Early versus Delayed Laparoscopic Cholecystectomy for Management of Acute Calculus Cholecystitis: Our Experience at King Hussein Medical Center

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ABSTRACT

Objective: To compare early laparoscopic cholecystectomy during index admission with delayed (interval) laparoscopic cholecystectomy in the management of acute cholecystitis at King Hussein Medical Center.

Methods: Over the study period of 48 months (June 2005 to May 2009), a total of 317 patients with clinical and radiographic diagnosis of acute cholecystitis were studied. One hundred-thirty one patients underwent laparoscopic cholecystectomy during the index admission (group A) while 186 patients (Group B) underwent cholecystectomy at least six weeks after the attack. Data analyzed included patients' age, gender, duration of symptoms, white blood cell count, operative time, hospital stay, overall surgical outcomes and postoperative morbidity and mortality.

Results: Both groups were demographically and clinically comparable. Surgical outcomes were comparable in group A and B with conversion rates of 8.3% and 7.4% ($p = 0.6645$), and complication rates of 12.25% and 12.6% ($p = 0.9352$) respectively. Although delayed surgery shortens operative time significantly (60 versus 100 min, $p<0.0001$), the overall hospital stay is significantly reduced by early operation (5 versus 14.6 days, $p<0.0001$).

Conclusion: Although both the early and delayed approaches in management of acute calculus cholecystitis are comparable in terms of complication and conversion rates, the early approach has the advantage of offering patients a definitive treatment while reducing the overall total hospital stay and avoiding the problems of failure of delayed therapy.

Key words: Acute cholecystitis, Cholecystectomy, Laparoscopic

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Introduction

Laparoscopic Cholecystectomy (LC) is one of the most common surgical operations performed by general surgeons.[1,2] Since its introduction in 1985,[3-5] laparoscopic cholecystectomy has become the gold standard management of symptomatic cholelithiasis.[1,2] Although Acute Cholecystitis (AC) was initially considered a relative contraindication to laparoscopic cholecystectomy,[6,7] more patients with acute cholecystitis are being successfully managed by laparoscopic cholecystectomy. However, there is still controversy about timing of surgery. In the era of cost containment, the question 'when to operate' still persists. The aim of this retrospective study was to compare early cholecystectomy (defined as LC during the first index admission for acute cholecystitis) with interval cholecystectomy (defined as LC six weeks after resolution of acute cholecystitis) in the management of patients with acute calculus cholecystitis at King Hussein Medical Center (KHMC).

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Methods

This retrospective study was conducted over a study period of 48 months (June 2005 to May 2009). A search of our pathology department data-base and our operating theater lists revealed that around 4,000 cholecystectomies were performed during the study period, with more than 600 cholecystectomies performed for acute cholecystitis. Medical records of these patients were reviewed. Data including patients' age, gender, duration of symptoms till time of operation, white blood cell (WBC) count, ultrasonographic findings, operative time, hospital stay and postoperative morbidity and mortality were recorded in a specially designed medical records abstract form. Only forms with complete data were submitted to analysis. A total of 317 patients (237 females and 80 males) with clinical and radiographic diagnosis of acute cholecystitis[(1)] were eventually included in this study (see Table I). All patients were treated initially with intravenous fluid, antibiotics and analgesia; 131 patients (97F, 34M) underwent LC during the index admission (group A) and the remaining 186 patients were discharged after successful conservative therapy and were scheduled for elective LC after an interval 'cooling off ' period (group B). Allocation of patients to both groups was non-systematized and based on many subjective factors, mainly surgeon's preference, availability of operating theater and patients' medical condition. One hundred seventy five patients in Group B eventually tolerated the cooling off period. Postoperatively, all patients who were included in the study and eventually underwent cholecystectomy were followed-up at the surgical outpatient clinic within four weeks after surgery and was confirmed by the histopathology reports. The follow-up period ranged from 2 months to 1 year for both groups. Statistical analysis was done using the GraphPad software.[(8)] The significance level was set at $p<0.05$. Analysis included unpaired t test, Fisher's exact test or Chi-square test.

Results

The demographic and clinical data of both groups were comparable at time of index admission as presented in Table II.

Patients in Group A (131 patients) underwent LC during the index admission. The time interval from onset of symptoms until the start of operation ranged from 17-126 hours with a mean of 57 hours. Eleven patients (8.3%) required conversion to open cholecystectomy due to obscured anatomy (6 patients), severely thickened gallbladder wall (2 patients), bleeding (2 patients) and Mirizzi syndrome (1 patient) (see Table III). Mean operative time was 100 minutes with a range of 45-180 minutes. Postoperative drainage tubes were used in 38 patients (29%) for a maximum of two days. The overall hospital stay ranged from three to seven days with an average of five days, while the mean postoperative hospital stay was two days. There was no mortality. Postoperative complications included minor wound infection (7 patients); minor bile leaks (5 patients) and postoperative jaundice due to slipped or retained stones (4 patients). Two patients required Endoscopic Retrograde Cholangiopancreaticography (ERCP). There were no major bile duct injuries (see Table IV).

Patients in group B (186 patients) were discharged after successful non surgical therapy and were scheduled for delayed elective cholecystectomy after an interval of about six weeks. The mean hospital stay during index admission ranged from four to seven days with a mean of five days. Forty-nine patients (26.3%) were readmitted during the interval waiting period, of which 11 patients (5.9%) underwent emergency cholecystectomy (failed delayed therapy) and were excluded from the study. Five patients in this subgroup were converted to open cholecystectomy (45%). Table V shows the indications for readmission for this group of patients and the interventions that were performed.

The remaining 175 patient were operated as scheduled after the interval cooling off period which ranged from 42-134 days with a mean of 59 days. Conversion to open cholecystectomy was required in 13 patients (7.4%) due to obscured anatomy (10 patients), difficulty in grasping a thick hard gallbladder (2 patients), and bleeding (1 patient) (see Table III). Operative time ranged from 35-160 minutes with a mean of 66 minutes. Postoperative drainage tubes were used in 42 patients (24%) for a maximum of two days. The mean postoperative hospital stay was two days with a range from 1-8 days. The mean total hospital stay for group B including the readmissions was 13 days with a range of 8-27 days. There was no mortality in this group of patients. Postoperative complications included wound infections (11 patients), minor bile leaks (6 patients) and postoperative jaundice due to slipped or retained stones (5 patients of whom 4 required postoperative ERCP) (Table IV). There were no major bile duct injuries. Table VI summarizes the overall results of this study.

Table I: Clinical and ultrasonographic diagnostic criteria of acute calculus cholecystitis

Clinical	Right upper quadrant (RUQ) pain & tenderness
	Positive Murphy's sign
	Fever ≥ 38 Cº rectally
	Leukocytosis > 11,000
Ultrasonographic	Presence of gallbladder stones
	Gallbladder wall thickening >4mm
	Pericholecystic fluid
	Positive ultrasonographic Murphy's Sign

Table II: Demographic and clinical characteristics of patients at the time of index admission

Criterion	Group A	Group B	P value
Number	131	175	
Age (mean±2SD)	50.5±25.9	51.0±21.8	0.7013
F:M ratio	2.9:1	3:1	
Mean duration of symptoms from onset till operation	60.7 hours (range 17-121 hours)	59.2 days (range 42-134 days)	Not applicable
WBC count (mean±2SD)	14.9±3.9	14.7±3.6	0.5019

Table III: Indications for conversion to open cholecystectomy

Indication	Group A	Group B
Obscure Anatomy	6	10
Thick gallbladder wall	2	2
Bleeding	2	1
Mirizzi syndrome	1	0
Total (%)*	11 (8.3%)	13 (7.4%)

*P value is 0.6645 and considered insignificant

Table IV: Postoperative complications

Complication	Group A	Group B	P value
Total	16	22	0.9352
Port/wound infection	7	11	0.8096
Minor bile leak/cystic stump leak	5	6	1.0000
Retained & slipped stones	4	5	1.0000
Need postoperative ERCP *	2	4	1.0000
Major CBD** injury	0	0	

*Endoscopic Retrograde Cholangiopancreaticography. **Common Bile Duct

Table V: Indications of readmission in Group B

Indication	Number	Intervention
Recurrent biliary colic	31	Conservative treatment
Recurrent AC	11	4 underwent emergent cholecystectomy
Acute pancreatitis	3	Conservative treatment followed by emergent cholecystectomy
Choledocholithiasis ± cholangitis	4	ERCP followed by emergent cholecystectomy
Total	49 (26.3%)	11 (5.9%) underwent emergent cholecystectomy

Table VI: Outcome in early and interval Laparoscopic Cholecystectomy in Acute Cholecystitis

Criterion	Group A	Group B	p value
Number	131	175	
Conversion rate (%)	8.3	7.4	0.6645
Mean operative time (min)	100.5(range 45-180)	66.5(35-150)	<0.0001
Drain	29%	24%	0.3926
Mortality	0	0	
Morbidity (%)	16 (12.2%)	22 (12.6%)	0.9352
Wound infection	7 (5.3%)	11 (6.3%)	0.8096
Minor bile leak	5 (3.8%)	6 (3.4%)	1.0000
Retained stones	4 (3.1%)	5 (2.9%)	1.0000
Need for ERCP	2 (1.5%)	4 (2.3%)	1.0000
Major BD injury	0 (0%)	0 (0%)	
Mean postoperative hospital stay (day)	2.1 (range1-7)	2.3 (range 2-8)	0.2425
Mean Total hospital stay including readmissions	5.0(range 3-7)	14.6 (range 8-27)	<0.0001

Discussion

Cholelithiasis affects 10-15% of the adult population of whom 1-4% becomes symptomatic in a year making LC one of the most common surgical operations performed by general surgeons. About 20% of symptomatic patients present with acute cholecystitis.[1,2]

LC was initially performed by the German surgeon, Erich Mühe (Böblingen, Germany) in 1985 and was thereafter made popular by Reddick in 1988 in USA.[3-5] Met early with skepticism, LC has become the gold standard treatment of symptomatic cholelithiasis.[9-11] Acute cholecystitis was initially considered a relative contraindication to laparoscopic cholecystectomy based on the assumption that acute inflammation obscures the anatomy and increases the risk of conversion to open surgery and complications, namely, major common bile duct injuries.[6-7,12] With increased experience and refinement of instrumentation, more patients with acute cholecystitis are being managed by laparoscopic cholecystectomy successfully.

However, there is still controversy about the timing of surgery.[13,14] Many Studies in the prelaparoscopic era have proved the efficacy and safety of early open cholecystectomy and its superiority in terms of shorter overall hospital stay and avoidance of recurrent symptoms compared to delayed surgery.[15-19] Many studies have also proved the efficacy, safety and superiority of early laparoscopic cholecystectomy in acute cholecystitis.[20-24] However, many surgeons, continue to adhere to the old policy of delaying surgery in patients with acute cholecystitis for inflammation to cool down.[25-26]

Some studies have concentrated on operating in the golden period, defined as the first 72 hours from the onset of symptoms,[27-29] while more recent studies have proved the safety of operation within a week from onset of symptoms. After one week fibrosis occur and the surgery should thus be deferred for 6 weeks thereafter.[30-31] As shown by our study and most studies comparing early LC and delayed LC, the operative time is longer in the early group (100 versus 60 min, $p < 0.0001$).[32-33] This is due partially to obscured anatomy but also to the operative modifications that are commonly required when faced with acute cholecystitis, such as aspiration of the gallbladder, use of additional trocar and angled laparoscope, suturing of edematous thick cystic duct, subtotal cholecystectomy and the use of retrieval bags and suction drains.[34-35]

Our conversion rates of 8.3% and 7.4% in group A and B respectively, contrast favorably with those stated in the literature which range from 4-30%.[26,36-37] Most recent studies have failed to prove an increase in conversion rate when LC is done during index admission compared to interval LC.[20,22,26,32,35] Many earlier studies where actually comparing early LC with elective LC and many of the studied population were actually having chronic rather than acute cholecystitis. The complication rates were comparable in both groups with no major bile duct injury overall. However, it should be stressed that patients with acute cholecystitis should be operated upon by experienced surgeons whether in the early or delayed settings for such outcome to be obtained.[38-40]

Most studies have proven that early LC is associated with a shorter total hospital stay compared to delayed LC[20-26] given the high rate of recurrent symptoms and complications during the cooling off period which range from 15-25%.[26]

In our study, the mean total hospital stay of group A of five days contrasts sharply with that of group B which averaged 14.7 days when all admissions were summed. A total of 26.3% of patients in group B were readmitted during the cooling off period of which 11 patients (6%) underwent emergency cholecystectomy (failed delayed therapy). The shorter total hospital stay may translate into cost effectiveness.[41-42]

In an international consensus meeting in Tokyo (2006),[43] an experienced working group have advocated severity assessment criteria of acute cholecystitis for more objective decision. Accordingly, acute cholecystitis is classified into three grades. Patients in Grade I (mild) can be safely managed by early LC. Those in grade II (moderate) and III (severe) are better managed by delayed cholecystectomy with or without percutaneous cholecystostomy. This study may

allow us to properly select patients who are appropriate candidates for early LC.

Conclusion

The early and delayed approaches in management of acute cholecystitis are comparable in terms of complication and conversion rates. The early approach has the advantage of offering the patients a definitive treatment during the index admission, while reducing the overall total hospital stay and avoiding the problems of failure of delayed therapy. This may translate into an economic benefit and better patient satisfaction when compared with delayed therapy. A more objective allocation of patients based on severity of acute cholecystitis is warranted.

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