

## Original Research Article

# Early versus late laparoscopic cholecystectomy in the management of acute cholecystitis: a retrospective study

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## ABSTRACT

**Background:** Early laparoscopic cholecystectomy (LC) is a life-saving procedure in the management of acute cholecystitis as it helps in prevention of late complications like development of adhesions, haemorrhage and sepsis. The study aims at comparing the outcomes of early versus late laparoscopic cholecystectomy in the management of acute cholecystitis.

**Methods:** A retrospective study was done by analyzing the past 5 years medical records of 250 patients admitted to the emergency department with diagnosis of acute cholecystitis established according to the Tokyo criteria. The relevant clinio-social demographic data of the patients, clinical and radiological parameters, intra-operative and post-operative findings and follow-up data were compared between early and late LC group of patients.

**Results:** The study included 125 middle aged patients who underwent early LC (within 24 hours) and 125 patients who underwent late LC (after 24 hours). The complication rate, conversion to open cholecystectomy and duration of surgery showed no significant differences between early and late laparoscopic cholecystectomy except for an increased duration of stay among the late LC group.

**Conclusions:** Early LC is an efficient procedure for acute cholecystitis but it has risks of complications which can be minimized by careful selection of patients after clear clinical and radiological evaluation.

**Keywords:** Early laparoscopic cholecystectomy, Acute cholecystitis, Early versus late

## INTRODUCTION

Acute cholecystitis is a common surgical emergency with the incidence of gallstones in Indian population being about 10-15% and the complication rate recurs in people who suffer the morbidity is around 35%.<sup>1</sup> Laparoscopic cholecystectomy (LC) has been the best intervention of choice from the time Mouret performed the first LC in 1987.<sup>2</sup> It has great advantages like providing minimal invasion, an educational opportunity for other young surgeons to learn the technique by visualizing as through the eyes of the surgeon, continuous documentation of the surgical procedure and time saving. Nevertheless, the

technique is not free from certain pitfalls like lack of tactile feedback, 2-dimensional vision, limited degree of movement of the instruments, and loss of natural hand-eye coordination.<sup>3</sup> The pathological sequelae of medically failed cholecystitis extends from oedema followed by necrosis and suppuration within 2-4 days.<sup>4</sup> This further warrants the need for earlier intervention in the form of laparoscopic cholecystectomy within 24 to 72 hours whichever is earlier. This study aimed at comparing the surgical outcomes when laparoscopic cholecystectomy was done early i.e., within 24 hours and after than 24 hours among patients suffering from acute cholecystitis and admitted to the tertiary care hospital.

## METHODS

This retrospective study was done by analysing the medical records of 250 patients admitted to Department of General Surgery, Shri Venkateshwara Medical College and Hospital, Ariyur, Puducherry with diagnosis of acute cholecystitis established according to the Tokyo criteria.<sup>5</sup> Patients admitted to the emergency between May 2014 to May 2019 with local (Murphy's sign/right upper quadrant pain) and systemic (fever/elevated C-reactive protein/white blood cell) signs of inflammation and confirmed by ultrasound with characteristic features like thickening of the gallbladder wall and pericholecystic fluid or radiological Murphy's sign, associated with biliary stone were included in the study. Those patients with documented evidence of severe sepsis, immunosuppression, perforated cholecystitis, biliary peritonitis, cholangitis, acute pancreatitis, and pregnancy were excluded from the study. All the included patients received empirical antibiotics including cephalosporins and metronidazole. The surgeries were performed by the same team of surgeons for both early and delayed cholecystectomy groups. The relevant clinico-social demographic data of the patients, clinical and radiological parameters, intra-operative and post-operative findings and follow-up data was recorded in a proforma. The above data was compared between the early and delayed laparoscopic cholecystectomy groups.

## Statistical analysis

Data entry and analysis was done using SPSS version 20.0. Descriptive statistics were reported as absolute number for categorical variables, and as mean ( $\pm$ SD). The difference between means among the two groups was compared using student t-test. Categorical variables were tested for significant difference using chi-square test. A p-value of  $<0.05$  was considered to be statistically significant.

## RESULTS

The study retrospectively reviewed 125 patients with acute cholecystitis in whom LC was done within 24 hours and 125 patients in whom conservative management was done and later LC was done after a delay ranging from 72 hours to 6 weeks. The socio-demographic variables of the study participants are depicted in Table 1.

The people who were taken up for early cholecystectomy were significantly ( $p=0.007$ ) younger (mean age= $47.8\pm 3.5$  years) but not different in gender ratio and differed from the late cholecystectomy group in terms of significantly higher duration ( $4.5\pm 1.2$  days), frequency of pain (34.4%,  $p<0.05$ ) and lower incidence of fever (33.6%) (Table 1).

**Table 1: Clinico-social variables of the study participants (n=250).**

Variable	Early LC (<24 hours) (n=125)	Late LC (>24 hours) (n=125)	P value
Age (mean $\pm$ SD)	47.8 $\pm$ 3.5	49.2 $\pm$ 2.9	0.007
Male: female ratio	78:47	82:43	0.61
Pain duration (days)	4.5 $\pm$ 1.2	3.2 $\pm$ 1.5	<0.001
Abdominal pain 2 or more attacks	43 (34.4)	29 (23.2)	0.05
Fever >3 days	42 (33.6)	65 (52)	0.03
Co morbidity	76 (60.8)	79 (63.2)	0.69

Figure in ( ) indicates column percentage.

**Table 2: Intra-operative and post-operative observations or complications.**

Variable	Early LC (n=125)	Late LC (n=125)	P-value
Duration of operation (minutes)	102.3 $\pm$ 26.9	101.9 $\pm$ 22.4	0.89
Duration of hospitalization (days)	5.1 $\pm$ 2.9	6.4 $\pm$ 1.3	<0.001
Intra or postoperative complication N (%)	7 (5.6)	4 (3.2)	0.54
Wound infection	3 (2.4)	4 (3.2)	
Biliary leakage	1 (0.8)	0 (0)	
Bleeding	2 (1.6)	0 (0)	
Bile duct injury	1(0.8)	0 (0)	
Rate of switching to open surgery	16 (12.8)	7 (5.6)	0.08
Difficulty identifying anatomy	8 (6.4)	7 (5.6)	
Adhesions	4 (3.2)	7 (5.6)	
Haemorrhage	3 (2.4)	0 (0)	
Biliary tract injury	1 (0.8)	0 (0)	

Figure in ( ) indicates column percentage.

The co-morbidities associated with the cholecystitis were higher in the late cholecystectomy (63.2%) group compared to the early LC group.

The complication rate, conversion to open cholecystectomy and duration of surgery showed no significant differences between early and late laparoscopic cholecystectomy except for an increased duration of stay among the late LC group (Table 2).

The rate of switching over to open surgery was considerably higher (12.8%) in the early LC group and adhesions due to earlier abdominal surgeries (3.2%), haemorrhage (2.4%) and biliary tract injury (0.8%) were major reasons whereas in the late LC group, the adhesions and difficulty in identification of the anatomy (5.6%) were the most serious reasons for open surgery.

## DISCUSSION

Conservative management is the most advocated standard practice in the management of acute cholecystitis which includes administration of IV fluids, empirical antibiotics, anti-inflammatory drugs and wait till 6 weeks for the inflammation to resolve and then attempt a cholecystectomy. Early LC was almost a banned procedure for acute cholecystitis as it has substantial risk of sepsis.<sup>6,7</sup> But with recent scientific evidences showing the efficacy of an early LC in acute cholecystitis, it is a promising early intervention.

Early LC can prevent the difficulty in dissection faced due to the fibrotic adhesions developed following inflammation and oedema between the surrounding anatomical structures and the gallbladder.<sup>8</sup> Early LC will also facilitate the dissection of oedematous plane and reduce the chances of late complications such as emphysematous or gangrenous cholecystitis.<sup>9</sup> In the present study we documented that the rate of presence of adhesions was higher among the late LC group (5.6%) compared to the early LC group (3.2%). All the cases with adhesions in the late LC group were converted to open laparotomy due to difficulty in dissection. The other complication and the infection rate were also similar in both the groups. The duration of hospital stay was longer in the delayed LC group when compared to the early LC group. This may be attributed to the earlier time spent in conservative therapy which makes the stay in the hospital longer against the concept of day care surgery with minimal hospital stay duration in preventing nosocomial infections. In the study by Condilis et al, the study population was divided into three groups viz., early LC during the first 48 hours (group 1), after 48 hours to 4 weeks (group 2) and after 5 to 8 weeks (group 3).<sup>10</sup> It was documented that the rates of switching to open surgery were higher in group 2 whereas complication rates and postoperative hospitalization duration were high were seen in group 1 which was contrary to our study. The complication rates and duration of stay in hospital again varies due to various other factors and cannot be merely

attributed to the surgical procedure. But early intervention definitely is a time saver and minimises risk of difficult surgeries and sepsis.

## CONCLUSION

Early LC is an efficient procedure for acute cholecystitis but it has risks of complications which can be minimized by careful selection of patients after clear clinical and radiological evaluation. The level of difficulty in technique and conversion to open surgery were higher in delayed LC due to adhesions. Hence the timing of surgery plays an important role in the management of acute cholecystitis and requires careful patient selection, in-depth yet rapid patient evaluation and skill of the surgeon to prevent complications.

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## REFERENCES

- Schirmer BD, Winters KL, Edlich RF. Cholelithiasis and cholecystitis. *J Long Term Eff Med Implants.* 2005;15(3):329-38.
- Mouret P. How I developed laparoscopic cholecystectomy. *Ann Acad Med Singapore.* 1996;25(5):744-7.
- Derossis AM, Fried GM, Abrahamowicz M, Sigman HH, Barkun JS, Meakins JL. Development of a model for training and evaluation of laparoscopic skills. *Am J Surg.* 1998;175(6):482-7.
- Kimura Y, Takada T, Kawarada Y, Nimura Y, Hirata K, Sekimoto M, et al. Definitions, pathophysiology, and epidemiology of acute cholangitis and cholecystitis: Tokyo Guidelines. *J Hepatobiliary Pancreat Surg.* 2007;14:15-26.
- Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, et al. TG13 diagnostic criteria and severity grading of acute cholecystitis (with videos). *J Hepatobiliary Pancreat Sci.* 2013;20:35-46.
- Lau H, Lo CY, Patil NG, Yuen WK. Early versus delayed-interval laparoscopic cholecystectomy for acute cholecystitis: a metaanalysis. *Surg Endosc.* 2006;20(1): 82-7.
- Johannsen EC, Madoff LC. Infections of the liver and biliary system. In: Mandell GL, Bennett JE, Dolin R, editors. *Principles of practice of infectious diseases.* 6th edition. Philadelphia: Elsevier; 2005: 951-958.
- Lo CM, Liu CL, Fan ST, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Ann Surg.* 1998;227(4):461-7.
- Casillas RA, Yegiyants S, Collins C. Early laparoscopic cholecystectomy is the preferred

management of acute cholecystitis. *Arch Surg.* 2008;143(4):533-7.

10. Condilis N, Sikalias N, Mountzalia L, Vasilopoulos J, Koynnos C, Kotsifas T. Acute cholecystitis: when is the best time for laparoscopic cholecystectomy?. *Ann Ital Chir.* 2008;79(1):23-7.

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