



Early Versus Delayed Laparoscopic Cholecystectomy for Uncomplicated Acute Cholecystitis

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Abstract: *Introduction:* 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; however, the timing of cholecystectomy and the value of the additional treatments have been a matter of controversy. *Aim:* To compare the outcome of early versus delayed laparoscopic cholecystectomy in cases of non-complicated acute cholecystitis, as its place remains controversial in the management of acute cholecystitis due to a high reported incidence of bile leaks and conversion rate. *Design:* Prospective interventional comparative study. *Methods:* 120 Patients admitted to Qena and Aswan universities' hospitals with acute cholecystitis over two years period (2013-2015) were included in this study. An early laparoscopic cholecystectomy (ELC), within 7 days from onset of symptoms, for 50 patients, and delayed Laparoscopic cholecystectomy (DLC) after 6 weeks of conservative treatment for 70 patients was performed. Demographic details, operative findings, conversion to open surgery, operative time, complications, timing of endoscopic retrograde cholangiopancreatography (ERCP) and hospital stay for all those patients were recorded. Statistical analysis was performed by SPSS version 18. *Results:* There was insignificant difference in the conversion rates (2 in ELC group versus 2 in DLC group, p value: 0.555), post-operative hospital stay (2 days vs 1.5 days, p value: 0.375). However, operative time was significantly more in the ELC group (85 minutes versus 70 minutes, p value: 0.023). Postoperative ERCP was required in 2 patients in ELC group and one patient in DLC group. Pre-operative ERCP was required in 2 patients in delayed group. 40% of patients (48) had previous admissions with similar symptoms. *Conclusion:* ELC for uncomplicated acute cholecystitis is technically demanding surgery, but it is safe and does not have increased complication rate than DLC. It decreases re-admission rate and overall hospital stay.

Keywords: Acute, Cholecystectomy, Laparoscopic

1. Introduction

Laparoscopic cholecystectomy is widely established as the standard operation in acute cholecystitis [1]. The traditional teaching has been a two-stage treatment for acute cholecystitis with an initial conservative management followed by an interval laparoscopic cholecystectomy [2]. Laparoscopic cholecystectomy is avoided for acute cholecystitis due to concerns about the potential hazards of

complications, especially common bile duct injury and a high conversion rate to open cholecystectomy [3]. The conversion rates for elective laparoscopic cholecystectomy range from 3–7% [4]. However, in the presence of acute inflammation, higher conversion rates of up to 30% have been reported [5-6]. Timing of surgery in acute cholecystitis has been controversial. Several studies have reported favorable outcomes with a low conversion rate if patients are operated within 96 hours of admission. After that window period, surgeons have opted for interval cholecystectomy after a

period of 6–8 weeks [7] Larger surgical centres have published their successful management of acute cholecystitis with urgent laparoscopic cholecystectomy [8] Since most surgeons prefer to delay surgery during the acute phase, we performed this prospective study to compare the outcome of early and delayed laparoscopic cholecystectomy in the treatment of uncomplicated acute cholecystitis.

2. Objectives

To compare the outcome of early versus delayed laparoscopic cholecystectomy in cases of non-complicated acute cholecystitis, as its place remains controversial in the management of acute cholecystitis due to a high reported incidence of bile leaks and conversion rate.

3. Patients and Methods

Between October 2013 and November 2015, 120 patients admitted to general surgery, internal medicine and gastroenterology departments with acute cholecystitis in South Valley and Aswan universities' hospitals were included in this study. An early laparoscopic cholecystectomy (ELC), within 7 days from onset of symptoms, for 50 patients, and delayed laparoscopic cholecystectomy (DLC) for 70 patients after 6 weeks was performed upon patient choice after adequate patient consultation, and understanding of benefits and drawbacks of each procedure. 5 patients had another acute attack during waiting time for DLC group. 10 patients lost follow up, 3 patients developed acute pancreatitis and 5 patients needed emergent cholecystectomy in the follow-up period of patients allocated for DLC. Those patients were deleted from DLC group. Complicated acute cholecystitis, patients with common bile duct (CBD) stones, diabetic patients and patients receiving immunosuppressive drugs are excluded from this study.

Abdominal ultrasonography was done for all patients admitted with the provisional diagnosis of acute cholecystitis. Diagnosis of acute cholecystitis was based on the presence of persistent right upper quadrant pain for more than 6 hours, with or without fever, with evidence of raised inflammatory markers above normal values, i.e. white cell count and/or C-reactive protein, presence of ultrasonographic abnormalities (gall stones, thick-walled gall bladder, pericholecystic fluid collection, and positive Murphy's sign).

Demographic data, operative time, starting from incision for the optical port to closure of port sites, conversion to open surgery, hospital stay, timing of endoscopic retrograde cholangiopancreatography (ERCP) and complications for all those patients were recorded.

We used the standard four-port technique for laparoscopic cholecystectomy but in some cases we used the three-port technique. Tense gall bladder was decompressed by pushing a spinal needle (Figure 1) or a 5-mm trocar through the fundus of the gall bladder. A combination of sharp and blunt dissection was used to dissect the Calot's triangle. Gall bladder was extracted in latex glove. A subhepatic drain was

placed in all cases.

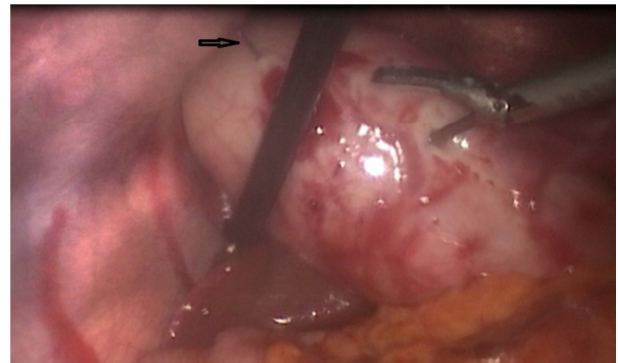


Figure 1. An intraoperative photograph showing a tense gall bladder just before being decompressed by pushing a spinal needle (the arrow).

Postoperatively, the patients were allowed oral intake 6–12 h after surgery provided they had neither nausea nor vomiting. The patients were discharged once the patients were afebrile and taking nutrition orally.

ERCP was performed in patients with bile duct stones (preoperative ERCP in 2 cases in delayed group) and those who developed postoperative bile leak (postoperative ERCP in one patient in early group). Bile leak was defined clinically as a persistent leak of bile through the subhepatic drain for more than 6 weeks. Chest infection was diagnosed on the basis of three or more of the findings including cough, phlegm, shortness of breath, chest pain, temperature above 38°C, and pulse rate above 100 beats per minute. Surgical site infection was also recorded.

Statistical analysis was performed using paired *t*-test and chi-square test. SPSS version 18 (SPSS Inc., Chicago, IL, USA) was used to determine *p* value (*p* value less than 0.05 was considered significant).

4. Results

There were 30 males and 90 females with a median age of 51 years (range, 20–82 years). Male to female ratio was 1:3. The demographic details are given in Table 1. Two patients in early group and two patients in delayed group underwent conversion to open surgery (*P* value: 0.555) due to difficult anatomy and bloody field which causes difficult visualisation (Figure 2).

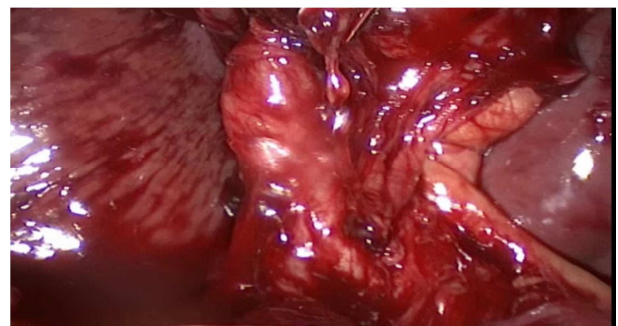


Figure 2. An intraoperative photograph showing difficult anatomy at the field of the Calot's triangle.

Longer operation time was required in the ELC than in DLC. The median operative time was 85 min in ELC and 70 min in DLC. The difference in operative time was statistically significant (P value: 0.023).

Pre-operative ERCP was required in 2 patients in delayed group. These patients had deranged liver function tests with evidence of dilated common bile duct on ultrasound scan. Postoperative ERCP was required in 2 patients in early group and 1 patient in delayed group, who had postoperative persistent bile leak and, as a result, investigated with ERCP. No major bile duct injury was identified. There was leakage from the cystic duct stump, a stent was placed at ERCP and the leak was controlled effectively. Operative details are shown in Table 2.

Table 1. Demographic data of studied cases.

Age	Median	51
	Range	20–82
Sex	Male	30
	Female	90
Median time between onset of symptoms and surgery:	4 days (range 1-7 days)	
Events in waiting period of DLC group:		
	Lost follow-up	10 patients.
	Urgent cholecystectomy	5 patients.
	Acute pancreatitis	3 patients.
	Another acute attack.	5 patients.
Previous admission (48 patients (40%).)		
	No previous admission	102 patients.
	once	30 patients.
	Twice	10 patients.
	More than twice	8 patients.

Table 2. Operative findings and complications.

	ELC group (n=50)	DLC group (n=70)	P value
Operative time	Mean 85±5.6	Mean 70±4.5	0.023
Conversion rate	2	2	0.555
Biliary leakage	2	1	0.375
Surgical site infection	1	0	0.417
Chest infection	2	3	0.656
Port site hernia	1	0	0.417
Post operative ERCP	2	1	0.375
Post operative hospital stay	Median = 2	Median = 1.5	0.375
	days	days	
	Range, 1–10 days	Range, 1–10 days	

The median time from onset of symptoms to surgery was 4 days (range, 1–7 days) in early group. 40% of patients (48) had previous admissions with similar symptoms (30 had one prior admission, 10 had two and 8 had more than two previous admissions).

In early group, there were one cases of wound infection. One patient was re-admitted because of umbilical port site hernia. 2 patients developed chest infection postoperatively and all were managed successfully with antibiotics and chest physiotherapy. In delayed group, 3 patients developed chest infection postoperatively. The median hospital stay was 2

days in early group and 1.5 days in delayed group (Range, 1–10 days). This difference was statistically insignificant (p value 0.375).

5. Discussion

Arguments made against early laparoscopic cholecystectomy include a high conversion rate and complications. Surgical intervention after the first 96 hours of onset of symptoms has been reported as difficult due to significant adhesions [9–10] and is associated with a higher conversion rate [11]. The conversion rates for elective laparoscopic cholecystectomy are 4–5% [12]. However, the average reported rates for laparoscopic cholecystectomy in acute cholecystitis are between 10–30% and can be much higher in patients with empyema or gangrenous gall bladder [6–13].

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.

However, with increasing experience of the surgeons with laparoscopic procedures and advances in the imaging techniques and operating instruments, laparoscopic cholecystectomy is increasing and applicable in the setting of acute cholecystitis [14].

González-Rodríguez et al [15], concluded that there is no advantage to delay cholecystectomy for acute cholecystitis on the basis of outcomes in complications, rate of conversion to open surgery, and mean hospital stay. Skouras et al [16], conclude that there is strong evidence that early laparoscopic cholecystectomy for acute cholecystitis offers an advantage in the length of hospital stay without increasing the morbidity or mortality. The operating time in ELC can be longer, however the incidence of serious complications (i.e. common bile duct injury), is comparable to the DLC group. Larger randomized studies are required before solid conclusions are reached.

Gutt CN et al [17] believe that immediate laparoscopic cholecystectomy should become therapy of choice for acute cholecystitis in operable patients, as; laparoscopic cholecystectomy in their study within 24 hours of hospital admission was shown to be superior to the conservative approach concerning morbidity and costs. Also, Barcelo et al [18] concluded that, early cholecystectomy in acute cholecystitis can reduce the hospital stay without increase of the conversion rate or complications.

In a systematic review done by Gurusamy et al [19], to compare early laparoscopic cholecystectomy (less than seven days of clinical presentation with acute cholecystitis) versus delayed laparoscopic cholecystectomy (more than six weeks after index admission with acute cholecystitis). A total of 488 participants with acute cholecystitis were randomised to early laparoscopic cholecystectomy (244 people) and delayed laparoscopic cholecystectomy (244 people) in the six trials.

They found no significant difference between early and late laparoscopic cholecystectomy. Early laparoscopic cholecystectomy during acute cholecystitis seems safe and may shorten the total hospital stay. The majority of the important outcomes occurred rarely. It is unlikely that future randomised clinical trials will be powered to measure differences in bile duct injury and other serious complications since this might involve performing a trial of more than 50,000 people, but several smaller randomised trials may answer the questions through meta-analyses.

Zhou GH *et al* [20], performed meta-analysis included seven trials with 1106 patients. There was no significant difference between the two groups in terms of bile duct injury or conversion to open cholecystectomy. The total hospital stay was shorter by 4 days for early laparoscopic cholecystectomy.

In retrospective cohort study of de Mestral *et al* [21], from 22,202 patients, a well-balanced matched cohort, 14,220 patients was defined for early cholecystectomy (within 7 days from clinical presentation) was associated with a lower risk of major bile duct injury, or death. Total hospital length of stay was shorter with early cholecystectomy. No significant differences were observed in conversion rate.

We agree with other studies [6, 22-23] that, prompt laparoscopic surgery for acute cholecystitis reduces readmission rates and enables the patient to return to normal activity and work, whilst limiting the morbidity from their gall bladder disease. In the waiting period of delayed group in our study, 10 patients lost follow up, 5 patients need urgent cholecystectomy, 3 patients had attack of acute pancreatitis and 5 patients had another acute attack.

Two patients in early group and two patients in delayed group underwent conversion to open surgery (P value: 0.555) due to difficult anatomy and bloody field which causes difficult visualisation. This difference is insignificant. We believe that conversion to open procedure is inevitable in laparoscopic management of acute cholecystitis and is not considered a complication.

Bile leak and bile duct injury are the two most feared complications of laparoscopic cholecystectomy for acute cholecystitis; the reported incidence for bile leaks after laparoscopic cholecystectomy for acute cholecystitis is around 0.25% for elective laparoscopic cholecystectomy but rises to 2–3% in the presence of acute inflammation [11-24].

We had 2 patients with bile leak in ELC and 1 patient in DLC but without any major bile duct injury: this compares favorably with the published literature.

In delayed group, two patients suspected of having common bile duct stones based on abnormal liver function tests, dilated common bile duct and evidence of ductal calculi underwent pre-operative ERCP.

The technical difficulty of laparoscopic cholecystectomy is related to operative findings during early surgery. A distended and edematous gall bladder is commonly seen in cases of acute cholecystitis. For good exposure of Calot's triangle, decompression of the gallbladder should be done early because this allows better grasping and retraction of the gallbladder.

In our study, decompression of the gallbladder was required for 40% of the patients in the early group. Stone spillage was seen in 20% of the cases in the early group. A subhepatic drain was fixed in all cases.

We agree with other studies that ELC needs longer operative time than DLC (85 vs 70 minutes). Our experience supports the belief that the inflammation associated with acute cholecystitis creates an edematous plane around the gallbladder which facilitates its dissection. Waiting for the inflamed gallbladder to "cool down" allows that plane to be fibrotic.

6. Conclusion

Early laparoscopic cholecystectomy is feasible and safe for uncomplicated acute cholecystitis. Delayed laparoscopic cholecystectomy is not associated with a lower conversion rate than that associated with early laparoscopic cholecystectomy. Early laparoscopic surgery offers definitive treatment at the initial admission and avoids the problems of failed conservative management and recurrent symptoms, which require emergency surgery. Furthermore, early surgery is associated with a much shorter overall hospital stay, which is a major economic benefit to both the patient and health care system.

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