Laparoscopic Cholecystectomy for Acute Cholecystitis: Prospective Trial

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Abstract. This prospective study determines the indications for and the optimal timing of laparoscopic cholecystectomy (LC) following the onset of acute cholecystitis. It also evaluates preoperative and operative factors associated with conversion from laparoscopic cholecystectomy to open cholecystectomy in the presence of acute cholecystitis. Having been established as the procedure of choice for elective cholelithiasis, LC is now also used for management of acute cholecystitis. Under these circumstances the procedure may be difficult and challenging. Certain favorable and unfavorable conditions may be present that influence the conversion and complication rates. Information about these conditions may be helpful for elucidating the optimal circumstances for LC or when the procedure is best avoided. We performed LC on an emergency basis as soon as the diagnosis was made on all patients presenting with acute cholecystitis from January 1994 to December 1995. All preoperative, operative, and postoperative data were collected on standardized forms. Of the 137 patients registered, 130 were eligible for the audit. Seven patients found by laparoscopic intraoperative cholangiography to have choledocholithiasis were converted for common bile duct exploration and were excluded from the study. Altogether 93 patients (72%) underwent successful LC and 37 (28%) needed conversion to open cholecystectomy. The conversion rate of acute gangrenous cholecystitis (49%) was significantly higher than that for uncomplicated acute cholecystitis (4.5%) ($p < 0.00001$) and for hydrops (28.5%) and empyema of the gallbladder (28.5%) ($p = 0.004$). The difference in conversion between the group with acute necrotizing (gangrenous) cholecystitis and the two groups with hydrops and empyema of the gallbladder was not statistically significant ($p = 0.07$). The complication rates of acute cholecystitis, hydrops, empyema of the gallbladder, and gangrenous cholecystitis were 9.0%, 9.5%, 14.0%, and 20.0%, respectively ($p = $ NS). Patients with an operative delay of 96 hours or less from the onset of acute cholecystitis had a conversion rate of 23%, whereas a delay of more than 96 hours was associated with a conversion rate of 47% ($p = 0.022$). The complication rate was 8.5% in the laparoscopic group and 27% in the converted group ($p = 0.013$). Patients over 65 years of age, with a history of biliary disease, a nonpalpable gallbladder, WBC count over 13,000/cc, and acute gangrenous cholecystitis were independently associated with a high LC conversion rate; male patients, finding large bile stones, serum bilirubin over 0.8 mg/dl, and WBC count over 13,000/cc were independently associated with a high complication rate following laparoscopic surgery with or without conversion. Generally, LC can be performed safely for acute cholecystitis, with acceptably low conversion and complication rates. Different forms of cholecystitis carry various conversion and complication rates in selected cases. LC for acute cholecystitis should be performed within 96 hours of the onset of disease. Predictors of conversion and complications may be helpful when planning the laparoscopic approach to acute cholecystitis.

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Within a few years laparoscopic cholecystectomy (LC) has been established as the treatment of choice for cholecystolithiasis, with acceptable low complication and conversion rates that are progressively decreasing. Use of the same technique for management of acute cholecystitis is still under debate [1].

Although many early reports include patients with acute cholecystitis [2, 3], the information regarding LC when this specific pathology is present is scanty, inaccurate, and conflicting. The number of patients with acute cholecystitis in most of these reports is small [2, 3], and acute cholecystitis is specifically addressed in only a few of the studies [4–6].

We initiated our present prospective study in an attempt to elucidate the place of LC in the treatment of acute cholecystitis, focusing on the timing of the procedure and on possible preoperative indicators of conversion and complications.

Materials and Methods

Study Group

Between January 1994 and December 1995 a total of 137 patients were treated for clinical acute cholecystitis in the Department of Surgery, Bnai Zion Medical Center. The clinical diagnosis was based on local right upper quadrant pain or tenderness, fever, and leukocytosis. In 80 cases (58%) it was the first presentation of biliary pathology, whereas 57 patients (42%) had previously reported biliary attacks. In 124 patients (90.5%) the pain was confined to the right upper quadrant and epigastrium, whereas in 13 (9.5%) it was more diffuse, involving the whole abdomen. In 62 patients (45%) the temperature reached 37°C, and in 75 (55%) it was more elevated: over 38°C in 36 patients (26%) and over 39°C in 7 (5%). The white blood cell count (WBC) varied between 5,800 and 10,000/cc in 29 patients (21%); it was between 10,500 and 15,000/cc in 67 patients (49%), and over 15,000/cc in 41 patients (30%). The serum bilirubin was over 1.0 mg/dl in 35 patients (25.5%) and over 2.0 mg/dl in 13 patients (9.5%). The clinical diagnosis was supported by ultrasound findings in 127 cases (93%), by HIDA studies (nuclear medicine scan) in 16 cases (12%), and by computed tomography (CT) scan in 2 cases (1.5%). Acute and gangrenous cholecystitis were pathologically confirmed.

All patients were first approached by a laparoscopic technique on an emergency basis as soon as the diagnosis was made. The procedure was performed by one of four senior surgeons, each of whom had performed at least 150 LCs. On admission, the patients were started on cephazolin, 1 g IV q 8h, which was discontinued postoperatively 24 to 48 hours after the temperature had dropped to normal.

Operative Technique

The standard four-trocar technique used for LC was slightly modified for acute cholecystitis. Because the gallbladder was in most cases edematous and friable, it was first aspirated. One of two methods was then used to allow a good hold on the gallbladder: (1) The fundus was opened and the free edge of the opening grasped with regular 5 mm forceps, or (2) larger graspers (mic 500, Ethicon, Somerville, NJ, USA) were inserted through a 10 mm right lower port. The cystic artery and duct were clip-ligated in 89 (96%) of the successfully operated cases. In four (4%) patients, in whom the procedure seemed to be inadequate, an Endoloop (Ethicon) was used. Electrocautery dissection of the gallbladder completed the cholecystectomy. The gallbladder and intraperitoneal "dropped" stones were collected in an endoscopic bag and extracted through the umbilical cannula site, which had to be extended in 67 cases (72%). The decision to leave a closed system suction drain was left to the individual operating surgeon. Fascial closure was attempted only at the umbilical cannula site. The skin at all the cannula sites was closed with staples.

In a selected group of 21 patients (15%) (with serum bilirubin > 1.5 mg/dl or alkaline phosphatase > 150 U/dl) intraoperative cholangiography was performed. Choledocholithiasis was diagnosed in seven of them (5% of the total group). They were converted to open cholecystectomy, their common bile duct was explored, and the stones were removed. These patients were excluded from the study, leaving 130 patients in our prospective audit.

Data Collection

Patients' data sheets were generated containing demographic data and preoperative, operative, and postoperative information. Preoperative notes concerned the history of gallbladder stones, the presence of associated diseases (cardiac, hypertension, diabetes, malignancy), duration of gallbladder complaints (as an indication for the onset of the disease), finding of a palpable gallbladder, temperature, and laboratory results of WBC count, serum bilirubin, diastase, and alkaline phosphatase. Operative data of concern were macroscopic findings (of acute cholecystitis, gangrenous cholecystitis, hydrops, and empyema of the gallbladder), the presence of small stones (≤ 1 cm diameter) or large bile stones (> 1 cm diameter), information regarding perforation of the gallbladder and intraperitoneally "lost" stones, reasons for conversion, and duration of surgery. Postoperative notes of interest included the use of nasogastric tubes and drains, the amount of analgesics used, complications, and length of hospital stay.

Complications were classified as surgical infections (wound infection, subphrenic or subhepatic abscess); noninfectious surgical problems (e.g., bile duct injury, hemorrhage); remote infections (urinary or respiratory); and miscellaneous problems (e.g., atelectasis, deep vein thrombosis).

The collected information was entered into a database as either continuous or categorical variables for statistical analysis.

Statistical Analysis

For comparison of the two groups, chi-square analysis and Fisher's exact test were used when appropriate for qualitative data, and the Student t-test (for normal variables) or the Mann Whitney U-test (for nonnormal variables) for quantitative data. Equality of variances in normally distributed variables was examined by the Levene test. For multivariate analysis the stepwise logistic regression was applied. A probability of 0.05 or less was accepted as statistically significant.

Results

The group of 130 patients treated by emergency laparoscopic surgery for clinical acute cholecystitis consisted of 78 women and 52 men ranging in age from 23 years to 80 years (mean 53.0 ± 15.5 years). There were 44 cases (34%) of acute cholecystitis, 51 (39%) of gangrenous cholecystitis, 21 (16%) of hydrops with chronic distension of the gallbladder due to an impacted stone at the cystic duct with white fluid inside the gallbladder, and 14 cases (11%) of empyema of the gallbladder. Thirty-seven patients (28%) required conversion to open cholecystectomy. Technical difficulties were the main reason for conversion. Additional causes were uncontrolled bleeding and anatomic uncertainty (Table 1). There was no mortality in the study group. The conversion and complication rates for the various operative and pathologic findings are presented in Table 1. The conversion rate of acute gangrenous cholecystitis was significantly higher than that of acute cholecystitis ($p < 0.00001$), and that of the two similar groups with hydrops and empyema of the gallbladder ($p = 0.004$). The difference in conversions between the group with acute necrotizing cholecystitis and the two groups with hydrops and empyema of the gallbladder was not statistically significant ($p = 0.07$). The differences in the complication rate between all the groups were insignificant.

Table 2 presents the significant differences between the group that underwent laparoscopic surgery successfully ($n = 93$) and the group that required conversion (univariate analysis). Postponement of LC following the onset of acute cholecystitis (duration of complaints) did not correlate with the conversion to open cholecystectomy; but when groups with delay periods of up to and including 96 hours and longer than 96 hours were compared, the difference in conversion rate between them was statistically significant. In the earlier operated group the conversion rate was 23% (converted/nonconverted = 23/77) and in the later operated group it was 47% (converted/nonconverted = 14/16) ($p = 0.022$) (Fig. 1). The complication rate was 8.5% in the laparoscopic group and 27% in the converted group (p = 0.013).

Table 3 presents factors that are independently associated with conversion of LC to conventional cholecystectomy and with operative complications (of the nonconverted and converted groups) (multivariate analysis in a stepwise logistic regression). Patients older than 65 years of age, a history of biliary pathology, a nonpalpable gallbladder, WBC count over 13,000/cc, and acute gangrenous cholecystitis were found to be independently associated with a high conversion rate of LC. Male patients, finding large bile stones, serum bilirubin over 0.8 mg/dl, and WBC count over 13,000/cc were independently associated with a high compli-

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Table 1. Operative and pathologic findings: conversion and complication rates.

Parameter	Acute cholecystitis	Necrotizing cholecystitis	Hydrops of gallbladder	Empyema of gallbladder
Total no. of cases	44	51	21	14
No. of converted cases	2 (4.5%)*,**	25 (49.0%)*,***	6 (28.5%)**,***	4 (28.5%)**,***
Reasons for conversion				
Anatomic uncertainty	1	9	1	1
Technical difficulties	—	12	3	3
Bleeding	1	4	2	—
Complications (conversion/nonconversion)				
Wound infection	2	7		
Atelectasis		1/1		
Pneumonia		1	1	
Pancreatitis	1			1
Bile leak	1			1
Subphrenic abscess			1	
Total no.	4 (9%)	10 (20%)	2 (9.5%)	2 (14%)

$*p < 0.00001$; $**p = 0.004$; $***p = 0.07$.

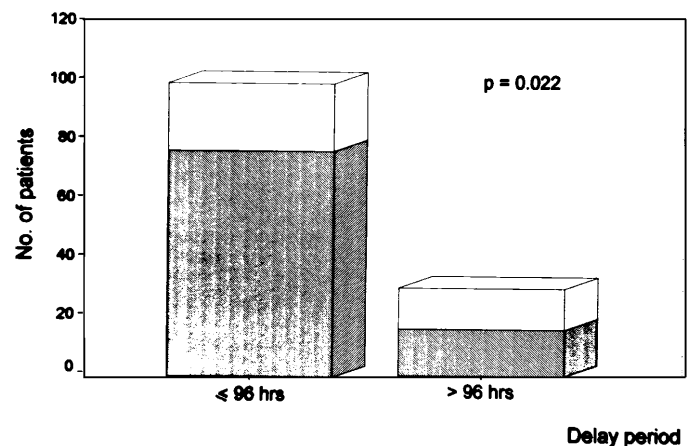**Table 2.** Demographic and perioperative data of the laparoscopically operated and converted groups.

Parameter	LC group	Converted group	p
No. of patients	93	37	
Age range (years)	23–80	29–71	
Mean age ± SD (years)	50.5 ± 16	60 ± 11	> 0.00001
Male/female	30/63	22/15	0.008
History of associated disease (+/−)	30/63	21/16	0.017
Duration of operation (hours)			
Range	0.25–3.0	1.0–3.5	
Median	1.0	2.0	> 0.00001
Nasogastric tube (+/−)	12/81	35/2	> 0.00001
Drainage (+/−)	10/83	25/12	> 0.00001
Antibiotics (days)			
Range	1–8	1–12	
Median	1	5	> 0.00001
Complications (+/−)	8/85	10/27	0.013
Postoperative hospital stay (days)			
Range	1–8	3–47	
Median	2	6	> 0.00001
Analgesics			
Demerol (dose)			
Range	0–450	50–1300	
Median	75	150	0.0022

LC: Laparoscopic cholecystectomy; +: yes; −: no.

Fig. 1. Conversion rate of laparoscopic cholecystectomy for acute cholecystitis. Comparison between groups with delay periods of up to and including 96 hours and longer than 96 hours from onset of complaints. Patients operated: □ converted; ■ non-converted.

cation rate following surgery. The *p* value calculated by the regression model in the multivariate analysis demonstrates the significance of the association between the independent variables and the outcome (e.g., conversion or operative complications). The accompanying odds ratio reveals the strength of association between these same factors.

Discussion

The enthusiastic introduction of LC for uncomplicated cholecystolithiasis and the growing experience with the procedure initiated attempts to further expand the boundaries of this therapy. One of the recent targets for this expansion has been the inflamed gallbladder. Intensive attempts have been made to treat acute cholecystitis with laparoscopic surgery, using the conversion and complication rates as indicators of the safety, cost-effectiveness, and acceptance of the procedure. However, reports are still scanty, inaccurate, and conflicting.

The reported conversion rate of LC to open cholecystectomy for clinically acute cholecystitis varies between 3% [1] and 30% [6]. This wide range is explained by a number of factors: First, the experience with LC for acute cholecystitis is small in most centers and is still on the slope of the learning curve, where improved performance brings about major statistical changes. Second, the reports deal with small numbers of selected cases. Third, the cases reported are usually not homogeneous and are uncontrolled. A number of studies [5, 7] have attempted to address the problem of homogeneity in clinical acute cholecystitis by analyzing the conversion rates of different degrees of inflammation of the gallbladder. Their results are compared to ours in Table 4. The total conversion rate of 28% among our acute cholecystitis cases reflects, first, our unbiased and unselected approach to this

Table 3. Independent factors associated with complications and conversion of attempted laparoscopic cholecystectomy (multivariate analysis).

| | Dependent factors | | | |
| | Complication | | Conversion | |
Independent factors	p	Odds ratio	p	Odds ratio
Age > 65 years			0.048	10.5
Gender	0.078	8.9		
History of biliary disease			0.0250	12.4
Palpation of gallbladder			0.0008	111.2
WBC > 13,000/cc	0.0028	13.7	0.0108	15.25
Bilirubin > 0.8 mg/dl	0.0068	9.1		
Acute gangrenous cholecystitis			0.0001	630.8
Finding of large bile stones	0.0072	8.5		

WBC: white blood cell count.

Table 4. Conversion rate of laparoscopic cholecystectomy to open surgery at various stages of disease.

Operative diagnosis	Singer & McKeen [7] (n = 68)	Cox et al. [5] (n = 98)	Present study (n = 130)
Acute cholecystitis	6/44 (13.6%)	12/55 (21.8%)	2/44 (4.5%)
Gangrenous cholecystitis	18/24 (75.0%)	5/10 (50.0%)	25/51 (49.0%)
Mucocele of gallbladder		1/15 (6.7%)	6/21 (28.6%)
Empyema of gallbladder		15/18 (83.3%)	4/14 (28.6%)

particular group of patients; second, the variety of more complicated forms of disease included in the clinical group of acute cholecystitis; and third, our position on the slope of the learning curve, which we hope to improve. These factors and technical difficulties due to fibrosis, scarring and adhesions in the region of the triangle of Callot brought about by the chronic inflammatory process (noted in three of our cases) may explain the high conversion rate observed in our patients with hydrops of the gallbladder. The number of cases is still small, however, so it is premature to draw final conclusions in this regard. Unlike simple acute cholecystitis, which is associated with reasonable conversion and complication rates, gangrenous cholecystitis carries a 50% conversion rate [5, 7]; when it is laparoscopically diagnosed, experienced teams should be involved in the procedure, or conversion must be seriously considered.

It is worth noting that in our study the complication rates of LC varied with the different forms of disease, though their differences were statistically not significant (Table 1).

An important and yet undiscussed issue of laparoscopic cholecystectomy is the timing of the procedure in relation to the onset of acute cholecystitis. During the era of open cholecystectomy, the time that elapsed from the onset of acute cholecystitis to hospitalization influenced the management of the disease. Schwartz [8], for example, suggested operating within the first "golden" 72 hours from the onset of the inflammation because within this period cholecystectomy is easier and safer. A number of studies of laparoscopic surgery for acute cholecystitis automatically adopted this "golden" 72-hour period [5, 9]. We used the conversion rate of LC to conventional open surgery as an indicator of the "golden" time period for laparoscopic surgery and found that it has extended to 96 hours from the onset of symptoms (Fig. 1). A longer delay was associated with a higher conversion rate to open cholecystectomy.

Although conversion from LC to conventional surgery is regarded as a matter of clinical judgment and not as an operative failure, our finding that it is associated with an increased complication rate cannot be ignored. Although it should by no means lead to avoidance of conversion to open surgery during LC, it should certainly be taken into consideration when planning LC. With the assistance of predictors of conversion, cases and conditions unsuitable for LC can be defined and avoided.

A number of studies have already addressed the question of

predictors of conversion with elective cholecystolithiasis [10–12] and acute cholecystitis [4]. Our finding that in older patients LC for acute cholecystitis was associated with an increased conversion rate to open cholecystectomy has been previously reported for cases of elective cholecystolithiasis [10, 12]. The association of elevated WBCs, gangrenous cholecystitis, and an increased conversion rate from LC to conventional surgery reported in this study supports the findings of previous reports [4, 5, 7]. The association between a history of previous biliary disease and a high conversion rate to open cholecystectomy is explained by local changes of repeated and chronic inflammation. A new and interesting finding of our study on acute cholecystitis is the association of a nonpalpable gallbladder with a high conversion rate. This finding can be explained by (1) previous repeated inflammations producing a scarred and fibrosed gallbladder that is unable to expand to a palpable size or causes significant adhesions around the gallbladder that interfere with LC; or (2) a long-standing, sealed-off inflammatory process that prevents palpation of the gallbladder as well as creating a situation not conducive for resection by LC. These assumptions are supported by the associated history of biliary disease. Of 85 nonpalpable gallbladders, 40 had a positive history of biliary disease compared to only 14 of 45 cases with a palpable gallbladder (p = 0.079, odds ratio 1.97).

Factors found to be independently associated with complications when LC was attempted for acute cholecystitis include male patients, an increased WBC count (>13,000/cc), elevated serum bilirubin (> 0.8 mg/dl), and the presence of large bile stones. It remains to be proved whether these findings indicate that these particular groups should be managed differently or with a different antibiotic regimen.

In conclusion, we found that laparoscopic cholecystectomy can be performed safely for acute cholecystitis, with acceptable low conversion and complication rates in selected cases. There are more favorable and less favorable preconditions for performing the procedure, which may be assessed using the predictors of conversion and complications. Different forms of acute cholecystitis are associated with varying conversion rates. Timing of the LC in relation to the "golden" 96 hours from the onset of the inflammation affects the conversion rate. Older patients, a history of biliary disease, a nonpalpable gallbladder, elevated WBC count (> 13,000/cc), and acute gangrenous cholecystitis were independent factors associated with a high conversion rate. Male patients, serum bilirubin over 0.8 mg/dl, WBC count over 13,000/cc, and the presence of large bile stones were independent factors associated with a high complication rate.

The number of patients in our series is still too small for us to draw final conclusions. The results, however, are fascinating

enough to trigger additional studies. Larger study groups will enable us to evaluate these predictors of conversions and complications more accurately.

Résumé

Etant donnée la placc prépondérante qu'occupe la cholécystectomie coelioscopique (CC) dans la lithiase vésiculaire, on pense que les indications de la CC pourraient s'étendre également à la cholécystite aiguë. Dans ces circonstances, cependant, la CC peut être difficile. Certaines conditions, favorables ou non, peuvent influencer les taux de conversion et de complications. Les connaître pourrait être utile pour trouver les indications optimales de la CC dans la cholécystite aiguë. Les objectifs de cette étude prospective ont été de déterminer les indications et le meilleur moment pour réaliser la CC après le début de la cholécystite aiguë et d'évaluer les facteurs pré et peropératoires associés à une conversion. De Janvier 1994 à Décembre 1995, une CC a été tentée chez tous les patients ayant une cholécystite aiguë dès que le diagnostic a été posé. Toutes les données (préopératoire, peropératoire et postopératoire) ont été recucillies sur des feuilles informatiques standardisées. Des 137 patients enregistrés, 130 dossiers ont été retenus pour analyse. Sept patients ayant une lithiase de la voie biliaire principale, détectée par la cholangiographie peropératoire, ont été convertis pour mieux réaliser l'exploration de la voie biliaire et n'ont pas été inclus dans cette étude. Quatre-vingt trois patients (72%) ont effectivement eu une CC alors que 37 (28%) ont nécessité une conversion. Le taux de conversion a été significativement plus élevé dans la cholécystite gangreneuse (49%), l'hydrocholécyste (28.5%) et l'empyème vésiculaire (28.5%) que dans la cholécystite aiguë (4.5%) (respectivement, p<0.00001 et p=0.004). Les taux de conversion des patients ayant une cholécystite avec nécrose (gangréne) et des patients ayant une hydrocholécyste ou un empyème n'étaient pas statistiquement significativement différents (p−0.07). Le taux de complications de cholécystite aiguë, d'hydrocholécyste, de l'empyème et de la gangrène vésiculaire ont été respectivement de 9%, 9.5%, 14% et de 20% (p=NS). Les patients ayant un délai supérieur à 96 heures entre le début de cholécystite aiguë et l'opération avaient un taux de conversion de 47% alors que le taux de conversion n'a été que de 23% (p−0.022) quand ee délai était < 96 heures. Le taux de complication a été de 8.5% après CC et de 27% dans le groupe «conversion» (p=0.013). Un âge supérieur à 65 ans, une histoire de maladie biliaire, une vésicule biliaire non palpable, une leucocytose supérieure à 13000/ml et une cholécystite aiguë gangreneuse étaient des facteurs indépendants associés à la conversion. Le sexe masculin, la macrolithiase, une bilirubinémie > 0.8 mg% et une leucocytose > 13000 ml étaient des facteurs indépendants associés aux complications après chirurgie laparoscopique, qu'il y ait eu conversion ou non. Conclusions: La cholécystectomie pour cholécystite peut être effectuée avec sécurité par coelioscopie avee des taux de conversion et de complications relativement bas. Les taux de conversion et de complication dépendent du type de cholécystite. La cholécystectomie coelioscopique pour cholécystite aiguë s'effectue au mieux dans les 96 heures aprés le début des symptômes. Les facteurs prédictifs de conversion et de complications sont utiles à connaître avant de prévoir une approche coelioscopique de cholécystite aiguë.

Resumen

El presente es un estudio prospectivo para determinar las indicaciones y el momento ideal de la colecistectomía laparoscópica (CL) a partir del comienzo de una colecistitis aguda, y también para evaluar los factores preoperatorios y operatorios que se asocian con la conversión de la colecistectomía laparoscópica a una colecistectomía abierta en presencia de colecistitis aguda. Resumen de antecedentes. Habiendo establecido que la CL es el procedimiento de escogencia para la colelitiasis electiva, también se la utiliza ahora en el manejo de la colecistitis aguda, en cuyas circunstancias el procedimiento puede resultar difícil y desafiante. Se pueden presentar condiciones favorables y desfavorables que influyen sobre las ratas de conversión y de complicaciones. Obtener información sobre tales condiciones puede ser de utilidad para establecer cuáles son las circunstancias óptimas para practicar la CL o cuando es mejor evitar el procedimiento. Métodos. Entre enero de 1994 y hasta diciembre de 1995, siempre tratamos de practicar CL tan pronto como se hubiera hecho el diagnóstico en todo paciente con colecistitis aguda. La totalidad de la información preoperatoria, operatoria y postoperatoria, fue recolectada en formatos estandarizados. De 137 pacientes registrados, 130 resultaron elegibles para la auditoría. Siete pacientes en quienes la colangiografía laparoscópica intraoperatoria demostró colelitiasis, fueron convertidos para practicar exploración del colédoco y fueron excluidos del estudio. Noventa y tres pacientes (72%) fueron sometidos a CL exitosamente y 37 (28%) requirieron conversión a colecistectomía abierta. Resultados. La tasa de conversión en la colecistitis aguda gangrenosa (49%) apareció significativamente más alta que en la colecistitis aguda no complicada (4.5%) (p<0.00001), que en el hidrops (hidrocolecisto) (28.5%) y que en el empiema (piocolecisto) de la vesícula biliar (28.5%) (p=0.004). Sin embargo, la diferencia en la conversión entre el grupo con colecistitis aguda necrotizante (gangrenosa) y los dos grupos con hidrops y empiema de la vesícula, no fue estadísticamente significativa (p=0.07). Las tasas de complicaciones de la colecistitis aguda, el hidrops, el empiema y la colecistitis gangrenosa fueron 9%, 9.5%, 14% y 20%, respectivamente (p=NS). Los pacientes con una demora en la ejecución de la operación de ó96 horas contadas desde el comienzo de la colecistitis aguda tuvieron una rata de conversión de 23%, en tanto que una demora de >96 horas se asoció con una rata de conversión de 47% (p=0.022). La tasa de complicaciones en el grupo laparoscópico fue de 8.5% y de 27% en el grupo que requirió conversión (p=0.013). Los pacientes mayores de 65 años, con antecedentes de enfermedad biliar, vesícula no palpable, leucocitosis > 13.000/cc3 y colecistitis aguda gangrenosa, aparecieron independientemente asociados con una alta rata de conversión, en tanto que el sexo masculino, el hallazgo de cálculos grandes, una bilirrubina sérica >0.8 mg% y leucocitos >13.000/cc3 fueron todos factores independientemente asociados con altas tasas de complicaciones luego de CL con o sin conversión. Conclusiones. En general la CL puede ser ejecutada en forma segura en la colecistitis aguda, con aceptables tasas de conversión y de complicaciones. Las diferentes formas de colecistitis conllevan diversas tasas de conversión y de complicaciones en casos seleccionados. La CL por colecistitis aguda debe ser practicada dentro de las primeras 96 horas leugo del comienzo de la enfermedad. Los predictores de conversión y complicaciones pueden ser de utilidad en la planeación del aproche laparoscópico en la colecistitis aguda.

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Invited Commentary

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It is generally reported that about 20% of cholecystectomies are performed for acute cholecystitis—hence the interest of prospective studies such as the large series reported herein by Eldar et al. The major findings in this study are that the conversion rate was related either to advanced anatomic lesions or diagnostic delay, and that the postoperative course was worse after conversion.

I agree with the authors that the timing of the procedure is an important issue. The "golden 72 hours" has been suggested by randomized trials [1] of open cholecystectomy; thus the authors' failure to show a statistical significance within this period could be explained by a possible type II error (small sample size). Whatever the length of the delay—72 hours [2], 96 hours in this study, indeed 120 hours [3]—it is essential in my opinion to determine whether the reasons of this delay are patient-driven or physician-driven, with the aim of using some strategy to shorten it; then operating with the laparoscopic approach is feasible and safe.

Fortunately, there was no major bile duct injury in this series. The higher risk of this complication in cases of acute disease is still controversial. A statewide experience showed that acute cholecystitis is associated with increased risk of such a complication [4], whereas a recent review failed to draw a definitive conclusion [5].

Concerning the higher morbidity rate after conversion in this study, a possible bias is the association of several co-morbid factors (their Table 2) and the fact that conversion has been performed in the most difficult cases. Furthermore, the authors did not study the morbidity according to the timing for conversion, as it has been suggested in the literature that a laparoscopy rapidly converted to laparotomy does not involve morbidity. In this way, we have reported in the field of laparoscopic colorectal surgery that morbidity was high when the decision to convert was made late in the procedure [6]. On the other hand, I admit that the conversion rate decreases with experience, so the conversion rate should be reported according to the number of procedures.

Should the conversion be considered a complication of laparoscopic procedure? I think the answer is no, provided that the decision to convert is made before a real complication occurs. In my opinion, it is still reasonable to initiate the procedure laparoscopically and to convert when the basic principles of surgery (i.e., adequate exposure and absolute identity of the anatomy) are not met.

Finally, it is important to note that there is no published randomized trial comparing laparoscopic with open cholecystectomy for acute cholecystitis, which was a reason for exclusion in all randomized trials. Similarly, there is no randomized trial comparing early with delayed laparoscopic cholecystectomy. We look forward to such trials to objectively evaluate the laparoscopic approach concerning the predictive criteria of its safety and its efficacy as well as its cost-effectiveness and the quality of life after surgery.

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