

Biliary Pancreatitis

The Era of Laparoscopic Cholecystectomy

Wayne H. Schwesinger, MD; Cary P. Page, MD; Glenn W. W. Gross, MD;
Joseph E. Miller, MD; William E. Strodel, MD; Kenneth R. Sirinek, MD, PhD

Objective: To evaluate the efficacy and safety of a combined approach to the treatment of biliary pancreatitis using laparoscopic cholecystectomy and selective endoscopic retrograde cholangiopancreatography (ERCP).

Design: Consecutive case series.

Setting: Tertiary care center.

Patients: All patients undergoing primary operations for biliary pancreatitis during 2 time periods were included. In the open era (June 1982 through May 1988), there were 276 patients; in the laparoscopic era (January 1996 through June 1997), there were 114 patients.

Interventions: Open cholecystectomy with or without common bile duct exploration (CBDE); laparoscopic cholecystectomy with selective ERCP and/or laparoscopic CBDE.

Main Outcome Measures: Two periods were compared for morbidity, mortality, the duration of preoperative and postoperative stays, and the total length of hospitalization.

Results: Both groups were demographically similar and had the same mortality (1.9%). Laparoscopic cholecystectomies provided a preoperative stay comparable to open cholecystectomy (6.4 vs 5.8 days), a shorter postoperative stay (1.5 vs 8.5 days), a lower incidence of CBDE (6.6% vs 26%), and a lower morbidity (8% vs 13.7%). The addition of an ERCP to laparoscopic cholecystectomy was associated with prolongation of the preoperative stay (7.4 vs 5.0 days), a comparable postoperative stay, a lower conversion rate (7.5% vs 13%), and fewer CBDEs (3% vs 13%). In 27 (42%) of the 64 ERCP cases, no stones were found.

Conclusions: Treatment of biliary pancreatitis with combined laparoscopic cholecystectomy and selective ERCP is safe and effective and is associated with a shorter hospitalization and fewer CBDEs than open cholecystectomy. Unnecessary ERCPs can be reduced by improved selection criteria or greater dependence on operative CBDE.

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THE CLINICAL course of acute pancreatitis is usually self-limited and relatively benign. However, adverse outcomes can occur and a mortality approaching 9% has been reported.¹ Overall, the prognosis of biliary pancreatitis appears to be worse when gallstone impaction in the papilla persists, or when cleared it recurs. For this reason, it is generally agreed that successful surgical therapy requires a 2-pronged approach: the timely removal of the gallbladder and the complete clearance of any residual calculi from the biliary system. Before laparoscopic surgery was available, the question of proper timing for the operation was vigorously debated. We and many others came to favor a selective approach, managing most patients nonoperatively until symptoms resolved and then electively performing cholecystectomy,

and, when necessary, common bile duct exploration.^{2,3} More urgent surgery was then reserved for those few patients whose conditions either failed to improve or deteriorated during conservative management. This approach was validated by the decreased morbidity and the reduced frequency of symptomatic recurrences that ensued.

Since the advent of minimally invasive techniques, new therapeutic strategies and clinical questions have emerged. Not surprisingly, several controversies have also developed. In particular, the use of preoperative endoscopic retrograde cholangiography (ERCP) to evaluate the biliary system and to clear intraductal stones has been increasingly challenged as both unnecessary and cost-ineffective.⁴ An alternative approach, employing laparoscopic techniques to extract common duct stones, is gaining momentum; several re-

From the Departments of Surgery (Drs Schwesinger, Page, Miller, Strodel, and Sirinek) and Medicine (Dr Gross), University of Texas Health Science Center at San Antonio.

PATIENTS AND METHODS

Between January 1996 and June 1997, 1050 consecutive patients with gallbladder disease underwent cholecystectomy at either the University Hospital or the Veterans Administration Hospital at San Antonio, in Texas, and were prospectively enrolled in our computerized surgical database. Gallstone pancreatitis was diagnosed in 114 patients (10.9%) who are the subject of this article. The diagnosis of acute pancreatitis was established by the presence of serum amylase and lipase elevations greater than 4 times normal together with typical abdominal pain and tenderness. Gallstones were demonstrated in all cases by ultrasound examination and confirmed at operation. Computed tomography was used selectively in equivocal cases or to resolve specific questions about ductal, hepatic, or pancreatic structure.

An ERCP was performed when common bile duct stones were strongly suspected based on a persistently or recurrently elevated serum total bilirubin level and/or sonographic abnormalities suggesting choledocholithiasis. Intraoperative cholangiography was performed selectively to better define the biliary anatomy or to exclude common bile duct stones.

Medical records and endoscopic and operative reports were reviewed to quantitate or confirm selected indicators of outcome such as morbidity, mortality, and length of hospital stay. Mortality was defined as any death occurring during hospitalization or within 30 days of the operation. All relevant data were then compared with those from a similar database previously generated from the University and Veterans Administration hospitals between June 1982 and May 1988 in which the results of open operations for biliary pancreatitis were reported.²

A Student *t* test was used for the statistical treatment of continuous variables and χ^2 analysis was applied to all discrete variables. Statistical significance was defined as $P < .05$. Where appropriate, each value was reported as the mean \pm SEM.

cent studies have confirmed the efficacy and safety of duct clearance using transcystic methods or choledochotomy.^{5,6} To help clarify these changing patterns of practice, we examined a recent 18-month experience with patients treated laparoscopically for biliary pancreatitis and compared their outcomes with those from a prelaparoscopic cohort collected at the same medical center.

RESULTS

The characteristics and clinical outcomes of the 2 patient populations are given in **Table 1**. In 102 (89.5%) of the total group of 114 laparoscopic-era patients, cholecystectomy was successfully completed laparoscopically. Twelve other patients (10.5%) required conversion either for technical reasons ($n=9$) or to manage common bile duct stones ($n=3$). When combined with selective endoscopy, laparoscopy resulted in a lower over-

Table 1. Characteristics and Clinical Outcomes of Cholecystectomy Patients in 2 Eras*

	Laparoscopic Era: 1/96-6/97	Open Era: 6/82-5/89
n	1050	3060
Biliary pancreatitis	114 (10.9)	276 (9)
Age, y	43.3 \pm 0.5	41.8 \pm 8.8
Sex, No. of M/F	36/78	90/186
Preoperative stay, d	6.4 \pm 0.7	5.8 \pm 0.5
Postoperative stay, d	1.5 \pm 0.1	8.5 \pm 1.3†
Elective operation	91.5	63†
Common bile duct exploration	6.6	26†
Morbidity	8	13.7
Mortality	1.9	1.8

*Values are given as mean \pm SEM, percentages, or number (percentage).

†Denotes $P < .05$ for laparoscopic vs open cholecystectomy.

all morbidity and a shorter hospitalization than open operations.

In the open era, urgent surgery was required in 102 (37%) of the 276 patients, usually because of persistent symptoms or retained intraductal stones. By contrast, most of the recent patients have been able to undergo an elective operation; only 12 patients who underwent laparoscopy (10.5%) required an urgent procedure. In part, this difference can be accounted for by the fact that preoperative ERCP was used in more than half of the patients undergoing laparoscopic cholecystectomy. In 28 (43.8%) of these 64 cases, ductal stones were unequivocally demonstrated and in 27 they were endoscopically removed. Patients from 9 additional cases (14.1%) had either a torn papilla or intraductal debris indicating that stones had already spontaneously passed. In 27 cases (42%) no stones or debris were found. These were considered to be unnecessary ERCPs.

An operative cholangiogram was obtained in all of the open-era patients and in 49 (43%) of the patients who underwent laparoscopy. Two of the patients who underwent laparoscopy and in whom ductal stones were extracted during preoperative ERCP were also found to have stones in the common bile duct during intraoperative cholangiography. Each patient subsequently underwent a postoperative ERCP. A single stone was extracted in one patient, but none was found in the other; it was presumed to have passed. One additional patient with no stones on ERCP was found to have multiple intraductal stones at the time of laparoscopic cholecystectomy, but intraoperative removal was considered impractical. Accordingly, an ERCP and sphincterotomy were performed on the first postoperative day and all stones were endoscopically extracted.

Five patients who had undergone laparoscopy but who had not undergone preoperative ERCP were unexpectedly found to have stones in their common bile duct at the time of operative cholangiography. Attempts at transcystic extraction were successful in 2 cases but unsuccessful in 3 others: 1 because of impaction in the papilla and 2 because of stones located proximal to the cystic-common duct junction. Two of these patients were converted to an open procedure to allow exploration of the

Table 2. Outcomes in Patients Undergoing Laparoscopic Cholecystectomy (LC) Alone or in Combination With ERCP*

	LC Alone	LC and ERCP
n	42	72
Preoperative stay, d	5 ± 0.5	7.4 ± 1.1
Postoperative stay, d	2 ± 0.3	2.5 ± 0.7
Total No. of days hospitalized	7	10.5
Conversion	13	7.5
Common bile duct exploration	13	3†
Morbidity	8	10

*Values are given as either mean ± SEM or percentage. ERCP indicates endoscopic retrograde cholangiopancreatography.

†Denotes $P < .05$ for LC and ERCP vs LC alone.

common bile duct and 1 was managed by postoperative ERCP and sphincterotomy.

The impact of the ERCP itself on clinical outcomes is given in **Table 2**. Patients in whom laparoscopic cholecystectomy was combined with ERCP had a longer preoperative stay compared with the patients who were treated with laparoscopic cholecystectomy alone, resulting in nearly a 50% increase in their total length of hospitalization. This disadvantage was offset, in part, by the fact that preoperative ERCP was associated with a substantially lower conversion rate and a 4-fold decrease in the need for common bile duct exploration. Complication rates remained similar. Notably, a single episode of hemorrhage after sphincterotomy was managed successfully without transfusion and an episode of ERCP-related pancreatitis resolved rapidly with conservative measures alone. Two deaths occurred during the 18-month laparoscopic study (1.9%) and 5 (1.8%) were observed during the open era.

COMMENT

Since the advent of laparoscopy, the management of biliary pancreatitis has become even more challenging and contentious. The central question remains unanswered: which method of gallstone extraction is optimal for patients with persistent or recurrent choledocholithiasis? Both laparoscopic and endoscopic techniques have enthusiastic and acquisitive advocates. The results of the current study illustrate some of the advantages as well as a number of the limitations of a combined approach.

Overall, the combined approach has been remarkably successful. One hundred two of the 114 cases in which cholecystectomy was attempted laparoscopically were completed successfully; the ensuing conversion rate of 10.8% (12 patients) compares favorably with the rates of 12% to 13% previously reported for biliary pancreatitis.^{7,8} Eight of the conversions in this study were necessary because of severe local inflammation from coexisting acute cholecystitis, a problem already noted by others. While some of these conversions might have been avoided by laparoscopic subtotal cholecystectomy⁸ or cholecystostomy,⁹ open therapy was generally preferred because it provides the most definitive solution to the underlying problems.

Only 3 conversions were specifically required for the extraction of common bile duct stones. In part, this low

rate is explained by the fact that most gallstones associated with pancreatitis pass spontaneously within 3 to 4 days after the onset of symptoms.¹⁰ It is also related to our selective use of preoperative ERCP and sphincterotomy in patients suspected of harboring intraductal calculi. Thus, 28 ducts were found to contain stones and 27 (96%) were cleared endoscopically before operation. Similar success rates of 85% to 95% are now regularly reported in the hands of experienced endoscopists.¹¹

Despite the successes of ERCP, several disadvantages remain. A major limiting factor in patients with biliary pancreatitis is the inability to accurately identify those patients who actually have intraductal stones. Available biochemical and imaging studies are still relatively insensitive and nonspecific.^{12,13} As a result, 27 (42%) of the selective ERCPs obtained in our study were considered unnecessary since they demonstrated no stones. Understandably, the identification of more accurate imaging modalities has become a high-priority objective. In this regard, infusion cholangiography has been recently reintroduced; a new formulation is said to be associated with fewer allergic reactions and an improved accuracy in the detection of stones.¹⁴ Similarly, magnetic resonance cholangiography appears to provide relatively precise visualization of the bile ducts and intraductal stones.¹⁵ Still, further studies will be necessary to clarify the appropriate clinical roles for these and other tests.

In the meantime, increasing fiscal and safety concerns have been voiced about regular ERCP usage. It is now clear that ERCP may nearly double the cost of treating biliary pancreatitis, especially when compared with intraoperative methods of stone extraction.¹⁶ In part, this increase is related to the additional procedural and technician costs incurred, but it also reflects the extra hospital days required as noted in the current study. Moreover, complications related to ERCP are reported in nearly 10% of all cases and are associated with an attendant mortality of approximately 0.4%.¹⁷ The 2 complications observed in the current series were not life-threatening, but each undoubtedly added to the total length of hospitalization and the global cost. Finally, the long-term sequelae of ERCP are not yet well understood. The possibility exists that chronic biliary inflammation and secondary stricturing may result from the unimpeded duodenobiliary reflux.¹⁸

Because of these ERCP-associated liabilities, a totally operative approach to common duct stones is being recommended with increased frequency. With such a strategy, most patients can be taken directly to the operating room for a laparoscopic procedure and intraoperative cholangiography or ultrasonography can be used to image the ductal anatomy and detect retained stones.¹⁹ When stones are found, a stratified approach that uses the simplest extraction techniques first has been recommended.^{20,21} Such an approach was used only infrequently in the current series but has been continued. In our early experience, transcystic extraction was successful in 2 (40%) of the initial 5 attempts. Other investigators have reported successful transcystic extractions in 55% to 93% of patients once a suitable learning curve was completed.^{22,23} As in our report, failures were related to the presence of stones proximal to the cholecystochole-

dochal junction, multiple intraductal stones, and tight impaction of stones in the ampulla. Electrohydraulic fragmentation or laser ablation have both been recommended for the latter problem^{24,25} but are not readily available and were not used in our cohorts. Rather, transcystic failures in 2 of our patients were managed with open common bile duct exploration and T-tube placement while the third patient underwent postoperative ERCP and sphincterotomy. A transampullary guidewire was not placed in this patient but has been recommended as an aid to successful postoperative ERCP ("rendezvous procedure").²⁶ While we did not attempt laparoscopic choledochotomy, such an approach is being advised by increasing numbers of experienced laparoscopists. High success rates can be achieved and complications avoided if adequate training and experience are obtained.^{27,28} At least 1 randomized study has confirmed that laparoscopic exploration of the common bile duct is as least as effective as ERCP and is associated with a shorter hospitalization.²⁹

From this cumulative experience, we conclude that laparoscopic cholecystectomy, when combined with selective ERCP, is a safe and clinically effective treatment for biliary pancreatitis. However, because many of the associated ERCPs ultimately prove unnecessary, unwarranted procedural charges and prolonged hospitalizations may accrue. With increased emphasis being placed the cost of health care delivery, it is now singularly important to consider alternative management strategies: either the methods of selecting patients for ERCP should be improved or dependence on preoperative ERCPs must be reduced. The specific directions of such efforts will necessarily depend on the local endoscopic, radiological, and surgical interest and expertise. Whatever the eventual choice, general surgeons should recognize that the current circumstances represent a challenge and an opportunity to once again take responsibility for the complete management of the patient with biliary pancreatitis.

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Corresponding author: Wayne H. Schwesinger, MD, Department of Surgery, 7703 Floyd Curl Dr, San Antonio, TX 78284-7842.

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