ORIGINAL ARTICLE

# Laparoscopic Cholecystectomy vs Open Cholecystectomy in the Treatment of Acute Cholecystitis

## *A Prospective Study*

*J. A. Lujan, MD, PhD; P. Parrilla, MD, PhD; R. Robles, MD, PhD; P. Marin, MD, PhD; J. A. Torralba, MD, PhD; J. Garcia-Ayllon, MD, PhD*

**Objective:** To compare the results of laparoscopic cholecystectomy (LC) with those of open cholecystectomy (OC) in the treatment of acute cholecystitis.

**Design:** A prospective, nonrandomized trial.

**Setting:** "Virgen de la Arrixaca" University Hospital, El Palmar (Murcia), Spain.

**Patients:** One hundred fourteen patients underwent LC, and 110 underwent OC. The patients underwent surgery within 72 hours of the onset of symptoms. The patients were selected for LC or OC depending on the surgeon's experience in laparoscopic surgery.

**Main Outcome Measures:** Operating time, rate of conversion from LC to OC, complications, and length of hospital stay.

**Results:** Conversion from LC to OC was necessary in 15% of the patients. The mean operating time was 77 minutes for the OC group and 88 minutes for the LC group ($P<.001$). Complications occurred in 14% of the patients in the LC group and in 23% of the patients in the OC group, with no significant differences between the 2 groups ($P=.06$). The number of moderate or severe complications was similar in both groups, whereas mild complications were more common in the OC group ($P<.02$). The length of the hospital stay averaged 8.1 days for the OC group and 3.3 days for the LC group ($P<.001$).

**Conclusions:** Laparoscopic cholecystectomy is a safe, valid alternative to OC in patients with acute cholecystitis. The technique has a low rate of complications, implies a shorter hospital stay, and offers the patient a more comfortable postoperative period than OC.

*Arch Surg. 1998;133:173-175*

*From the Departamento de Cirugia General, Hospital Universitario "Virgen de la Arrixaca," El Palmar (Murcia), Spain.*

LAPAROSCOPIC cholecystectomy (LC) has clearly displaced open cholecystectomy (OC) in the management of simple biliary lithiasis.[1-3] However, the role of LC in the treatment of acute cholecystitis (AC) is somewhat controversial because some surgeons claim that the inflammation, edema, and necrosis experienced by patients with AC make dissection more difficult, which can, therefore, increase the rate of complications.[4] Certain studies have recently found that LC is a safe, efficient technique for cases of AC.[5-7] However, the patients are selected in some of these studies, and some are multicentric; also, some of these studies do not compare the results of LC with those of OC, which is the safest technique for managing AC. This study describes a series of patients with AC who were treated with LC or OC and assesses the results of both techniques.

## RESULTS

Cholecystectomy was performed in 100% of the patients. Intraoperative cholangiography was performed in 72 (63%) of the 114 patients who underwent LC and in 79 (72%) of the 110 patients who underwent OC, revealing 2 cases of choledocholithiasis in the former and 1 in the latter. Conversion from LC to OC was necessary in 17 (15%) of the 114 patients: in 13 for inflammation or adhesions that hampered dissection of the elements of the Calot triangle, in 2 for choledocholithiasis, and in 2 for bleeding of the cystic artery. The mean surgical time was 77 minutes for the OC group (range, 30-165 minutes) and 88 minutes for the LC group (range, 30-180 minutes), with statistically significant differences ($P<.001$) between groups. In the LC group, 18 complications occurred in 16 (14%) of the patients. In the OC group,

## PATIENTS AND METHODS

Between June 1991 and December 1996, we conducted a nonrandomized, prospective study of 224 patients with AC: 114 patients underwent LC, and 110 underwent OC. The diagnosis of AC was established by (1) clinical and laboratory criteria, (2) an ultrasonographic indication of AC, (3) intraoperative findings of AC, or (4) pathological anatomical features revealing the presence of AC. Patients in whom choledocholithiasis was diagnosed preoperatively were excluded from the study. Age, sex, and operative findings are shown in **Table 1**. An antibiotic and antithrombotic prophylaxis was performed during the preoperative period and continued until 24 to 48 hours postoperatively. All the patients underwent surgery within 72 hours of the onset of symptoms. The patients underwent LC when the surgeon (J.A.L., P.P., or R.R.) responsible had experience in laparoscopic surgery (ie, >100 LCs performed in patients with simple cholelithiasis). The surgical technique used for OCs in all patients was a subcostal incision with removal of adhesions plus cholecystectomy. The surgical technique for LCs was performed according to the French school, as described previously.[8] In all patients, intraoperative cholangiography was performed if the caliber of the cystic duct and the amount of inflammation of the Calot triangle permitted. The following data were recorded: operating time; rate of conversion to OC in the LC group; postoperative complications, divided into 4 groups according to severity (**Table 2**)[9]; and length of hospital stay. The statistical analysis used for comparison was the $\chi^2$ test in an analysis of contingency tables and in a subsequent analysis of the residues. When the expected frequency was less than 3, we used the Fisher exact test.

**Table 1. Patient Data**

| Variable | Patients Who Underwent Open Cholecystectomy* | Patients Who Underwent Laparoscopic Cholecystectomy* | P† |
|---|---|---|---|
| Total No. of patients | **110** | **114** | . . . |
| Age, y (range) | 60 (22-88) | 57 (13-85) | .45 |
| Sex ratio (M/F) | 36:74 | 48:66 | .15 |
| Operative features | | | |
| Inflammation | 68 | 64 | .38 |
| Gangrene | 27 | 31 | .65 |
| Empyema | 15 | 19 | .52 |

*All data are given as the number of patients in each group unless otherwise specified.
†Ellipses indicate data not applicable.

**Table 2. Classification of Complications**

| Grade | Concept |
|---|---|
| 1 | Deviation from ideal postoperative evolution, no threat to the patient, spontaneous resolution or minimum bed procedures, without increasing hospital stay |
| 2 | Threat to patient's life, possible need for invasive procedures |
| 3 | Grade 2 complications with residual sequelae, including resection of organs or a persistent life-threatening situation |
| 4 | Death of the patient |

**Table 3. Postoperative Complications According to Severity***

| Grade | Patients Who Underwent Open Cholecystectomy | Patients Who Underwent Laparoscopic Cholecystectomy | P† |
|---|---|---|---|
| 1 | 25 | 12 | <.02 |
| 2 | 3 | 4 | .96 |
| 3 | 1 | 2 | .92 |
| 4 | 0 | 0 | . . . |

*All data are given as the number of patients in each group unless otherwise specified.
†Ellipses indicate data not applicable.

29 complications occurred in 27 (23%) of the patients. A list of the type and number of complications in each group is provided (the grade of the complication is given in parentheses):

| Postoperative Complications | OC Group | LC Group |
|---|---|---|
| Adynamic ileus (1) | 9 | 3 |
| Biliary fistula (2) | 0 | 1 |
| Pulmonary complications (1) | 2 | 1 |
| Phlebitis (1) | 8 | 5 |
| Bile duct injury (2) | 0 | 1 |
| Allergy (1) | 1 | 1 |
| Foreign body (2) | 1 | 0 |
| Wound infection (1) | 3 | 1 |
| Intra-abdominal infection (2) | 0 | 1 |
| Diarrhea (1) | 2 | 1 |
| Intra-abdominal bleeding (2) | 2 | 1 |
| Residual lithiasis (3) | 1 | 2 |

In the LC group, these complications included 1 minor biliary fistula, which closed on the third postoperative day in a patient in whom the cystic duct was not identified during surgery; 1 case of choledochal stenosis caused by a burn from a coagulating crochet hook, which required reoperation a month after the cholecystectomy; 1 case of bleeding of the hepatic bed, which required a blood transfusion; 1 intra-abdominal abscess, drained by radiological puncture; and 2 cases of residual lithiasis 9 and 12 months after LC, which were resolved with endoscopic papillotomy. In the OC group, these complications included 2 cases of bleeding of the hepatic bed; 1 foreign body, which required reoperation in the immediate postoperative period; and 1 case of residual lithiasis 14 months after the operation, which resolved with endoscopic papillotomy. Comparing the complications overall, we found a higher rate in the OC group than in the LC group, with no significant differences between groups ($P$=.06). Regarding severity (**Table 3**), we see that the rate of grade 2, 3, and 4 complications was similar in both groups, whereas the rate of grade 1 complications was higher in the OC group ($P$<.02). The mean length of the hospital stay was 8.1 days for the OC group (range, 4-20 days) and 3.3 days for the LC group (range,

1-12 days), with statistically significant differences ($P<.001$) between groups.

## COMMENT

Laparoscopic cholecystectomy is a clear alternative in the management of uncomplicated biliary lithiasis.[1-3] The advantages and inconveniences of this new procedure are well documented for uncomplicated biliary lithiasis but not so well defined for the treatment of AC. The data published about patients with AC are usually multicentric studies or personal series reviewed retrospectively, and they are sometimes of little value because of the wide variation in the definition of AC and because they include cases with a histological rather than a clinical diagnosis. Our study included patients who were admitted to the emergency department for clinical, analytic, and ultrasonographic manifestations of AC; all the patients had signs of acute inflammation when LC was performed.

The operative time in our series was significantly longer in the LC group ($P<.01$). This is because the surgeon and the emergency department team must get used to managing the laparoscopic material and need time to master the laparoscopic technique; also, LC is more laborious than OC in patients with AC.

The rate of conversion depends, on the one hand, on the surgeon's experience (in fact, most conversions occurred in each surgeon's initial patients) and, on the other hand, on the time when the patient undergoes surgery.[10] All the patients with AC in this series were operated on within 72 hours of the onset of symptoms because at this stage of the disease inflammation is widespread and it is easy to perform dissection of the structures. At a later stage, there is induration, hypervascularity, and the formation of abscesses and necrosis, factors that make dissection difficult. One factor to remember regarding conversion is that it must never be considered a complication but rather a wise move on the part of the surgeon. In our opinion, a low rate of conversion is directly related to an increase in major complications.

The treatment of choice for AC for many surgeons is OC because it has an acceptable morbidity and mortality rate.[11] Any alternative to this treatment must improve the results obtained with this technique. The incidence of complications in our series was greater with OC than with LC, although not significantly ($P=.06$). If we classify these complications according to severity, we see that mild complications (grade 1), which usually occur in any postoperative period (eg, phlebitis and adynamic ileus), were more frequent in patients who underwent OC than in those who underwent LC because the postoperative period was significantly ($P<.01$) longer for these patients (8.1 vs 3.3 days). Conversely, the amount of moderate or severe complications (grades 2, 3, and 4), usually related to surgical technique, was similar in both groups of patients.

We believe that LC is a safe, valid alternative to OC in patients with AC. The procedure has a low rate of complications, implies a shorter hospital stay, and offers the patient a more comfortable postoperative period than OC. The threshold for conversion to OC must be low so that the rate of complications is also low.

*Reprints: J. A. Lujan, MD, PhD, Departmento de Cirugia General, Hospital Universitario "Virgen de la Arrixaca," 30120 El Palmar (Murcia), Spain.*

## REFERENCES

1. Cuschieri A, Dubois F, Mouiel J, et al The European experience with laparoscopic cholecystectomy. *Am J Surg.* 1991;161:385-388.
2. Dubois F, Berthelot G, Levard H. Laparoscopic cholecystectomy: historic perspective and personal experience. *Surg Laparosc Endosc.* 1991;1:52-57.
3. Spaw AT, Reddick EJ, Olsen DO. Laparoscopic laser cholecystectomy: analysis of 500 procedures. *Surg Laparosc Endosc.* 1991;1:2-7.
4. Cameron JC, Gadacz TR. Laparoscopic cholecystectomy. *Ann Surg.* 1991;214:251.
5. Fried GM, Sigman HH, Meakins J, et al. Management of acute cholecystitis by laparoscopic cholecystectomy. *Surg Endosc.* 1992;6:88.
6. Miller RE, Kimmelstiel FM. Laparoscopic cholecystectomy for acute cholecystitis. *Surg Endosc.* 1993;7:296-299.
7. Phillips EH, Carroll BJ, Fallas MJ. Laparoscopically guided cholecystectomy: a detailed report of the first 453 cases performed by one surgical team. *Am Surg.* 1993;59:235-242.
8. Lujan JA, Parrilla P, Robles R, et al. Laparoscopic cholecystectomy in the treatment of acute cholecystitis. *J Am Coll Surg.* 1995;181:75-77.
9. Clavien PR, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery.* 1992;111:518-526.
10. Rattner DW, Ferguson C, Warsahaw AL. Factors associated with successful laparoscopic cholecystectomy of acute cholecystitis. *Ann Surg.* 1993;217:233-236.
11. Norrby S, Herlin P, Holmin T, Sjödahl R, Tagesson C. Early or delayed cholecystectomy in acute cholecystitis? a clinical trial. *Br J Surg.* 1983;70:408-411.