

Outcome analysis of early laparoscopic cholecystectomy in acute cholecystitis through various grades using Tokyo guidelines grades

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Abstract

Background: Many randomised trials and meta-analysis across the globe have consistently provided evidence to support the importance of early Laparoscopic Cholecystectomy in patients with Acute Cholecystitis. Yet, the practise is not adopted evenly among General surgeons. We started our practise of early laparoscopic intervention for such cases in 2010, initially for early Cholecystitis, gradually moved on to intervene laparoscopically for severe forms of Cholecystitis by the year 2014. The Tokyo guidelines was first published in 2007, later bettered with minor modifications and updated in 2013 as TG13. The purpose of this descriptive study is to analyse the outcome of our practise retrospectively by stratifying our patients using Tokyo Guidelines into various grades and to check if our outcome in all grades are consistent with various universally published results in literature. **Methods:** Data from the patients who underwent Early Laparoscopic Cholecystectomy between 2012 and June 2015, were analysed. Various factors considered for assessing the effectiveness and safety of the procedure was, conversion rate, operating time, length of hospital stay, incidence of major complication and mortality. Data were compared between various grades of Cholecystitis as stratified by Tokyo guidelines 2013 (TG13). **Results:** Out of 137 patients who underwent an initial Laparoscopic approach, the overall conversion rate was 10.2%. (Grade I – 2.6%, Grade II – 16.7%, Grade III – 26.3%, $P < 0.01$). The overall average operating time was 65 minutes (Grade I – 56 minutes, Grade II – 72 minutes, Grade III – 99 minutes). The average length of hospitalisation was 5.6 days (Grade I – 4.5 days, Grade II – 5.5 days, Grade III – 9.9 days). The incidence of major complication is 1.4% (2 cases of bile duct injury), both occurring in Grade III group. There was no incidence of mortality. **Conclusion:** Our analyses have shown that the results were comparable with literature and that Early Laparoscopic Cholecystectomy is the safe and effective approach for patients with Acute Cholecystitis.

Key Word: Acute Cholecystitis, Early Laparoscopic Cholecystectomy, Tokyo guidelines, Conversion rate.

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INTRODUCTION

An omnipresent cause of emergency admission with gastrointestinal disease is Acute Cholecystiti.^{1,2} In the dawning ages of Laparoscopy, early intervention of Acute Cholecystitis by laparoscopy has been considered unsafe and time consuming.^{3,4}

Worldwide, various Meta-analysis, Randomised controlled trials, Expert reviews, have reported Laparoscopic cholecystectomy for Acute Cholecystitis on initial admission to be safe and competent in cases without severe sepsis when compared to a delayed approach.^{5,13} All the studies that had concluded in favour of early intervention has ubiquitously declared that the conversion rates between early and delayed approach are

comparable, while significantly lesser period of stay in the hospital in early approach.⁶⁻¹⁰ Not to mention, various reports showing additional admission days for recurrence of symptoms and possibly a risk of emergency surgery in the interval period in 20% of patients in the delayed study group.^{7,8,14}

Since the advent of Minimally Invasive surgery, there has been constant development and improvisation in the techniques and instrumentation. As a result of this continuing development, minimally invasive surgery is perceptibly becoming a subspecialty and has ramified in all possible directions. One such development is the Laparoscopic removal of Gall bladder for Acute Cholecystitis on first presentation.

In the management of Acute Cholecystitis, the Tokyo guidelines was first published 2007 and after various minor modifications it was updated in the year 2013 (TG13).¹⁵

We have retrospectively analysed our practice of early Laparoscopic intervention for Acute Cholecystitis and compared the outcomes of this approach across various grades.

MATERIALS and METHODS

Data collection: Data were collected retrospectively from the records of 137 patients with Acute Cholecystitis, who were taken up for early Laparoscopic intervention. The decision of Laparoscopy was made by availability of experienced personnel. Since June 2014, almost all patients with Acute Cholecystitis were taken for Laparoscopic Cholecystectomy irrespective of Grades. Five patients had choledocholithiasis, who was subjected to ERCP and stone extraction. Those five patients were managed by a delayed approach. One patient had a deranged anatomy of early Mirizzi syndrome, and was not taken for early laparoscopic approach.

Preoperative workup: After optimisation of patients, correcting haemodynamic abnormality and improving the general condition of the patients, all patients were subjected to MRCP routinely. The idea was to identify the concurrent presence of stone in common bile duct and to identify any deranged anatomy. All patients consistently received intravenous Piperacillin-Tazobactam and Metronidazole, started at the time of admission.

Intraoperative details: All patient were operated by a team of well experienced Laparoscopic surgeons through a standard four port approach. Patients were taken up for

surgery under General Anaesthesia. Gall bladder was routinely emptied in all cases by wide bore needle aspiration, for ease of holding and retraction of the fundus of the Gall bladder.

After careful blunt dissection and release of adhesions, the Calot's triangle is dissected to delineate cystic duct and artery. In a few cases with difficulty in dissection of Calot's, a dome down approach was found very conducive.

The cystic structures were clearly skeletonised before doubly ligating them individually using intracorporeal knotting technique or clip ligation. The suture ligation was used in certain cases when the inflammation and oedema was florid in the cystic structures, as suture ligation was thought to be safer than clip application.

After completion of cholecystectomy, the Gall bladder were routinely removed through an endo-bag, to reduce the risk of infection of port site. All patients were left with a passive drainage tube for drainage of reactionary fluid, any blood or pus. This also serves to detect early detection of bile leak, if any.

RESULTS

Between 2012 to June 2015, 137 patients were operated by early laparoscopic approach for Acute Cholecystitis. Out of these 78 were females and 59 males, ages ranging between 38 and 69 years (mean = 53).

On categorising the patients by Tokyo guidelines of severity stratification, 76 were in Grade I, 42 were in Grade II and 17 were in Grade III.

2.6 % of Grade I cases (2 out of 76) were converted to open procedure. 16.7% of cases of Grade II were converted to open (7 out of 42) and 26.3% of Grade III were converted to open (5 out of 19).

The average operating time for Grade I cases is 70 minutes, Grade II cases is 85 minutes and Grade III cases is 99 minutes.

There were 2 instances of bile duct injury, both occurring in Grade III group (2 out of 19, 10.5%), one in 2014 and one in 2015. Both were detected intraoperatively and converted to open for repair of bile duct with T-Tube drainage. There was no instance of mortality in our study group.

The average length of hospital stay was 4.5 days, 5.5 days and 9.9 days in Grade I, Grade II and Grade III groups respectively.

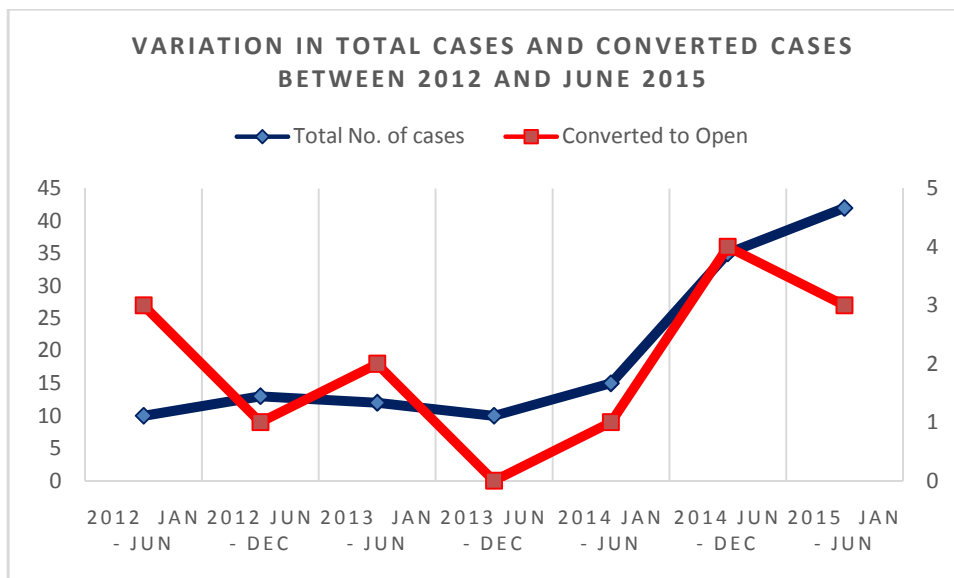


Figure 1: Variation in total cases and converted cases between 2012 and June 2015

Table 1: Results of Early Laparoscopic Cholecystectomy in Acute Cholecystitis across various grades

	Grade I	Grade II	Grade III
Total No. of cases	76	42	19
No. of converted cases	2	7	5
Conversion rate	2.6%	16.7%	26.3%
Mean Operating time (in cases in 2014 and 2015)	56 mins	72 mins	99 mins
Mean Length of hospital stay	4.5 days	5.5 days	9.9 days
Incidence of major complication	0	0	2

DISCUSSION

Till the early 21st century, the management of Acute Cholecystitis is entirely based on conjectural evidences and expert’s experience. There was no proposed guidelines till then. It was in the year 2007, the first instance of practise guidelines in the severity grading and management of Cholangitis and Cholecystitis was published in the Journal of Hepato-Biliary-Pancreatic Surgery (Tokyo Guidelines, TG07). Since then the guidelines was embraced by surgeons worldwide. This guidelines was standardised after few minor modifications which provided increase in sensitivity of diagnosis of Acute Cholecystitis and was published as updated Tokyo guidelines 2013 (TG13).¹⁶

We started the practise of managing Acute Cholecystitis, with early laparoscopic intervention in 2010, initially for patients with early Cholecystitis. Over the years we started operating on patients through all grades of Cholecystitis. We retrospectively analysed our practise by application of the updated Tokyo Guidelines, and the outcomes of patients between 2012 and June 2015 were interpreted.

In February 2015, a retrospective review of analysis of patients who underwent early laparoscopic

cholecystectomy for Grade II and Grade III Acute Cholecystitis, Kamalapurkar et al, has published the conversion rate as 2% in grade II and 27% in Grade III group.¹⁷

In our analysis during the study period, of the 137 patients, who were initially taken up laparoscopic Cholecystectomy, 14 patients were converted to an open procedure. The net conversion rate was 10.2%. On splitting with TG13 grading, the conversion rate was 2.6%, 16.7% and 29.4% in Grade I, Grade II and Grade III respectively Table 1. As evident from Figure 1, most number of the converted cases in Grade II was in early years, which dropped to zero in late 2013. This can be explained as part of the learning curve and we started achieving optimal results in grade II group by then. Since 2014, we adopted laparoscopic approach for patients with Grade III when there was a rise in conversion rates. Overall the results from our analysis was concurrent with universally achieved results.

In our analysis, though there is an increased risk of conversion rate in Grade III, all the converted patients have successfully removed gall bladder without major complication or mortality. Except for the 2 patients (both

in grade III, 1.4%), who had common bile duct injury, there was no other untoward events

One of the quoted demerit of Laparoscopic approach in acute Cholecystitis is increased operating. Notwithstanding, on escalation in the learning curve this demerit perhaps resolved.^{18, 19} The mean operating time in our current study 56, 72, and 99 minutes in Grades I, II and III respectively.

There was 2 patients who had injury to the common bile duct, detected intraoperatively, and promptly got converted to an open procedure for repair of bile duct and T-tube insertion. (2 out of 137, 1.4%). In the dawning years of laparoscopic approach, the bile duct injury rate was quoted as 0.8- 1.4%. In subsequent years, it dropped to 0.5 to 0.6%.^{20, 21} Various studies in literature has quoted the mean hospital stay varying between 2-12 days across all grades of Acute Cholecystitis in patients undergoing early Laparoscopic Cholecystectomy.^{17, 22} The average length of stay in the hospital in our study was 5.6 days among the 137 patients. The respective average length of hospital stay for Grades I, II and III was, 4.5, 5.5, and 9.9 days. This indicates that as the grade increases, the length of hospital stay increases. Yet, the total hospital stay time when compared to the delayed group in various comparative studies is way less. Withal the extra stay time in about 20% of patients in delayed group for recurrent symptoms in the interim period before delayed surgery.

CONCLUSION

Overall, the results from our retrospective analysis were consistent with various randomized trials, meta-analysis, that Early Laparoscopic cholecystectomy is a safe and effective approach for Acute Cholecystitis regardless of grade.

FUTURE

A large volume prospective randomized trial comparing results of early and delayed approach in patients with Acute Cholecystitis of all grades, would provide us an authoritative evidence for the practice of the early approach.

REFERENCES

1. Russo MW, Wei JT, Thiny MT, Gangarosa LM, Brown A, Ringel Y, Shaheen NJ, Sandler RS: Digestive and liver diseases statistics, 2004. *Gastroenterology* 2004, 126(5):1448-1453.
2. Williams JG, Roberts SE, Ali MF, Cheung WY, Cohen DR, Demery G, Edwards A, Greer M, Hellier MD, Hutchings HA et al: Gastroenterology services in the UK. The burden of disease, and the organisation and delivery of services for gastrointestinal and liver disorders: a review of the evidence. *Gut* 2007, 56 Suppl 1:1-113.

3. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, Trede M, Troidl H: The European experience with laparoscopic cholecystectomy. *American journal of surgery* 1991, 161(3):385-387.
4. Wilson P, Leese T, Morgan WP, Kelly JF, Brigg JK: Elective laparoscopic cholecystectomy for "all-comers". *Lancet (London, England)* 1991, 338(8770):795-797.
5. Germanos S, Gourgiotis S, Kocher HM: Clinical update: early surgery for acute cholecystitis. *Lancet (London, England)* 2007, 369(9575):1774-1776.
6. Gurusamy K, Samraj K, Gluud C, Wilson E, Davidson BR: Meta-analysis of randomized controlled trials on the safety and effectiveness of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *The British journal of surgery* 2010, 97(2):141-150.
7. Johansson M, Thune A, Blomqvist A, Nelvin L, Lundell L: Management of acute cholecystitis in the laparoscopic era: results of a prospective, randomized clinical trial. *Journal of gastrointestinal surgery : official journal of the Society for Surgery of the Alimentary Tract* 2003, 7(5):642-645.
8. Kolla SB, Aggarwal S, Kumar A, Kumar R, Chumber S, Parshad R, Seenu V: Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective randomized trial. *Surgical endoscopy* 2004, 18(9):1323-1327.
9. Lai PB, Kwong KH, Leung KL, Kwok SP, Chan AC, Chung SC, Lau WY: Randomized trial of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *The British journal of surgery* 1998, 85(6):764-767.
10. Lo CM, Liu CL, Fan ST, Lai EC, Wong J: Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Annals of surgery* 1998, 227(4):461-467.
11. Overby DW, Apelgren KN, Richardson W, Fanelli R: SAGES guidelines for the clinical application of laparoscopic biliary tract surgery. *Surgical endoscopy* 2010, 24(10):2368-2386.
12. Strasberg SM: Clinical practice. Acute calculous cholecystitis. *The New England journal of medicine* 2008, 358(26):2804-2811.
13. Yamashita Y, Takada T, Strasberg SM, Pitt HA, Gouma DJ, Garden OJ, Buchler MW, Gomi H, Derveniz C, Windsor JA et al: TG13 surgical management of acute cholecystitis. *Journal of hepato-biliary-pancreatic sciences* 2013, 20(1):89-96.
14. de Mestral C, Rotstein OD, Laupacis A, Hoch JS, Zagorski B, Nathens AB: A population-based analysis of the clinical course of 10,304 patients with acute cholecystitis, discharged without cholecystectomy. *The journal of trauma and acute care surgery* 2013, 74(1):26-30; discussion 30-21.
15. Takada T, Strasberg SM, Solomkin JS, Pitt HA, Gomi H, Yoshida M, Mayumi T, Miura F, Gouma DJ, Garden OJ et al: TG13: Updated Tokyo Guidelines for the management of acute cholangitis and cholecystitis. *Journal of hepato-biliary-pancreatic sciences* 2013, 20(1):1-7.
16. Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, Pitt HA, Garden OJ, Kiriyaama S, Hata J et al: TG13 diagnostic criteria and severity grading

- of acute cholecystitis (with videos). *Journal of hepatobiliary-pancreatic sciences* 2013, 20(1):35-46.
17. Kamalapurkar D, Pang TC, Siriwardhane M, Hollands M, Johnston E, Pleass H, Richardson A, Lam VW: Index cholecystectomy in grade II and III acute calculous cholecystitis is feasible and safe. *ANZ journal of surgery* 2015.
 18. Tekin A, Kucukkartallar T, Belviranli M, Vatansev C, Aksoy F, Tekin S, Kartal A: [Early laparoscopic cholecystectomy for acute cholecystitis]. *Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma and emergency surgery : TJTES* 2009, 15(1):62-66.
 19. Unger SW, Rosenbaum G, Unger HM, Edelman DS: A comparison of laparoscopic and open treatment of acute cholecystitis. *Surgical endoscopy* 1993, 7(5):408-411.
 20. Karvonen J, Gullichsen R, Laine S, Salminen P, Gronroos JM: Bile duct injuries during laparoscopic cholecystectomy: primary and long-term results from a single institution. *Surgical endoscopy* 2007, 21(7):1069-1073.
 21. Pessaux P, Tuech JJ, Rouge C, Duplessis R, Cervi C, Arnaud JP: Laparoscopic cholecystectomy in acute cholecystitis. A prospective comparative study in patients with acute vs. chronic cholecystitis. *Surgical endoscopy* 2000, 14(4):358-361.
 22. Ciftci F, Abdurrahman I, Girgin S: The outcome of early laparoscopic surgery to treat acute cholecystitis: a single-center experience. *International journal of clinical and experimental medicine* 2015, 8(3):4563-4568.

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