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Original Research Article

Compare the effectiveness of early versus delayed laparoscopic cholecystectomy in acute calculus cholecystitis

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ABSTRACT

Background: Compare the effectiveness of early versus delayed laparoscopic cholecystectomy in acute calculous cholecystitis.
Methods: Thirty Cases each in early group and delayed group were selected according to their time of presentation of their first symptom. Parameters were recorded intraoperative complications, timing of surgery, postoperative morbidity, days of hospital stay, days of antibiotic coverage, conversion to open and readmissions. In addition, author estimated the direct cost savings of implementing an ELC program
Results: The overall morbidity and complications are less in ELC compared to DLC. Mean number of hospital stay is less in ELC (4.90%) whereas DLC (6.30%). Mean number of days of antibiotic coverage less in ELC (3.9 days) to DLC (5.30 days). Mean operative time is less in ELC (60 minutes) and DLC (82 minutes). Overall the complications, morbidity, mortality, ICU admissions, readmissions are less in early laparoscopic cholecystectomy.
Conclusions: ELC is safe in patients with acute cholecystitis and could lead to a reduction in the direct costs of treatment.

Keywords: Acute calculus cholecystitis, Delayed laparoscopic cholecystectomy, Early laparoscopic cholecystectomy

INTRODUCTION

Acute cholecystitis is a pathology of inflammatory origin, usually associated with cholelithiasis, with a high incidence in the environment. The treatment of acute cholecystitis involves an important socioeconomic impact. There are two surgical therapeutic options: early laparoscopic cholecystectomy (ELC) during the same admission or delayed laparoscopic cholecystectomy (DLC) during a later admission after conservative treatment. The first studies that assessed EC as a treatment for acute cholecystitis date back to the 1950s. In 1970, the first controlled study was published by van der Linden and Sunzel, demonstrating better morbidity and shorter average hospital stay after open EC. The exponential development of laparoscopic surgery occurred during the 1990s. Some of the first publications about laparoscopic ELC showed bad results in terms of morbimortality and high percentages of bile duct injuries. Based on these results, laparoscopic ELC was deprecated and even considered a contraindication for the treatment of acute cholecystitis, favoring initial conservative treatment followed by a laparoscopic DC. Kiviluoto et al, reported similar results in terms of morbimortality between laparoscopic EC and open EC.[1] Lo et al, presented the first controlled study that compared laparoscopic EC and laparoscopic DC, with lower morbidity and hospital stay in the laparoscopic EC group.[2] Recently, many studies have reported similar results in favor of laparoscopic EC. It is important to note

that the vast majority of these articles only include laparoscopic cases, which could cause a bias in the external validity of these studies, as they exclude many of the less favorable cases involving open EC. In spite of many publications that suggest benefits in favor of EC, there is still controversy regarding the timing to perform cholecystectomy. Although literature favors laparoscopic EC, most evidence comes from prospective studies specifically designed to prove this particular aspect, which probably does not reflect the worldwide clinical practice.[2-6] In addition, it is well known that laparoscopic EC is not the usual practice in many hospitals.[7] Present study aim is to compare between the effectiveness of ELC versus DLC in acute calculous cholecystitis in a tertiary care.

METHODS

Patient admitted to JSS hospital in the Department of Surgery for acute calculus cholecystitis. It is a comparative study and duration of study was two years from September 2015 to September 2017.

It is a hospital based study. 30 Cases of acute calculus cholecystitis who got admitted within 72 hours of symptoms are taken for early laparoscopic. cholecystectomy. 30 cases of acute calculus cholecystitis who got admitted after 72 hours of symptoms are posted for delayed laparoscopic cholecystectomy.

Inclusion criteria

- All radiologically proven cases of acute calculous cholecystitis

Exclusion criteria

- Patients with a calculous cholecystitis
- Patients with recurrent episodes of right upper abdominal pain (chronic cholecystitis)
- Patients with CBD stones
- Patients with acute calculous cholecystitis with CBD stones
- Patients with CA gallbladder
- Patients with comorbid conditions precluding an emergency surgery
- Patient presenting with other pathologies along with calculous cholecystitis

RESULTS

Statistical methods

Summary statistics done using mean, standard deviation and proportions. Inferential statistics is done using chi-square test and independent t-test. Chi-square tests is done to compare the two or more proportions which are mutually exclusive an independent t-test is done to compare the mean of variable which is normally distributed, between two independent groups. All the measurements are done using SPSS version 21.0. $p<0.05$ is considered as statistically significant.

Table 1: Age of patients.

	Timing			
	Delayed		Early	
	Mean	SD	Mean	SD
Age (year)	41.63	11.41	40.20	11.12

P=0.6

Table 2: Age category.

Age category	Timing			
	Delayed		Early	
	Count	Column N %	Count	Column N %
21-30	7	23.3	6	20.0
31-40	6	20.0	12	40.0
41-50	9	30.0	5	16.7
51-60	6	20.0	6	20.0
>61	2	6.7	1	3.3

Majority of patients belong to age group of 31-40 and mean age is 40 in ELC and 41 in DLC. Second most common is 51-60. Age was not found to be statistically significant for deciding for ELC or DLC (p=0.5).

Table 3: Sex.

Sex	Timing			
	Delayed		Early	
	Count	Column N %	Count	Column N %
Female	13	43.3	14	46.7
Male	17	56.7	16	53.3

P=0.8

Total number of male subjects in early is 56% and in delayed is 53% Female 43% and 46%. Sex is not significant for deciding early and delayed cholecystectomy.

The co-morbid conditions were analyzed, and it was found that 40% of the patients had hypertension in delayed and 26% in early, also, 30% of the study population suffered from diabetes in delayed and 26% in early cholecystectomy.

Other significant comorbidity seen was obesity. In delayed group 9 patients had diabetes and in early 8 patients.

In delayed group 12 patients had hypertension, in early 8 patients had hypertension.

In delayed group 3 patients were obese and in early group 2 patients were obese. In obese patient's adhesions were more and operative timing was more compared to normal individuals.

Among the medical co-morbid conditions, hypertension and diabetes was found to be the most common association, however it was not statistically or clinically significant risk factor in deciding the timing of cholecystectomy(p>0.05).

Other co-morbid conditions such as previous abdominal surgeries etc. were also not found to be significant.

Table 4: Comorbid conditions of patients.

		Timing				
		Delayed		Early		
		Count	Column N %	Count	Column N %	P value
Obesity	No	27	90.0	28	93.3	0.7
	Yes	3	10.0	2	6.7	
DM	No	21	70.0	22	73.3	0.8
	Yes	9	30.0	8	26.7	
HTN	No	18	60	22	73.3	0.3
	Yes	12	40.0	8	26.7	
Other	Bronchial asthma	0	0.0	1	3.3	0.2
	Hypothyroid	4	13.3	2	6.7	
	LSCS	0	0.0	4	13.3	
	Previous abdominal surgery	0	0.0	1	3.3	

Table 5: Timing of cholecystectomy.

	Timing			
	Delayed		Early	
	Mean	SD	Mean	SD
Timing of cholecystectomy(days)	44.57	4.30	2.93	0.74

The mean timing of cholecystectomy in delayed group is 44.57 days and in early the mean timing is 2.93 days.

No. of days after first symptom

The mean timing of interval cholecystectomy done in delayed group is 44%. Patient was treated conservatively in their first admission and was operated after approximately 6 weeks interval. The mean timing of cholecystectomy in early group is 2.93%

Table 6: Operative timing.

	Timing			
	Delayed		Early	
	Mean	SD	Mean	SD
Operative time (min)	81.27	8.82	69.00	10.70

The mean operative time on an average in early cholecystectomy is 69% and in delayed is 81.27%. The difference in timing on average is 12 min. p <0.0001. This is statistically significant.

Number of days of antibiotic coverage in early is 3.97 days while in delayed cholecystectomy is 5.30 days with average 4 days of antibiotic in previous admission. P value <0.0001 is statistically significant.

Table 7: Number of days of antibiotic coverage.

	Timing			
	Delayed		Early	
	Mean	SD	Mean	SD
No of days of antibiotics	5.30	1.09	3.97	0.81

P<0.0001

Table 8: Number of days of hospital stay.

	Timing			
	Delayed		Early	
	Mean	SD	Mean	SD
No of days of hospital stay	6.43	1.76	4.97	0.81

P<0.0001

The average number of hospital stay in early cholecystectomy is 4.97 days while in delayed cholecystectomy is 6.43 days. P value <0.0001 which is statistically significant. The hospital stay in early cholecystectomy is 2 days less than delayed cholecystectomy.

There was no death on either group. Overall complications like minor adhesions, thickened gall bladder, intraoperative bleeding is higher in delayed. Other Complications adhesions, Intraop bleeding, edematous, bile leak is more in delayed cholecystectomy compared to early cholecystectomy but not statistically significant. There is no significant difference in postoperative bleeding in both early and delayed cholecystectomy.

Adhesions are more in delayed 43.3% compared to early which is 20% which is significant. Bile duct injury complications are more towards delayed cholecystectomy but here it's not statistically significant.

Mean time to presentation in Delayed group was 8.63±2.19 days.

Table 9: Complications.

	Timing				
	Delayed		Early		
	Count	Column N %	Count	Column N %	P
Any complications (minor)	23	76.7	12	40.0	0.004
Adhesions	13	43.3	6	20.0	0.052
Bleeding	10	33.3	6	20.0	0.2
Edematous	2	6.7	1	3.3	0.6
Bile leak	1	3.3	0	0.0	0.4
Intrahepatic GB	1	3.3	0	0.0	0.4

DISCUSSION

The common approach for management of acute calculous cholecystitis consists of initial control of inflammation followed by interval cholecystectomy after a period of 6 weeks.

Overall morbidity

Arguments made against early laparoscopic cholecystectomy include a high conversion rate to open cholecystectomy and other complications. Various studies have reported high conversion rate ranging from 6% to 35% for early laparoscopic cholecystectomy in acute calculous cholecystitis, it is therefore argued that delayed cholecystectomy leads to a technically easier surgery with lower conversion rate. However, there is increased risk of gallstone induced pancreatitis, recurrent attacks in the waiting period.

In present study morbidity rate is same for both the groups as no cases got converted to open cholecystectomy nor any patients in delayed group presented with recurrent attacks or gall stone induced pancreatitis. There is always an increased risk in waiting period in the delayed group of recurrent pain attacks or other complications. Another similar study Carasso MS et al conducted concluded that morbidity is lower in early laparoscopic cholecystectomy group compared to delayed group.

Surgical morbidity

Surgical intraoperative complications like adhesions, bleeding etc are lower in ELC group compared to DLC group where there was more adhesions and intraoperative bleeding. While edematous gallbladder is almost same in both ELC and DLC group. There is no postoperative infection or postoperative bleeding in both groups. In other studies, post-operative infection rate is more in DLC than ELC. In similar study Carasso MS et al, there are lower complications in ELC than compared to DLC.

But from analysing the morbidity of some of the other most influential studies, such as the meta-analysis of Papi et al and Gurusamy and Samraj, author note that there were no significant differences between both groups.

Other complications like the proportion of bile leakage and major injuries of the bileduct was almost double in DC compared to that in EC, but with no statistically significant differences, which is in line with the results published by Gurusamy et al, in their various meta-analyses.[6,8-11] In their experience, the laparoscopic approach seems to be safer than the open surgery in the EC group, but author must consider that the selection of the type of surgery was not randomized in any case, so the results are not conclusive.

Author must point out that author believe that the ATOM classification is the most appropriate form of assessment of iatrogenic injury to the bile duct, but, given its recent publication and the retrospective nature of the present study, which does not permit us to know certain aspects for the correct characterization of some of the injuries, author have used the Strasberg classification.[12] In present study one case of bile duct injury in the DLC group which was managed accordingly.

Timing

Most surgeon agree that timing of cholecystectomy in early group is important in determining the outcome. Ideally surgery should be performed within 72 hours from the onset of symptoms because after that more inflammatory changes occurs and gallbladder will be more edematous.

In this study all cases of ELC group are operated within 72 hours golden period. In DLC patients had been treated conservatively in their first admission and operated after an interval of 6-8 weeks from the onset of symptoms. In similar study Carasso MS et al, patients have been divided as <72 hours, >72 hours and DLC group.[13,14]

Mortality

In present study there is no mortality on both the groups. While other study shows despite the fact that the mortality rate was more than twice as high in the DC group as in the EC group, the differences were not significant. The majority of the previous studies present similar mortality rates for both groups, with percentages close to 1% or without registered mortality.[10,15]

Days of hospital stay

In present study mean hospital stay for ELC is 4.97 days. In DLC is 6.43 days and average 4 days in previous admission. Total of around 10 days in DLC group. EC patients had a significantly lower average hospital stay than that of DC patients. All of the articles published to date offer significantly lower results of hospital stay in the EC group, with differences in days of stay ranging from 2 days in the population study of Banz et al to 10 days in the van-der Linden and Sunzel and Papi et al studies.[4,15] In addition, many of the works published hospital stay results very close to those of the EC group; among others, Lai et al showed 7.6 days, Papi et al 10.6 days and Gurusamy et al 7 days.[6,8,13]

ELC has lower hospital stay in turn direct effect on cost savings and time savings.

Readmissions

There is risk of readmission in DLC group in the waiting interval of 6 weeks like recurrent pain attacks, gall stone induced pancreatitis. In present study no patients have been readmitted in this interval time with the above complications. In other studies, the difference between the percentages of readmissions of the EC and the DC groups is due to the readmissions of the DC group that occur between the first admission for acute cholecystitis and the admission to perform the cholecystectomy (18.2%), which is somewhat lower than the results provided by Lahtinen et al and Lau et al, with percentages of readmission prior to surgery between 25% and 30%.

The average hospital stays and the percentage of patients who required a readmission, as well as the percentage of patients who were admitted to the ICU, were all significantly higher in the DC group than in the EC group. All of these factors contribute to ensuring that, with a high probability, the direct costs of EC treatment are lower than those of DC, something also pointed out by other recent studies.

CONCLUSION

ELC provides better morbidity results, as well as a clear trend toward lower mortality and fewer injuries to the main bile duct. The complications rates in ELC group is much lower than the DLC group. Hospital stay in ELC is less compared to DLC which in turn direct effect on costs savings and manpower.

Author would recommend DLC only in cases where acute pancreatitis, choledocholithiasis, or cholangitis cannot be ruled out and those with unacceptable anesthetic risk at the time of diagnosis.

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