

Variables affecting outcome of laparoscopic cholecystectomy in acute cholecystitis

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Abstract

Objectives: The aim of this study was to compare the outcome of laparoscopic cholecystectomy performed for acute cholecystitis within and after 72 hours of admission.

Study design: Randomized controlled trial

Setting and duration: Hayatabad Medical Complex Peshawar, Pakistan from March 2010 to March 2012.

Methodology: A total of 100 patients with acute cholecystitis were included in the study. All patients underwent surgery within 7 days of admission and were divided into two groups based on the length of time from onset of symptoms to surgical intervention, Group 1 (early) less than 72 hrs (n=50) and Group 2 (delayed) more than 72 hrs (n=50). Length of stay, major complications, operating time and conversion rates were assessed. Statistical analysis was performed using paired t-test and chi-square test with significant set at < 0.05.

Results: Of 100 patients 50 received early LC at < 72 h, and 50 received delayed LC at > 72 h. Mean age was 43.75 ± 10.07 years in ELC group and 46.20 ± 13.10 years in DLC group. Comparing both groups, the conversion rates to an open cholecystectomy was less in ELC group than DLC group (4% and 12%), operating time in ELC and DLC were (65 min versus 80 min), postoperative hospital stay was (1.3 versus 2.7 days) and total hospital stay was (2.5 versus 4.5 days). Postoperative complications occurred in 2 cases (4%) in ELC and 6 cases (12%) in DLC group. No mortality noted in both groups.

Conclusion: Early laparoscopic cholecystectomy is reliable, safe and effective technique for acute cholecystitis, but we recommend early intervention within 72 hours of admission to shorten the operating time and total hospital stay and to minimize the postoperative complication rates.

Keywords: early laparoscopic cholecystectomy (ELC), delayed laparoscopic cholecystectomy (DLC), acute cholecystitis

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Introduction:

Cholelithiasis is a common disorder in our society. Females are most commonly affected than males¹. Most of the patients having gallstones are asymptomatic, but biliary colic (56%) and acute cholecystitis (36%) are the most common presentation of gallstones². The surgical management of patients with acute cholecystitis remain controversial³. Traditional management of acute cholecystitis is initial conservative management with supportive measures and antibiotics followed by elective open cho-

lecystectomy several weeks later. Most of the patients treated initially with the conservative management develops complications and therefore conservative management has to be abandoned⁴.

The scope of minimal access surgery is to minimize the traumatic insult to the patients without compromising the safety and efficacy of treatment compared with conventional open surgery⁵. Current literature suggests that early laparoscopic treatment for acute cholecys-

titis should be within 72 hours from onset of symptoms. Improved technique with time could be one of the reasons why newer reports show good outcome regardless of timing of Laparoscopic cholecystectomy in acute cholecystitis in comparison to earlier reports^{6,7}. Gonzalez-Rodriguez et al demonstrated a significant reduction in conversion rates, length of hospital stay, and postoperative complications in early laparoscopic cholecystectomy group (i.e. performed within 72 hours of presentation)⁸. Bile duct injury of 5.5% during laparoscopic surgery for acute cholecystitis was a major concern. The failure rate of laparoscopic cholecystectomy for acute cholecystitis and conversion to open surgery in the literature various markedly from 7% up to 30%. Currently early laparoscopic cholecystectomy is considered to be a safe and effective management strategy in cases of acute calculous cholecystitis⁹. Successful laparoscopic cholecystectomy for acute cholecystitis is associated with the early recovery and shorter hospital stay. However these advantages of early laparoscopic cholecystectomy can be offset by the potential hazards of serious complications¹⁰, and a high conversion rate. Emergency laparoscopic cholecystectomy for the treatment of acute cholecystitis is associated with more complications and increased risk of common bile duct injury¹¹. However these iatrogenic complications can be minimized with careful patient selection, more experience in minimal invasive surgery, meticulous operative dissection and judicious use of cholangiography along with sound surgical judgment. Most surgeons can perform this procedure quickly with a minimal conversion rate.

We are going to present our experience of 100 consecutive, selected cases of acute cholecystitis to compare the outcome of laparoscopic cholecystectomy performed for acute cholecystitis within and after 72 hours of admission.

Methodology:

This study of 100 consecutive cases with clinical diagnosis of acute cholecystitis confirmed

subsequently by abdominal ultrasonography were admitted for laparoscopic cholecystectomy during same admission at Surgical unit Hayatabad Medical Complex Peshawar from march 2010 to march 2012 after approval from hospital ethical committee. Diagnosis of acute cholecystitis was based on clinical evidence of pain right hypochondrium/epigastrium, guarding and tenderness in right upper quadrant, fever, nausea and vomiting associated with leucocytosis more than 10,000/ m³. Ultrasound performed in all cases confirmed the diagnosis of gallstones and acute cholecystitis. All patients with acute cholecystitis were further investigated with complete blood picture, LFTs, RFTs, RBS, ECG and X-ray chest.

All included patients were divided into two groups after informed consent by lottery method, depending on the timings of LC after admission: Group 1 (n-50) within 72 hours and Group 2 (n-50) after 72 hours. Early intervention (group 1) was defined as cholecystectomy performed within 72 hours from the onset of symptoms and delayed intervention (group 2) as surgery after 72 hours up to 7 days from the onset of symptoms. All patients in both groups were put on supportive measures and intravenous ceftriaxone 1 gm BD till surgery. Patients having acute pain of less than 7 days and tenderness right hypochondrium were included in the study. Patients with concomitant CBD stones, acute biliary pancreatitis, cholangitis, previous upper abdominal surgery, poor anaesthesia risk due to cardiac or other medical problems, suspected or confirmed gallbladder malignancy with stones, acalculous acute cholecystitis and with symptoms of more than 7 days duration were excluded from the study.

An informed consent taken from the patients pre-operatively, explaining the complications and the risk of conversion to open operation. A single dose of injection ceftriaxone 1 gm was given 30 minutes before induction of anaesthesia. Under general anaesthesia laparoscopic cholecystectomy was performed

in both groups by consultant surgeons well trained in minimal invasive surgery. All surgeries were performed by four port techniques with one 10mm below umbilical port, one 10mm epigastric port and two 5mm ports at mid-clavicular line along the right subcostal margin and right flank respectively. In three cases a fifth port was used to improve exposure. Gall bladder was extracted through umbilical port. A suction drain was placed if clinically indicated and the incision closed. When required, conversion to open surgery was performed through a right subcostal incision.

Postoperatively all patients were continued on intravenous ceftriaxone 1gm BD till discharged. Patients were then sent home on oral ciprofloxacin 500 mg BD for 5 days, oral omeprazole 20 mg OD for one month and oral diclofenac sodium 75 mg as needed. All patients were followed after 7 days, 14 days and one month post discharge and were evaluated for postoperative complications.

Statistical analysis was performed with paired t-test and chi-square test using SPSS version 10. A p-value <0.05 was considered significant.

Results:

During the study period, a total 100 patients were randomized: 50 received early LC at < 72 h, and 50 received delayed LC at > 72 h. In both groups females predominate the males and mean age was 43.75 ± 10.07 years in ELC group and 46.20 ± 13.10 years in DLC group (Table 1). Four patients (8%) of the early group had undergone previous abdominal surgery as had three patients (6%) of the delayed group. Five patients (10%) of the early group and eight patients (16%) of the delayed group had experienced previous biliary symptoms. There was no significant difference in fever or leucocytosis between both groups at presentation. The average duration of symptoms was 42.1 ± 19.1 h for early group and 92 ± 14.3 h for the delayed group (Table 1).

The ultrasonographic findings of the patients in the both groups is shown in the (Table

2). The average operating time for the early group was 65 min and 80 min in delayed group in simple uncomplicated cases which was statistically significant ($p=0.001$), but the cases where major complications encountered, the maximum time taken was 95 min in early group and 115 min in delayed group. The post-operative hospital stay and total hospital stay were shorter in the early group (1.3 and 2.5 days) compared with the delayed group (2.7 and 4.5 days) showed statistically significant difference ($p=0.0001$) (Table 3). Three patients (6%) in early group and seven patients (14%) in delayed group underwent conversion to open surgery which was not statistically significant ($p=0.3178$) (Table 3). The main reason for conversion in the early cases included obscure anatomy at Calot's triangle in 2 cases and uncontrollable liver bleeding in one case. The main reason for conversion in delayed cases included dense adhesions of gall bladder to CBD and duodenum in 3 cases, stones in CBD in one case missed on ultrasound, CBD injury in 2 cases and liver bleeding in one case.

Table 1: Pre Hospitalization data of patients

Characteristics	Early group (n-50)	Delayed group (n-50)	p-value
Mean age (years)	43.75±10.07	46.20±13.10	0.2970
Sex:			
Male	13(26%)	17(34%)	0.5131
Female	37(74%)	33(66%)	
Previous abdominal surgery	4(7.69%)	3(6%)	1.000
Previous biliary symptoms	5 (10%)	8(16%)	0.5536
Acute symptoms duration (H)	42.1±19.1	92±14.3	0.0001
TLC (>11000/ml)	37(74%)	41(82%)	.4695
Total bilirubin (mg)	0.7±0.13	0.6±0.14	0.0004
AST (U/L)	40.7±20	30.8±14	0.0051
ALT (U/L)	35.3±18	25.4±13	0.0008
Alkaline phosphatase (IU/L)	182±60	153±38	0.0048

Table 2: Ultrasound findings of the patient

U/S Findings	Early group (n-50)	Delayed group (n-50)	P-value
Thickened edematous GB	38(76%)	43(86%)	0.3080
Presence of G stone	50(100%)	50(100%)	1.000
Distended GB	46(92%)	41(82%)	0.2336
U/S murphy sign +ve	39(78%)	36(72%)	0.6447
Pericholecystic free fluid	28(56%)	31(62%)	0.6845

Table 3: Hospital data of patients

	Early group (n-50) <72 hr	Delayed group (n-50) >72 hr	P value
Operative time	65 + 10.4SD	80 + 11.7SD	0.0001
Postoperative stay	1.3 + 0.8SD	2.7 + 1.2SD	0.0001
Total hospital stay	2.5 + 0.9SD	4.5 + 1.4SD	0.0001
Conversion rate	3(6%)	7 (14%)	0.3178

Table 4: Operative complications

Complications	Early group (n-50)	Delayed group (n-50)	p-value
Intraoperative complications			
Bile duct injury	0	2 (4%)	0.4949
Hartman pouch transaction	0	0	1.000
Bleeding	1 (2%)	1 (2%)	1.000
Postoperative complications			
Bile leak	0	1 (2%)	1.000
Wound infection	1 (2%)	2 (4%)	1.000

The overall complication rate was 4% (2 of 50) in early group and 12% (6 of 50) in delayed group. Major bile duct injury occurred in 2 (4%) cases in delayed group and none in the early group (p=0.4949). Major bile duct injuries required conversion and one was primarily repaired over T-tube, and the second one by hepaticojejunostomy. One patient (2%) in each groups had uncontrollable liver bleeding required conversion in both cases and blood transfusion (p=1.000). Post operatively one patient (2%) in the delayed group had a minor bile leak at the junction of the cystic duct and bile duct, treated with the percutaneous drainage of the bilioma and ERCP with stenting (p=1.000). Retained CBD stone was man-

aged by endoscopic retrograde cholangiopancreatography (ERCP) and stone extraction. In the delayed group there were 2 (4%) wound infections as compared to one (2%) in early group (p=1.000), which responded to conservative treatment in both groups. No mortality noted in either group.

Discussion:

In the early years of laparoscopic surgery, acute cholecystitis was considered a relative contraindication to laparoscopic cholecystectomy, but now it has been shown that the early laparoscopic cholecystectomy is the treatment of choice for the majority of patients with acute cholecystitis. LC became an established procedure due to less pain, shortened postoperative hospitalization and minimum morbidity and early return to home. Initially many surgeons performed randomized studies to evaluate LC versus open procedure, but this is no longer a matter for discussion and LC is now the procedure of choice for treating GB stones¹². Laparoscopic cholecystectomy now exceeds open cholecystectomy because of its promise for reduced morbidity¹³. The indications for approximately 20% of present-day cholecystectomy is acute cholecystitis¹⁴. In the early phase of acute cholecystitis, the stage of hyperemia and edema predominate and this may even facilitate laparoscopic dissection of Calot's triangle. After 72 hours chronic inflammation predominates with adhesion, fibrosis, hypervascularity and necrosis responsible for difficulty in laparoscopic dissection of the Calot's triangle¹⁵.

The question of relating the timing of LC for acute cholecystitis to admission or onset of symptoms has been overemphasized. Laparoscopic cholecystectomy is more likely to be successful and complication free if it is performed within 72 hours of presentation. Similar findings guided surgeons towards early surgery for acute cholecystitis before the laparoscopic era¹⁶. Patients treated within 48 hours of onset of symptoms experience lower conversion rate, shortened operative time and reduced hospitalization¹⁷, as also shown in our study in patients treated within 72 hours of

admission (early group). Most surgeons consider early LC as the optimum treatment for acute cholecystitis, which is well supported by a recent international consensus published as Tokyo Guidelines¹⁸.

The rate of conversion to open surgery in cases of severe cholecystitis has been reported to be between 8.7% and 75%^{19,20}. Three patients (6%) in early group and seven patients (13.46%) in delayed group underwent conversion to open surgery (Table 3), with the overall rate of conversion of 10%. The main reason for conversion in the early cases included obscure anatomy at calot's triangle in 2 cases and uncontrollable liver bleeding in one case. The main reason for conversion in delayed cases included dense adhesions of gall bladder to CBD and duodenum in 3 cases, stones in CBD in one case missed on ultrasound, CBD injury in 2 cases and liver bleeding in one case. The rate of conversion from LC to OC in acute cholecystitis in some different studies as well our results are shown in (Table 5).

Table 5: Results of conversion rate in early and delayed groups of patient in the different literature and our study

Author	N	Delayed	
		Early group (<72hr)	group (>72hrs)
Green wald et al ²¹	88	8%	74%
Elder et al ²²	130	23%	47%
Casillas RA ²⁵	173	5.6%	11.5%
Asif qureshi ²³	164	2.9%	13.6%
Our study	100	6%	13.46%

The average operating time for the early group was 65 min and 80 min in delayed group in simple uncomplicated cases, but the cases where major complications encountered, the maximum time taken was 95 min in early group and 115 min in delayed group. The postoperative hospital stay and total hospital stay were shorter in the early group (1.3 and 2.5 days) compared with the delayed group (2.7 and 4.5 days) Table 3. In a study by Abdulmohsen, et al²⁴ showed shorter total hospital and postoperative stay in early versus delayed group after LC for acute cholecystitis, as also

shown in our own study. The same study also showed low operating time in early versus delayed group.

The overall complication rate was 4% (2 of 50) in early group and 12% (6 of 50) in delayed group. Bile duct injury probably is the most important issue in a comparison of the two groups. Major bile duct injury occurred in 2 (4%) cases in delayed group and none in the early group. Major bile duct injuries required conversion and one was primarily repaired over T-tube, and the second one by hepaticojejunostomy. One patient (2%) in each groups had uncontrollable liver bleeding required conversion in both cases and blood transfusion. Post operatively one patient (2%) in the delayed group had a minor bile leak at the junction of the cystic duct and bile duct, treated with the percutaneous drainage of the bilioma and ERCP with stenting. Retained CBD stone was managed by endoscopic retrograde cholangiopancreatography (ERCP) and stone extraction. In the delayed group there were 2 (4%) wound infections as compared to one (2%) in early group, which responded to conservative treatment in both groups. No mortality noted in either group.

Based on international experience and our own results, we support laparoscopic cholecystectomy within 72 hours of admission for acute cholecystitis. It is our observation that LC within this period is technically less demanding because the oedema planes magnify the structures and thus facilitate dissection.

This study was limited because the number of patients studied was small, and more randomized trials are needed to confirm these findings.

Conclusion:

Early laparoscopic cholecystectomy is safe and feasible for acute cholecystitis, with low conversion rate and no mortality. However, LC should be performed as early as possible, preferably within the golden period of 72 hours after admission to decrease the morbidity rate, operation time and total hospital stay.

Role and contribution of authors:

Dr Yousaf Jan conception and design

Dr Shaukat Hussain collection and assemble of data

Dr Waqas, collection of references, Dr Muhammad Shah, writing the discussion

Dr Amjad Khan Analysis and interpretation of data, statistical analysis

Dr Ahmad Din, critical revision of the artical

Conflict of Interest: None**References:**

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