Interval Laparoscopic Cholecystectomy: What is the Best Timing for Surgery?

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ABSTRACT: **Background:** The timing of interval laparoscopic cholecystectomy continues to be a matter of debate.

Objectives: To evaluate the best timing for performing this procedure after an episode of acute cholecystitis.

Methods: In this retrospective analysis, we divided 213 patients into three groups based on the time that elapsed from an episode of acute cholecystitis to surgery: Group I: 1–6 weeks, Group II: 6–12 weeks, Group III: › 12 weeks.

Results: The mean operative time ranged from 51 to 59 minutes, complication rate 2.6%–5.9%, conversion rate 2.6%–10.8%, length of hospitalization 1.55–2.2 days, and the 30 day readmission rate 2.7%–7.9%. There were no statistically significant differences between the study groups in the primary outcome parameters.

Conclusions: Due to the lack of statistically significant differences between the groups, interval laparoscopic cholecystectomy can be performed safely and without increasing the complication rate within 6 weeks after the acute episode as well as 12 weeks after. However, a trend towards higher conversion and complication rates was observed in Group II (6–12 weeks).

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KEY WORDS: laparoscopic cholecystectomy (LC), delayed laparoscopic cholecystectomy, conversion rate

Laparoscopic cholecystectomy (LC) is the gold standard operation for gallbladder disease. Over one million such procedures are performed each year in the United States. Generally, it is safe and cost-effective, with a low complication rate and a short hospital stay [1-3].

Most cases of LC are performed on an elective basis following biliary colic and episodes of obstructive jaundice or biliary pancreatitis that resolved spontaneously, or following endoscopic retrograde cholangiopancreatography (ERCP). However, a substantial number of LCs are performed for acute cholecystitis. In recent years, a trend towards early intervention during the first 72 hours of acute cholecystitis has become the standard of care in order to avoid readmission due to recurrent episodes of this condition [4-7]. Still, some patients arrive at the hospital more than 72 hours after the onset of symptoms or suffer from comorbidities contraindicating early surgery. These patients are treated conservatively with antibiotics and scheduled for interval LC. Recent studies recommend LC for patients after an episode of acute mild biliary pancreatitis, even during the same hospitalization, in order to avoid recurrent episodes [8]. However, patients who are indicated for surgery following an episode of acute cholecystitis are scheduled for interval LC 6 to 12 weeks after the onset of symptoms [5,7,9].

The aim of this retrospective study was to determine the best timing to perform interval LC as judged by the conversion rate, complication rate, 30 day readmission rate, and length of stay.

PATIENTS AND METHODS

This retrospective study was performed with the authorization of the Assaf Harofeh Medical Center Institutional Review Board (No: 77/12). We built a computerized database of all patients undergoing LC during the period July 2007 to April 2012. The following parameters were evaluated: age, gender, co-morbidities, time since the episode of acute cholecystitis to surgery, duration of the surgical procedure, conversion rates, complication rates, length of hospitalization, and 30 day readmission rates.

Patients were divided into three groups according to the time elapsed from the episode of acute cholecystitis to the operation (Group I: 1–6 weeks, Group II: 6–12 weeks, Group III: ≥ 12 weeks). Our policy was to schedule patients for interval LC between 6 and 12 weeks following the acute episode (Group II). Variations in the interval period were related to symptom exacerbation leading to earlier surgery (Group I). Delay for longer periods (more than 12 weeks) was based on patient choice or medical condition (Group III). All patients with perforation of the gallbladder or patients who required percutaneous cholecystostomy for drainage in the acute episode were excluded.

All patients were operated by residents supervised by at least one attending. The same surgical technique was used in all operations, namely, employing a four-trocar technique (2 x 5 mm, 2 x 10 mm) and insufflating the abdominal cavity to 15 mmHg. Preoperative antibiotics were administered to all patients. Following discharge, patient follow-up was conducted in the outpatient clinic or by the referring surgeon.

STATISTICAL ANALYSIS

To compare quantitative (continuous) variables between two independent groups, the two-sample *t*-test was applied. Comparison of quantitative (continuous) variables between three or more groups was carried out using the ANOVA procedure with the Bonferroni post hoc test. The association between two categorical variables was assessed using the chi-square test. All statistical tests were two-tailed, and a *P* value of 5% or less was considered statistically significant.

RESULTS

From July 2007 to April 2012, 223 patients underwent interval LC following an episode of acute cholecystitis. Ten patients were excluded from the study due to lack of data. The average age was 54.8 years (range 18–87), and the female to male ratio was 1.47:1. Thirty-nine percent of the patients had hypertension, 19.7% had diabetes, and 15% had a history of ischemic heart disease. The demographic data are summarized in Table 1. There were no differences between groups in the type of surgery in the acute-phase admission including length of stay. The youngest patients were in Group I, with a mean age of 46.2 as compared to the other groups ($P < 0.05$). Also, in Group I, the percent of concomitant co-morbidities was statistically lower than in the other groups ($P < 0.05$).

The average operative time was 57 minutes (range 16–220) and the overall conversion rate 7.5% (16 patients). The mean length of hospital stay following surgery was 1.9 days (1–14). The differences between the groups in duration of surgery, conversion rates, complication rates, length of hospitalization, and readmission rates are shown in Table 2.

Thirty-eight patients underwent LC 1–6 weeks after the acute episode (mean 4.4 weeks). The operative time was 50 minutes and the conversion rate 2.6%. Mean length of hospitalization was 1.55 days with a 30 day readmission rate of 7.9%. Surgery was performed in 102 patients 6–12 weeks after the acute episode. The mean interval time to surgery was 7.84 weeks. The conversion rate was 10.8%, 5.9% of the patients suffered a complication, and 8 patients were readmitted within 30 days. Seventy-three patients (Group III) were operated on more than 12 weeks since the acute event. The duration of the operative procedure was 58 minutes, the conversion rate 5.5%, length of hospital stay 1.8 days, and 30 day readmission rate 2.7%.

Overall, there were 7 complications in the entire group (3.3%) and 13 cases of 30 day readmission (6.1%). One patient sustained iatrogenic common bile duct (CBD) injury that was diagnosed and treated with an immediate Roux-en-Y hepaticojejunostomy. In another patient, ERCP was used to treat a bile leak. Two patients required a blood transfusion postoperatively due to bleeding from the gallbladder bed (2 units of packed red cells per patient). Three patients who were readmitted due to a collection of fluids in the gallbladder bed responded to medical treatment, and none required drainage. The list of complications and causes for readmission are listed in Table 3.

Table 1. Demographic data of the 213 patients

	Group I (1–6 weeks) 38 patients	Group II (6–12 weeks) 102 patients	Group III (≥ 12 weeks) 73 patients
Mean time followed acute episode (weeks)	4.4	7.8	30.3
Average age (years)	46	56.4	57
Female	65.8%	62.7%	52.1%
Male	34.2%	37.3%	47.9%
Co-morbidities			
Hypertension	18.4%	39.2%	49.3%
Ischemic heart disease	2.6%	16.7%	19.2%
Diabetes mellitus	7.9%	20.6%	24.7%
Other	0.0%	9.8%	8.2%

Table 2. Surgical data of the 213 patients

	Group I (1–6 weeks) 38 patients	Group II (6–12 weeks) 102 patients	Group III (> 12 weeks) 73 patients
Duration of surgery (min)	51	59	58
Conversion to open surgery	2.6%	10.8%	5.5%
Length of hospitalization (days)	1.55	2.0	1.8

Table 3. Complications and readmissions

	Group I (1–6 weeks)	Group II (6–12 weeks)	Group II (≥ 12 weeks)
Complications	1 (2.6%)	6 (5.9%)	None
Wound infection	1	2	
Common bile duct injury iatrogenic		1	
Bile leak		1	
Other		2 (1 cardiac, 1 ileus)	
30 day readmission rate	3 (7.9%)	8 (7.8%)	2 (2.7%)
Abdominal pain	2	3	2
Subhepatic collection	1	2	
Superficial wound infection		1	
Pulmonary		2	

DISCUSSION

Laparoscopic cholecystectomy is the treatment of choice for gallbladder disease. The best timing for performing LC following an episode of acute cholecystitis is still a matter of debate [5,7,9]. There is some evidence in the literature that surgery performed during the first 72 hours from the onset of acute cholecystitis symptoms has the best outcome [5,7,10]. When LC is performed more than 72 hours from the onset of symptoms, the conversion and complication rates are higher and the hospital stay longer [10].

However, immediate surgery is not performed in all patients. These are patients whose general physical condition renders

them unfit for immediate surgery, or patients who arrived more than 72 hours after symptoms began. According to some studies, surgery is advisable 6–12 weeks after the acute episode [5,7].

In the past, all patients who required internal LC even after an episode of acute pancreatitis were advised to undergo surgery after 6–12 weeks. A Cochrane Review published in 2013 states that patients needing LC following an episode of acute mild pancreatitis are advised to have surgery as soon as possible, even during the same hospitalization (after the symptoms of pancreatitis subside) in order to avoid recurrent hospitalizations due to another pancreatitis episode [8].

The current study aimed to explore the common recommendation to delay surgery for 6–12 weeks and to determine the most effective timing for interval LC. We examined the data of 213 patients in this retrospective study. The overall conversion rate was 7.5% in the entire study population; the highest conversion rate (10.8%) was in Group II (6–12 weeks) and the lowest rate (2.6%) in Group I (1–6 weeks), with an intermediate rate of 5.5% in Group III. These findings were not statistically significant. The conversion rates quoted in other series range from as low as 3.7% to as high as 30%. In a recent study, patients who underwent interval LC were compared with patients who underwent LC on an elective basis. The group of patients undergoing interval LC differed from the elective group of patients undergoing LC, in terms of higher conversion and complication rates.

The mean operative time was 57 minutes, and the mean duration of hospitalization 1.86 days. These observations are similar to those reported in the Cochrane Review [7]. There were no statistically significant differences between the groups regarding the duration of the operation and the length of hospital stay.

The overall complication rate in the current study was 3.3%. Most of the complications occurred in Group II (week 6–12) (5.9%), and the most devastating of all was a CBD injury. One patient had a bile leak requiring ERCP. The rate of iatrogenic CBD injury and bile leak was lower than that published in the Cochrane Review, which reported an acceptable rate of 1.4%–2.8% CBD injury and 0–3.2% bile leak [7]. There were no significant differences in the complication rate between the groups [Table 3].

The overall 30 day readmission rate was 6.1%, which is higher than the rate cited in the literature (2–3%) [11,12]. However, the figures quoted in these studies [11,12] relate to elective LC and not to LC performed as an interval operation, which could explain the higher rates. The 30 day readmission rate was the same in Groups I and II.

To the best of our knowledge, this is the first report evaluating interval LC performed during three different time periods following acute cholecystitis. While no statistically significant difference was reached between the groups, there was a trend for better outcome in the group that underwent the LC within 1–6 weeks from the acute episode. This was evident by shorter operative times, shorter lengths of hospitalization, and lower conversion and complication rates. Although statistically not significant, these results are surprising as it was, and still is, common practice to refer patients for interval LC 6–12 weeks following the acute episode. These superior results can be explained by the differences in age and co-morbidities which were much lower in this group compared to the others. A possible explanation might be that the degree of adhesions and fibrosis is not prominent during this time period as compared to the other periods.

In conclusion, based on our work, it appears safe to operate on patients less than 6 weeks or more than 12 weeks following acute cholecystitis; thus, the common recommendation to operate 6–12 weeks following acute cholecystitis is questionable. A prospective study is needed to validate this finding.

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