50	69.8	24	

\*\* Highly significant test  $p < 0.01$

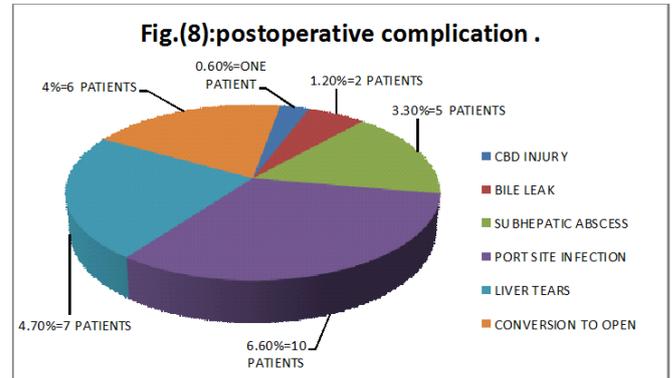
This table shows that 1<sup>st</sup>50 cases take stay for longer time intra-operatively compared to the together two groups with highly significant difference in between by using one way ANOVA test. On the other hand 3<sup>rd</sup>50 operation had a shortest time in comparison to the other two groups with highly significant difference in between.



**Fig. 7. Operative time of patients for three groups**

**Table 5. Operative and post operative complication**

Characteristics	Number	%
CBD injury	One patient	0.6%
Bile leak	2 patients	1.2%
Intestinal injury	no	0%
Sub hepatic abscess	5 patients	3.3%
Port site infection	10 patients	6.6%
Liver tears	7patients	4.7%
Coverision to open	6 patients	4%



In our study CBD injury was happened in one patient (0.6%)because the hartman was adherent to CBD so converted to open and we found small hole in the CBD primary repair was done with vicryl 4/0,post operative ERCP done for this patient and we found no stricture or leak age .two patients developed small bile leakage in the drain and stopped after two day. Five patients also developed sub hepatic abscess after 4 days from discharge treated with antibiotic and per cutaneous drainage .during the operation liver tears happened in 7 patients (4.7%)bleeding controlled with diathermy. Port site infection appeared in ten case whose empyema of gall bladder and treated as outpatient with local and systemic antibiotic (Table-5), (Fig.8). Coverision to open cholecystectomy was happened in 6 cases (4%) on case CBD injury, three cases sever gall bladder phlegmon and two cases was unclear anatomy at the Calot's triangle (Table-6).

**Table 6. Causes to coverision to open cholecystectomy**

Characteristics	Number
CBD injury	One patient
Sever adhesion	3 patients
Unclear anatomy	2patients

Post hospital stay ranged from 24-72 hours with a mean of 37 hours.144 patients(96%) stayed in hospital from 24 to 36 hours. 6patients(4%) stayed in hospital from 24 to 72 hours, Table (7). Oral feeding started after 6 hours post operative for lap chole patients and after24hours for open cases. 130 patients suffer from mild pain(90% of the patients) and take single dose of injected analgesic, 10patients suffer from moderate pain (6.6% of the patients) which response to double dose of injected analgesic, 5patients suffer from sever pain (3.3% of the patients) and take triple dose of injected analgesic

**Table 7. The average time of post-operative hospital stay**

Hospital stay in hours	No. of cases	Percentage (%)
24-36 hours	144	96%
24-72 hours	6	4%

## DISCUSSION

The common management of acute calculous cholecystitis consists of an initial control of inflammation followed by interval cholecystectomy after a period of 6–8 weeks. The main arguments made against early laparoscopic cholecystectomy include a high conversion rate and complications. Now with increased experience, improved skills, and new instruments, the high rates of conversion to OC, prolonged operation time, and increased morbidity, particularly CBD injury, of early LC for acute cholecystitis can be done and the complications have been dramatically reduced. Various studies have reported high conversion rates, ranging from 6% to 35% for early laparoscopic cholecystectomy in acute cholecystitis (Chandler *et al.*, 2000; Miller, 2013). It is, therefore, argued that if delayed laparoscopic cholecystectomy leads to a technically easier surgery with a lower conversion rate, it may be a better treatment option for acute cholecystitis. However, there is an increased risk of gallstone-related morbidity during the waiting period for cholecystectomy like severe pancreatitis and obstructive jaundice. Most surgeons agree that timing of the procedure is an important factor in determining outcome. Ideally, the surgery should be performed within the “golden 72 h” from the onset of symptoms (Koo *et al.*, 1996). In our study, early surgery was performed within this golden period and low rate to conversion to open cholecystectomy (4%), especially if done within three days from onset of attack because the edema makes the dissection of the gall bladder bed easy. The difficulty of laparoscopic cholecystectomy for acute cholecystitis is related to operative findings during early surgery like distended, edematous gall bladder and adhesion between gall bladder and other structures commonly seen in cases of acute cholecystitis. On the basis of our experience, we believe that certain key points must be kept in mind when laparoscopic surgery is performed for acute cholecystitis. For good exposure and dissection of Calot’s triangle, good exposure of the first part of duodenum, CBD and decompression of the gallbladder should be done early because this allows better grasping and retraction of the gallbladder. The other technical rules call for the use of a suction-irrigation device for dissection and can use blunt dissection with sterile gauze. In our study, decompression of the gallbladder was required for 40% of the patients (60 patients), and stone spillage was seen in 16% of the cases, (16 patients) which was removed by using retrieval bags and sterile gloves (Fig.5). Our experience supports the belief that the inflammation associated with acute cholecystitis creates an edematous plane around the gallbladder, thus helping its dissection from the other structures. Waiting for the inflamed gallbladder to “cool down” allows maturation of the surrounding inflammation and results in organization of the adhesions, leading to scarring and contraction, which make the dissection more difficult.

## Conclusion

Laparoscopic cholecystectomy for acute cholecystitis performed within the same admission is safe and feasible, and no mortality and should be performed, preferably within the golden period of 72 hours after admission, to decrease the conversion rate to open cholecystectomy, morbidity rate, operation time and avoid the problem of failed conservative management and recurrent symptoms which required emergency surgery. Early LC is associated with a shorter total hospital stay as compared to delayed LC, which is a major economic benefit.

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