

A COMPARATIVE STUDY OF EARLY AND DELAYED LAPAROSCOPIC CHOLECYSTECTOMY IN MANAGEMENT OF ACUTE CHOLECYSTITIS

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Abstract

Background: The present study is an endeavour to find out the Intraoperative as well as post-operative morbidity in early cholecystectomy for cholecystitis and its benefit over traditional interval cholecystectomy conducted in our hospital with a sample size of 25 in both early [EC] and delayed groups [DC]. **Materials and Methods:** A prospective study conducted in Department of General Surgery, Government Doon medical college, Dehradun, From March 2023 to February 2024. A sample size of 25 was included in both early and late groups based on both inclusion and exclusion criteria. Approval for this study was obtained from hospital ethical committee. After admission in 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 operation was performed after proper preoperative preparation. These patients were operated in the same admission and Informed consent was obtained. Patients were then allocated in to either 'early' or the 'delayed' group. In the early group, laparoscopic cholecystectomy was performed within 7 days of randomization, whereas in the delayed group, conservative treatment with intravenous fluids and antibiotics including ampicillin, gentamicin and metronidazole was given. Surgery was done with the patient under general anaesthesia and using endotracheal intubation. The collected data were analysed with IBS.SPSS statistics software 23.0 version. **Result:** During the study period, a total of 50 patients were randomized : 25 patients in the early group and 25 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 both in terms of Intraoperative and post-operative complications. **Conclusion:** Although Intraoperative and postoperative complications are associated more with delayed cholecystectomy compared with early laparoscopic cholecystectomy. It should be preferred by surgeons for treatment of acute cholecystitis with the advantage of reduced intra operative complications, post-operative morbidity and shorter hospital stay.

INTRODUCTION

Biliary tract diseases are the commonest abdominal conditions, probably next to appendicitis, that the surgeons, gastroenterologist and radiologist encounter in day to day life and gall bladder diseases are the most frequently encountered biliary tract disease. Acute cholecystitis is pathology of inflammatory origin, usually associated with cholelithiasis, with a higher incidence in our environment. Other risk factors for acute

cholecystitis include immunocompromised states, sepsis, diabetes and prolonged total parenteral nutrition. Complications of acute inflammation of gallbladder include chronic inflammation, empyema, mucocele and perforation of gallbladder. The anatomy 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. Currently, there are three attitudes towards this disease. The first, which is the oldest, is an elective surgery after an initial medical treatment allowing the cooling down of the inflammatory phenomenon, during a second hospitalization. The second is a delayed cholecystectomy, scheduled during the same hospitalization. The third is an early cholecystectomy, as soon as possible after admission.^[8,9] More studies were focused on the timing of cholecystectomy during the same hospitalization, should it be performed in acute phase or scheduled after a few days of medical treatment. Laparoscopic cholecystectomy is widely established as the standard operation in acute cholecystitis. The traditional teaching has been a two stage treatment for acute cholecystitis with an initial conservative management followed by an interval laparoscopic cholecystectomy. Laparoscopic cholecystectomy is avoided for acute cholecystitis due to concerns about the potential hazards of complications, especially common bile duct injury and a high conversion rate to open cholecystectomy. The conversion rates for elective laparoscopic cholecystectomy range from 3-7 %.However in presence of acute inflammation, higher conversion rates of up to 30 % have been reported. Several studies have reported favourable outcomes with a low conversion rate if patients are operated within 96 hours of admission.^[4,6] There are two surgical therapeutic options: Early cholecystectomy[EC] during the same admission or delayed cholecystectomy [DC] during a later admission after conservative treatment. Early cholecystectomy performed within 2 to 3 days of presentation is preferred over 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 a period of 6 -8 weeks. Large surgical centres have published their successful management of acute cholecystitis with urgent laparoscopic cholecystectomy.^[11,12] The first studies assessed EC as a treatment for acute cholecystitis date back to the 1950 s. In 1970, the first controlled study was published by Vander linden and Sunzel demonstrating better morbidity and shorter average hospital stay after EC.^[4] The exponential development of laparoscopic surgery occurred during 1990's.Since last 20 years, increasing number of surgeons has favoured a policy of early surgery .Several randomized studies in the early 1980 has shown that performing early cholecystectomy for acute cholecystitis was better than delayed cholecystectomy in terms of operative feasibility,post operative complications and shorter hospital stay.^[1-3] In spite of many publication that suggest benefits in favour of EC ,there is still controversy regarding the time to perform cholecystectomy. Although literature favours 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 [60%] of conversion to open cholecystectomy. Bile duct injury during laparoscopic cholecystectomy was a major concern.^[6-11] The present study is an endeavour to find out the Intraoperative as well as post-operative morbidity in early cholecystectomy for cholecystitis and its benefit over traditional interval cholecystectomy conducted in our hospital with a sample size of 25 in both early [EC] and delayed groups [DC]. Cholecystectomy for patients with acute cholecystitis, including data on costs, work days lost and quality of life.^[9,10]

Aim and Objective:

To compare the safety, intra-operative difficulty, postoperative morbidity, duration of stay in hospital and effectiveness of early lap/open versus delayed lap/open cholecystectomy in cholecystitis.

MATERIALS AND METHODS

A prospective study conducted in Department of general surgery, Government Doon medical college, Dehradun, From March 2023 to February 2024. A sample size of 25 was included in both early and late groups based on both inclusion and exclusion criteria .The diagnosis of acute cholecystitis was based on a combination of clinical criteria [acute right upper quadrant tenderness, temperature exceeding 37.5 and total count more than 12000] And Ultrasonography criteria [thickened oedematous distended gall bladder, positive sonographic Murphy's sign .presence of gallstones and fluid collection. Approval for this study was obtained from hospital ethical committee. After admission in 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 operation was performed after proper preoperative preparation. These patients were operated in the same admission and Informed consent was obtained .Patients were then allocated in to either 'early' or the 'delayed' group. In the early group, laparoscopic cholecystectomy was performed within 7 days of randomization, whereas in the delayed group, conservative treatment with intravenous fluids and antibiotics including ampicillin, gentamicin and metronidazole was given. The patients who responded to conservative treatment underwent an elective laparoscopic cholecystectomy 6 weeks after acute episode has subsided. The collected data were analysed with IBS.SPSS statistics software 23.0 version.

Inclusion Criteria:

Adult patients aged 25 to 60 years admitted with acute cholecystitis.

Exclusion Criteria:

1. Age below 18 years or more than 65 years.
2. Any obvious septicaemia.
3. Patients treated with steroids, immunosuppressive drugs or chemotherapy.
4. Any other serious pre-existing cardiovascular, pulmonary immunological diseases.
5. Choledocholithiasis.

Surgical Procedure:

Surgery was done with the patient under general anaesthesia and using endotracheal intubation. Pneumoperitoneum was created by blind puncture with a Verses needle through a supraumbilical incision. Four laparoscopic ports were used; two 10 mm ports [one umbilical 10 mm port for the optical system and one epigastric port for the dissector/suction device] and two 5 mm [one at the midclavicular line along the right sub costal margin and one in the right flank]. If necessary, a fifth was added to improve exposure. Adhesion release and exposure of Calot's triangle were first undertaken. If necessary the gallbladder was emptied through a laterally inserted Verses needle to allow better grasping. The cystic pedicle was dissected to isolate the cystic duct and artery separately. Both were then clipped and divided. The gallbladder was dissected off its bed with a monopolar cautery hook. At completion of surgery, the gallbladder was placed in a retrieval bag and extracted through the epigastric incision, which was enlarged if necessary. Haemostasis was achieved in gallbladder bed, and after a thorough saline lavage a suction drain was placed if clinically indicated and the incision closed. When required open procedure was performed through a right sub costal incision.

Follow Up:

At the time of discharge from hospital all the patients were advised revisit for check-up. First check-up done after 2 weeks, and then monthly for three months and then six monthly and when required basis. When the patients visited for check-up, they were enquired regarding persistence of previous symptoms, general improvement of health condition and for appearance of newer symptoms and then a thorough examination of the patient made and investigations done whenever necessary.

Statistical Analysis:

The collected data were analysed with IBS.SPSS statistics software 23.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and S.D. were used for continuous variables. To find the significant difference between the vicariate samples in independent groups the unpaired sample t-test was used. To find the significance in categorical data Chi-square and Fischer's Exact was used. In all the above statistical tools the probability value .05 is considered as Significant level.

RESULTS

During the study period, a total of 50 patients were randomized: 25 patients in the early group and 25 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 both in terms of Intraoperative and post-operative complications.

The results are discussed below. In our study the average age of patients was in a range of 43 +/- 12 Year, in the early group and was around 42 +/- 12 Years in the late group. In this study among early group there were 48% female population in early group and 52% female population in late group. Among male population 52% belonged to early group and 48% belonged to late group. Among the early group 17 [68%] underwent laparoscopic cholecystectomy and 8 [32%] underwent open cholecystectomy.

In the late group 19 [76%] underwent laparoscopic cholecystectomy and 6 [24%] underwent open cholecystectomy. In the early there was 40% difficulty in identifying Calot's triangle and in the late group 40% had difficulty in identifying Calot's triangle. In both groups 60% cases didn't have difficulty in the intra-operative period. Taking bile duct injury in to account 3 patients [12%] among the Early group and 6 patients [24%] had bile duct injury. The p value was derived using Fischer's test and the significance was around 0.463. Considering the post-operative wound infections of this study 4 patients [16%] in the early group and 6 patients [24%] in the late group had wound infections. The p-value obtained using Fischer's test was 0.725, which is not much significant due to small sample size. In the early group 6 patients [24%] and 10 patients [40%] had lung infections. 76% in the early group and 60% in the late group had lung infections. P value obtained by Pearson's Chi-square test Duration of stay in hospital for both groups was compared.

Average duration of stay for patients in the early group was around 9.52 with a standard deviation of 6.423 and average duration of stay for patients in the late group was around 14.84. With a standard deviation of 6.466. Duration of stay in early cholecystectomy group was shorter when compared to patients who underwent late cholecystectomy.

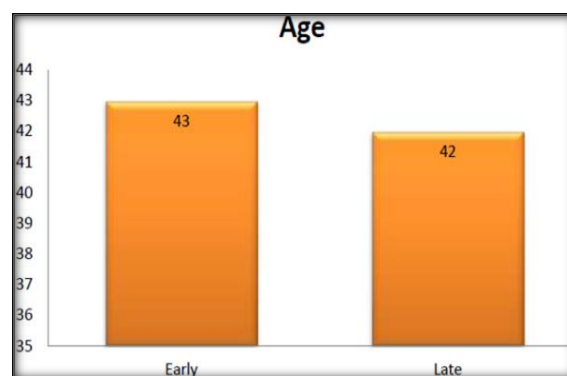


Figure 1: ?

		Groups		
		Early	Late	
SEX F	Count	12	13	25
	%	48.0%	52.0%	50.0%
M	Count	13	12	25
	%	52.0%	48.0%	50.0%
Total	Count	25	25	50
	%	100.0%	100.0%	100.0%

Figure 2: ?

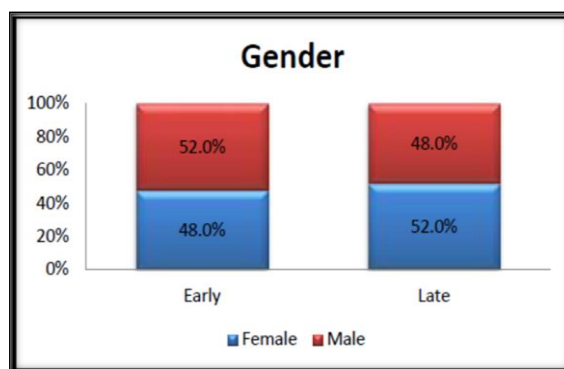


Figure 3: ?

Table 1: Treatment Groups

	Groups		Total
	Early	Late	
LAPAROSCOPIC Count	17	19	36
% within Groups	68.0%	76.0%	72.0%
OPEN Count	8	6	14
% within Groups	32.0%	24.0%	28.0%
Total Count	25	25	50
% within Groups	100.0%	100.0%	100.0%

Table 2: BILE LEAK

	Groups		Total
	Early	Late	
No Count % within Groups	22 (88.0%)	19 (76.0%)	41 (82.0%)
Yes Count % within Groups	3 (12.0%)	6 (24.0%)	9 (18.0%)
Total Count % within Groups	25 (100.0%)	25 (100.0%)	50 (100.0%)

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 obviates the advantages of early laparoscopic cholecystectomy.^[13,16,12,25] 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. Adam et al [1947] was of the opinion that surgical treatment should be carried within 26 -72 hours of onset of symptoms.^[19] Zinninzer [1934], Mentzer [1936], Wright et al [1960], Ahmed [1992] all favoured early cholecystectomy.^[11,17] It is therefore argued that if delayed laparoscopic cholecystectomy leads to a technically easier surgery with lower conversion rate, it may be a better treatment option for acute cholecystitis. However, there is an increased risk of gallstone related morbidity during the waiting period for cholecystectomy. However, the increasing experience of the surgeons with laparoscopic procedures and advances in the imaging techniques and operating instruments, laparoscopic cholecystectomy is increasing applicable in the setting of acute cholecystitis. The

general belief that initial conservative treatment increases the chance of successful laparoscopic cholecystectomy at a later date probably is not true, as borne out by this study. In our study both early and delayed groups had similar difficulty in identifying calot's triangle .In the early group ,the friable and oedematous gallbladder tore when grasped. Moreover, there was excessive oozing attributable to acute inflammation. In the early stages ,we found that about ten patients [40%] had difficulty in identifying the calot's triangle and around 15 patients [60%] didn't have difficulty in identifying the calot's triangle .However in the delayed group also ten patients had difficulty in identifying the calots triangle [40%] and around 15 patients [60%] didn't have difficulty in identifying the calot's triangle .Although difficulty in identifying the calot's triangle seems to be equal in both groups ,we believe that more experience and skills of the surgeon may bring down the complication rate in both early and delayed groups. The most common serious complications of LC are bile duct injury, which is fatal and necessary for reoperation.^[13] Misidentification of common bile duct as the cystic duct is the most common cause of bile duct injury. Bile duct injury is probably the most important issue in a comparison of both early and delayed groups.^[5] Around three patients in the early group [12%] had bile duct injury and six patients in the late group had bile duct injury [24%]. However in the early group one case was converted to open due to short cystic duct and three patients in

the late group were converted to open due to major bile leak in two cases and injury to common bile duct in one case. One patient in the delayed group had a rent in the cystic duct – common bile duct junction while traction was applied to the Hartmann's pouch. This was detected during the laparoscopic procedure, so considering the friable nature of the tissues the procedure was converted to open surgery and the rent was closed with a single interrupted suture of 4-0 vicryl. This patient had features of cholangitis in the immediate post

Operative period but settled with higher antibiotics. Other patient in the early group with bile duct injury also experienced cholangitis postoperatively with increase in bile drainage through the drain. This was successfully managed by endoscopic retrograde cholangiopancreatography and stenting. An abdominal ultrasound done 6 months later were normal. Other 2 patients in the early group and 5 patients in the delayed group with cystic duct injury were observed in the post-operative period and were managed conservatively and had no significant complications. An abdominal ultrasound done 6 weeks later were normal.

Thus, overall, there was one major complication in the early and delayed groups. This was probably attributable to cholangitis. Thus, although the magnitude of the complication was same in both groups, we strongly believe that with increasing experience, these problems can be overcome.

The technical difficulty of laparoscopic cholecystectomy is related to operative findings in early surgery. A distended, oedematous gallbladder containing infected bile commonly is seen in cases of acute cholecystitis. With our experience, we believe that several key points must be kept in mind when laparoscopic surgery is performed for acute cholecystitis. For good exposure of Calot's triangle, decompression of the gallbladder should be early because this allows better grasping and retraction of the gallbladder. In our study, sub hepatic drain was required for 40% of the early group patients and 60% of the delayed group patients. On the other hand, in the delayed cases, the increase in dense adhesions around the gallbladder after initial conservative treatment made laparoscopic dissection more difficult and constituted the main reason for Intraoperative difficulty in identifying the Calot's triangle and bile duct injury. Our study supports the belief that inflammation associated with acute cholecystitis creates an oedematous plane around the gallbladder, thus facilitating its dissection from the surrounding structures. Waiting for the inflammation to settle down allows maturation of the surrounding inflammation and results in organization of the adhesions, leading to scarring and contraction, which makes the dissection more difficult. The inflammation in early stages may not necessarily involve the Calot's triangle, chronic inflammation often scars and distorts Calot's triangle, making dissection in this area more difficult. Post operatively, pain scores and analgesia

requirement were same in both groups. In the early group around 6 patients [24%] had lung infections following surgery compared to delayed group, where 10 patients [40%] had lung infections following surgery [$p= 0.225$]. Post-operative management with antibiotics and physiotherapy yielded similar results in both groups. With adequate analgesia, antibiotic cover and physiotherapy lung atelectasis could be possibly prevented in both early and delayed groups. One advantage in late group is that, when surgery is postponed for a period of six weeks they get adequate time to treat any pre-existing lung infections and time to improve the pulmonary function with pre-operative physiotherapy. However, lung atelectasis in both Early and delayed group also involves any pre-existing infection, poor lung compliance, old age group and history of chronic smoking. Hence belonging to either the early or delayed group does not fully correlate with the prevalence of lung infection post operatively in both groups. So with adequate analgesia and physiotherapy with good antibiotic cover can prevent post-operative lung atelectasis to a great extent. The significance of belonging to either early or delayed group does not play a major role in lung infections. Another anticipated post-operative complication is post-operative wound infection at the wound site. Linden et al [1970] described post-operative wound infection is the most common postoperative complication which is more common in patients undergoing early cholecystectomy.^[19] In our study around 4 patients [16%] in the early group had infection in the wound site. In the delayed group around 6 patients [24%] had infection in the wound site. Post-operative infection in the wound site had other causes too apart from timing of surgery which includes poor general hygiene, diabetic, contamination with gallbladder in attempt to deliver it through port site. Patients in both early and delayed groups presented with serous discharge from the wound site on day 5 or day 6 followed by purulent discharge in some case. Pus sent for culture sensitivity and antibiotics were started appropriately. Most of the culture was positive for gram negative organisms and sensitive to Penicillin, Amino glycosides and Cephalosporin's. Patients were treated with appropriate antibiotics with regular dressing. Most of the patients responded well to this management. Hence with regular dressing and proper post-operative wound care, about 3 patients in the early group responded well with no further need for secondary suturing. One patient in the early group required secondary suturing. In the late group 4 patients responded to regular dressing and two patients required secondary suturing. Therefore good general condition, proper hygiene and other co morbid conditions like diabetes play an important role in post-operative wound infection in both delayed and early groups. R.A. Pyne [1969] in his study found that the average duration of hospital stay to be around to be 16 days

for delayed cholecystectomy.^[24] Duration of stay was around 10 days for the early group and around 15 days for the delayed group from the time of admission for symptoms followed by surgery up to suture removal in some cases and good general condition in some cases. The prolonged stay in the early groups were due to bile duct injury, post-operative wound infection or lung infections .I. Ahmed [1992] in his study found that the average duration of hospital stay in early cholecystectomy group to be ten days.^[14] The total hospital stay was shorter by 5 days in the early group when compared to the delayed group . This may result from the more treatment and therapies following Intraoperative and post-operative complications. The difference in operating time was not significant, although some cases of early cholecystectomy required a longer operative time than delayed groups, however the total hospital stay in the delayed group, which included the total time spent during two admissions, was significantly longer than in the early group .Prolonged stay in hospital also induces some psychological stress in the Patient with some effect on the cost effectiveness too. When compared early group who underwent cholecystectomy for cholecystitis had a shorter duration of stay when compared to the delayed group. Early cholecystectomy is safe and shortens hospital stay and reduces the risk of repeated cholecystitis. Early cholecystectomy was found to decrease the morbidity during the waiting period for elective laparoscopic cholecystectomy; operating time and hospital stay .In a recent survey evaluating surgical approaches for acute gallbladder disease between 1989 and 2006 in Sweden, total hospital stay was found to be shorter for patients who had emergency cholecystectomy at first admission compared with patients with elective cholecystectomy. Similar to the above clinical studies, we found that hospitalization duration was significantly shorter and work lost days was lower with early laparoscopic cholecystectomy compared with delayed laparoscopic cholecystectomy for cholecystitis. Therefore we conclude that early cholecystectomy for acute cholecystitis is advantageous in terms of the length of hospital stay without increase in morbidity and mortality . In the present study we showed that duration of Stay were lower in early cholecystectomy group. This may be due to a shorter hospitalization duration and lack of conservative treatment in early laparoscopic. Cholecystectomy Early cholecystectomy is therefore advantageous when compared to delayed cholecystectomy.

CONCLUSION

In conclusion, although Intraoperative and postoperative complications are associated more with delayed cholecystectomy compared with early laparoscopic cholecystectomy. It should be

preferred by surgeons for treatment of acute cholecystitis with the advantage of reduced intra operative complications, post-operative morbidity and shorter hospital stay.

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