Laparoscopic Cholecystectomy for Elderly Patients

Gold Standard for Golden Years?

Juliane Bingener, MD; Melanie L. Richards, MD; Wayne H. Schwesinger, MD; William E. Strodel, MD; Kenneth R. Sirinek, MD

Hypothesis: Laparoscopic cholecystectomy (LC) has known physiological benefits and positive socioeconomic effects over the open procedure. Although recent studies have questioned the technique’s efficacy in elderly patients (>65 years), we hypothesize that LC is safe and efficacious in that patient group.

Methods: Five thousand eight hundred eighty-four consecutive patients (mean age, 40 years; 26% male) underwent an attempted LC (conversion rate, 5.2%) from 1991 to 2001 at a teaching institution. Of these, 395 patients (6.7%) were older than 65 years. Analysis included patient age, sex, American Society of Anesthesiologists classification, conversion rate, morbidity, mortality, and assessment of results over time.

Results: Elderly patients were predominantly male (64%). Septuagenarians had a 40% incidence of complicated gallstone disease, such as acute cholecystitis, cholelithiasis, or biliary pancreatitis, and octogenarians had a 55% incidence. Overall mortality was 1.4%.

The conversion rate was 17% for the first 5 years of the study period and 7% for the second half. The conversion rate was 22% for patients with complicated disease and 2.5% for patients with chronic cholecystitis. Average hospital stay decreased from 10.2 days to 4.6 days during the first and second half of the study period, respectively.

Conclusions: The results of LC in patients aged 65 to 69 years are comparable with those previously reported in younger patients. Patients older than 70 years had a 2-fold increase in complicated biliary tract disease and conversion rates, but a low mortality rate (2%) compared with results of other authors (12%), despite an increase in American Society of Anesthesiologists classification. Increased technical experience with LC favorably affected outcomes over time. Early diagnosis and treatment prior to onset of complications are necessary for further improvement in the outcomes of elderly patients undergoing LC.

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Approximately 15% of the US population is older than 65 years. The population of persons older than 80 years has increased by 66% during the last century. Fifty percent of women and 16% of men in their 70s have been shown to have gallstone disease, and 20% of the abdominal procedures performed in those older than 80 years are hepatobiliary.

Despite the known socioeconomic effect of laparoscopic cholecystectomy (LC) that is superior to that of the open procedure, the approach to elderly patients with gallstone disease has remained controversial in the medical community. Strong consideration has been given to the nonoperative treatment of gallstone disease in elderly patients. In 1999, Howard and Fromm reviewed the management of gallstone disease, citing a mortality of 12% for patients older than 80 years. They did not find any evidence that mortality is lower with laparoscopic surgery. The present study evaluates the outcomes in an elderly population at a time when LC has become the gold standard for patients with symptomatic gallstone disease.

Methods

Data from all 5884 patients undergoing an attempted LC from March 1991 through June of 2001 at University Hospital of the Bexar County Hospital District and at the Audie L. Murphy Veterans Administration Hospital in San Antonio, Tex, were prospectively collected in a database. Of these, 395 patients (6.7%) were 65 years or older. The patients were divided into 3 age groups: 65 to 69 years (group A), 70 to 79 years (group B), and 80 years or older (group C). Patients’ sex and American Society of Anesthesiologists (ASA) classification were tabulated. The indication for cholecystectomy was recorded as noted in the operative report. Some but not all surgeons performed a routine intraoperative cholangiogram.
Cholelithiasis was addressed by perioperative endoscopic retrograde cholangiopancreatography (ERCP) in 73% of patients and by laparoscopic or open common bile duct exploration in the remainder. Conversion rates and reasons for conversion, morbidity, and mortality were extracted from the database and selected chart review. Charts were reviewed if database entries were incomplete. Complications were classified as class I for minor complications requiring bedside intervention, class II for those requiring interventions such as reoperation or percutaneous drain placement, class III for those with permanent disability, and class IV for death. Biliary tract injuries and cardiorespiratory complications were assessed as a subgroup. Length of hospital stay and complications occurring in patients for whom LC was converted to an open cholecystectomy were included in an intention-to-treat analysis. The results were compared between the groups and assessed over time. Statistical analysis was performed using the t test and the χ² test where appropriate.

RESULTS

The number of elderly patients undergoing LC per year increased during the study period, from 24 patients in the first full year of 1992 to 73 patients for the year 2000 (Figure 1).

The demographic details of the 3 age groups are depicted in Table 1. There were 165 patients in group A, 181 patients in group B, and 49 patients in group C. The patients were predominantly men (64% overall), and the ASA classification rose with age. There were 2 patients with an ASA classification of 4 in the youngest group (65-69 years), 5 patients in the 70- to 79-year-old group, and 3 patients in the group older than 80 years. Most patients underwent cholecystectomy for biliary colic or chronic cholecystitis (62%). Acute cholecystitis was present in 17% of patients, whereas gangrenous cholecystitis occurred in an additional 5% of all patients older than 65 years. Sixteen percent of patients had either cholelithiathiasis or biliary pancreatitis. The indications for operation and intraoperative findings by age group are shown in Table 2. The 2 older groups had a 3-fold and a 4-fold, respectively, higher incidence of gangrenous cholecystitis than the younger group of patients. Thirty-seven (9.3%) of the 395 elderly patients required conversion from a laparoscopic to an open cholecystectomy.

The conversion rate was 17% during the first 5 years and 7% during the second half of the study period (P < .001) (Figure 2). Twenty-two percent of patients with complicated gallstone disease required conversion to the open procedure compared with 2.5% of the patients with chronic cholecystitis. The female-male ratio was 1:1.7 in the overall group of elderly patients and 1:2.4 in the converted group. The conversion rate by age group was 6.6% for the 65- to 69-year-old patients, 11.6% for the 70- to 79-year-old patients, and 10.2% for those patients 80 years or older. The female-male ratio in the different age groups for conversion to the open procedure and for all patients with an attempted LC is presented in Table 3. In 22 patients (63%) in the overall group, the inability to identify the anatomy correctly led to conversion. Bleeding was the reason in 3 patients (9%), common bile duct exploration in 4 patients (11%), and suspected biliary tract injury in 2 patients (6%). Other reasons occurred in 4 patients (11%) and included 1 choledocho- duodenal fistula and 1 inadvertent intestinal injury. In 1 patient, the abdomen could not be accessed for laparoscopy because of dense adhesions after a previous laparotomy, and in another patient, control of the cystic duct stump could not be obtained laparoscopically.

**Table 1. Demographics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age Group, y</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>65-69</td>
<td>70-79</td>
<td>≥80</td>
</tr>
<tr>
<td>No. (%) male</td>
<td>165</td>
<td>181</td>
<td>49</td>
</tr>
<tr>
<td>Mean age, y</td>
<td>66</td>
<td>74</td>
<td>84</td>
</tr>
<tr>
<td>No. (%) male</td>
<td>89 (54)</td>
<td>133 (73)</td>
<td>31 (63)</td>
</tr>
<tr>
<td>Mean ASA classification</td>
<td>2.2</td>
<td>2.5</td>
<td>2.75</td>
</tr>
</tbody>
</table>

**Table 2. Indication for Surgery**

<table>
<thead>
<tr>
<th>Disease</th>
<th>65-69</th>
<th>70-79</th>
<th>≥80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute cholecystitis (gangrene)</td>
<td>19 (1.8)</td>
<td>21 (6.1)</td>
<td>33 (8.1)</td>
</tr>
<tr>
<td>Cholelithiathiasis</td>
<td>13</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Biliary colic</td>
<td>68</td>
<td>60</td>
<td>45</td>
</tr>
</tbody>
</table>

*All values are presented as percentages of patients.

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The overall morbidity rate was 11.9%, and it has changed over time. It increased from 4% at the beginning of the study period, to a peak of 20% in 1996 and was at 8% in 2000 and 2001 (Figure 3). The morbidity rate was 7.3% for patients in group A, 14.4% for patients in group B, and 17.3% for patients in group C. The degree of morbidity differed between the age groups. Complications requiring intervention occurred in 1.8% of the 65- to 69-year-old patients, in 3.3% of the 70- to 79-year-old patients, and in 11.5% of the patients 80 years or older. Cardiac and pulmonary difficulties were the most frequent reasons for intervention in the eldest patient group. Complications causing disability (one myocardial infarction and one stroke) occurred in the eldest group of patients (Figure 3). Biliary tract complications are noted as follows:

<table>
<thead>
<tr>
<th>Biliary Injury</th>
<th>No. (% of Patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duct injury</td>
<td>1 (0.25)</td>
</tr>
<tr>
<td>Retained stone</td>
<td>1 (0.25)</td>
</tr>
<tr>
<td>Bile leak</td>
<td>2 (0.5)</td>
</tr>
<tr>
<td>Subhepatic fluid collection</td>
<td>2 (0.5)</td>
</tr>
<tr>
<td>Common bile duct stricture</td>
<td>1 (0.25)</td>
</tr>
</tbody>
</table>

Two patients with bile leaks were successfully managed with common bile duct stenting and percutaneous catheter drainage. Percutaneous drain placement also resolved subhepatic fluid collection in 2 patients. One injury to the bile duct was noted intraoperatively and was repaired over a T tube after conversion to open cholecystectomy. One retained common bile duct stone was treated with postoperative ERCP, sphincterotomy, and stone extraction. One patient developed a common bile duct stricture months after LC with intraoperative cholangiogram and was successfully treated with ERCP, common bile duct dilation, and stenting. The complication rate for patients who underwent conversion to open cholecystectomy was 27%.

Six patients died, generating a mortality rate of 1.4%. The mortality rate for group A was 0.6%, 2.2% for group B, and 2.0% for group C. All 6 patients had acute cholecystitis. The female-male ratio was 1:3 for the patients who died.

The average hospital stay decreased from 10.2 to 4.2 days (P<.01) over the first and second half of the study period, respectively. The lengths of hospital stay for each age group are shown in Figure 4. The average hospital stay decreased by 41% for the group of patients 65 to 69 years old, by 64% for the patients 70 to 79 years old, and 55% for the patients 80 years or older.

Selection bias has been cited for dismissing previous surgical reports of safety and feasibility of LC in elderly patients. Further, there appears to be a wide regional variation in the use of LC for acute cholecystitis in elderly patients. In New England, the laparoscopic approach was used in 30% to 75% of Medicare patients with acute cholecystitis who were undergoing operative intervention.

We investigated separately the group of patients aged 65 to 69 years because it is included in some but not all studies assessing surgical outcomes in elderly patients. In our study, the group of patients aged 65 to 69 years did not show worse outcomes than our overall group of 5884 patients (mean age, 40 years) who underwent LC throughout the last 10 years. The morbidity rate is the same at 7%, and the conversion rate (6.6% vs 5.2%) is not markedly increased.

Comparison with all 5884 patients who underwent LC throughout the last 10 years confirms that patients older than 70 years are at a higher risk for conversion (5% vs 10%) or for complication after surgical intervention (7% vs 12%). In their recent investigation, Brunt et al concluded that the increase in morbidity and conversion was significant for the extremely elderly patients (>80 years old) compared with 65- to 79-year-old patients. Separate analysis of the 65- to 69-year-old patient group led to different results in our study. The overall conversion rate (9.3%) compares favorably with previously pub-
lished conversion rates of 10% to 35% for elderly patients under inclusion of complicated disease.3-6 Analysis of the conversion rate over time showed a significant decrease from the first to the second half of the study period (17% vs 7%; P < .001). Technological advances (eg, video equipment) and increased surgical experience likely led to improvement of the conversion rate even after the inclusion of “all comers.” Older age and male sex were correlated with higher conversion rates in the group of patients older than 70 years. There was no marked increase beyond that in the octogenarians. Complicated biliary disease resulted in a nearly 10-fold increase in conversion rates for all patients older than 65 years, with an increase in morbidity to 27% for patients undergoing conversion. The reason for conversion was the inability to identify the anatomy correctly in 63% of the patients and was mainly due to acute inflammation, which correlates with the increased conversion rate for complicated disease. Analysis of the morbidity rate over time shows an initial increase from 4% to 22% after the inclusion of patients with complicated disease. Technological advances and increased surgical experience are, again, likely the main reason for improvement to a rate of 8%, despite the inclusion of “all comers.” This also may have contributed to acceptable rates (0.25%) of biliary injury requiring surgical biliary diversion relative to the high rate of complicated disease. Outcomes might also be improved as well with a lower rate of complicated disease. Early diagnosis and treatment of symptomatic gallstone disease could contribute to this.

Morbidity and mortality increased with age as expected. The frequency and severity of cardiopulmonary complications in patients older than 80 years was also encountered.3 It speaks to the limited physiologic reserve of this patient group but remains below the rate reported for open cholecystectomy.7

While Uecker et al5 and Magnuson et al8 did not see a benefit of LC with respect to morbidity and mortality in the management of acute biliary tract disease in the octogenarian, our data suggest otherwise. Uecker et al reported a complication rate of 56% after laparoscopic intervention and 14% after open cholecystectomy for acute cholecystitis. The complication rate after surgery was 17% for octogenarians in our study. More than half the patients older than 80 years had complicated biliary disease and underwent urgent or emergent procedures. The mortality for LC for acute cholecystitis was 22% vs 8.6% for open cholecystectomy in their retrospective review in 2001.3 We report a mortality of 4% after LC for complicated biliary disease in this age group. The risk for this eldest group of patients was markedly lower than that seen in historical results for open cholecystectomy. Mortality rates of up to 12% have been reported with open cholecystectomy in patients older than 80 years. In 1978, Morrow et al8 reported a mortality rate of 10% for emergent open cholecystectomy in 88 patients and 2% for elective biliary surgery in the 49 elderly patients. The respective morbidity was 44% for emergent operations and 22% for elective biliary procedures in patients older than 60 years. Maxwell et al10 performed a discharge database analysis in 11 states from 1988 to 1992. Mortality for 13,466 patients in that database who were older than 80 years and who were undergoing open cholecystectomy was 4.4%. They described a mortality rate of 1.8% for 5034 patients older than 80 years who were undergoing LC. The authors found that a higher proportion of men underwent open cholecystectomy, and the mortality rate for men undergoing open or LC was higher than for women of the same age (2.1% vs 1.6%). Mortality rates for general and open biliary surgery in patients older than 80 years have been reported to range from 4% to 17% since 1990.8-14

Additional support for the benefit of the laparoscopic approach is demonstrated in the decreased length of hospital stay. The decrease is significant for all age groups, indicating that elderly patients also benefit from the minimally invasive approach. However, despite the improvement of LC results over open cholecystectomy, the onset of complications such as acute cholecystitis still leads to an increase in conversion and complication rate. In our opinion, LC should be regarded as the gold standard approach for elderly patients with gallstone disease, especially early symptomatic gallstone disease.

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REFERENCES

DISCUSSION

James A. Madura, MD, Indianapolis, Ind: I thank the Western Surgical Association and the program committee for the privilege of discussing this paper. However, Dr Sirinek, I object at being included in the “elderly” group as designated by the San Antonio group.

The real focus of this paper should be on the patients in their 70s, 80s, and 90s, since the 65- to 69-year-olds did as well as much younger patients. One needs only to read the newspaper to learn that octogenarians run marathons, marry 20-year-old women, and climb mountains. Of more importance, however, are the comorbidities that this group brings to the OR along with their gallstones. We know that acute cholecystitis, choledocholithiasis, and biliary pancreatitis are more morbid and lethal diseases in the extremes of age. In the recent past, papers detailing the higher incidence of such illness in those afflicted with cardiac problems, particularly cardiac failure and following heart transplants, have appeared and detail a very high morbidity rate. The current paper confirms the higher incidence of emergent presentation and complicated disease.

Nonetheless, when one looks at the true elderly patients in this series, the mortality and morbidity is lower than that seen in the open procedure in many reports. Additionally, this group has achieved as good or better mortality and morbidity rates than those seen in the current reports of laparoscopic cholecystectomy in the surgical literature.

My questions for the authors are as follows:

Tell us more about the management of possible choledocholithiasis in these patients. There are reports in the literature suggesting that up to 40% of patients older than 80 years old may have common duct stones.

What percentage of your patients had operative cholangiograms, and in those patients who did not have intraoperative imaging, were symptomatic common duct stones a problem postop? What were your indications for pursuing cholangiography in your elderly patient groups? Even with open techniques and universal intraoperative cholangiography, some stones have been missed. Do you ever consider preoperative ERCP and sphincterotomy to diagnose and/or extract stones, prevent conversion to open procedures, and shorten operative times?

There are some complications that are almost unpreventable and usually lethal, such as heart attack, stroke, and pulmonary embolus. Have you involved any preventative strategies such as preoperative aspirin and perioperative normalization of heart rate and blood pressure as has been reported in the cardiovascular literature recently?

Finally, do you really treat these patients any different than “younger” patients undergoing cholecystectomy? What anesthetic and laparoscopic measures do you utilize to minimize cardiopulmonary complications?

Jose M. Velasco, MD, Skokie, Ill: Thank you very much for giving me hope for the future! I would like to expand on Dr Madura’s question regarding ERCP preoperatively. The question is, if ERCP is to be done, what do you do with those patients? What criteria do you use as to which patient will go on to cholecystectomy? Do you base it on patency of the cystic duct? Do you have any criteria along those lines?

The second question has to do with conversion rate, and I’m talking about patients older than 80 [years]. I agree that the conversion rate in patients older than 80 [years] is higher, probably because of acute cholecystitis. Have you considered or do you have a policy as to how to deal with this group of patients? Do you have any experience in using ultrasound-guided drainage of the gallbladder? What are the indications? We found it to be an extremely useful technique. We perform this technique in the operating room and the worst that could happen is that we have to do a cholecystostomy under local anesthesia.

Raymond J. Joehl, MD, Chicago, Ill: As you clearly documented in your study that the conversion rate is higher in this group of patients who are over the age of 70 [years], have you altered your already informed consent, or do you plan to alter how you provide informed consent based on this higher conversion rate and higher morbidity rate?

Keith W. Millikan, MD, Chicago: Since you document the devastating disease of gallstones in males in their 70s, 80s, and 90s, should men of Dr Madura’s age now be screened for gallstones at the age of 65 since we don’t have to have ultrasound done down in radiology, and most surgeons have them in their office these days?

Merrill T. Dayton, MD, Salt Lake City, Utah: One of the questions that I have relates to the patient whose severity of gallstone disease is matched by their risk factors (ie, patient with a recent MI [myocardial infarction] who is in the 80s or late 70s). Is there a role in your series for cholecystectomy tubes? Is that an operation that still has a place? Did you do any in your series? Perhaps I missed that, but I’d like to know if you ever used that and when you decided to do it.

James J. Peck, MD, Portland, Ore: I rise to emphasize the role of early diagnosis and treatment. Many older patients are stoical and tough. There is a reason why they got to be 80 years old. It was clearly pointed out by our secretary, Richard Thirlby, at the WSA meeting in Chicago, that we only have a short 4-day window of opportunity to use the laparoscopic approach in patients with acute cholecystitis, especially males. Was there a correlation between the conversion rate, morbidity, and mortality and the duration of the symptoms and their gender?

Claude H. Organ, Jr, MD, Oakland, Calif: When can we establish a procedure as being the gold standard? Do you have any general guidelines to justify saying that this is now the gold standard?

Kenneth R. Sirinek, MD, San Antonio, Tex: It’s always pleasant to see that Dr Madura remains paranoid 33 years after working together. I am sure that Dr Zollinger is up there in pancreatic heaven somewhere absolutely happy that you remain paranoid. Jim, I will keep doing whatever I can to, even in your retirement, to keep that factor going.

I do appreciate your comments, though. You asked about how we manage choledocholithiasis, and that wasn’t the gist of the paper, but as Dr Bingener pointed out early on in the series, a lot of the patients who were this old were excluded from the laparoscopic cholecystectomy series. Then with time, just like pregnant patients and morbidly obese patients and those with acute cholecystitis, they were brought into the flock, and as you saw, when that happened, our morbidity and mortality curve and our conversion rate also went up at that time, starting in about 1994 to 1995. But with our approach to handling choledocholithiasis in our patients, we do see a significant number of patients coming in who have passed a common duct stone.

I am really surprised, and I think it is part of our virulent disease that we see in our Hispanic population in San Antonio. We have a lot of patients who come in with elevation in their total bilirubin, their alkaline phosphatase, and a blip in their AST [aspartate transaminase] and ALT [alanine transaminase]. We watch them. We remeasure these. If they go down, we do not study them preoperatively. If they remain constant or go up, then they are candidates for preoperative ERCP. We have an excellent group of gastroenterologists who perform this procedure. They have about a 99% success rate with cannulat-
ing the ampulla and about a 97.5% rate of removing the stones. If we have some difficulty in removing the stone, sometimes we do have to call on our colleagues in interventional radiology to try to help us out percutaneously transhepatically.

There are those of us who have also addressed the common duct stones through the cystic duct. We have pushed stones through the ampulla with the choledochoscope, sometimes even retrieving the stones with balloons. But this does not address any stones that are proximal in the biliary tree as you well know, and that is very frustrating. We do have 2 surgeons on our faculty who trained with Morris Franklin in San Antonio and they do laparoscopic common bile duct explorations and have been very successful. Not all of us: the other 5 general surgeons have refused to go along with making an incision on the common bile duct if we can handle the common bile duct stones postoperatively by ERCP.

You asked about routine IOC [intraoperative cholangiogram], and this is a big debate. Wayne Schwesinger, who is my partner and runs the other main general surgery service, disagrees. Wayne likes to do routine intraoperative cholangiograms. I like to do it selectively, and I don’t think that we have ever proven the benefit. I think it is primarily a teaching point for our residents in a training program so that they can do it, but we do handle most of the problems with choledocholithiasis preoperatively by ERCP, and, in this particular study, we only had 1 patient with a retained common bile duct stone. When we ran our series of about 3600 patients, we looked at this, and we had 27 patients who underwent postoperative ERCP for a suspected retained common bile duct stone. Out of those 27 patients, 9 did not have evidence of a common bile duct stone. Nine had already passed their common bile duct stone, and, as you well know, most of those patients will pass those small common bile duct stones, and 9 did have common bile duct stones. Six of them belong to me, and since I did not do the routine intraoperative cholangiography, but this was not a problem, we only had 9 patients out of total of 3600 at that point in our series, and so based on that data, I decided not to alter my course of therapy.

The question came up about routine precautions that we use in this group of patients. We do use compression devices on all of our patients because of the insufflation of the abdomen with carbon dioxide and because of the reverse Trendelenberg position. We closely monitor the end tidal carbon dioxide in these patients and especially in our group of patients who have impaired pulmonary function, those with COPD [chronic obstructive pulmonary disease], or those who are post-lung transplant, which we seem to have a significant population of those patients. In addition, in our cardiac patients, the anesthesiologists will sometimes elect to give the patients a β-blocker preoperatively to control the double product effect so that they will not develop a tachycardia nor become hypertensive under those circumstances, and it seemed to have worked quite well, although as Dr Bingener reported, we did have 1 patient who did have an MI in the immediate postoperative period and 1 cerebrovascular accident.

Older patients undergo the same technique, and I am glad that somebody pointed that out about changing the consent form, and that is one of the reasons why you review data, so that you can go ahead and change your approach, and thank you for pointing that out to us—that we ought to point out to our older patients that there is an increased risk and complication for them with this procedure. We do have the anesthesiologist’s limit narcotics on these patients, and we also monitor and carefully limit the amount of fluid that these patients are given intraoperatively. A lot of times, depending upon the resident staff and anesthesia and how closely things are being monitored (although we are not considered the captain of the ship), I think it is still up to the surgeons to closely watch what is being done at the head of the table.

We do use cholecystostomy tubes. Dr Scholper from our radiology department has reported our results in the American Journal of Radiology. We differ from the radiologists. We would prefer them to leave the catheter in. Their experience is that they would like to aspirate it once and not leave a catheter. If it’s a recurrent problem, then they will go ahead and leave the catheter in, but they think it’s a source of complications if you leave the catheter in.

Dr Organ, I don’t know how to define the gold standard. I guess he who has the gold makes the rules, and I guess that’s the insurance companies. But we would really believe that laparoscopic cholecystectomy is the gold standard for 2002 for just about all comers.