

## ORIGINAL RESEARCH

# Evaluation of Risk Factors in Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy In Cases of Acute Cholecystitis

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## ABSTRACT

**Introduction:** Laparoscopic cholecystectomy from the day of its introduction has aimed at improving the results of traditional surgical treatment and is regarded as gold standard treatment in acute cholecystitis. The study was aimed to find the reasons for conversion laproscopic cholecystectomy to open cholecystectomy and to evaluate the role of delayed surgery after golden 72 hours in open cholecystectomy in acute cholecystitis.

**Material and methods:** The present retrospective study was carried out on 150 patients who completed laparoscopic cholecystectomy and required conversion to open cholecystectomy, comparison was carried out in terms of age, sex, laboratory findings, operation timing, complications and duration of hospital stay.

**Results:** Conversion to open cholecystectomy was seen in 31 (20.6%) patients.

**Conclusion:** Patient characteristics, such as advancing age, abnormal leucocyte count, increased thickness of gallbladder, abnormal liver function tests and delayed surgery after 72 hours of appearance of symptoms indicate a higher possibility of conversion from laparoscopic to open cholecystectomy.

**Keywords:** Laparoscopic cholecystectomy, conversion to open surgery, risk factor

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## INTRODUCTION

Laparoscopic cholecystectomy from the day of its introduction has aimed at improving the results of traditional surgical treatment.<sup>1</sup> Now-a-days it is regarded as gold standard treatment for most of the benign gallbladder diseases<sup>2</sup> because in comparison to its open counterpart, the laparoscopic procedure provides several significant advantages, generally based on the reduced surgical access trauma.<sup>1</sup> Although LC has generally a low incidence of complications, the conversion rate to open surgery is particularly affected by the presence and severity of inflammation, advancing patient's age, male gender, greater body weight and previous abdominal surgery.<sup>3</sup> However, in spite of increasing expertise and advances in technology conversion rate is still 1.5-19% in different centers.<sup>4</sup> But this conversion is neither a failure nor a complication, but it is an attempt to avoid complications.<sup>5</sup> The present study was aimed to find the reasons for conversion to open cholecystectomy and to evaluate the role of delayed surgery after golden 72 hours in open cholecystectomy in acute cholecystitis

## MATERIAL AND METHODS

This retrospective study was carried out on prospective data obtained from 150 patients who underwent a laparoscopic cholecystectomy for acute cholecystitis from August 2007 to December 2012 in our institute. Ethical approval was taken from the concerned authority for the commencement of study. Patients who completed laparoscopic cholecystectomy and required conversion to open surgery were included in the study.

ersion to open cholecystectomy were compared in terms of demographic data including age, sex and obesity, history of previous acute attacks, fever, leukocyte count, abnormal preoperative liver function tests, laboratory findings, co morbid diseases (hypertension, any cardiovascular disease, etc), time of surgery after symptom begin, operation timing, ultrasound findings, complications and duration of hospital stay.

Cholecystectomies were performed by experienced surgeons in the standard four-port technique. All patients were placed on intravenous antibiotics upon admission which was continued after surgery. The first port (10-mm cannula) was inserted in the subumbilical region and three 5–10 mm ports were inserted along the subcostal margin under direct vision at midline, midclavicular and anterior axillary line. Dissection of Calot's triangle and the gallbladder from the liver bed was accomplished by using monopolar electrocautery. The gallbladder was retrieved in an endoscopic bag and extracted through the subumbilical port site. Conversions were performed by median or subcostal laparotomy according to each patient's condition and the surgeon's decision.

## STATISTICAL ANALYSIS

Data so obtained was analyzed using Statistical Package for Social Science (SPSS) Version-16 data analysis software. Chi square test was used for the analysis and a p-value of less than or equal to 0.05 was considered statistically significant.

## RESULTS

Total 150 patients with acute cholecystitis, 58 male and 92 female patients, with a mean age of 48.4 years (range 21 to 81 years) were included in the study. Laproscopic surgery was carried out and all the operations were carried out or assisted by the same four consultants. Conversion to open cholecystectomy was seen in 31 (20.6%) patients, 19 male and 12 female (p value was non significant with  $p > 0.05$ ). 62 patients were  $< 40$  years of age, out of which 4 were converted to open surgery, 88 patients were  $> 40$  years of age, out of which 27 were converted to open surgery.

The p value was significant with  $p < 0.05$ .

In case BMI, 71 patients had  $> 35$  and were considered obese, out of which 15 were converted to open surgery, 79 patients had  $< 35$  and were considered non-obese, out of which 16 were converted to open surgery (p value was non-significant with  $p > 0.05$ .) Similarly, the patients with the unexpected operative findings of a severely inflamed gallbladder and dense adhesions to neighbouring organs had a higher rate of conversion ( $p < 0.05$ ).

Patients with abnormal liver function test and leukocyte count showed higher rate of conversion to open surgery (value was significantly higher with  $p < 0.05$ ). Duration of hospitalization and operation time were significantly longer in conversion group ( $p < 0.05$ ). Out of total 150, 11 patients were operated after golden 72 hour, out of which 7 was converted to open surgery ( $p < 0.05$ ).

Conversion rate was found significantly higher in patients with history of fever, older age, abnormal leukocyte count, delayed surgery after symptoms and history of previous acute attacks (Table-1). The history and data obtained from the present study revealed that inability to correctly identify anatomy, biliary tract injuries, delayed surgery after 72 hour of gall bladder inflammation, increased thickness of gallbladder, fibrosis of liver parenchyma (Table-2) are considerable causes for the conversion of laproscopic cholecystectomy to open surgery.

## DISCUSSION

In spite of laproscopic cholecystectomy being considered as the gold standard treatment of symptomatic cholelithiasis, however preoperative prediction of the risk of conversion to open surgery is an important aspect of planning laproscopic surgery.<sup>5</sup> In the present study data retrieved from the patients who underwent conversion to open cholecystectomy was compared in terms of demographic data including age, gender, obesity, history of previous acute attacks, fever, leukocyte count, abnormal preoperative liver function tests, laboratory findings, co morbid diseases (hypertension, any cardiovascular disease, etc), time of surgery after symptom begin, operation timing, ultrasound findings, complicat-

Patient Findings		Admitted for Laproscopic Cholecystectomy n=150	Converted to open Surgery n=31	p value
Sex	Male	58	19	>0.05
	Female	92	12	
Mean Age		48.4 years	63.7 years	< 0.05
Obesity status	BMI (Non- obese)	79	16	>0.05
	BMI (Obese)	71	15	
Surgery after 72 hour of gall bladder inflammation		11	7	< 0.05
Ultrasound findings	Increased thickness of gallbladder	10	6	< 0.05
	Fibrosis of liver parenchyma	2	2	< 0.05
Previous history of acute cholecystitis		27	13	>0.05
Co morbid disease		74	11	>0.05
Abnormal liver function test		39	23	< 0.05
Abnormal leukocyte count		69	24	< 0.05
Mean duration of hospital stay		3 days	7 days	< 0.05

**Table-1:** Patient findings and conversion to open surgery

Reasons for conversion to open surgery	Number (n=31)
Inability to correctly identify anatomy	9
Biliary tract injuries	5
Delayed surgery after 72 hour of gall bladder inflammation	7
Spillage of multiple stones	2
Increased thickness of gallbladder	6
Fibrosis of liver parenchyma	2

**Table-2:** Reasons for conversion to open surgery

ions and duration of hospital stay.

Singh K et al<sup>6</sup> reported rate of conversion as 0.36%, Ishizaki Y et al<sup>7</sup> as 5.3%, Bakos E et al<sup>8</sup> as 5.7%, whereas Oymaci et al<sup>9</sup> reported rate of conversion as 27.9% which is nearly similar to the results obtained by the present study (20.6%).

The present study did not found any significant findings in relation to the gender of the patients where as S Kumar et al,<sup>5</sup> Kama NA et al,<sup>4</sup> Fried GM et al,<sup>10</sup> Sanabria JR et al,<sup>11</sup> Hutchinson CH et al,<sup>12</sup> considered male sex as preoperative factors as predictive factor for the need to convert to open surgery.

The present study noticed age as a risk factor of conversion similar to Kama et al<sup>4</sup> and Liu et al<sup>13</sup> where as Kumar et al<sup>5</sup> did not notice age to be associated with conversion rate.

Patients who had a BMI  $\geq$  35 were considered obese according to the international definition.<sup>14,15</sup> Similar to study carried by Jethwani et al,<sup>14</sup> Kaplan M et al,<sup>16</sup> the present study did not find obesity as a predictive risk factor.

The presence of liver function test and leukocyte count abnormalities, conversion to open surgery were found to be significantly higher. Leukocyte count abnormalities was taken into account in spite of an increase or decrease in the WBC count because both indicates inflammation, thus

“leukocytosis” was changed to “abnormal WBC count”.<sup>17</sup>

In the present study, 6 patients with gallbladder thickness and 2 patients with fibrosis of liver parenchyma underwent open surgery. Hutchinson et al,<sup>12</sup> Kama et al<sup>4</sup> and Liu et al<sup>13</sup> considered gallbladder thickness to be the most important sonographic risk factor of conversion to open surgery.<sup>14</sup>

In the present study significant higher rate of conversion to open surgery was noted in case of delayed surgery after appearance of symptoms. Thus, surgery for acute cholecystitis could be time critical.<sup>18</sup> According to Zhu et al,<sup>19</sup> gallbladder inflammation during the first 72 h of onset of symptoms may not involve structures within the triangle of Calot. Surgical dissection within this critical period therefore appears easiest due to lack of organized adhesions. Cholecystectomy within this time frame reduces the risk of injury to the structures within the triangle of Calot.<sup>18</sup>

Biliary tract injuries (BTI) represents the most serious and potentially life-threatening complication of cholecystectomy. The most common cause of BTI is the failure to recognize the anatomy of the triangle of Calot. This is attributed to factors inherent to the laparoscopic approach that include limitation of two-dimensional vision, absence of manual palpation of the porta-hepatis, use of a tangential and inferior approach to the common bile duct and poor vision during significant bleeding.<sup>20</sup> In the present study 11 cases attributed to inability to correctly identify anatomy and biliary tract injuries, delayed surgery after 72 hour of gall bladder inflammation, increased thickness of gallbladder, fibrosis of liver parenchyma (Table-2) are considerable causes for the conversion of laparoscopic cholecystectomy to open surgery.

## CONCLUSION

Patient characteristics, such as advancing age, abnormal leucocyte count, increased thickness of gallbladder, abnormal liver function tests and delayed surgery after 72 hours of appearance of symptoms indicate a higher possibility of conversion from laparoscopic to open cholecystectomy.

## REFERENCES

1. Soltes M, Radonak J. A risk score to predict the difficulty of elective laparoscopic cholecystectomy. *Videosurgery Mininiv* 2014;9:608–12.
2. Le VH, Smith DE, Johnson BL. Conversion of laparoscopic to open cholecystectomy in the current era of laparoscopic surgery. *Am Surg*. 2012;78:1392-5.
3. Kanakala V, Borowski DW, Pellen MGC, Shridhar S. Risk factors in laparoscopic cholecystectomy: A multivariate analysis. *International Journal of Surgery* 2011;9: 318-23.
4. Kama NA, Kologlu M, Doganay M, et al. A risk score for conversion from laparoscopic to open cholecystectomy. *Am J Surg* 2001;181:520-5
5. S Kumar, S Tiwary, N Agrawal, G Prasanna, R Khanna, A Khanna. Predictive Factors for Difficult Surgery in Laparoscopic Cholecystectomy for Chronic Cholecystitis. *The Internet Journal of Surgery*. 2007;16; 20-22
6. Singh K, Ohri A. Laparoscopic cholecystectomy – is there a need to convert? *J Minim Access Surg*. 2005;1(2): 59–62.
7. Ishizaki Y, Miwa K, Yoshimoto J, Sugo H, Kawasaki S. Conversion of elective laparoscopic to open cholecystectomy between 1993 and 2004. *Br J Surg*. 2006;93:987–91.
8. Bakos E, Bakos M, Dubaj M, Prekop I, Jankovic T. Conversion in laparoscopic cholecystectomy. *Bratisl Lek Listy*. 2008; 109:317–9.
9. Oymaci E, Ucar AD, Aydogan S, Sari E, Erkan N, Yildirim M. Evaluation of affecting factors for conversion to open cholecystectomy in acute cholecystitis. *Prz Gastroenterol* 2014; 9 (6): 336–41.
10. Fried GM, Barkun JS, Sigman HH, et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. *Am J Surg* 1994;167:35-41.
11. Sanabria JR, Gallinger S, Croxford R, et al. Risk factors in elective laparoscopic cholecystectomy for conversion to open cholecystectomy. *J Am Coll Surg* 1994;179:696-704.
12. Hutchinson CH, Traverso LW, Lee FT. Laparoscopic Cholecystectomy. Do preop-

- erative factors predict the need to convert to open? *Surg Endosc* 1994;8:875-8.
13. Liu CL, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting conversion of laparoscopic cholecystectomy to open surgery. *Arch Surg.* 1996;131:98–101.
  14. Jethwani U, Singh G, Mohil RS, Kandwal V, Razdan S, Chouhan J, et al. Prediction of difficulty and conversion in laparoscopic cholecystectomy. *OA Minimally Invasive Surgery* 2013;1:1-5.
  15. Habib FA, Kolachalam RB, Khilnani R, Preventza O, Mittal VK. Role of laparoscopic cholecystectomy in the management of gangrenous cholecystitis. *Am J Surg.* 2001;181:71–5.
  16. Kaplan M, Sulman B, Iyikoskar HI, Yalcin HC, Yilmaz U. The Reasons and Risk Factors for Conversion to Open in Laproscopic Cholecystectomy. *The New of Medicine* 2007; 24:146-151.
  17. Mayumi T, Takada T, Kawarada Y, et al. Results of the Tokyo Consensus Meeting Tokyo Guidelines. *J Hepatobiliary Pancreat Surg* 2007;14:114–21.
  18. Ambe P, Weber SA, Christ H, Wassenberg D. Cholecystectomy for acute cholecystitis. How time-critical are the so called “golden 72 hours”? Or better “golden 24 hours” and “silver 25–72 hour”? A case control study *World Journal of Emergency Surgery* 2014;9:1-6.
  19. Zhu B, Zhang Z, Wang Y, Gong K, Lu Y, Zhang N: Comparison of laparoscopic cholecystectomy for acute cholecystitis within and beyond 72 h of symptom onset during emergency admissions. *World J Surg* 2012,36:2654–8.
  20. Parmeggiani D, Cimmino G, Cerbone D, Avenia N, Ruggero R, Gubitosi A, Docimo G, Mordente S, Misso C, Parmeggiani U. Biliary tract injuries during laparoscopic cholecystectomy: three case reports and literature review. *Casistica Clinica* 2010;31:16-9.