Hypothesis: Transcystic laparoscopic common bile duct exploration (LCBDE) with biliary endoscopy results in excellent long-term clinical outcome and patient satisfaction.

Design: Prospective cohort study of unselected patients found to have common bile duct stones during laparoscopic cholecystectomy between October 1989 and April 1998. A mailed survey assessed symptoms, outcome, and satisfaction.

Setting: A large community teaching hospital.

Patients: Two hundred seventeen patients with common bile duct stones.

Intervention: Transcystic LCBDE with choledochoscopy.

Main Outcome Measures: Success of LCBDE, morbidity, postoperative symptoms, and satisfaction.

Results: One hundred sixteen surveys (54%) were returned. Mean follow-up was 60 months. The LCBDE procedure failed in 6 patients and endoscopic retrograde cholangiopancreatography was performed in 4 patients (3%). One patient had unsuspected retained stones. No patient had late recognition of retained stones or a bile duct stricture. Abdominal pain was present in 90 patients (89%) preoperatively and in 29 patients (26%) postoperatively (P = .001). The LCBDE procedure reduced 3 specific pain profiles: epigastric, from 47% (n = 54) to 7% (n = 8); back, from 31% (n = 36) to 6% (n = 7); and shoulder, from 18% (n = 21) to 2% (n = 2). When pain persisted, it was different in character in 15%. All nonpain symptoms (such as nausea, bloating, indigestion, and gas) were reduced from 78% (n = 91) to 34% (n = 39) (P = .001) except diarrhea. Diarrhea was present in 24 patients (22%) preoperatively and postoperatively, though it was a new postoperative symptom in 11 patients (11%). One hundred two patients (95%) were satisfied or mostly satisfied with LCBDE.

Conclusions: Pain and nonpain symptoms, while reduced significantly after LCBDE, may persist. The LCBDE procedure does not result in common bile duct strictures or a significant rate of retained stones. This relatively new treatment for common bile duct stones is safe and effective.

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Identifying patients with common bile duct stones (CBDS) remains a diagnostic as well as a therapeutic challenge. Classic symptom profiles have been ascribed to diseases of the biliary tree. However, there often is no clear distinction between symptoms due to gallbladder stones and those caused by CBDS. While surgeons accept that some patients will have persistent symptoms after cholecystectomy because those symptoms were erroneously ascribed to the gallbladder, most believe performing a cholecystectomy and removing CBDS will cure the patient.

In recent years, the traditional approach of open common bile duct exploration has been supplanted by newer, less-invasive procedures. The principal minimally invasive options in the treatment of CBDS include endoscopic retrograde cholangiography with endoscopic sphincterotomy (ES) and laparoscopic common bile duct exploration (LCBDE), either via the transcystic approach or via choledochotomy.

To our knowledge, no studies have compared preoperative and postoperative symptom profiles or measured outcome and satisfaction in patients with CBDS. This study attempts to analyze and quantify patients' perception of preoperative and postoperative pain and nonpain symptom profiles. The long-term outcome data presented provide the first basis for comparison of differing treatments for patients with choledocholithiasis.
PATIENTS AND METHODS

Between October 1989 and March 1998, 217 unselected patients underwent laparoscopy, fluorocholangiography, and LCBDE by a single surgical team with the participation of surgical residents. Preoperative, intraoperative, and early postoperative data were gathered concurrently by the primary surgeon. Laparoscopic common bile duct exploration with flexible fiberoptic choledochoscopy was performed according to techniques previously described in detail.1-3

Outcome was assessed using a survey instrument that was sent to all patients and was returned by 116 (54%). These 116 patients constitute the basis of this article. The 6-page survey tool was developed in conjunction with survey professionals to enhance the validity of the questions, maximize instrument return, and ensure that there was no misunderstanding about the questions being asked. The survey was conducted anonymously by mail or telephone by a single interviewer. The questions prompted patients to describe specific aspects of their preoperative pain and discomfort and the extent to which these were relieved by the operation, and to assess overall satisfaction with the surgical experience. For measures of satisfaction or quantification of symptoms, a Likert scale ranging from 1 to 10 was used.

Statistical analysis was performed using the McNemar test for paired variables. Logistic regression was used to evaluate the relationship between postoperative symptoms and preoperative covariates. Significance was assigned at \( P < .05 \).

RESULTS

Of the 116 patients who responded to the survey, 39 (34%) were male and 77 (66%) female, with an average age of 63 years (range, 11-86 years). One hundred (94%) of 106 patients who underwent the procedure had successful LCBDE via the transcystic approach. The LCBDE procedure was unsuccessful in 6 patients. Of these 6 patients, 2 (1.7%) were observed expectantly without sequelae, 2 (1.7%) were converted to open exploration, 1 (0.9%) underwent laparoscopic choledochotomy, and 1 (0.9%) underwent postoperative ES. Of the 116 patients, 4 (3.4%) underwent postoperative ES (3 had no attempt at LCBDE [1 in the failed transcystic group]). Two patients had a laparoscopic choledochotomy (1 in the failed transcystic group) and 8 patients were observed expectantly (2 in the failed transcystic group).

Mean operative time was 122 minutes (range, 45-280 minutes). Mean duration of postoperative hospitalization was 3.4 days (range, 1-32 days). There was 1 death (0.05%) in the immediate postoperative period and 3 deaths (1.8%) due to unrelated causes late in the follow-up period. Mean follow-up was 60 months (range, 8-102 months). One patient (0.9%) had an unscheduled retained stone 2 weeks postoperatively.

Major complications occurred in 4 patients (3.4%). The only postoperative death in the series was a patient with cirrhosis who developed postoperative bleeding and aspiration pneumonia. One patient had a pulmonary embolus and another sustained an intraoperative pneumothorax. One patient had a transient common bile duct stricture, due to overdistention of the cystic duct, that was treated successfully by stenting the common duct with a T tube for 6 weeks. Minor complications occurred in 8 patients (6.9%). These included trocar site infections (n = 3), mild hyperamylasemia without clinical pancreatitis (n = 3), prolonged fever (n = 1), and ileus (n = 1).

Patients presented with pain (89%) or fever and leukocytosis without pain (11%) as their primary symptom. In addition to pain, nonpain symptoms were present in 78%. Duration of preoperative symptoms varied as follows: hours (6% [n = 7]), days (26% [n = 29]), weeks (21% [n = 24]), months (29% [n = 32]), and years (18% [n = 20]).

The most frequent site of pain was epigastric (47%) followed by right upper quadrant in 29%. Pain also occurred in locations considered atypical (Table 1). The pain was nonradiating in most cases but when it did, it radiated most frequently to the back (31%), the shoulder (18%), or both back and shoulder (12%). Pain was characterized most frequently as stabbing or sharp (45%).

Most patients (74%) reported a significant postoperative reduction in pain symptoms (Table 1) but pain persisted (>6 weeks postoperatively) in 29 patients (26%). Of the 29 patients with postoperative pain, 18 patients had a reduction of pain as measured by a Likert scale, 4 patients’ pain increased (mean of 7 compared with 2 preoperatively on a Likert scale), and 3 patients had the same intensity of pain (5, 6, and 10 on the Likert scale). Unfortunately, 4 patients (3%) who had not experienced pain preoperatively had new onset of pain postoperatively (2, 7, 7, and 8 on the Likert scale).

Nonpain symptoms were common and 1 or more were present in 91 (78%) of the 116 patients. Indigestion (44%), fatty food intolerance (41%), and heartburn (40%) were the most common nonpain symptoms. All nonpain symptoms were reduced (except diarrhea) but were present in 34% postoperatively (Table 2). Diarrhea was present in 22% and persisted in 11% while another 11% developed new onset of diarrhea. Eleven pa-

### Table 1. Location and Incidence of Pain Before and After Laparoscopic Common Bile Duct Exploration*

<table>
<thead>
<tr>
<th>Pain Location</th>
<th>Preoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall occurrence†</td>
<td>90 (89)</td>
<td>29 (26)</td>
</tr>
<tr>
<td>Epigastric</td>
<td>54 (47)</td>
<td>8 (7)</td>
</tr>
<tr>
<td>Right upper quadrant</td>
<td>34 (29)</td>
<td>7 (6)</td>
</tr>
<tr>
<td>Periumbilical</td>
<td>30 (26)</td>
<td>8 (7)</td>
</tr>
<tr>
<td>Right lower quadrant</td>
<td>22 (19)</td>
<td>7 (6)</td>
</tr>
<tr>
<td>Left upper quadrant</td>
<td>18 (16)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Hypochondrium</td>
<td>16 (14)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Left lower quadrant</td>
<td>14 (12)</td>
<td>4 (3)</td>
</tr>
</tbody>
</table>

*All data are presented as number (percentage) of patients. \( P = .001 \) for all pain locations except left lower quadrant (\( P = .02 \)).
†There were 101 respondents for overall occurrence of pain.
tients developed different and multiple nonpain symptoms. These included increased gas and belching in 9 patients (7%), indigestion in 3 patients (2.5%), bloating in 3 patients (2.5%), fatty food intolerance in 2 patients (2%), heartburn in 2 patients (2%), spicy food intolerance in 1 patient (0.9%), and nausea in 1 patient (0.9%). Four patients (3%) who denied preoperative nonpain symptoms developed them postoperatively.

When we used logistic regression to determine which patients were most likely to develop postoperative diarrhea, age was the only significant variable (P = .02). Without age in the model, sex was the only variable selected (P = .09). Young female patients were more at risk to develop post-LCBDE diarrhea.

Satisfaction concerning specific perioperative events and variables was as follows: preoperative education about anesthesia (89%), required tests (79%), and pain (65%). The hospital length of stay was thought to be “just right” by 81%. The median response on the Likert satisfaction scale (range, 0-10) was 9 for a general sense of well-being and 7 for the postoperative appearance of the abdomen. Overall, 95% of patients were “pleased or mostly pleased” with LCBDE.

**Table 2. Occurrence of Nonpain Symptoms Before and After Laparoscopic Common Bile Duct Exploration**

<table>
<thead>
<tr>
<th>Nonpain Symptom</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall occurrence</td>
<td>91 (78)</td>
<td>39 (34)</td>
<td>.01</td>
</tr>
<tr>
<td>Indigestion</td>
<td>51 (44)</td>
<td>14 (12)</td>
<td>.01</td>
</tr>
<tr>
<td>Fatty food intolerance</td>
<td>48 (41)</td>
<td>15 (13)</td>
<td>.01</td>
</tr>
<tr>
<td>Heartburn</td>
<td>47 (40)</td>
<td>18 (16)</td>
<td>.01</td>
</tr>
<tr>
<td>Nausea</td>
<td>42 (36)</td>
<td>3 (3)</td>
<td>.01</td>
</tr>
<tr>
<td>Gas</td>
<td>40 (34)</td>
<td>25 (22)</td>
<td>.01</td>
</tr>
<tr>
<td>Spicy food intolerance</td>
<td>36 (31)</td>
<td>12 (10)</td>
<td>.01</td>
</tr>
<tr>
<td>Vomiting</td>
<td>30 (26)</td>
<td>0 (0)</td>
<td>.01</td>
</tr>
<tr>
<td>Bloating</td>
<td>28 (24)</td>
<td>13 (11)</td>
<td>.01</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>24 (21)</td>
<td>25 (22)</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Jaundice</td>
<td>17 (15)</td>
<td>0 (0)</td>
<td>.01</td>
</tr>
<tr>
<td>Chills</td>
<td>14 (12)</td>
<td>1 (1)</td>
<td>.01</td>
</tr>
<tr>
<td>Fever</td>
<td>11 (10)</td>
<td>0 (0)</td>
<td>.01</td>
</tr>
<tr>
<td>Sweet food intolerance</td>
<td>12 (10)</td>
<td>5 (4)</td>
<td>.07</td>
</tr>
</tbody>
</table>

*All data are presented as number (percentage) of patients.

The short-term efficacy and safety of LCBDE has already been established. There are only a few reports demonstrating the long-term safety of LCBDE. The data reported herein demonstrate that LCBDE was successful in 91% of patients. Morbidity was 3.4%, with 1 unexpected retained stone, 1 death, and no late strictures.

Roush and Traverso examined outcome following LCBDE in a retrospective review. Thirty-two (67%) of 48 patients with CBDs were treated by LCBDE while the remaining patients underwent ES (n = 10), open common bile duct exploration (n = 1), or observation (n = 5). In those patients treated with LCBDE, the initial success rate was 59% but increased to 100% in the later part of the study period. The complication rate and hospital stay were higher in patients initially treated with ES than in patients successfully treated with LCBDE. Persistent postoperative pain was present in 14%. No delayed morbidity from LCBDE was detected (mean follow-up, 1.8 years).

Stoker reported a 94% success rate for LCBDE in 64 patients treated either by laparoscopic transcytoscopic exploration or laparoscopic choledochotomy with T-tube placement. He reported a 5% rate of retained stones and all patients were reported to be “asymptomatic” with normal liver function test results (mean follow-up, 48 months).

Neither study evaluated relief of specific symptoms or patient satisfaction. To our knowledge, this is the first report to assess the effect of transcytoscopic LCBDE with biliary endoscopy and basket stone retrieval on preoperative and postoperative symptoms and patient satisfaction. In our study, most patients with choledolithiasis complicated by choledocholithiasis had both pain (89%) and nonpain (78%) symptoms. "Classic" pain profiles occurred in only 47% and radiation to the back in only 31%. While pain symptoms were completely gone in 74% following LCBDE, pain was significantly decreased in an additional 17% (91% cured or improved). Unfortunately, postoperative pain was unchanged in 6% and worse in 3%.

All nonpain symptoms were reduced by LCBDE but were still present in 34% of patients postoperatively. However, 11 patients developed diarrhea and 9 developed increased intestinal gas. Nevertheless, 95% were “pleased or mostly pleased” with LCBDE.

While no recent reports could be found that analyzed symptoms referable to choledocholithiasis, several studies examined symptoms associated with cholelithiasis. Diehl et al examined the relation of gastrointestinal complaints to the presence of gallstones. Gastrointestinal symptoms in 122 patients with gallstones were contrasted with those of 178 gallstone-free patients. Patients with gallstones more often reported epigastric pain lasting at least 30 minutes (64.2% vs 45.1%, P < .004). The latter patients infrequently complained of lower abdominal pain (12.3% vs 29.9%, P < .002), but more often described pain radiating to the upper back. Gallstone-associated pain usually occurred more than 1 hour after meals, persisted from 1 to 24 hours, and was steady. Although these differences were statistically significant, likelihood ratio analysis indicated that clinical symptoms and signs were relatively weak discriminators of gallbladder disease.

Jorgensen also examined this problem. In their series, 3608 patients were studied. The predictive values of various complaints about pain and discomfort were very low, ranging from 0% to 25%, whereas for “absence of gallstones” the predictive value of no pain complaints was very high, ranging from 93.2% to 94.2%. In patients with stones, the prevalence of upper right quadrant pain during the last 12 months was equal to that in subjects with a normal gallbladder. They concluded that in a random population it is difficult to define the symptoms specific for gallstones.

Wegge and Kjaergaard performed a prospective evaluation of the value of 37 symptoms and signs of gallstones in 192 patients admitted to the hospital with upper abdominal pain. The evaluation showed that the classic signs and symptoms are relatively poor in establishing...
the diagnosis of gallstone disease, but their absence is a relatively good indicator for excluding the diagnosis. The multivariate analysis showed that the diagnosis of gallstone disease depends on intolerance to fatty foods, severe pain, and tenderness in the upper right quadrant.

On the other hand, there are many studies reporting the “success” of open cholecystectomy, laparoscopic cholecystectomy, and comparisons of both. Methods used include physician interviews, medical record reviews, and questionnaires. The cure of pain symptoms ranges from 69% to 100%. Most studies with a follow-up of 1 year or more report lower success rates (69%-80%). Some suggest classic pain symptoms are always cured while the report by Gilliland and Traverso suggests otherwise, as does ours. The few reports that mention postoperative nonpain symptoms report an incidence of 22% to 26%. Luman et al reports that preoperative complaints of bloating and constipation and use of psychotropic medication is associated with persistent postoperative symptoms.

Gilliland and Traverso sampled the responses of 525 patients contacted approximately 45 months after open cholecystectomy. Of those patients who had predominantly pain symptoms preoperatively, 88% reported complete symptomatic relief. Of interest is that of those patients claiming partial or no relief, almost 66% had been thought to have had complete relief by their surgeon at the last office visit.

Stefanini et al retrospectively studied 212 (26%) of 800 surveyed patients who remained symptomatic after cholecystectomy (mean follow-up, 4 years). All patients were believed to have typical biliary colic preoperatively. Of the 212, 14% had biliary abnormalities that were overlooked at surgery and 86% complained of persistent or new pain and nonpain symptoms.

Our previous study of 573 patients after laparoscopic cholecystectomy (mean follow-up, 48 months) showed pain reduced from 75% to 25% and nonpain symptoms from 80% to 43%. Certain preoperative variables predicted that nonpain symptoms would persist after operation. These included diarrhea, fatty or spicy food intolerance, aged younger than 40 years, and the presence of both pain and nonpain symptoms preoperatively. The probability of persistent nonpain symptoms increased by 64% for each preoperative nonpain symptom.

Most reports consider “typical” biliary pain as epigastric or right upper quadrant, with radiation through to the back or shoulder, lasting hours as opposed to minutes, and frequently awakening patients at night. Our study made no attempt to classify patients as typical or atypical. Instead we looked at pain and nonpain symptoms and hoped to identify which symptoms would be ameliorated by LCBDE. Our results show that patients with CBDS have significant relief from pain and nonpain symptoms, including atypical symptoms, while classic symptoms may still be present after surgery. Also, patients with proven CBDS who are cured by surgery have a small but real incidence of postoperative complaints, which suggests that some of these symptoms (especially diarrhea) may be related to the effects of cholecystectomy.

In summary, LCBDE represents a treatment for CBDS that is safe and effective and results in a high degree of patient satisfaction. It does not result in common bile duct strictures or a significant rate of retained stones. However, pain and nonpain symptoms, though significantly reduced, may persist following laparoscopic cholecystectomy and CBDS extraction. Additionally, a small percentage of patients may develop new pain and nonpain symptoms, especially diarrhea and bloating. Awareness of these results should improve physician and patient expectations while providing a basis to compare alternative treatments for CBDS.

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References

DISCUSSION

Lawrence Way, MD, San Francisco, Calif: The purpose of this study was to determine in a scientific, unbiased manner the clinical status of a large group of patients who had undergone laparoscopic cholecystectomy and laparoscopic common bile duct exploration (LCBDE) on an average of 5 years previously. The centerpiece of the study was a questionnaire that asked the patients retrospectively to compare their preoperative and postoperative symptoms. The results showed that pain thought to be caused by gallstone disease was usually although not always relieved by surgery, and other symptoms typically associated with gallstones were often, but less predictively, relieved. These findings conform closely with previously published observations that were confined, however, to patients who had cholecystectomy without LCBDE. Thus, one can be fairly confident in predicting preoperatively that presumed biliary colic will be eliminated by cholecystectomy with or without LCBDE, but for symptoms such as food intolerance and bloating the outcome is good but less certain. Remember that population studies have demonstrated that all of these symptoms are common in the general population, irrespective of the presence of gallstones. So a certain background incidence is not surprising. I have a few questions. First, is information available on the reliability of patients' recall of symptoms they experienced as long as 5 years previously? The study assumes that it would be accurate, but the question could be validated. Secondly, the text of the paper discusses the results in terms of LCBDE, whereas in fact the preoperative complaints appear likely in most cases to have been caused by the gallbladder stones, not the common bile duct stones. This led me to wonder whether to make the point, you might have been able to select a subset of patients whose clinical findings were more typical of common duct stones and to compare their before and after status with that of patients whose stones were confined to the gallbladder. This, I imagine, would help to control for the gallbladder disease. A final question, which is related to the last one: If you eliminated from consideration the patients with common duct stones who had jaundice, cholangitis, or pancreatitis, would the symptoms among the remainder differ from the symptoms of patients with gallbladder stones alone? The issue is whether the character of pain, bloating, and food intolerance, for example, varies with common duct vs gallbladder stones.

This is a unique, original contribution that has expanded knowledge concerning common duct stones. My questions only reflect additional thoughts stimulated by reading the manuscript.

Leon Morgenstern, MD, Los Angeles, Calif: My comments are less about the symptoms than the procedure. I have watched Dr Phillips for 10 years now and his associates and admired him, not only for his proficiency in technique but also for the careful statistics that he has kept. But the last time I commented on this subject it seemed to me that the advocates of laparoscopic ductal exploration were like preachers speaking to a small choir with an even smaller congregation. I wonder if that is still true—whether most surgeons, particularly in this society, opt out of doing laparoscopic ductal explorations and leave it to another person, an endoscopist, to solve the problem at a later time.

Karen Deveney, MD, Portland, Ore: Some of the comments that I make reflect some of the thoughts that Dr Way has already expressed, but also I was struck by the fact that many of these symptoms are nonspecific and possibly not pertinent to the operation itself, such as gas, bloating, and heartburn. What then is the relevance of these symptoms in your patients, and should we even be looking at these? There may be both positive and negative effects on these symptoms by performing an operation, for instance, the placebo effect may be responsible for some symptom resolution. The inspection of your data reveals that the symptoms that were most likely related to the presence of common bile duct stones themselves, such as fever, chills, and jaundice, were very well relieved postoperatively whereas the nonspecific symptoms were not, a not-too-surprising outcome. Since this study is a retrospective study, you may not be able to do this, but can you distinguish how many of the patients were presenting for treatment because of symptoms of disease in their gallbladder vs symptoms of disease in their bile duct, and did the success of the resolution of symptoms differ in these 2 groups?

I wondered whether an intraoperative cholangiogram is done routinely in all of your patients who undergo laparoscopic cholecystectomy. Do all patients who have a positive intraoperative cholangiogram then get duct exploration or not? You mentioned in the abstract that choledochoscopy was done in these patients, but you didn't comment on what this contributed to the management of the patients. Did you routinely perform choledochoscopy and did it help or add anything to the fluoroscopic cholangiograms?

Namir Katkhouda, MD, Los Angeles: I am impressed by the high success rate of transcystic LCBDE. We have not had the same success. I would like to know what the limits are of this approach vs tackling the common bile duct itself?

Dr Phillips: I would like to start with Dr Way's questions regarding the survey instrument and retrospective analysis. This subject was brought up in the discussion of this morning's paper on lymphedema. Certainly people who fall out at either extreme of being incredibly happy or incredibly unhappy usually take time out to answer these questionnaires. Consequently our goals of identifying late complications such as recurrent stones, bile duct strictures, and bile duct cancer would be met as these problems would have come to the fore. I am sure that the patients who did satisfactorily in their view and were busy didn't take time out to fill the questionnaire, but a 54% response rate is really excellent and did give us 116 patients, so I think that it is a good enough sample to get some information as long as we keep in mind the caveat that there is bias in any survey.

Regarding patient recall 5 years later, though obviously it is not perfect and would tend to underestimate pain, knowing that you are filling out a survey about an operation that you probably didn't want to have, you would go back and think of the most dominant pain in your mind. That is why I like it better than the physician surveys because of physician bias as to expected outcomes. We actually do have data preoperatively of what I and my colleagues wrote down about the patients' complaints and we did have a much higher incidence of complaints, but the physician asks, "Are you having pain here, or are you having pain in the right upper quadrant? Is it going through the back?" Whereas this survey 3 years later gave pictorial diagrams and they had to point out on the picture where their pain was. So I think in some ways it shows what is most important to them, and I found it interesting that even atypical pain was relieved—left upper quadrant pain, some periumbilical pain, even lower abdominal pain.

Regarding the subset of patients who had complications, such as cholangitis, and analyzing the data to determine whether we could discriminate between those patients who had complications due to common duct stones vs patients who had complications from gallstones—that is an interesting problem because clinically there are times we have a jaundiced patient with fever and the patient has either acute cholangitis...
toms: I think the key is that if a patient comes to you and says
in frequency.

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be the standard of care but it is not going to blossom the way
dents learn the technique, it will increase in frequency. It will
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has to be guarded carefully so that it is not broken. In sum-
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safer, much more elegant, and much more accurate to do cho-
Deveney’s questions about choledochoscopy, it is incredibly
not necessary. Yet, the LCBDE is not a perfect technical pro-
we really don’t want that patient to have a sphincterotomy if
have an 8-mm CBDS during laparoscopic cholecystectomy and
stomies and then deleted them from the overall group. In fact,
we have not, and it’s a good suggestion. Approximately 30%
were admitted with either cholangitis or cholecystitis with
common duct stones. That is an interesting point. We did
look at the subset of patients who had endoscopic sphincter-
tomy, and they had no difference from the overall group in
terms of their preoperative and postoperative pain and non-
pain symptoms.

In response to Dr Morgenstern’s question, is LCBDE in-
creasing in prevalence, there is a slow growth and interest in it
because we are all confronted with that 45-year-old patient who
has an 8-mm CBDS during laparoscopic cholecystectomy and
we really don’t want that patient to have a sphincterotomy if
not necessary. Yet, the LCBDE is not a perfect technical pro-
cedure. In my mind, which I will comment on regarding Dr
Deveney’s questions about choledochoscopy, it is incredibly
safer, much more elegant, and much more accurate to do cho-
ledochoscopy, but it is an expensive piece of equipment that
has to be guarded carefully so that it is not broken. In sum-
mary, there will be a slow growth in LCBDE, and as the resi-
dents learn the technique, it will increase in frequency. It will
be the standard of care but it is not going to blossom the way
laparoscopic cholecystectomy blossomed. But it will increase
in frequency.

To answer some of Dr Deveney’s questions about specific
nonpain symptoms and what the relevance is to those symp-
toms: I think the key is that if a patient comes to you and says
they are bloated and they have diarrhea, you are only going to
give them a 50-50 shot, which is like flipping a coin, that those
symptoms are going to get better after cholecystectomy. Whereas,
obviously, if somebody comes in with jaundice and fever, etc,
you are going to say, we’ll cure you. That is the value of a study
like this. It is to educate your patients as to what to expect. It
is striking that there was an 11% incidence of new diarrhea af-
after surgery. That has been noted before but has to be rein-
forced. Most surgeons feel if a common duct stone is found and
removed, the patient will be cured. Unfortunately, it’s just not
the case.

Regarding the question about cholangiography, we do rou-
tine cholangiography in all of our patients. We have a wall-
mounted fluoroscopic unit in the operating room. We do this
both to train residents and also because we believe that elimi-
nating 1 level III bile duct injury pays for all the unnecessary
cholangiograms. We have had experienced surgeons misiden-
tify the common duct thinking it was the cystic duct, put a clip
on it, do a gram, and then only see the distal common duct.
That patient ends up with a T-tube instead of an excision of
their common duct. So we are advocates of routine cholangi-
ography, and that is how we have identified a lot of patients
with CBDs.

I would like to answer Dr Katkhouda’s question regard-
ing applicability and success rate of LCBDE. There are several
points I would like to make. (1) It’s important to have all of
the equipment in one place so it’s readily available. (2) It’s ap-
licable in patients whose stones are less than a centimeter in
size and distal to the cystic duct entrance into the common duct.
(3) The dissection of the cystic duct junction to the common
duct is also important, and lastly the experience in flexible en-
doscopy and use of wire baskets is critical. All this being said,
there are different patient populations and at County Hospital
these are more complicated cases that will decrease the suc-
cess rate.

So in summary, I don’t think that we are not going to be
able to answer the question with this type of study as to which
symptoms are due to gallstones and which are due to the com-
mon duct stones, but I think it will help us counsel our pa-
tients as to their expectations following bile duct surgery.