Outcome of Early Laparoscopic Cholecystectomy in Acute Calculus Cholecystitis

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Abstract

Background: The surgical management of patients presenting with acute calculus cholecystitis remains controversial. Objective: The aim of this study was to evaluate the safety and feasibility of early laparoscopic cholecystectomy for acute calculus cholecystitis and to document the outcome of early laparoscopic cholecystectomy. Methodology: This observational comparative study was carried out in the Department of General Surgery of Sylhet MAG Osmani Medical College Hospital, Sylhet from July 2006 to June 2008, a period of 24 months. The study group enrolled 101 patients of both sexes who underwent laparoscopic cholecystectomy and divided into two groups. 51 patients with a diagnosis of acute calculus cholecystitis were assigned randomly to early laparoscopic cholecystectomy within 72 h of admission (early group, n=51) or to initial conservative treatment followed by elective laparoscopic cholecystectomy, 6 to 12 weeks later (elective group, n=50). Results: There was no significant difference in operation times (early, 81.98 vs elective, 79.96), conversion rates (early, 5.88% vs elective 10%) or postoperative complications (early 31.4% vs elective, 24%). However, during early laparoscopic cholecystectomy distended gallbladder containing infected bile was more in 41 patients (80.01%) while 04 patients (09%) and 03 patients (7.20%) in elective laparoscopic cholecystectomy (p>0.05) and significantly (p<0.05) more modification in operative techniques in early group than elective group. In addition, early group had shorter hospital stay (8.37 vs 12.62 day) and lower treatment cost (5243.13 vs 7327) which were statistically significant (p<0.05). Conclusion: Inclusion laparoscopic cholecystectomy during the early admission with acute calculus cholecystitis can be performed safely and successfully. Earlier surgery has a beneficial impact for patients and the National Health Service. [Journal of National Institute of Neurosciences Bangladesh, 2019; 5(2):161-166]

Keywords: Acute calculus cholecystitis; early laparoscopic cholecystectomy; elective laparoscopic cholecystectomy

Introduction

Cholelithiasis is the most common biliary pathology in surgical unit. It occurs in at least 20.0% of women over age of forty years. Incidence of gall stone in male is about 1/3 of female and increases with age. So that, between 50 and 65 years of age about 20.0% of female and 5.0% of male is affected.¹ When such asymptomatic patient followed, between 1.0% and 4.0% per year developed biliary symptoms². Therefore, cholecystectomy is the commonest operation in elective abdominal surgery. Acute cholecystitis was defined by three criteria: Acute
abdominal pain commonly in right subcostal or in midline epigastric area with duration more than 12 hours, fever and leucocytosis. Acute cholecystitis was then confirmed by the presence of gall bladder stone and signs of inflammation on ultrasonography and clinical biochemistry data\(^1\). The traditional management of acute cholecystitis is initial conservative treatment with antibiotic followed by elective cholecystectomy usually after 6 to 8 weeks when inflammatory condition subsided. In this study it was defined as elective or delayed cholecystectomy. Some surgeons advocate urgent operation as a routine measure in case of acute condition, that operation is undertaken with in 48 to 72 hours of onset of attack when excellent surgical facilities are available, termed as early cholecystectomy\(^4\).

The appropriate timing for laparoscopic cholecystectomy in the treatment of acute calculus cholecystitis remains controversial\(^6\)\(^-\)\(^11\). Several randomized studies in the pre-laparoscopic era had shown that early open cholecystectomy for acute calculus cholecystitis was better than elective or delayed open cholecystectomy in terms of shorter hospital stay but both had similar operative mortality and morbidity\(^6\)\(^-\)\(^11\). Initial reports suggested that early laparoscopic surgery for acute calculus cholecystitis was associated with increased complication rates, prolonged operation times and increased conversion rates\(^12\). As the consequence, initial conservative treatment with subsequent elective laparoscopic surgery became accepted practice\(^12\). More recently, the application of early laparoscopic surgery for the treatment of acute calculus cholecystitis has become accepted as safe, although conversion rate may be higher\(^12\).

With increasing experience, introduction of new instruments, now any type of gall bladder can be managed by laparoscopic method. For reduction of complications, various studies are ongoing in different part of the world to find out spectrum of complications of laparoscopic cholecystectomy, their methods of identification, prevention and appropriate measures\(^13\). However considering the time required for an accurate pre-operative diagnosis and for arrangement of operating schedule, we define early laparoscopic cholecystectomy as those performed within 72h of admission and elective operation those are treated conservatively, discharged and readmitted for surgery after an interval of 6 to 8 weeks.

On the background of these two thoughts of school, this study had been taken up to observe the outcome of early laparoscopic cholecystectomy in acute calculus cholecystitis by using different parameter like operative complications, hospital stay, conversion rate, treatment cost.

**Methodology**

**Patient selection and study design:** This prospective comparative study was conducted in the Department of General Surgery of Sylhet MAG Osmani Medical College Hospital, Sylhet from July 2006 to June 2008, a period of 24 months. After approval from the institutional ethics committee, 101 patients of both sexes admitted for acute calculus cholecystitis were evaluated by clinical examination and investigations. The diagnosis of acute calculus cholecystitis was based on a combination of clinical criteria (acute right upper quadrant tenderness, temperature exceeding 37.5°C and white blood cell count greater than 10\(^8\)\(^-\)\(^9\)/L) and ultrasonographic criteria (thickened, edematous distended gallbladder, presence of stone in gallbladder, ultrasonic Murphy’s sign and pericholecystic fluid collection). Patients with incidental findings of acute inflammation of the gallbladder during another elective surgery, concomitant diseases like CRF, any malignancy, jaundice, uncontrolled DM, HTN, pancreatitis or severely malnourished patients were excluded from this study. Informed consent was obtained. Included patients were divided into either the “early” group or the “elective” group. In the early group, laparoscopic cholecystectomy was performed within 72h of admission (early group, n=51), whereas in the elective group, conservative treatment with intravenous fluids and antibiotics was given (elective group, n=50). They were discharged from hospital after a complete relief of symptoms and were called for laparoscopic cholecystectomy after 6-8 weeks. Data of all patients were collected on a preformed data sheet.

**Surgical Technique:** The surgery was done with the patient under general anaesthesia using endotracheal intubation. Nasogastric suction catheters and urinary catheters were used if clinically indicated. Initial pneumoperitoneum done usually by open laparoscopic technique, sometimes by blind puncture with a Veress needle through a supraumbilical incision. Four laparoscopic ports were used and local anaesthetics were used in all ports. Two 10-mm ports (one around the umbilical 10-mm port for the optical system and one epigastric port for the clip applicator or suction device) and two 5-mm ports (one at the midclavicular line along the right subcostal margin and one in the right lumen or right iliac fossa) were used. If needed, a fifth port was added to improve exposure for liver extraction. Ports were inserted as per baseball diamond theory.
Adhesion release and exposure of Calot’s triangle were first undertaken. The cystic pedicle was dissected to isolate the cystic duct and the artery separately. Both were then clipped and divided. The gallbladder was dissected off its bed with a monopolar cautery hook or spatula and removed via the epigastric or umbilical port sites. Some modifications needed during surgical procedure for acute calculus cholecystitis. In case of empyema gallbladder decompressive aspiration done by aspirator. For phlegmonous mass in gallbladder dissection done by suction tube, proper traction and counter traction. Blunt dissection needed sometimes done by hard swab. Monopolar diathermy were used for control of minor haemorrhage. Sometimes endobag was used to remove specimen if gallbladder is perforated during dissection or stone spillage occurred. All structures identified properly before callot’s triangle dissection.

Statistical Analysis: Data were expressed as mean and SD. SPSS (statistical Packages for Social Sciences) for windows version 16 was used for data analysis. Unpaired ‘t’ test was done and also significant test of categorical variables were performed with chi-square test with 95% confidence interval to make inference. p value <0.05 was accepted as level of significance.

Results
During the study period, a total 101 patients were randomized; 51 patients in the early group and 50 patients in the elective group. The two groups were well matched in terms of age and sex, as well as clinical and laboratory findings. (Table 1)

Ultrasoundographic findings: The ultrasonographic findings of the patients in the two groups were similar except for significantly (p<0.001) higher proportion of patients with edematous gallbladder in the early group (Table 2).

Table 1: Clinical data and laboratory results on admission

| Variables                      | Early group (n=51) (Mean±SD) | Elective group (n=50) (Mean±SD) | p value |
|--------------------------------|------------------------------|---------------------------------|---------|
| Age (year)                     | 42.60±10.41                  | 39.92±11.57                     | 0.43    |
| Sex (F:M)                      | 39:12                        | 46:4                            | 0.54    |
| Body weight (kg)               | 66.78±8.33                   | 67.48±8.33                      | 0.43    |
| Previous surgery               | 03                           | 06                              | 0.54    |
| Duration of acute stage (days) | 2.34                         | 3.89                            | 0.44    |
| Fever>37.5°C                   | 38.15±0.86                   | 37.89±0.74                      | 0.71    |
| WBC (109/L)>10                 | 13.36±3.4                    | 14.36±10.82                     | 0.09    |
| Total bilirubin (mg/dL)        | 1.10±0.38                    | 1.07±0.34                       | 0.39    |
| Alkaline phosphatase (IU/L)    | 125.54±24.73                 | 123.42±22.08                    | 0.07    |
| Previous biliary symptoms      | 11                           | 08                              | 0.10    |

Table 2: Ultrasonographic Findings on Initial Admission

| Ultrasonographic findings      | Early group(n=51) | Elective group(n=50) | p value |
|--------------------------------|--------------------|----------------------|---------|
| Thickened gallbladder Wall     | 39 (70%)           | 43 (66%)             | 0.53    |
| Edematous gallbladder wall     | 44 (80 %)          | 16(45%)              | 0.001   |
| Distended gallbladder          | 48 (90.02%)        | 34 (87.03%)          | 0.10    |
| Presence of gallstones         | 51(100%)           | 50 (100%)            | 0.89    |
| USG Murphy’s sign              | 43 (85.01%)        | 28 (76.22%)          | 0.76    |
| Pericholecystic collection     | 07 (52.23%)        | 12 (55.05%)          | 0.54    |
| Dilated CBD                    | 00                 | 02 (3 %)             | 0.88    |

Table 3: Operative findings of the Study Population

| Operative findings             | Early group(n=51) | Elective group(n=50) | p value |
|--------------------------------|--------------------|----------------------|---------|
| Severe adhesion                | 11 (21.57%)        | 23 (46%)             | 0.01    |
| Distended gallbladder          | 41 (80.01%)        | 04 (9%)              | 0.001   |
| Pus or turbid bile in gallbladder | 41 (80.01%)    | 03 (7.20%)           | 0.001   |
The appropriate timing for laparoscopic cholecystectomy is now a matter of debate. Studies have shown that early open cholecystectomy has reduced complications and increased conversion rates compared to later intervention. As a consequence, laparoscopic surgery has become the accepted practice, although conversion rates may be higher.

**Operative findings:** In early cholecystectomy, the gallbladder was significantly more distended and filled with mucus, turbid bile or pus than in elective cholecystectomy. However, severe adhesion were significantly higher among patients in elective group than early group (Table 3).

**Modification of technique in operation:** Significantly more modifications were done in operation technique, including gallbladder decompression, closed drainage in subhepatic space were required in early group. An additional cannula was used for 03 patients in early group to facilitate retraction of viscera (Table 4).

**Operative time and conversion rate:** The mean operative time for early group was higher than elective group whereas the mean conversion rate for early group was less than elective group. However, this difference did not show significance (p>0.05) on statistical analysis (Table 5).

**Postoperative complications:** In cholecystectomy operation, post-operative complications were noticed in 16 (31.4%) patients in early group compared to 05 (10%) patients in elective group (Table 6).

**Hospital stay:** Post-operative hospital stay was slightly higher in early group than elective group but it was non-significant (p>0.05) whereas total hospital stay was significantly higher (p<0.05) in elective group (Table 7).

**Treatment cost:** Approximate treatment cost by patients estimated which is significantly lower in early laparoscopic cholecystectomy than elective laparoscopic cholecystectomy (Table 8).

| **Table 4: Modification of technique in operation** |
|--------------------------------------------------|
| **Modification of technique** | **Early group (n=51)** | **Elective group (n=50)** | **p value** |
| Use of fifth cannula | 3 (5.88%) | 0 (0.0%) | 0.22 |
| Gall bladder decompression | 41 (75%) | 4 (8.09%) | 0.001 |
| Use of ligature for cystic duct | 9 (12.09%) | 7 (10.7%) | 0.45 |
| Enlargement of umbilical incision | 27 (40%) | 13 (20.02%) | 0.01 |
| Use of drainage | 37 (70%) | 16 (26.06%) | 0.001 |

| **Table 5: Operative Time and Conversion Rate (Mean±SD)** |
|--------------------------------------------------|
| **Operative time (min)** | **Early group (n=51)** | **Elective group (n=50)** | **p value** |
| Total operative time | 81.98±13.95 | 79.96±14.81 | 0.48 |
| Successful laparoscopic procedure | 82.00±14.02 | 78.78± | 0.17 |
| Conversion rate | 5.88% (03) | 10% (05) | 0.45 |

| **Table 6: Postoperative Complications** |
|--------------------------------------------------|
| **Complications** | **Early group (n=51)** | **Elective group (n=50)** |
| Wound infection | 05 | 03 |
| Sub-hepatic collection | 01 | 00 |
| Drainage of bile stained fluid | 05 | 02 |
| Chest infection | 04 | 05 |
| Urinary tract infection | 01 | 02 |
| Obstructive jaundice | 00 | 00 |
| **Total** | 16 (31.4%) | 12 (24%) |

**Unpaired ‘t’ test was done to see the group difference, p was significant (<0.05)**
Discussion
This prospective comparative study was carried out with an aim to compare the outcome of early and elective laparoscopic cholecystectomy in acute calculus cholecystitis. In the early stage, acute calculus cholecystitis was considered a contraindication to laparoscopic cholecystectomy. Currently, it has been shown that laparoscopic cholecystectomy is feasible and safe for acute calculus cholecystitis. Various studies have reported high conversion rates, ranging from 6.5% to 35.0%\textsuperscript{6,14,15}. However, in some series the diagnosis of acute cholecystitis was made according to either the operative or pathological findings without consideration of clinical condition\textsuperscript{14}. Results from these series might not be applicable to patients who have clinical evidence of acute calculus cholecystitis. For evaluation of the rule and timing of laparoscopic cholecystectomy in the management of this clinical problem, only patients with clinical, laboratory and ultrasonic evidence of acute cholecystitis should be included.

The technical difficulty of a laparoscopic cholecystectomy is related to the operative findings. During early laparoscopic cholecystectomy, distended edematous gallbladder containing infected bile was frequently encountered in 41(80.01%) patients whereas 4(9%) patients and 3(7.20%) patients of elective laparoscopic cholecystectomy developed distended gallbladder containing infected bile and this could be overcome by modifications in operative technique including gallbladder decompression, closed drainage in sub-hepatic space. These were required significantly in early group than elective laparoscopic cholecystectomy. These findings were in accordance with the study done by previous study\textsuperscript{16}.

The difference in the total operation times in the present study was not significant, although early group patients required a longer operation time than elective group. This finding of the study was consistent with the findings of previous study by Lo et al\textsuperscript{4}.

In current study, 03 (5.88%) patients in the early group patients and 05 (10%) patients in the elective group patients required conversion to open surgery. The most common cause of conversion was difficulty in exposing the gallbladder and dissection because of severe adhesions (one in the early group and three in the elective group). In the immediate phase of inflammation, adhesions are easily separated and there is usually an edematosus plane around the gallbladder that facilitates dissection. After a period of conservative treatment, the inflammation and edema are replaced by fibrotic adhesions between the gallbladder and surrounding structures, which occasionally render laparoscopic dissection extremely difficult. Similar pattern of finding was also noted in the study by Lo et al\textsuperscript{1}.

In our study, there were no bile duct injuries or any other major complications compared to open cholecystectomy. Minor complications occurred in 28(27.72%) of 101 patients, 16 patients in early group and 12 patients in early group. The most common minor complications were wound infection, bile stained fluid drainage.

In this study, total hospital stay after laparoscopic cholecystectomy for acute cholecystitis (6.4 days for early group and 12.2 days for elective group) as reported in the literature. Patients undergoing successful early group have a little longer postoperative hospital stay than do those who have undergone elective surgery but total hospital stay was significantly shorter in the early group. This can be explained by the presence of acute intra-abdominal inflammation before surgery in the early group with resulting delay in the postoperative recovery. Such differences in the postoperative hospital stay between elective groups were unnoticed in the pre-laparoscopic era, because the slower recovery after open surgery determines the duration of postoperative hospital stay. Major advantages of the early laparoscopic cholecystectomy is the reduction of total hospital stay being (8.37±1.74 days vs. 12.62±2.08) and reduce total treatment cost significantly. These findings were on the parallel lines as in previous studies by Lo et al\textsuperscript{1} and Kolla et al\textsuperscript{16}.

Conclusion
Initial conservative treatment followed by elective or delayed surgery cannot reduce conversion rate and morbidity of laparoscopic cholecystectomy for acute calculus cholecystitis. Early operation within 72 hours of admission has medical and socioeconomic benefits and both patients and hospital administration. It is also safe and feasible, offering the additional benefit of a shorter hospital stay.

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between 50 and 65 years of age about 20.0% of female about 1/3 of female and increases with age. So that,

Introduction

Acute cholecystitis was defined by three criteria: Acute urgent operation as a routine measure in case of acute controversy. Several randomized studies in the world to find out spectrum of complications, various studies are ongoing in different part of the world. With increasing experience, introduction of new laparoscopic surgery became accepted practice. More accepted as safe, although conversion rate may be higher.

With increasing experience, introduction of new laparoscopic surgery became accepted practice. More accepted as safe, although conversion rate may be higher.

The appropriate timing for laparoscopic cholecystectomy, their methods of dissection. After a period of conservative treatment, the inflammation and edema are replaced by a complete relief of symptoms and were called for early group to facilitate retraction of viscera (Table 4).

Surgical Technique:

In cholecystectomy, these findings were in accordance with 95% confidence interval to make inference. p difference did not show significance (p>0.05) on any thing between the groups. Patients with incidental findings of acute calculus were not included in the study.

Methodology:

The study had been taken up to observe the outcome of early discharge and readmitted for surgery after an interval of 3 days vs. 12.62±2.08) and reduce total treatment cost.

Cholecystitis; Interval surgery or observation. Randomized clinical study conducted by SFCERO. Surg Endosc. 1997; 11: 56-63.

Prospective Evaluation of Early Versus Delayed Laparoscopic Cholecystectomy: A prospective Study of 100 Cases

In current study, 03 (5.88%) patients in the early group required conversion to open surgery. The most common indication for conversion was severe adhesion. However, severe adhesion were unnoticed in the pre-laparoscopic era, because the edematous gallbladder in the early group. The difference in the total operation times in the early group were unnoticed in the pre-laparoscopic era, because the edematous gallbladder in the early group was noticed, but postoperative complications, hospital stay, conversion rate, treatment cost were not noticed.

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