

## Post Operative Complications In Early Versus Interval Laparoscopic Cholecystectomy For Acute Cholecystitis: A One Year Eastern Indian Experience

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**Abstract:** Background: Laparoscopic cholecystectomy is the gold standard method of treatment for acute cholecystitis. Controversy exists regarding its timing. Though interval cholecystectomy after 4 to 6 weeks of resolution of acute inflammation was the standard of care there has been recent trend of early cholecystectomy within 72 hours of symptom onset. The objective of the study is to compare the results between these two approaches. Methods: We carried out a prospective study for one year duration at department of surgery Peerless Hospital with 50 patients, keeping 25 patients in each group (based on admission in even and odd days of week ). The statistical analysis was done using 'SPSS' with a p-value < 0.05 to be significant. Results: Our results suggest that though early laparoscopic cholecystectomy was technically difficult than interval approach, there was advantage of significantly lower total hospital stay and early return to activity without much difference between operating time and postoperative complications. This is also economically more acceptable in our overcrowded hospital. Conclusion: Based on these results we believe that early laparoscopic cholecystectomy within 72 hours of symptom onset is the preferred and safe method for treating acute cholecystitis than interval laparoscopic cholecystectomy. [Pal M Natl J Integr Res Med, 2019; 10(6):49-55]

**Key Words:** Acute cholecystitis, Early laparoscopic cholecystectomy, Interval laparoscopic cholecystectomy

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**Introduction:** The incidence of gall bladder disease has shown multifold increase probably due to proper application of ultrasonography. 90 to 95% cases of acute cholecystitis are related to gall stones. Female sex, obesity, pregnancy, fatty food, Crohn's disease, terminal ileum resection, gastric surgery, hemoglobinopathies are associated with an increased risk of developing gall stones<sup>1</sup>.

Acute cholecystitis occurs in up to 10% of patients with gall stones and is more likely if gall stones is previously been symptomatic<sup>2</sup>. Acute cholecystitis should be differentiated from biliary colic by presence of constant pain in right upper abdomen (>12hrs), tenderness in right upper abdomen (usually with positive Murphy's sign and at times a palpable mass representing mucocoele or empyema of gall bladder) and a systemic inflammatory response syndrome (with elevated markers)<sup>3</sup>. In presence of these features diagnosis is confirmed by ultrasonography<sup>4</sup>:

Bile in absence of gall stones or any other biliary tract disease is sterile. In presence of gall stones or biliary obstruction the prevalence of bactobilia increases. Positive bile cultures are significantly more common in elderly (>60 years) patients with symptomatic gall stones than in younger patients (45% versus 16%)<sup>5,6</sup>.

Acalculus acute cholecystitis accounts for 5-6% of acute cholecystitis. This often has fulminant course with complications.

Earlier, the sheet anchor of management of acute cholecystitis was conservative approach with cholecystectomy after 4 to 6 weeks when acute inflammation subsides. During last 30 years, there have been many reports recommending early surgery as treatment of choice.

Protagonist of early operation opines that. Early surgery avoids a waiting period of low-grade pain.

Laparoscopic cholecystectomy indeed can be done safely with acute inflammation of gall bladder (Maingot's Abdominal Surgery)<sup>7</sup>.

Early surgery can avoid unpredictable complications of during waiting. Up to 30% of cases with uncomplicated acute cholecystitis fail to resolve their symptoms on appropriate medical therapy, and progression of the attack or a supervening complication leads to the performance of early operation (Harrison's Principles Of Internal Medicine)<sup>8</sup>.

In our country most of the patients after subsidence of acute attack do not report to hospital further. On the other hand, patients are far more agreed for surgery during acute attack

because of agonizing pain. Hence, our aim is to carry out a study of the results of early surgery compared with interval surgery in one year. Early surgery in our study is laparoscopic cholecystectomy done during the same admission period within 72 hours of onset of symptoms.

**Material & Methods:** The present study is aimed to evaluate the following two groups i.e. patients undergoing interval laparoscopic cholecystectomy (4 to 6 weeks after medical therapy) and those with early laparoscopic cholecystectomy (within 72 of onset of symptoms) for acute cholecystitis.

**Exclusion Criterion:** We excluded patients coming after 72 hours of onset of symptoms, patients who have contra-indications to surgery like uncontrolled hypertension, diabetes mellitus, proved cases of bleeding diathesis, ischemic heart disease, patients presenting with complications of acute cholecystitis like emphysematous cholecystitis, perforation or empyema of gall bladder as these are itself indications of surgery, proved cases of malignancy or pregnancy, patients not giving consent from our study.

Total number of patients admitted with features of acute cholecystitis during that period was 63. Amongst these 63 patients 3 cases did not give consent for study. One case during operation was found to have high-up sub-hepatic appendicular lump, one diabetic case was diagnosed as acute emphysematous cholecystitis on ultrasonography, 2 cases were found to have co-existing gall bladder mass on ultrasonography and 1 case presented with SIRS and subsequently diagnosed as acute severe pancreatitis. So ultrasonography had a diagnostic error in 2 out of 60 patients i.e. 3.33%. All these cases were excluded from the study.

Patients admitted on Tuesday, Thursday and Saturdays, 25 of such cases underwent early operation. The remaining 30 cases, admitted on Monday, Wednesday and Fridays were managed conservatively and discharged. They were planned for interval operation 4 to 6 weeks later.

The proposed study was conducted in the Department of Surgery, Peerless Hospital from 1<sup>st</sup> February 2019 to 31<sup>st</sup> January 2020 (one year). We used 'SPSS' using a p-value <0.05 to be statistically significant. Before commencing the study we took ethical committee clearance from our hospital.

**Inclusion Criterion:** We included all patients preoperatively diagnosed as acute cholecystitis by clinical evaluation with ultrasonography after informed consent.

Of these 30 patients 5 did not turn up. So in 25 cases of interval operation were done. The diagnosis was confirmed by ultrasonography based on thickened edematous gall bladder, presence of stones, pericholecystic fluid collection and probe guided Murphy's sign.

All the patients in both the arms underwent history, clinical examination and preoperative investigations including CRP and liver function test before operation.

**Results:** The total number of patients studied is 50 with 25 patients in each group [early and interval surgery]. The mean age was 45.96 and 45.56 years in early and interval groups respectively with 70% female population.

**Clinical Features:** The symptoms of acute cholecystitis were right upper quadrant pain in 50 patients (100%), radiation in 24 patients (48%), raised temperature in 20 patients (40%) and nausea with vomiting in 40 patients (80%), history of previous attack in 36 patients (72%). The signs were right upper quadrant tenderness in 50 patients (100%), muscle guarding in 32 patients (64%), rebound tenderness in 14 patients (28%), palpable GB in 2 patients (4%), Murphy's sign in 42 patients (84%) and tachycardia in 40 patients (80%).

**Laboratory Investigations:** Hematological Investigations Are Depicted In Table 1.

**Table 1: Hematological Investigations**

Investigations	Early Group (N=25)		Interval Group (N=25)		Normal Range
	Mean ± S.D.	Range In Early Group	Mean ± S.D.	Range In Early Group	

Total leucocyte count (/cmm)	11092±2394.77	6100-14200	8156±1488.03	6000-10800	4000-11000
Hemoglobin (gm%)	9.4±1.23	7.5-12.5	9.98±1.46	7.5-11.9	13-16(M), 12-15(F)
Blood sugar (mg/dl)	91±11.14	76-110	91.8±12.07	72-110	<200 (random)
Serum total bilirubin (mg/dl)	1.14±0.75	0.6-4.6	0.97±0.15	0.8-1.2	0.3- 1.3
SGOT (I.U./L)	31±10.99	18-52	30.52±7.55	18-47	12- 38
SGPT (I.U./L)	33.76±12.35	18-62	27.84±8.32	18-48	7- 41
Alkaline phosphatase (IU/L)	280±57.73	210-400	266.4±23.19	208-290	Upto 290
ESR (mm/1 <sup>st</sup> hour)	23.28±10.06	8-40	11.96±3.71	5-18	Upto 15(m), upto 20(F)
CRP(mg/L)	6.82±3.85	0.8-12.4	1.46±0.67	0.6-2.68	Upto 3

Before operation in early surgery group (n=25), 11 patients had leucocytosis (44%). Three patients had elevated total bilirubin (12%), 6 patients had elevated alkaline phosphatase (24%), 17 patients had elevated ESR (68%) and 19 patients had elevated CRP (76%). In the interval surgery group no patient shows such abnormalities before operation. The patients showing elevated bilirubin and/or alkaline phosphatase level underwent MRCP but none of them showed any common bile duct pathology. Radiological investigation

Ultrasonography was done in all patients. We found thickened edematous GB in 68%, stone in the GB in 100%, peri-cholecystic edema in 80% and ultrasonic probe guided Murphy's sign in 100% of cases.

**Operative Procedure:** In the early surgery group after a brief period of resuscitation laparoscopic cholecystectomy was attempted by duct first method. In three cases there were oozing at the Calot's triangle during dissection. So decision to proceed with fundus first method was taken. In two of them it could be done but in one patient it required open conversion. In the interval surgery group all the patients were subjected to laparoscopic cholecystectomy which was successfully done without conversion. We placed drain in all cases.

The intraoperative findings, difficulties, postoperative complications and operating time were noted. Patients were followed up at the outpatient department after 1 week and 6 weeks with ESR and CRP reports. Stitches were removed in the first meeting.

In the early surgery group, 2 patients (8%) had pain at the epigastric port site. No specific cause was identified and the symptom resolved with paracetamol tablet. No patients demonstrated jaundice. ESR and CRP levels failed to normalize at 1<sup>st</sup> week follow up in another 4 and 3 patients respectively which subsequently did in the next follow up. In the interval surgery group, 2 patients (8%) complained mild post-operative pain at upper abdomen which subsequently resolved with tablet paracetamol. There was no clinical or laboratory abnormality in follow up.

In all the patients' biopsy of the gall bladder did not reveal signs of malignancy. Comparison between early and interval group wise research findings are depicted in table 2.

Post-operative complications in both groups (no. of patients). No patients in either group suffered from continuous drainage of bile, blood, wound infection and jaundice. In our present series no patients required blood transfusion and there was no mortality.

**Table 2: Early Groups And Interval Group Wise Research Findings**

Parameters	Indicators	Early Groups (N=25)	Interval Groups (N=25)
Operative	Duct first method	22 (88%)	25 (100%)

procedure (Laparoscopic cholecystectomy)	Fundus first method	2 (8%)	0(0%)
	Conversion to open approach	1 (4%)	0 (0%)
Operative findings	Distended gall bladder	17 (68%)	0(0%)
	Edematous gall bladder wall	19 (76%)	-
	Edematous Calot's triangle	15 (60%)	-
	Adhesion at calot's triangle	10 (40%)	11 (44%)
	Contracted gall bladder	-	17 (68%)
	Normal sized gall bladder	-	8 (32%)
	Adhesion of omentum with fundus of gall bladder	13 (52%)	3 (12%)
	Perforation of the fundus of gall bladder during holding	2 (8%)	-
	Oozing at the calot's triangle during adhesiolysis	4 (16%)	-
Operative difficulties	Difficulty in holding gall bladder	3 (12%)	-
	Adhesions between gall bladder and the omentum causing difficult adhesiolysis	3 (12%)	-
	Oozing from the liver bed after removal of the gall bladder	3 (12%)	1 (4%)
	Difficult calot's dissection for adhesion	-	7 (28%)
Operating time	Duration (Minutes)	91.2±23.1	86±24.81
Post-operative complications	Post-operative bile drainage from abdominal drain (transient for 24 hrs in patients with perforation of the fundus during holding)	2 (8%)	-
	Drainage of blood through the drain for 24 hrs of total 100 ml amount (in whom there was liver bed oozing)	1 (4%)	-
	Respiratory tract infection	4 (16%)	2 (8%)
Mean (±S.D.) hospital stays	Pre-operative	1.36±0.49	9.04±5.81
	Post-operative	3±0.96	2.69±0.67
	Total	4.24±0.83	11.69±5.99
Follow up	Pain	2 (1 <sup>st</sup> wk)(8%)	2 (1 <sup>st</sup> wk)(8%)
	Port site infection (epigastric port)	0(0%)	0(0%)
	Jaundice	0(0%)	0(0%)
	Elevated ESR	4(1 <sup>st</sup> wk)(16%)	0(0%)
	Elevated CRP	3(1 <sup>st</sup> wk)(12%)	0(0%)

**Discussion:** In our present observation, we performed early and interval operation in 25 cases in each groups. We did not perform early operation beyond 72 hours of onset of symptoms. Based on an empirical study conducted by Tan et al.<sup>9</sup> had also observed the conversion rate of 21% for patients with more than 7 days of symptoms.

In our present series USG failed to diagnose 2 out of 60 patients with a diagnostic error of 3.33% as compared to the standard literature showing diagnostic error between 1.3-3.8%.

sex incidence in our present series in females is 70% which is comparable with Attili et al (84.9%)<sup>10</sup> and Khan MN et al. (67.19%)<sup>11</sup>.

In our present series we found 24% of patients had raised serum alkaline phosphatase level.

Our conversion rate was 4% in early group. Two patients (8%) in early group required fundus first method for difficulty whereas all patients (100%) in interval group, operations were done by duct first method without conversion.

One of the reasons against early operation is technical difficulties, increased intra-operative blood loss and operative complications. However,

in acute cholecystitis, the gall bladder wall is thick and edematous due to edema. It is the outer wall

edema that provides a plane of cleavage in acute stage. Lahtinen et al. (1978) also take the view

that it is easier to perform, and that the operation time is significantly shorter<sup>12</sup>. In our present series we had operative difficulty in 60% of patients in the early group and 32% of patients in the interval group. According to Addison and Finan, "We firmly believe that on occasion a fundus first cholecystectomy can be the only safe way to remove the acutely inflamed gall bladder in order to obviate the risk of damage to the common hepatic or common bile ducts. Even those advocates of the 'duct first' technique have to abandon this approach and resort to 'fundus first' technique."<sup>13</sup>

bladder wall in 76%, and edematous calot's triangle in 60%, and adhesion at calot's triangle in 40% and adhesion with gall bladder in 52%. The operative findings in interval group were contracted gall bladder in 68%, normal sized gall bladder in 32%, and adhesion at calot's triangle in 44% and adhesion of omentum with fundus of gall bladder in 12% of cases.

The operative difficulties in early surgery were perforation of the fundus of gall bladder during holding in 8%, oozing at the calot's triangle during adhesiolysis in 16 %, difficulty in holding gall bladder in 12%, adhesions between gall

Our conversion rate is in parity with Chang TC et al.(7.14%)<sup>14</sup>, Casillas RA et al.(5.6%)<sup>15</sup> and Goyal M et al.(2.59%)<sup>16</sup>. The mean operating time in early group is 91.2±23.1 minutes and in interval group is 86±24.81 minutes (p value > 0.05: unpaired student- 'T' test). So there is no statistically significant difference between early and interval surgery. In case of early surgery Lo CM et al.<sup>17</sup>, Chang TC et al.<sup>14</sup> and Briggs CD et al.<sup>18</sup> had operating time of 137.2, 109±37.59 and 62 minutes respectively.

The operative findings in early group were distended gall bladder in 68%, edematous gall bladder and the omentum causing difficult adhesiolysis in 12%, oozing from the liver bed after removal of the gall bladder in 12% of cases.

Difficulties encountered in the interval surgery group were difficulty in calot's dissection d/t adhesion in 28% and oozing from the liver bed after removal of the gall bladder in 4% of cases.

In our study the total complication rate in early and interval groups were 28% and 8% respectively. Incidence of postoperative complications in different series is depicted in table 3.

**Table 3: Incidence Of Postoperative Complications In Different Series**

Series	Group	Percentage of complications
Sokhi GS et al.(1973)19	Early	30.0
	Interval	27.7
Norrby et al.(1983)20	Early	14.9
	Interval	15.2
Kola SB et al.(2004)21	Early	15%
	Delayed	20%
González-Rodríguez FJ et al. (2009)22	Early	8.8%
	Interval	17.7%
Present series	Early	28%
	Interval	8%

The mean postoperative hospital stay in early group was 3±0.96 days and in interval group was 2.69±0.67days (p value > 0.05: unpaired student'T' test). So there was no significant difference in the postoperative stay between the 2 groups. The total hospital stay in early surgery group in our present series was 4.24±0.83 days and that of interval surgery group was 11.96±5.99 days (p value <0.05: unpaired student'T' test). So there was significant difference in the total hospital stay between the 2 groups. Apart from a shorter hospitalization,

patients with early surgery also enjoy an improvement inequality of life through faster return to work whilst avoiding any gallstone-related morbidity while awaiting elective surgery, for which studies have shown up to 18% of interval patients require emergency LC due to non-resolution of symptoms<sup>23</sup>. In that case the total cost of early surgery seemed significantly lower than interval group. Comparison of mean postoperative and total hospital stay in different series is depicted in table 4.

**Table 4: Mean Postoperative And Total Hospital Stay In Different Series**

Series	Group	Mean Postoperative Stay (Days)	Mean Total Hospital Stay (Days)
Lo CM et al <sup>17</sup>	Early		6.4
	Interval		12.4
Norrby et al. (1983) <sup>20</sup>	Early	6.6	9.1
	Interval	6.6	15.5
Chang TC et al. <sup>14</sup>	Early	4.5	4.53
	Interval	2.6	7.79
Present series	Early	3±0.96	4.24±0.83
	Interval	2.69±0.67	11.96±5.99

Follow up of both the groups were uneventful.

In the early surgery group patients with acute cholecystitis had mean ESR level of 23.28±10.06 mm in 1<sup>st</sup>hr and mean CRP level of 6.82±3.85 mg/L preoperatively. During follow-up at 1<sup>st</sup> week the mean values of ESR and CRP were 19.84±16.07 mm in 1<sup>st</sup>hr and 2.87±2.51 mg/L respectively. So there was a statistically significant decline in the values of CRP following early intervention (p value<0.05: paired student't' test). Kondras M et al.<sup>24</sup> support this data. There was also decline in the ESR level following early surgery but that was not statistically significant (p value>0.05: paired student't' test).

The mean values of preoperative ESR and CRP in the interval surgery group were 11.96±3.71 mm in 1<sup>st</sup>hr and 1.46±0.67 mg/L respectively and that of postoperative values at 1<sup>st</sup> week meeting were 12.5±3.5 mm in 1<sup>st</sup>hr and 1.91±0.55 mg/L respectively. There was no statistically significant between the values pre and postoperatively.

**Conclusion:** The timing of cholecystectomy was debated until recently when data from several studies became available. According to some, patients should be treated non-operatively, allowing resolution of the acute inflammation followed by interval cholecystectomy. Others claimed that operation should be done as soon as the diagnosis is confirmed.

The results of our present study in consistent with several other trials demonstrate that early surgery to be the better form of management of acute cholecystitis. There was no significant difference in the post-operative complications.

Though there were difficulties during early operation but technical difficulties can be reduced with experience. The mean total hospital

stay was significantly less in the early surgery group. Early return to productivity is optimum to the economic infrastructure of our population.

Moreover, the prolonged waiting period in our already overcrowded hospital makes early operation more acceptable. Sometimes patients do not report in proper time for interval operation and land up in complications. Early surgery avoids these problems.

So, to conclude early surgery is recommended in acute cholecystitis after a brief period of assessment and preparation.

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Conflict of interest: None
Funding: None
Cite this Article as: Pal K, Bhattacharya P, Bagchi D, Mandal S, Bera S, Bhowmick S. Early Vs Interval Cholecystectomy For Acute Cholecystitis. <i>Natl J Integr Res Med</i> 2020; Vol.11(6): 49-55