Minilaparoscopic and Laparoscopic Cholecystectomy

A Comparative Study

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Hypotheses: To evaluate the feasibility and safety of the minilaparoscopic cholecystectomy (MLC) and to compare the clinical benefits experienced by patients who undergo MLC with those who undergo laparoscopic cholecystectomy (LC) or 5-mm laparoscopic cholecystectomy (5-mm LC).

Design: Prospective consecutive study.

Setting: A tertiary referral center.

Patients: From September 1, 2000, through June 30, 2001, 90 patients with symptomatic gallstones were randomized to undergo 1 of these 3 procedures.

Intervention: Minilaparoscopic cholecystectomy, LC, and 5-mm LC.

Main Outcome Measures: Duration of surgery, loss of blood, length of hospital stay, resumption of solid food intake, quantity of analgesic dosage administered, development of complications, degree of pain at ports 24 and 48 hours after surgery, and overall cosmetic result.

Results: Subsequent to excluding 6 patients who were converted to LC, there were 30 patients in the LC group, 29 patients in the 5-mm LC group, and 25 patients in the MLC group. The MLC necessitated a longer time to complete the procedure than was the case for the other 2 procedures. There was no notable difference in the mean dosage of the meperidine hydrochloride (Pethidine) administered between the LC and MLC groups, but an apparent increase in the analgesia requirements for the 5-mm LC group was noted when compared with those of the other 2 groups. There was no remarkable difference in terms of blood loss, resumption of solid food intake, hospital stay subsequent to surgery, or surgical-related complication between these 3 groups. The MLC group did have a lower pain score in the subxyphoid port only at 24 hours after surgery compared with the other 2 groups. The cosmetic results were evaluated and no notable difference was noted at 1 week, 1 month, and 6 months after surgery.

Conclusions: Although this study has demonstrated the feasibility and safety of the MLC, it does require a longer surgical time and reflects a reasonably high possibility for the conversion to LC. Furthermore, the MLC did not provide any notable clinical benefit for the tested patients compared with those patients in the LC group. We concluded that there is no reason for the MLC to become the universally accepted mode of treatment for symptomatic gallstones before further improvements are made in the technique and instrumentation.

Arch Surg. 2003;138:1017-1023

Laparoscopic cholecystectomy (LC) has become a standard procedure for the treatment of symptomatic gallstones. It is considered less invasive than open cholecystectomy, what with the laparoscopic technique providing certain advantages compared with open cholecystectomy including a shortened hospital stay, a reduced postoperative pain burden, an earlier return to work and normal daily activity after surgery, and an overall cosmetically more-acceptable wound. The procedure is traditionally performed with two 10-mm and two 5-mm trocars. Recently, many surgeons have demonstrated an interest in reducing the relative size of the laparoscope and the other instruments used for the procedure to reduce the pain associated with port incision. Some of their results have demonstrated that the use of a smaller-sized port was associated with a more satisfactory cosmetic effect than conventional LC with less associated pain and local wound damage. It has not yet been satisfactorily demonstrated, however, that the use of minimized instrumentation will result in any cogent benefit for those patients undergoing the procedure, in terms of the length of the necessary hospital stay, the quantity of the analgesic dose adminis-
tered, and the commencement of solid food intake subsequent to surgery.

The use of 2-mm laparoscopic instruments for performing cholecystectomy in our hospital was introduced in March 1998. Three different methods of LC are commonly used for treating symptomatic gallstones and, for the purposes of this study, we have reserved the term laparoscopic cholecystectomy for all cholecystectomy procedures using instruments ranging in size from 5 to 10 mm; 5-mm LC for those procedures for which the instruments used were 5-mm in diameter; and minilaparoscopic cholecystectomy (MLC) for those procedures using 2-mm instruments.

The aim of this study was to evaluate the safety and feasibility of MLC, the degree of postoperative pain, and the overall cosmetic standard of these 3 types of LC. The study factors included surgical time, postoperative delay prior to the resumption of solid food intake, length of hospital stay, development of any surgical complications, requisite analgesic dose after surgery, degree of postoperative pain experienced for each wound, and overall cosmetic result.

METHODS

PATIENT SELECTION

From September 1, 2000, through June 30, 2001, 90 patients with symptomatic gallstones were randomized. All patients were admitted to the appropriate ward via the outpatient clinic owing to the patient’s presentation with symptomatic gallstones. All of these patients underwent surgery according to an elective schedule. Subsequent to having obtained informed consent from study-participating patients, the allocation of the specific surgical procedure was determined by the random selection of a sealed envelope by the patient. The envelope contained the description of the type of surgery that patient would undergo in the operating room.

SURGICAL TECHNIQUE

All surgical procedures were performed by a single surgical team, all of whom had been thoroughly trained in general surgical techniques and who had more than 2 years of laparoscopic surgical experience.

All patients were administered a single dose of antibiotic agents prior to surgery commencing, following which the specific surgical procedure that the patient was about to undertake was determined in the operating room. The patient was still unaware of which type of surgery would be performed before receiving anesthesia. Following the administration of general anesthesia, the operative field was draped, and the patient was placed, initially, in the supine position.

LC PROCEDURE

A 10-mm incision was made in the umbilical region, after which a Veress needle was introduced into the peritoneal cavity to establish a 15–mm Hg pneumoperitoneum using carbon dioxide gas. A 10-mm trocar (US Surgical Corp, Norwalk, Conn) was inserted into the peritoneal cavity via the umbilical wound. The body position of the patient was then changed to the Trendelenburg position with the right side turned uppermost and the surgeon standing on the left side of the patient. The peritoneal cavity was examined using a 10-mm 30° laparoscope (Karl Storz GmbH & Co, Tuttingen, Germany) with a 3-chip video-camera and light source (Storz) introduced via the umbilical port. Under direct vision, another 10-mm trocar was introduced into the peritoneal cavity in the subxyphoid region and two 5-mm trocars were placed in the right upper quadrant and right flank. Two 3-mm grasps (EndoGrasp, US Surgical Corp) were inserted through the right upper quadrant and flank ports to lift the gallbladder upward. Dissection of the cystic duct and artery was performed by an electrodisssector through the subxyphoid port. Once the cystic duct and artery were exposed, double 10-mm clips (EndoClip; US Surgical Corp) were introduced to ligate the cystic duct and artery and divide them using shears (Endo Shears; US Surgical Corp). A hook dissector (Stryker Corp, Santa Lara, Calif) was introduced through the subxyphoid port to remove the gallbladder from the liver bed. Subsequent to any necessary homeostasis and irrigation having been completed, the gallbladder was removed via the umbilical port under direct vision of the 10-mm laparoscope that was directed to the site through the subxyphoid port. The umbilical and subxyphoid wounds were closed using a standard needle holder with a 1-0 absorbable synthetic polyglycolic acid suture (Dexon; Davis-Geck, Wayne, NJ), but the other two 5-mm wounds were closed using sterilized strips only.

MLC PROCEDURE

The difference between the MLC and LC is the size of the incision and the instruments used. Once the pneumoperitoneum had been set up, a 10-mm 30° laparoscope was inserted into peritoneal cavity via the 10-mm umbilical port and three 2-mm trocars (MiniSite; US Surgical Corp) were introduced into the peritoneal cavity at the same sites as previously described for the LC. Two 2-mm grasps (MiniSite Endo Grasp; US Surgical Corp) were inserted through the right upper quadrant and flank ports to lift the gallbladder upward. Dissection of the cystic duct and artery was performed using electrosissors (MiniSite Endo Shears; US Surgical Corp), these being inserted to the site via the subxyphoid port in a manner similar to that performed in the conventional LC. Once the cystic artery and duct had been exposed, a 2-mm 0° laparoscope (US Surgical Corp) was inserted through the subxyphoid port, after which the cystic duct and artery were ligated and divided using the 10-mm laparoscopic instruments that had been introduced through the umbilical port. The electrosissors were inserted through the subxyphoid port, to remove the gallbladder from the liver bed. Subsequent to necessary homeostasis and irrigation, the gallbladder was removed through the umbilical port under direct vision using a 2-mm laparoscope that was inserted via the subxyphoid port. The umbilical wound was closed using a standard needle holder with a 1-0 absorbable synthetic polyglycolic acid suture (Dexon; Davis-Geck) while the other two 3-mm wounds were closed using sterilized strips only.

FIVE-MILLIMETER LC PROCEDURE

The procedure for the 5-mm LC was similar to that for the LC. The umbilical and subxyphoid ports were established at 5 mm in diameter and the right upper quadrant and flank ports at 2 mm, as was the case for the MLC. A 5-mm 30° laparoscope (Stryker Corp) was inserted through the umbilical port for visualization of the target area. A 5-mm clip (US Surgical Corp) was applied to ligate the cystic duct and artery through the subxyphoid port, although if the cystic duct was too large for the application of a 5-mm clip, a 10-mm clip was applied via the umbilical port with a 5-mm 30° laparoscope being introduced through the subxyphoid port. The umbilical wound was closed using a standard needle holder with a 1-0 absorbable syn-
 Table 1. Demographic and Clinical Characteristics of Tested Patients in the LC, 5-mm LC, and MLC Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>LC Group (n = 30)</th>
<th>5-mm LC Group (n = 30)</th>
<th>MLC Group (n = 30)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>48.2 (14.7)</td>
<td>48.9 (16.7)</td>
<td>49.6 (15.2)</td>
<td>.95</td>
</tr>
<tr>
<td>Sex, F/M</td>
<td>18/12</td>
<td>19/11</td>
<td>18/12</td>
<td>.99</td>
</tr>
<tr>
<td>BMI, mean (SD) [range]</td>
<td>24.3 (5.0) [18.2-36.3]</td>
<td>24.2 (4.1) [17.4-33.7]</td>
<td>24.4 (2.9) [18.5-29.4]</td>
<td>.76</td>
</tr>
<tr>
<td>Operation history, No. of patients</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>.74</td>
</tr>
<tr>
<td>Upper abdomen</td>
<td>3</td>
<td>½</td>
<td>½</td>
<td></td>
</tr>
<tr>
<td>Lower abdomen</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Patologic condition, No. of patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic cholecystitis</td>
<td>24</td>
<td>24</td>
<td>25</td>
<td>.92</td>
</tr>
<tr>
<td>Acute cholecystitis</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chronic with acute exacerbation</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Conversion to LC, No. (%) of patients</td>
<td>0</td>
<td>1 (3.3)</td>
<td>5 (16.6)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index (calculated as the weight in kilograms divided by the square of height in meters); LC, laparoscopic cholecystectomy; MLC, minilaparoscopic cholecystectomy.

The postoperative care was conducted according to the same clinical pathway for all patients who had undergone 1 of these 3 different surgical procedures. Meperidine hydrochloride (Demerol; Smith-Nephew, London, England) in the operating room, such that the pain and the clinical nurses involved remained unaware of which LC procedure was used for which patient in the ward. Postoperative care was conducted according to the same clinical pathway for all patients who had undergone 1 of these 3 different surgical procedures. Meperidine hydrochloride (Pethidine), 1 mg/kg, was administered intramuscularly subsequent to surgery and on patient arousal from anesthesia at the patient's request if the wound pain became intolerable. Acetaminophen, 500 mg every 6 hours, was commenced 24 hours subsequent to surgical completion. Patients were allowed to commence solid food intake as soon as the patient felt that he or she was able to tolerate such nutrition. A 10-cm visual analog pain scale was described to patients by ward nursing staff to assess the pain intensity associated with each of the 4 incisions at 24 and 48 hours subsequent to surgery. The scale ranged from 0 to 10 points and patients can point out a mark along the scale that represented the pain intensity at that time. The timing of the resumption of solid food intake and patient discharge from the hospital, the administered meperidine dosage, and the pain intensity associated with each of the 4 incisions were all measured and recorded by ward nursing staff. As soon as it became clearly apparent to the clinical nurse that the patient's normal activity and diet could be resumed and that there was no sign of any wound infection or postoperative sepsis, the patient was discharged from the hospital. Patients returned to the outpatient clinic 1 week subsequent to the completion of their surgical procedure.

**Statistical Analysis**

All data were collected and entered into a computer database. For continuous variables, statistical analysis was performed using the Kruskal-Wallis test to compare the mean parameter values corresponding to the 3 groups. If any significant differences existed, the Mann-Whitney test was used to compare every data pair corresponding to the 3 groups. For categorical variables, the Fisher exact test was used to analyze data corresponding to the 3 groups. If significant heterogeneity existed, the Fisher exact test was used again, although this time to compare every pair of data corresponding with each of the 3 groups. The results of statistical comparison were defined as significant at $P<.05$. All data are given as mean (SD).

**Results**

From September 1, 2000, through June 30, 2001, 90 patients underwent LC undergoing 1 of these 3 procedures, with, initially, 30 patients allocated to each of the 3 surgical procedural groups. The basic clinical characteristics of the patients are summarized in Table 1. The 3 groups revealed an evenly distributed sex ratio, age, body mass index (calculated as the weight in kilograms divided by the square height in meters), and pathologic abnormality. One patient from the 5-mm LC group and 5 patients from the MLC group switched to conventional LC owing to dense fibrotic or inflamed change of gallbladder. At final tally, there were 30 study participants who derived from the LC group, 29 from the 5-mm LC group, and 25 from the MLC group subsequent to the exclusion of those cases that converted to LC. The clinical results of these 3 procedures are listed in Table 2.

**Surgical Time and Blood Loss**

The mean duration of surgery for patients from the LC, 5-mm LC, and MLC groups was 47.3 (20.8) minutes, 49.8 (20.8) minutes, and 64.8 (27.7) minutes, respectively. Difference was notable when comparing the MLC group with the LC and 5-mm LC groups ($P = .02$ for both such comparisons). If the 6 patients converted to LC were included, the mean duration of surgery became 51.6 (22.8) minutes in the 5-mm LC group and 74.8 (34.3) minutes in the MLC group. The estimated mean blood loss during the surgical procedure was 20.8 (53.8) mL for the LC group, 9.8 (9.3) mL for the 5-mm LC group, and 19.8 (38.9) mL for the MLC group; although for this factor, no statistical difference was discernible between the 3 groups.
POSTOPERATIVE COMMENCEMENT OF ORAL INTAKE OF SOLID FOOD AND LENGTH OF HOSPITAL STAY

The mean interval prior to oral food intake resumption was 10.0 (7.6) hours, 8.4 (3.2) hours, and 9.7 (4.3) hours for the LC, 5-mm LC, and MLC groups, respectively. For this parameter, no statistical difference was detected between any of these 3 groups. The mean length of hospital stay subsequent to surgery was 3.3 (2.3) days, 3.1 (0.8) days, and 3.0 (0.8) days for the LC, 5-mm LC, and MLC groups, respectively. Again no statistical difference was detectable between the 3 groups.

COMPLICATION AND CONVERSION RATE

The following 4 categories of complication were observed following surgery: (1) complications arising as a result of the use of a trocar, (2) bile spillage and/or cystic artery bleeding, (3) bile duct injury, and (4) wound infection. Two patients from the LC group had subxyphoid-port bleeding that was subsequently controlled by the use of a laparoscopic technique to suture the oozing subxyphoid wound during surgery. There was no reported wound infection, cystic artery bleeding, or bile duct injury for any study participants from any of these 3 groups. The occurrence of bile spillage was 4, 4, and 3 cases for the LC, 5-mm LC, and MLC groups, respectively. No statistical difference was apparent when comparing the results corresponding to the 3 groups.

None of the patients in the study group needed to have their planned surgical procedure converted to an open cholecystectomy, but there were still 5 patients (16.7%) in the MLC group who required conversion from MLC to LC because of the surgeon’s inability to dissect the necessary anatomical structures when using 2-mm instruments. There was 1 patient (3.3%) in the 5-mm LC group who required conversion to LC because of the realization that the grasp of the 2-mm instrument was insufficient to hold the inflamed gallbladder.

POSTOPERATIVE ANALGESIC REQUIREMENT AND DEGREE OF WOUND PAIN

Meperidine was administered intramuscularly to 5 patients (16.7%) in the LC group, 13 patients (44.8%) in the 5-mm LC group, and 5 patients (20%) in the MLC group for relief of pain following surgery. The mean dosage was 0.20 (0.40) mg/kg, 0.66 (0.81) mg/kg, and 0.24 (0.52) mg/kg for the LC, 5-mm LC, and MLC groups, respectively. Difference was notable when comparing the results corresponding to the 3 groups.
value for the other 2 surgical groups at 24 and 48 hours after surgery, such comparison revealing notable differences between the LC and 5-mm LC groups at 24 and 48 hours after surgery, respectively (24 hours, \( P = .01 \); 48 hours, \( P = .003 \)). Although the subxyphoid port for the MLC group posed a lower pain intensity level than did that corresponding to the LC and 5-mm LC groups at 24 and 48 hours after surgery, the difference was detectable only when the corresponding value for the MLC group was compared with the LC group at 24 hours after surgery (\( P = .03 \)). The pain score for the right upper quadrant and flank ports at 24 hours and 48 hours after surgery did not reveal any notable difference between the 3 surgical groups.

**COSMETIC RESULT**

The cosmetic result was evaluated on 3 separate occasions, namely, at 1 week, 1 month, and 6 months after surgery. By inquiring as to the patient’s perception of the relative aesthetic acceptability of the surgical remnants, we qualified a scoring system ranging from 1 to 5 (ie, 1 indicating all wounds were prominent; 2, three wounds were prominent; 3, two wounds were prominent; 4, one wound was prominent; and 5 that no wounds were prominent). A summary of the cosmetic results is listed in Table 4. No apparent difference was detectable when comparing the 3 groups at 1 week, 1 month, and 6 months after surgery.

**COMMENTS**

Although the minilaparoscope was used for diagnostic purposes initially in 1980,\(^{12}\) it was not widely accepted by surgeons because of poor image resolution and a narrow visual field. Despite the advancement of fiberoptic materials and the development of miniaturized instruments, it was not until 1998 that the first MLC series was reported.\(^{10}\) Many surgeons are still attempting to focus on the appropriate procedures for reducing the wound size by using small-sized instruments\(^{7,9}\) or on decreasing the number of surgical ports required\(^{13-16}\) in an attempt to reduce the dimension of postoperative wound pain, to shorten the hospital stay, and to improve the overall cosmetic appearance of the surgical site. We have attempted to summarize their results and list them in Table 5. We still used the 4-port method to produce a more effective comparison of the specific pain level associated with this style of surgery. A 10-mm laparoscope was used during most of the procedure for the MLC group, apart from the stage involving the clipping of the cystic duct and cystic artery, because the 2-mm grasp was still insufficiently strong to manipulate and dissect the dense fibrous tissue. Second, because of a single camera and light source system, it became necessary to change from a 10-mm laparoscope to a 2-mm laparoscope during the stage when the cystic duct and cystic artery were ligated by 10-mm clips, which were applied via the umbilical port. Therefore, for the sake of saving surgical time, the preparation of 2 sets of cameras and light sources is required.

Although 2 patients from the LC group did suffer subxyphoid-port bleeding, this was subsequently successfully controlled by the use of a laparoscopic technique to suture the oozing subxyphoid wound during surgery. The results observed in this study, as given in Table 2, indicate that no patient suffered from surgery-related major complications or excessive blood loss, endured a prolonged hospital stay, or suffered a delayed first-food intake subsequent to surgery in the MLC group. These results are clearly promising and support the safety and feasibility of the overall MLC if careful selection of suitable patients is conducted prior to surgery.

For the MLC, some surgeons working at other institutions, as also our group of surgeons have performed the procedure using, principally, a 10-mm laparoscope for gallbladder dissection, then only reverting to a 2-mm laparoscope for clipping the cystic duct and cystic artery.\(^{10,17-19}\) Some other studies have reported using the 10- or 12-mm umbilical port for gallbladder dissection using a 2- or 3-mm laparoscope.\(^{7,9}\) The conversion rates of change to LC corresponding to these 2 methods have varied widely as indicated in literature-cited studies,\(^{6,11,17,18}\) values of 0% to 38% having been previously reported. From our study, the incidence of MLC converted to LC was 16.7% (6 patients) for the MLC group and 3.3% (1 patient) for the 5-mm LC group. Although laparoscopic surgery is a typical learning-curve technique for practitioners, the small caliber of the instruments used were, ultimately, still too weak to dissect any dense fibrotic tissue encountered, or too small to effectively support and hold the inflamed and thickened wall of the gallbladder. For reducing the possibility of con-

<table>
<thead>
<tr>
<th>Time After Operation</th>
<th>LC Group (n = 30)</th>
<th>5-mm LC Group (n = 29)</th>
<th>MLC Group (n = 25)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 wk</td>
<td>4.3 (0.6) [3-5]</td>
<td>4.1 (0.5) [3-5]</td>
<td>4.3 (0.5) [4-5]</td>
<td>.55</td>
</tr>
<tr>
<td>1 mo</td>
<td>4.1 (0.7) [3-5]</td>
<td>4.3 (0.8) [3-5]</td>
<td>4.3 (0.7) [3-5]</td>
<td>.64</td>
</tr>
<tr>
<td>6 mo</td>
<td>4.4 (0.6) [3-5]</td>
<td>4.5 (0.5) [4-5]</td>
<td>4.3 (0.5) [3-5]</td>
<td>.41</td>
</tr>
</tbody>
</table>

**Table 4. Cosmetic Result in the LC, 5-mm LC, and MLC Groups**

Abbreviations: LC, laparoscopic cholecystectomy; MLC, minilaparoscopic cholecystectomy.

*Data are given as mean (SD) [range].
version to LC in the MLC group, further refinements of the surgical equipment necessary for the MLC technique are required before it may be universally adopted as a routine procedure for symptomatic gallbladder-gallstone removal. Further, as other studies have also indicated,9-11 no consistent improvement as regards either the earlier resumption of solid food intake or the relative length of hospital stay was noted in the current study when the MLC was compared with either of the other 2 LC groups.

Several studies have demonstrated that the MLC reveals the advantage of eliciting a reduced level of wound pain and a reduced requirement for postoperative analgesia compared with conventional LC.10,11,17,18 although our study was unable to reveal such a reduction in the degree of postoperative analgesia required when similarly compared. In fact, there seemed to be a marked increase in the postoperative analgesia requirements of test patients from the 5-mm LC group when compared with patients allocated to the other 2 groups. Such a result may be because of the extension of the umbilical wound to facilitate the change to a 10-mm port to accommodate a 10-mm clip or to remove the gallbladder for the first 10 patients of the 5-mm LC group. It would seem reasonable to suggest that the pain emanating from the right upper quadrant and flank port wounds might be able to be effectively reduced by reducing the port size from 5 mm to 2 mm. As listed in Table 3, no detectable difference in the pain score associated with the right upper quadrant and flank port wounds was noted when comparing pain scores corresponding to the 3 groups at 24 and 48 hours after surgery. As regards the subxyphoid wound, although the pain score corresponding to the MLC group was lower than was the case for the other groups at 24 hours postoperatively, there was no notable difference 48 hours after surgery. From our results, in actuality, we may have noted a reduction in the dimension of the incision pain only when port diameter was reduced from 10 mm to 2 mm in the subxyphoid area. The extent of patient-experienced pain associated with the umbilical wound may increase if the dimension of the wound needs to be extended during an LC procedure and, correspondingly, the quantity of the analgesic dose required subsequently would thus increase postoperatively.

Several studies have concluded that the MLC provided a better cosmetic result than was the case for the LC,10,11,17 but such a result was unable to be duplicated in our study. It is difficult to effectively and consistently evaluate the cosmetic result associated with a surgical procedure because no definitive factors exist, and, further, the result may be variable if the factor is interpreted differently by different surgeons and patients. We did not use the terms “patient satisfaction” or “patient acceptance” to qualify the cosmetic result but did evaluate the cosmetic result by inquiring of the patient as to the condition of the incision scar and if patients thought this was prominent or not after surgery. It may thus be a little clearer and simpler to use such a factor to compare the cosmetic result for these 3 groups than would be the case for the use of a possibly very subjective parameter such as patient satisfaction or acceptance.

This comparative study does reveal that MLC is a feasible and safe removal procedure for patients with uncomplicated, symptomatic gallbladder or gallstone, although it does carry a high possibility of converting to LC. The MLC warranted a longer operating time, although it does carry a high possibility of converting to LC. The MLC warranted a longer operating time, although it did reflect the same efficiency as regards the term required for the resumption of solid food intake, the analgesia requirements after surgery, and the length of the patients’ hospital stay as was the case for the other 2 procedures. In this study, however, we were unable to demonstrate that a reduction in the port size would elicit benefits such as a reduced level of postoperative pain or an improved cosmetic result for the tested patients. There is no reason for MCL to become the universally accepted mode of treatment for symptomatic gallstones before further improvements in the technique and some instrumentation advancements are made.

**Table 5. Summary of the MLC Results Compared With LC in the Other Series and Comments**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type of Procedure</th>
<th>No. of Cases</th>
<th>Operation Duration, min</th>
<th>Conversion to LC, %</th>
<th>Analgesic Dose</th>
<th>Recovery of Oral Intake</th>
<th>Pain Score</th>
<th>Length of Hospital Stay, d</th>
<th>Cosmesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuan et al17</td>
<td>MLC 14</td>
<td>Not prolonged</td>
<td>0</td>
<td>Less</td>
<td>Shortened</td>
<td>NE</td>
<td>Shortened</td>
<td>NE</td>
<td>Better</td>
</tr>
<tr>
<td>Gagner and Garcia-Ruiz19</td>
<td>MLC 60</td>
<td>98</td>
<td>5</td>
<td>Less</td>
<td>NE</td>
<td>NE</td>
<td>1.2</td>
<td>Better</td>
<td></td>
</tr>
<tr>
<td>Reardon et al9</td>
<td>MLC 50</td>
<td>88.7 (5.9)*</td>
<td>10</td>
<td>NE</td>
<td>Not shortened</td>
<td>1.5 (0.2)</td>
<td>NE</td>
<td>NE</td>
<td></td>
</tr>
<tr>
<td>Bisgaard et al18</td>
<td>MLC 13</td>
<td>78 (5.5)*</td>
<td>38</td>
<td>NE</td>
<td>NE</td>
<td>1.8 (0.4)</td>
<td>NE</td>
<td>NE</td>
<td></td>
</tr>
<tr>
<td>Sarli and Costi11</td>
<td>MLC 30</td>
<td>50.6 (12.3)*</td>
<td>0</td>
<td>Less but not significant</td>
<td>NE</td>
<td>Lower</td>
<td>1.2 (0.5)</td>
<td>Better</td>
<td></td>
</tr>
<tr>
<td>Leggett et al19</td>
<td>MLC 159</td>
<td>20.9</td>
<td>3.1</td>
<td>More</td>
<td>NE</td>
<td>Higher</td>
<td>NE</td>
<td>NE</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: LC, laparoscopic cholecystectomy; MLC, minilaparoscopic cholecystectomy; NE, not evaluated.

*Data are given as mean (SD).
REFERENCES


