International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 511-516 www.ijdmsrjournal.com ISSN: 2582-6018

A Comparative Study of Early Versus Delayed Laparoscopic Cholecystectomy in Acute Calculous Cholecystitis.

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Submitted: 30-07-2021 Revised: 05-08-2021 Accepted: 08-08-2021

ABSTRACT: **Background:** Laparoscopic cholecystectomy is considered the gold standard for the treatment of acute calculus cholecystitis. several randomized studies that suggest benefits in favour of early laparoscopic cholecystectomy , there is still controversy regarding the timing of performing cholecystectomy. Primary aim of this study is to compare the outcomes and efficacy between early and delayed laparoscopic cholecystectomy for acute calculus cholecystitis

Methods and Material: The study was conducted at the Department of General surgery, Kalinga Institute of Medical Sciences, Bhubaneswar as prospective study during the period September 2018 to August 2020. Total 92 patients were included in the study and divided into two group early laparoscopic cholecystectomy group (surgery done within 72 hours of symptoms) and delayed laparoscopic cholecystectomy group (surgery done after 6 weeks). Statistical analysis used: Data analysis was carried out using the standard statistical software.

Results: The difference in the mean duration of surgery was not significant, as evident from our study. Duration of antibiotic therapy between both the groups was found to be significant as per the results of our study with a p value of 0.006. The mean duration of hospital stay was found to be 4.28 days in the early LC group while, that in delayed LC group was 5.29 days with a significant p value of 0.009.

Conclusions: Early laparoscopic cholecystectomy is associated with reduced duration of Antibiotic therapy and shorter hospital stay, also resulting in lesser morbidity and economic benefit to the patient.

KEYWORDS: Acute calculus cholecystitis, Early Laparoscopic cholecystectomy, Delayed Laparoscopic cholecystectomy.

I. INTRODUCTION

Gall bladder diseases are frequently encountered entity in day to day practice in surgical field. The gold standard treatment for acute cholecystitis is laparoscopic cholecystectomy.[1,2] Currently, there are two main modalities, early and delayed laparoscopic cholecystectomy in practice regarding the timing for surgery in the setting of acute cholecystitis [3, 4] Inspite of several randomized studies that suggest benefits in favour of early laparoscopic cholecystectomy , there is still controversy regarding the timing of performing cholecystectomy.

Primary aim of this study is to compare the outcomes and efficacy between early and delayed laparoscopic cholecystectomy for acute calculus cholecystitis. Also to study the role of timing of laparoscopic cholecystectomy in acute calculus cholecystitis that is, comparison of early and delayed laparoscopic cholecystectomy in reducing the intra-operative complications, conversion rate, post-operative morbidity, duration of hospital stay and cost effectiveness.

Subjects and Methods: This study was hospital-based prospective observational study includes 92 patients, who are admitted in the Department of General surgery, Kalinga Institute of Medical Sciences, Bhubaneswar, for laparoscopic cholecystectomy during the period September 2018 to August 2020. The study was approved by ethics committee of the hospital and informed written consent was obtained from all patients

Detailed history of the patient, clinical examination of patient, routine investigations: - complete blood count, blood sugar, blood urea and creatinine,

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Volume 3, Issue 4, July-Aug 2021 pp 511-516 www.ijdmsrjournal.com ISSN: 2582-6018

serum electrolyte, viral markers (HIV, HBsAg & HCV) and Liver function Tests and USG abdomen and pelvis was done in all patients. Specific investigations or procedures - CT scan, MRCP and ERCP were done in some patients. Pre-operative informed consent was taken and explanation regarding the possible complications and conversion to open procedure was done to the patient and relatives.

Inclusion criteria: Patients who have been clinically and radiologically diagnosed as acute calculus cholecystitis along with patients who have been previously diagnosed as a case of calculus cholecystitis brought to the hospital with acute attack and planned for laparoscopic cholecystectomy.

Exclusion criteria:

1) All patients who are medically unfit for laparoscopic cholecystectomy
2) Acute Calculus Cholecystitis with CBD stones
3) Acalculus Cholecystitis
4) Chronic Cholecystitis
5) Carcinoma of Gall Bladder
6) Empyema Gall Bladder
7) Emphysematous Cholecystitis
8) Perforation/peritonitis

Conduct of the Operation

Patients with symptoms within 72 hours of onset were grouped under early LC group and those with symptoms more than 72 hours since onset were conservatively managed. Those who responded to conservative treatment underwent elective laparoscopic cholecystectomy six weeks after the acute onset subsided and were grouped under delayed laparoscopic cholecystectomy group.

After obtaining an informed written consent, patients were taken up for the surgery. Laparoscopic cholecystectomy, whether early or delayed, was performed by a consultant surgeon. The surgery was performed under general anaesthesia. Nasogastric tube was inserted to decompress the stomach. Pneumoperitoneum was created by open technique through supraumblical incision using carbon dioxide. Four laparoscopic ports were made. The epigastric 10 mm port was for dissection or the suction and retrieval of specimen. 10 mm port was made for telescope at suprsumblical region. Two 5 mm ports were placed one in right upper quadrant, and another in right flank at level of umbilicus were used for grasping forceps. Fifth port was added to improve exposure if necessary. The gallbladder, if distended, was decompressed through suction needle to allow better grasping.

The dissection is always started at the junction between the cystic duct and gallbladder at the inferior margin and carried out upwards close to the gallbladder neck on its posterior aspect with complimentary anterior dissection in Calot's triangle. Posterior window is created by separating the neck and part of body of the gallbladder all around. Next dissection is downward from the junction of gallbladder neck and the cystic duct, to define the cystic duct and the cystic artery. Critical view of safety is taken to ascertain that the two structures; that is, cystic duct and cystic artery are joining the gallbladder clearly. The cystic pedicle was dissected in order to isolate the cystic duct and artery separately. Both cystic duct and artery clipped and divided. [5]

Gallbladder was dissected off its bed by to and fro retraction with a monopolar cautery hooks. At the completion of the procedure, the gallbladder was placed into a retrieval bag if needed and extracted through the epigastric port, which was enlarged if necessary. Hemostasis was achieved in the gallbladder bed and after a thorough saline lavage, a suction drain was left in place if clinically indicated and the ports closed. When required, the conversion to open procedure was performed through a right subcostal incision.

Data analysis was carried out using the standard statistical software (spss 20). Categorical variables are being presented as frequency (-1). Continous parameters will be shown as mean (+/-). To compare any two catergorical variables, chi-square test and Fischers end test were used. To compare the mean level of continous, normally distributedparameter between the two groups, independent t - test were used. Skewed data were analysed by Wilcoxon Rank Sum test. A p value of <0.05 will be considered as statistically significant.

II. RESULTS

Age:

Table 1: Age distribution in Early Laparoscopic Cholecystectomy

Age (years)	16 – 30 Y	30 -45 Y	45 – 60 Y	> 60 Y
N (45)	9	11	14	11
Percentage	20%	24.44%	31.11%	24.44%

Mean – 47.2, standard deviation – 16.35

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In this study, the minimum age at presentation was 16 years while the oldest patient was 78 years old.

Table 2: Age distribution in Delayed Laparoscopic Cholecystectomy

Age	16 – 30 Y	30 – 45 Y	45 – 60 Y	> 60 Y
N (47)	9	14	14	10
Percentage	19.0%	30%	30%	21.0%

Mean – 47.04, standard deviation – 16.3

The minimum age at presentation was 17 years and maximum age was 75 years**.**

Sex:

35 out of 92 patients were male and 57 were female.

Table 3: Sex distribution in Early LC and Delayed LC

Sex	Male	%	Female	%
Early LC	17	37.8	28	62.2
Delayed LC	18	38.3	29	61.7

Surgery:

Table 4: Types of Surgery

Surgery	N	%	Early LC	%	Delayed LC	%
Laparoscopic cholecystectomy	81	88.04	41	91.11	40	85.11
Laparoscopic subtotal cholecystectomy	11	11.96	4	8.89	7	14.89
Conversion to open cholecystectomy	0	0	0	0	0	0

Duration of surgery:

Table 5: Duration of Surgery

Surgery	N	Mean	Std deviation	95% C.I
Early LC	45	93.04	24.44	85.70
Delayed LC	47	95.11	20.25	89.15

No significant difference in the duration of surgery was found between the two groups with a p value of 0.330 which is statistically insignificant.

Bile duct injury:

Table 6: Bile duct injury

Surgery	Bile duct injury
Early laparoscopic cholecystectomy	0
Delayed laparoscopic choleystectomy	1

Only one case was encountered with bile duct injury. Patient was a 54 year old female who underwent interval laparoscopic cholecystectomy with intraoperative findings of contracted gall bladder with dense omental adhesions with CBD injury (Type D strasberg classification). Primary laparoscopic repair of the injury was done by endosuturing followed by ERCP with transpapillary stenting and was discharged with advise to follow up after 6 weeks for definitive surgery.

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Duration of antibiotic therapy:

Table 71 : Duration of Antibiotic therapy

Surgery	N	Mean	Std.deviation	95% C.I
Early LC	45	2.57	1.72	2.05
Delayed LC	47	3.51	1.80	2.98

A significant difference was found in the duration of antibiotic therapy post surgery between the two groups with a p value of 0.006 which is statistically significant.

Duration of hospital stay post surgery:

Table 8: Duration of Hospital stay

Surgery	N	Mean	Std. Deviation	95% C.I
Early LC	45	4.28	1.79	3.75
Delayed LC	47	5.29	2.21	4.64

A significant difference was found in the average post operative hospital stay between the early LC and delayed LC group with a p value of 0.009, which is statistically significant.

Cost effectiveness:

In this study, it was found that the average net expenditure for treatment was comparatively higher in the delayed laparoscopic cholecystectomy than the early laparoscopic cholecystectomy group with a p value of 0.03, which is statistically significant.

III. DISCUSSION

The present study includes 92 consecutive cases of acute calculus cholecystitis admitted and treated in the Department of General Surgery and following observations were noted.

In this study, the cases of acute calculus cholecystitis with the exclusion criteria as mentioned in the methodology have a range of age from 16 to 78 years of age, out of which, in the early LC group mean age of presentation of 47.2 years, with an increased incidence in the age group 45 - 60 years. Whereas, in the delayed LC group mean age of presentation of 47.04 years, which is more or less the same when compared to early LC group, with maximum incidence seen between 30 – 60 years.

35 (38 %) out of 92 patients were male and 57 (62 %) were female among the patients in our study. In both the study groups, the sex distribution was almost the same, with 17 males (37.2 %) and 28 females (62.2 %) in the early group and, 18 males (38.3 %) and 29 females (61.7 %) in the delayed group. Miguel Sanchez Carrasco et al[6] showed that the sex distribution in cases of acute cholecystitis was 2:1. V Jayanthi et al[7] concluded that gall stone diseases are more common in women than men.

Out of 92 patients, 81 (88.04%) patients underwent laparoscopic total cholecystectomy and 11 patients (11.96 %) underwent laparoscopic subtotal cholecystectomy, 4 in the early LC group and 7 in the delayed LC group. Subtotal laparoscopic cholecystectomy (SLC) a safe alternative with added advantages of avoiding common bile duct injury and liver bed bleeding. [8, 9, 10] The indications for adoption of laparoscopic subtotal cholecystectomy were severe fibrosis, dense adhesions, also associated with distorted anatomy of the hepatocystic triangle (Calot's triangle). But, none of the cases required coversion to open cholecystectomy, aided by the increased level of expertise and skill in laparoscopic surgery of our surgeons. [11]

While stating about early diagnosis and planning for immediate laparoscopic cholecystectomy in acute cholecystitis , Jarold K H et al [11] mentioned that , only 45.1% of acute cholecystitis patients managed to undergo early LC within 12 hours of their reported onset of symptoms , owing to non – specific nature of initial symptoms and possible attempts by patients to self medicate resulting in late recognition of the disease. Also, a substantial group of patients with significant co-morbidities would require time for adequate pre-operative assessment and optimisation.

The most common and serious complication of laparoscopic cholecystectomy is bile duct injury. It may necessitate reoperation. Biliary leakages have increased in the era of laparoscopic cholecystectomy (LC) by up to 3%. [12, 13, 14] In our study early LC group, none of the cases were encountered with bile duct injury but, one patient in the delayed group was dealt with bile duct injury which belongs to Strasberg D classification. The reason for bile duct injury in this case was contracted gall bladder with wide and

short cystic duct with dilated CBD, added with distorted anatomy of the Calot's triangle which led to the injury. Intraoperative on table cholangiogram was done which confirmed the injury. Laparoscopic endosuturing of the rent was done with placement of drain in the subhepatic space 2 cm away from the site of injury. ERCP with transpapillary stenting was done and the patient was discharged with advise for follow up after 6 weeks, where abdominal ultrasound showed normal study with no bile leak or collection.

In a 2017 study by Khalid et al, which included 188 patients, surgery duration was 64.32 min in early group and 58.24 min delayed group. [15] Goh et al., in a 2017 study that included 466 patients, duration surgery was 101.5 min in the early and 88.0 min in the delayed group. [16] The difference in the mean duration of surgey was not significant, as evident from our study. The mean duration of surgery in the early LC group was found to be 93.04 minutes and that in delayed LC was 95.11 minutes.

The difference in the mean duration of antibiotic therapy between both the groups was found to be significant as per the results of our study with a p value of 0.006. In the early group , the average duration of antibiotic therapy was found to be 2.57 days and that in delayed LC group was 3.51 days which may be attribute to the difficulty in dissection intraoperatively and the comorbidities of the patient. Madhu C P et al found that the mean duration of antibiotic therapy in early LC was 3.9 days while that in delayed LC was 5.3 days. [17]

The mean duration of hospital stay was found to be 4.28 days in the early LC group while, that in delayed LC group was 5.29 days. This was found to be significant with a p value of 0.009. This may be attributed to non - requirement of conservative management in the early LC group when compared with delayed LC group, who required hospital admission twice - one for stabilisation and other for definitive surgery after 6 weeks of subsiding of the acute attack. Kolla S B etal[18] showed that mean hospital stay was 4 days in the early group and 10 days in the delayed group. In Sweden, a survey for evaluating the surgical approach for acute gall bladder diseases between 1989 to 2006 found that total hospital stay was shorter for patients who had emergency cholecystectomy at first admission compared with patients with laparoscopic cholecystectomy 6 weeks after the acute attack. Prolonged hospital stay in the delayed LC group may aid to the higher expenditure incurred as compare to the early LC group patients.

IV. CONCLUSION

Early laparoscopic cholecystectomy done within 72 hours of signs and symptoms is ideal and safe for acute calculous cholecystitis compared to delayed laparoscopic cholecystectomy done after 6 - 8 weeks. Duration of surgery and post operative morbidity was comparable in both the groups. Delayed laparoscopic cholecystectomy was not indifferent to complications such as bile duct injury as evident from this study. Increase in skill and expertise of the surgeon in laparoscopic surgery have shown reduction in complication rates , conversion rates as well as duration of surgery. Early laparoscopic cholecystectomy is also associated with reduced duration of Antibiotic therapy and shorter hospital stay, also resulting in lesser morbidity and economic benefit to the patient. A larger randomized, multi-institutional study is required to establish the optimal timing for cholecystectomy in acute calculus cholecystitis.

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