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The Comparative Study Between Early and Late Laparoscopic Cholecystectomy in the Treatment of Acute Cholecystitis

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Abstract

Background: With the increasing experience of surgeons with laparoscopic procedures and advances in imaging techniques and operating instruments, laparoscopic cholecystectomy is increasingly applicable in the setting of acute cholecystitis. The timing of laparoscopic cholecystectomy (LC) in cases of acute cholecystitis is still a matter of debate. In general, delayed LC is preferred because of the higher morbidity and conversion rate when LC is performed in acute cholecystitis. **Aim and Objective:** The present study was conducted to compare the clinical outcomes of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. **Material and Method:** A prospective study was conducted at Rani Durgawati Medical College, Banda, UP. A total of 80 patients with the diagnosis of acute cholecystitis were enrolled in the study. The patients were equally divided into two groups: 40 underwent early laparoscopic cholecystectomy within 72 hours of admission (Group A) and the next 40 underwent delayed laparoscopic cholecystectomy after 6-8 weeks of conservative management (Group B). **Result:** Our results show data from eighty patients who underwent laparoscopic cholecystectomy. The mean age of the patient in Group A was 41.57± 5.02 years whereas in Group B it was 43.10 ± 5.30 years. In Group A there were 25 females among 15 male patients whereas In Group B there were 28 females and 12 male patients. The mean duration of operative time in Group A was 90.22±2.81 minutes whereas in Group B it was 80.97±4.47 minutes which was statistically significant ($P < 0.001$). **Conclusion:** To conclude our study, early laparoscopic cholecystectomy seems safe, shortens the total hospital stay, and is cost-effective because there is no need for second hospital admission as well as second treatment.

Keywords: Acute Cholecystitis, Laparoscopic, Cholecystectomy

INTRODUCTION

Acute cholecystitis is a pathology of inflammatory origin, usually associated with cholelithiasis, with a higher incidence seen in various settings from the district hospital to specialized tertiary-level institutions.[1] Other risk factors for acute

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cholecystitis include immunocompromised states, sepsis, diabetes, and prolonged total parenteral nutrition. Complications of acute inflammation of the gallbladder include chronic inflammation, empyema, mucocele, and perforation of the gallbladder. The anatomy of Atcalot's triangle in acute cholecystitis is distorted due to adhesions which makes delayed cholecystectomy somewhat difficult. The treatment of cholecystitis involves an important socioeconomic impact. It is now established that the standard treatment for acute cholecystitis is surgery. However, the question of timing cholecystectomy remains controversial. [2,3] Acute cholecystitis is due to gallstones in up to 90% of patients [4]. Laparoscopic cholecystectomy for acute cholecystitis is mainly performed after an acute episode occurs while conservative therapy, usually antibiotics, and DLC are still common in many centers.[5] Laparoscopic cholecystectomy is found to be superior as a treatment for acute cholecystitis [6] However, the timing of laparoscopic cholecystectomy remains controversial regarding the inflammation, edema, and adhesions during the acute course of the disease. Early cholecystectomy[EC] during the same admission or delayed 3 cholecystectomies [DC] during a later admission after conservative treatment. Early cholecystectomy performed within 2 to 3 days of presentation is preferred over an interval or delayed cholecystectomy that is performed 6 to 10 weeks after initial admission or before the end of the planned cooling-off period. Surgeons have opted for interval cholecystectomy after 6 -8 weeks. Large surgical centers have published their successful management of acute cholecystitis with urgent laparoscopic cholecystectomy.[7,8]

The prevalence of cholesterol gallstones has increased exponentially, especially in obese people in both developing and developed countries. The expanded predominance of stones is generally due to the super-saturation of bile with cholesterol [9], due to increased synthesis by the liver and emission into bile. Saturation is additionally increased during weight reduction [10]. The advantages of laparoscopic cholecystectomy over open surgery include less postoperative pain, early mobilization; less pulmonary function impairment, decreased operative stress, and a shorter hospital stay [11] The conventional treatment of acute Cholecystitis is conservative which includes administration of intravenous antibiotics and analgesics to prevent possible complications associated with inflammation followed by elective laparoscopic cholecystectomy after 4-6 weeks. [12] . Spite of many publications suggest benefits in favor in terms of quick definitive treatment of the disease on first hospital admission itself and avoiding the problems of failed conservative management and recurrent symptoms [13].

Although literature favors laparoscopic EC, most evidence comes from prospective studies specifically designed to prove this particular aspect. Initially, laparoscopic cholecystectomy was contraindicated in acute cholecystitis because of the fear of increased morbidity and high rates of conversion to open cholecystectomy. In our Hospital, we were practicing both early and delayed laparoscopic cholecystectomy for the treatment of acute Cholecystitis. The present study was done to compare the safety, intra-operative difficulty, postoperative morbidity, duration of stay in the hospital, and effectiveness of early laparoscopic versus delayed laparoscopic cholecystectomy in cholecystitis. Therefore, this study aims to compare the clinical outcomes between early versus delayed laparoscopic cholecystectomy for acute Cholecystitis.

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MATERIAL AND METHOD

A prospective study was conducted in the Department of General surgery of NC Medical College and Hospital, Panipat from 2021 to 2023. A sample size of 80 is taken from cases attending our institute for the treatment of acute cholecystitis Patients are made to understand and sign the informed consent form. Patients with acute cholecystitis are subjected to early lap/open cholecystectomy within 72 hours of the onset of symptoms after 6 to 8 weeks of conservative management were enrolled in the study.

The ethical clearance was taken from the Institutional Ethical Committee. The diagnosis of acute Cholecystitis was made based on history, clinical examinations, and Ultrasonography of the abdomen and pelvis.

Adult patients aged 15 to 60 years were admitted with acute cholecystitis and taken as study participants. Those patients were below 15 years or more than 60 years, with Any obvious septicemia. Patients treated with steroids, immunosuppressive drugs, or chemotherapy, any other serious pre-existing cardiovascular, pulmonary, or immunological diseases, pregnancy, and Contraindication for laparoscopic cholecystectomy were excluded from the study.

The participants were divided into two groups containing 40 patients each, Group A (early laparoscopic cholecystectomy) and Group B (delayed laparoscopic cholecystectomy). After admission to the hospital, necessary particulars regarding the age, sex, religion, and address of the patients were recorded. The patients were then studied clinically and investigations were done and the operation was performed after proper preoperative preparation. The diagnosis of acute cholecystitis was based on a combination of clinical criteria [acute right upper quadrant 50 tenderness, temperature exceeding 37.5, and total count more than 12000] and ultrasonographic criteria [thickened edematous distended gall bladder, positive sonographic murphy's sign. Presence of gallstones and fluid collection. Detailed evaluation and documentation of the management plan, postoperative progress of the patients, and complications during the stay in the hospital were made Laboratory results of Group A and Group B patients at the time of admission along with histopathology reports were documented in the study.

Statistical Analysis:- The collected data were analyzed with SPSS16.0 statistics software 16.0 version. To describe the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and the mean and S.D. were used for continuous variables. To find the significant difference between the bivariate samples in independent groups the unpaired sample t-test was used. A P-value of <0.05 was considered statistically significant.

OBSERVATION AND RESULTS:

During the study period, a total of 80 patients were randomized: 40 patients in the early group and 40 patients in the late group. The two groups were well-matched in terms of age, sex, as well as clinical and laboratory parameters. Both early and late groups were compared in terms of intraoperative and postoperative complications.

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The results are discussed below: -

Table no. 1 depicts that eighty patients underwent laparoscopic cholecystectomy. The mean age of the patient in Group A was 41.57± 5.02 years whereas in Group B it was 43.10 ± 5.30 years. In Group A there were 25 females and 15 male patients whereas In Group B there were 28 females and 12 male patients. The mean weight of the patient in Group A was 63.7±10.63 kg whereas in Group B it was 66.05 ± 9.79kg.

Table no. 1: Demographic comparisons of Group A and Group B

Variables	**GROUP A N=(40)**	**GROUP B N=(40)**	**P-VALUE**
Age (years)	41.57± 5.02	43.10 ± 5.30	0.189
Sex (M:F)	15:25	12:28	
Weight (Kg)	63.7±10.63	66.05 ± 9.7	0.305
ASA	1/2	1/2	

The mean duration of operative time in Group A was 90.22±2.81 minutes whereas in Group B it was 80.97±4.47 minutes which was statistically significant (P < 0.001) as shown in Table 2. The mean duration of hospital stay of Group A was 2.02±0.15 days whereas Group B was 2.15±0.36 days which was statistically significant as shown in Table 4. Out of 80 patients, 2 patients in Group A and 1 patient in Group B needed conversion to open cholecystectomy as shown in Table 5. During follow-up in Out Patient Department, surgical site infection was noted in 3

Table 2: Comparison of operative time between Group A and Group B

Variables	**GROUP A N=(40)**	**GROUP B N=(40)**	**P-VALUE**
Operative time in minutes	90.22±2.81	80.97±4.47	<0.001

The mean duration of hospital stay of Group A was 2.02±0.15 days whereas Group B was 2.15±0.36 days which was statistically significant observed by Table no. 3.

Table 3:Comparison of hospital stay between Group A and Group B

Variables	**GROUP A N=(40)**	**GROUP B N=(40)**	**P-VALUE**
Duration of Hospital stay in days	2.02±o.15	2.15±0.36	0.30

Out of 80 patients, 2 patients in Group A and 1 patient in Group B needed conversion to open cholecystectomy as shown in Table 4. During follow-up in Out Patient Department, surgical site infection was noted in 3

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Table 4: Comparison of conversion to open cholecystectomy between Group A and Group B

Variables	GROUP A n=(40)	GROUP B n=(40)	P-VALUE
Conversion to open Cholecystectomy	2	0	0.55

Table 5: Operative complications (n=80)

Intraoperative complications	GROUP A n=(40)	GROUP B n=(40)	P-VALUE
Bile leak	6	8	0.78
CBD injury	0	1	1.43
Conversion rate	14	13	1.0
Postoperative complications			
Wound infection	3	1	0.30
sub hepatic collection	7	10	0.61
Chest infection	2	1	0.82
Retained CBD stones	1	2	0.73

Routine blood investigations and ultrasonographic parameters of patients in the two groups were also compared are shown in Tables No.6 and 7 respectively.

Table 6: Laboratory results of Group A and Group B patients along with histopathology report

Laboratory Findings	GROUP A n=(40)	GROUP B n=(40)	P-VALUE
Total Bilirubin (mg/di)	1.6 (0.4-3.7)	1.4 (0.4- 2.6)	0.411
Direct Bilirubin (mg/di)	0.64 (0.1-2.1)	0.2 (0.1 - 2.1)	0.034
AST/SGOT (IUIL)	56 (22-176)	29 (11-148)	0.239
ALT/SGPT (IU/L)	48(16-144)	21(10 -98)	0.611
Alkaline phosphatase (IUll..)	91 (46-188)	116 (36 -221)	0.262
Totalleukocytes count (10	14.3(8.8-24.2)	15.1(9.1 -31.n	0.165
Hemoglobin (mg/di)	11.2(8.2 -17.4)	10.7 (7.1 -15.6)	0.864
Urea (mgldl)	15.1(7.6-28.4)	13.6 (6.2-31.2)	0.391

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Creatinine (mg/di)	1.1(0.7-2.2)	0.9 (0.6- 2.8)	0.466

AST/SGOT = Aspartate transaminase / Serum glutamic oxaloacetic transaminase ALT/SGPT = Alanine transaminase / Serum glutamic pyruvic transaminase *Values are expressed as median (range) unless specified otherwise

Histopathology Examination

Laboratory findings	GROUP A n=(40)	GROUP B n=(40)	P-VALUE
Acute gangrenous Cholecyslilis	4	0	0.001
Acute Cholecystitis	22	0	0.001
Acute on chronic Cholecystitis	12	3	0.001
Chronic Cholecystitis	2	37	0.001

DISCUSSION

In the early years of laparoscopic surgery, acute cholecystitis was considered a relative contraindication to laparoscopic cholecystectomy. Recently it has been shown that laparoscopic cholecystectomy is feasible and safe for acute cholecystitis. Various studies have reported higher conversion rates, ranging from 6% to 35 % .for early cholecystectomy used to manage acute cholecystitis. The higher conversion rates obviate the advantages of early laparoscopic cholecystectomy. [14] However, the treatment of choice for acute cholecystitis is still controversial. Laparoscopic cholecystectomy was considered a relative contraindication for acute cholecystitis in the early days [15,16]. 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. But recent meta- analysis and randomized controlled trials showed benefits of early cholecystectomy within 72 hours of one set of symptoms than delayed surgery in terms of morbidity, mortality, and cost- effectiveness [17-19].

In our study mean age of the patient in Group A was 41.57± 5.02 years whereas in Group B it was 43.10 ± 5.30 years which does not show any statistically significant difference (p=0.189) with female predominance in each group, similar findings were comparable with the study conducted by Shrestha et al [17, 18]. The mean duration of operative time in (Group A) patients was 90.22±2.81 minutes whereas in (Group B) patients it was 80.97±4.47 minutes, which was statistically significant ($p<0.001$). The study conducted by Siddiqui et al. who analyzed four clinical studies containing 375 patients mentioned longer operative time in early laparoscopic cholecystectomy [20]. Similar results were comparable with our study. In our study, longer operative time was noted in (Group A) patients because our techniques were modified according to intraoperative findings of gall bladder such as some needed decompression of gall bladder, some underwent partial/subtotal cholecystectomy, and drain placement was needed in few cases. All these procedures were time-consuming. But very few cases in (Group B) needed such modifications.

The mean duration of Hospital stay in (Group A) patients was 2.02±0.15 days whereas in (Group B) it was 2.15±0.36 days which was statistically insignificant

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(p=0.30). These timings were calculated after the operation to discharge both groups of patients. But, if the total days of hospital admission are calculated, obviously it was longer in (Group B) patients because they needed second admission. In the Swedish survey conducted from 1989 to 2006 for acute gallbladder disease, the total hospital stay was shorter for patients who had emergency cholecystectomy compared with elective cholecystectomy [14]. Two patients in Group A and one patient in Group B needed conversion to open cholecystectomy with (p=0.55) which showed no statistically significant difference. The study conducted by Siddiqui et al also showed no difference in conversion rates between early and delayed laparoscopic cholecystectomy which is comparable with our study [19]. In contrast, the meta-analyses of randomized clinical trials in the literature comparing early versus delayed laparoscopic cholecystectomy mentioned conflicting results on conversion rates [19, 22,23, 24].

Surgical site infection was noted in three patients of Group A and one patient of Group B, which was statistically insignificant (p=0.30). However, the study conducted by Chang et al. mentioned a higher rate of wound infection in the early laparoscopic cholecystectomy group compared with the delayed group [18]. Laboratory findings like total leukocyte counts, renal function tests, and hemoglobin and liver function tests were comparable between the two groups. However, Acute Cholecystitis was a prevalent feature on histopathology examination ($p<0.001$) in Group A patients. There was no significant difference between early versus delayed laparoscopic cholecystectomy in our study except for operative time. However, early laparoscopic cholecystectomy reduces the morbidity of patients as well as it is cost-effective.[25] and Gaurav Thami et. Al. found that the average duration of surgery was 42.2±8.74 minutes in group A and 53.37±10.65 minutes in group B which is found to be statistically insignificant (p value<0.05). The rate of conversion was found to be 2% in the early group A as compared to 6% in the delayed cholecystectomy group B. Wound infection, biliary leakage, bile duct injury, and respiratory tract infection were found to be statistically significant between the two groups. Early cholecystectomy is feasible and safe for acute cholecystitis and is the better method of treatment because of its shorter hospital stay, which is a major economic benefit to both the patient and the health care system.[26]

The present study had some limitations. The sample size was considerably small and a significant difference in p-value could not be obtained. It was conducted in a single center with a limited follow-up of 4 weeks post-operatively and long-term complications were not evaluated.

CONCLUSION

In conclusion, early cholecystectomy is feasible and safe for acute cholecystitis. We believe that increasing the experience and skill of the surgeon should bring down the rate of complications. Though factors like operative difficulty and duration of surgery are the same for both early and late groups, they depend on the skill and experience of the surgeon in laparoscopy. Post-operative complications, morbidity, and mortality are comparable in both groups. Delayed cholecystectomy is associated with a longer total hospital stay but equivalent morbidity as compared to Early cholecystectomy for patients presenting with acute cholecystitis. from our study, we have derived that early cholecystectomy would appear to be the treatment of choice for patients presenting with acute cholecystitis. By a study of the various above-mentioned

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literature on the topic and by comparison of their documented findings, it is clear that our study has findings that are following most of them.

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Conflict of interest: None

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