Laparoscopic cholecystectomy for acute cholecystitis

Can preoperative factors predict conversion?

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ABSTRACT

Objective: To determine if preoperative clinical, laboratory and radiology data can predict conversion of laparoscopic cholecystectomy for acute cholecystitis to open procedure.

Methods: Retrospective analysis of 44 laparoscopic cholecystectomies were performed for acute cholecystitis between August 2000 and July 2002 at King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia. Data related to age and sex of patients, maximum body temperature, white blood cell count, gallbladder wall thickness on ultrasonography and timing of surgery from onset of symptoms were collected.

Results: The procedure was converted from laparoscopic to open cholecystectomy in 10 patients (23%). Conversion rate was significantly high (33% versus zero; p=0.01) if the gallbladder wall was thickened. Conversion rate was significantly low (zero versus 32%: p=0.01) if the procedure was performed within 48 hours from the onset of symptoms. The data related to age, sex, white blood cell count and body temperature did not reliably predict conversion of laparoscopic cholecystectomy for acute cholecystitis to open procedure. There was no mortality or major morbidity.

Conclusion: Laparoscopic cholecystectomy is a safe modality of treatment for acute cholecystitis. Factors associated with increased conversion rate are thickened gallbladder wall on ultrasonography and delay in surgery for more than 48 hours from the onset of symptoms.

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Success, safety and cost effectiveness of laparoscopic cholecystectomy for acute cholecystitis has been established.[1-3] The initial belief that acute cholecystitis was a relative contraindication is no longer true. Improvement in laparoscopic techniques and growing experience has made laparoscopic cholecystectomy the initial surgical approach in the majority of patients with acute cholecystitis.[4] However, the conversion rate has been reported to be higher[5] than elective laparoscopic cholecystectomy. Reliable prediction of conversion of laparoscopic cholecystectomy for acute cholecystitis would be helpful in planning and preparation of surgery for such patients. In this paper, we evaluated our experience of laparoscopic cholecystectomy for acute cholecystitis. The study was aimed at defining the effect of clinical, laboratory and radiological data, that is, information available preoperatively, on prediction of conversion of laparoscopic to open cholecystectomy for the treatment of acute cholecystitis.

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Methods. Retrospective analysis of charts of patients who had an attempt of laparoscopic cholecystectomy for the treatment of acute cholecystitis at the King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia between August 2000 and July 2002 was carried out. The diagnosis of acute cholecystitis was established using clinical features, laboratory data and radiologic studies. The diagnosis was made in patients who were admitted as emergency cases with right upper quadrant or epigastric pain for more than 2 hours, had localized peritoneal signs and their abdominal ultrasound studies demonstrated evidence of gallbladder inflammation. Later, intraoperative findings or pathological examination reports, or both, also confirmed the diagnosis. The operations were performed using standard 4-puncture technique.[6] Special modifications like use of an additional port, enlargement of port incision to extract the specimen or placement of closed suction drains in the sub-hepatic space, were used whenever considered necessary. Monopolar electrocautery was used in all cases. Demographic and clinical data were collected. Six pre-operative factors that can be useful in predicting conversion to open cholecystectomy were analyzed. These included age, sex, maximum body temperature, white blood cells (WBC) count, gallbladder wall thickness and timing of surgery from onset of symptoms. The patients who required conversion to open cholecystectomy (conversion group) were compared to those patients who had successful laparoscopic cholecystectomy (successful group). Statistical analysis was carried out using Epistat statistical package. Comparison between groups was made using Fisher's exact test; p values less than 0.05 were considered significant.

Results. During the 2-year period, 44 patients with acute cholecystitis had an attempt of laparoscopic cholecystectomy. There were 14 males (32%) and 30 females. The age range was 14-75 years with the average age of 43 years. Ten of 44 patients (23%) required conversion to open cholecystectomy. There was no statistical significant difference between the 2 groups in terms of age, sex, temperature and WBC count. All 10 patients in conversion group had increased gallbladder wall thickness on ultrasound study compared to 20 of 34 patients (59%) in the successful group (p=0.01). Thirteen patients had laparoscopic cholecystectomy attempted within 48 hours from onset of symptoms. None of these patients had conversion to open cholecystectomy. Ten of 31 patients (32%) who had laparoscopic cholecystectomy attempted after 48 hours from the

Table 1 - Comparison of preoperative factors in successful and conversion group.

Characteristics	Successful group (n=34)	Conversion group (n=10)	Conversion rate (%)	*p* value
Age (years)				
≤59	24	8	(25)	0.44
≥60	10	2	(17)	
Sex				
Male	10	4	(29)	0.39
Female	24	6	(20)	
Body temperature (^{o}C)				
37-37.9	24	6	(20)	0.39
≥38	10	4	(29)	
WBC count (per cmm)				
<10,000	16	3	(16)	0.27
>10,000	18	7	(28)	
Gallbladder wall thickness				
Normal	14	0	(0)	0.01*
Increased	20	10	(33)	
Timing of surgery				
<48 hours	13	0	(0)	0.01*
>48 hours	21	10	(32)	

* statistically significant, WBC - white blood count

onset of symptoms had to be converted to open cholecystectomy (p=0.01). There was no death. No patient had bile duct injury. The results are summarized in **Table 1**.

Discussion. Laparoscopic cholecystectomy has become "gold standard" for the treatment of symptomatic gallstones.[7] Presently, majority of cholecystectomies are performed laparoscopically. In surgical residency programs, the trainees are trained in laparoscopic cholecystectomy before open cholecystectomy. With experience and improved techniques, laparoscopic cholecystectomy has become a safe modality of treatment for patients with acute cholecystitis. Our study also shows that laparoscopic cholecystectomy can be performed successfully with most patients with acute cholecystitis. There was no mortality or major morbidity of the procedure. When compared with elective cholecystectomy, higher rates of conversion to open cholecystectomy are reported in laparoscopic cholecystectomy in patients with acute cholecystitis. Conversion rates between 7% and 35% have been reported.[1,2,3,8] The need for conversion to laparotomy should not be considered a complication. Rather it is an attempt to avoid complication. Elective conversion is always preferable to emergency conversion. Various studies have looked into risk factors predicting conversion from laparoscopic to open cholecystectomy for acute cholecystitis.[9] Most reports show that the timing of the surgery from onset of symptoms is an important in determining the outcome.[2,10,11] Literature has recommended "early operation" (between 48-96 hours) from the onset of symptoms. Our study supports this view. The patients who had surgical intervention within 48 hours from onset of symptoms had zero conversion to open cholecystectomy. All 10 conversions were in patients who had an attempt of laparoscopic cholecystectomy more than 48 hours from onset of symptoms. It has been postulated that during the early phase of acute cholecystitis, the edematous plane in the submucosa of the gallbladder facilitates its dissection from the liver bed. Also, in the early stages of inflammation the anatomy in the Calot's triangle may not be distorted.[12]

Another risk factor is the increased thickness of the gallbladder wall on ultrasonography. This represents fibrosis due to previous attacks of cholecystitis.[9,13] None of our patients with normal gallbladder wall thickness had to be converted to open procedure. One third of the patients (10 of 30 patients) with increased gallbladder wall thickness were converted. Recurrent attacks lead to maturation of fibrous tissue, which appears as thickened gallbladder wall on ultrasonography.[14] This may make the anatomy unclear and dissection difficult, leading to conversion.

Many reviews have reported male sex, old age, high temperature and leukocytosis as significant predictive factors for conversion.[2,9,10,11] In our experience, the percentages of conversion were higher in male patients, patients who were febrile and patients with leukocytosis, but these did not reach statistical significance. The percentage of conversion in patients older than 60 years was lower (17%) than patients less than 60 years (25%). One study looking specifically on laparoscopic cholecystectomy in elderly patients did not report high conversion rate in this particular group of patients.[15] Preoperative prediction of the risk factors may help in planning of surgery. Patients may be informed appropriately, and they may arrange their work and family matters accordingly.[14] Experienced laparoscopic surgeon should operate upon these patients. This may also help to decide early during the laparoscopic procedure to convert if the surgeon encounters difficulty in dissection. Furthermore, these high risk patients may not be suitable for day case laparoscopic cholecystectomy. Although patients may be categorized as high risk for conversion, it is important to emphasize that technical difficulty of laparoscopic cholecystectomy is related to intraoperative findings.[16] The outcome of laparoscopic cholecystectomy for acute cholecystitis depends on experience, technical competency and clinical judgment of the operating surgeon. Surgeon should decide regarding the conversion of the laparoscopic procedure for the sake of safety of the patient whenever he or she faces difficulty intraoperatively.

In conclusion, our study shows that laparoscopic cholecystectomy can be accomplished successfully with low morbidity in most patients with acute cholecystitis. Patients with increased gallbladder wall thickness on preoperative ultrasonography and those undergoing surgery more than 48 hours from the onset of symptoms are at high risk for conversion to open cholecystectomy.

References

1. Miller RE, Kimmelstiel FM. Laparoscopic cholecystectomy for acute cholecystitis. ***Surg Endosc*** 1993; 7: 296-299.
2. Rattner DW, Ferguson C, Warshaw AL. Factors associated with successful laparoscopic cholecystectomy for acute cholecystitis. ***Ann Surg*** 1993; 217: 233-236.
3. Versasco JM, Dominguez JM, Vallina VL, O'Toole KA. Laparoscopic cholecystectomy in acute cholecystitis. ***J Laparoendosc Surg*** 1994; 4: 305-309.
4. Kiviluto T, Siren J, Luukkonen P, Kivilaakso E. Randomised trial of laparoscopic versus open cholecystectomy for acute and gangrenous cholecystitis. ***Lancet*** 1998; 351: 321-325.
5. Kum CK, Goh PMY, Isaac JR, Tekant Y, Ngoi SS. Laparoscopic cholecystectomy for acute cholecystitis. ***Br J Surg*** 1994; 81: 1651-1654.
6. Reddick EJ, Olsen DO. Laparoscopic laser cholecystectomy: a comparison with mini-lap cholecystectomy. ***Surg Endosc*** 1989; 3: 131-133.

7. Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy. The new " gold standard"? ***Arch Surg*** 1992; 127: 917-921.
8. Zucker KA, Flowers JL, Bailey RW, Graham SM, Bueu J, Imbembo AL. Laparoscopic management of acute cholecystitis. ***Am J Surg*** 1993; 165: 508-514.
9. Fried GM, Barkun JS, Sigman HH, Joseph L, Clas D, Garzon J et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. ***Am J Surg*** 1994; 167: 35-41.
10. Lo CM, Liu CL, Fan ST, Lai ECS, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. ***Ann Surg*** 1998; 227: 461-4677.
11. Teixeira JP, Saraiva AC, Cabral AC, Barros H, Reis JR, Teixeira A. Conversion factors in laparoscopic cholecystectomy for acute cholecystitis. ***Hepatogastroenterology*** 2000; 47: 626-630.
12. Madan AK, Aliabadi-Wahle S, Tesi D, Flint LM, Steinberg SM. How early is early laparoscopic treatment of acute cholecystitis? ***Am J Surg*** 2002; 183: 232-236.
13. Daradkeh SS, Suwan Z, Abu-Khalaf M. Preoperative ultrasonography and prediction of technical difficulties during laparoscopic cholecystectomy. ***World J Surg*** 1998; 22: 75-77.
14. Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapci M. A risk score for conversion from laparoscopic to open cholecystectomy. ***Am J Surg*** 2001; 181: 520-525.
15. Montori A, Boscaini M, Gasparrini M, Miscusi G, Masoni L, Onorato M et al. Gallstones in elderly patients: impact of laparoscopic cholecystectomy. ***Can J Gastroenterol*** 2000; 14: 929-932.
16. Brodsky A, Matter I, Sabo E, Cohen A, Abrahamson J, Eldar S. Laparoscopic cholecystectomy for acute cholecystitis: can the need for conversion and the probability of complication be predicted? A prospective study. ***Surg Endosc*** 2000; 14: 755-760.