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Long-Term Follow-Up After Bilioenteric Anastomosis for Benign Bile Duct Stricture

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Objective

The authors provide a prospective evaluation of long-term results after bilioenteric anastomoses for benign biliary stricture.

Summary Background Data

With the advent of laparoscopic techniques, the frequency of bile duct injury after operation has increased. Reports on the operative management of these injuries have not provided long-term follow-up. Over a similar period, reports of both endoscopic and invasive radiographic methods as primary treatment for bile duct stricture have compared success rates to antiquated surgical reports.

Methods

A protocol whereby preoperative radiographic (*e.g.*, cholangiogram, computed tomographic scan, ultrasound), biochemical (*e.g.*, alkaline phosphatase, and total bilirubin), and clinical evaluation was combined with ongoing postoperative evaluation and follow-up at approximately 6-month intervals. A total of 111 patients were evaluated from 1985 to 1995. Patients were categorized in three groups: 1) those with postoperative injuries during open and laparoscopic gallbladder surgery (31 patients), 2) those undergoing operation for pain associated with chronic pancreatitis who have distal common bile duct stenoses (64 patients), and 3) those with nonchronic pancreatitis-associated benign bile duct strictures (16 patients).

Results

Mean follow-up was 60 months. Overall preoperative alkaline phosphatase was 640 units/L with a range of 280 to 1860 units/L. All patients had abnormally elevated alkaline phosphatase. Only 3 of 111 patients have had mild persistent elevation after operation. Clinical jaundice, present in 49 of 111 patients, was resolved uniformly by operative decompression. Total bilirubin was elevated abnormally in 56 of 111 patients and also was uniformly corrected by operation.

Conclusions

These data support the careful combined use of endoscopy, invasive radiology, and surgery in the management of benign strictures of the biliary tree. These data further suggest a success rate for surgical management that, over long-term follow-up, appears to exceed that found using alternative measures. Alternative methods should measure their success rates against success rates currently achieved by operative management.

For decades, benign biliary strictures were the exclusive domain of the surgeon. These lesions fortunately were quite rare because the surgeon's ability to obtain images of the lesion before operation was very limited and the recognition of available anatomic planes was similarly unequal to techniques currently available.[1] For these reasons, the success rates for the operative management of benign biliary strictures were low and the incidence of postoperative strictures was high.[2] As endoscopic and invasive radiographic techniques have developed, the surgeon was benefitted by enhanced information used in developing an operative strategy. Recently, primary definitive management of these strictures has been undertaken by endoscopists, using endoscopic retrograde cholangiopancreatography (ERCP), and by invasive radiologists.[2-4] Often, these innovative results have been compared with those found in antiquated reports from the surgical literature.[2,3]

Chronic pancreatitis is known to combine main pancreatic duct dilatation with distal common bile duct stenosis in as many as 50% of patients.[5] Standards have been developed to define the indication for operative drainage of the common bile duct to accompany longitudinal pancreaticojejunostomy.[6] Recently, the advance of laparoscopic techniques applied to the cholecystectomy has resulted in a considerable rise in the volume of intraoperative injuries to the bile duct.[7-11] Reports of operative repair of such injuries similarly have increased.[8-11] Early successes after these procedures have uniformly been reported. It is our objective in this article to document by long-term follow-up of patients after bilioenteric bypass the success rate achieved by operative management. It is hoped that these data will be used for comparisons when alternative nonoperative techniques are evaluated.

METHODS

Beginning in 1985, a clinic devoted to the management of pancreatic and complex biliary tract diseases provided a mechanism for obtaining initial and follow-up evaluation on all patients requiring operative repair of benign biliary strictures. The indications for operative drainage of the biliary tree consisted of radiographic evidence using ERCP or percutaneous transhepatic cholangiogram (PTC), biochemical evidence, using a variety of studies but finally focusing on serum total bilirubin (TB) and serum alkaline phosphatase (AP). The indication for operation also was based on clinical evidence, which included clinical jaundice (CJ), pruritus, and prior episodes of cholangitis. The diagnosis of cholangitis was established by means of identifying the triad of right upper quadrant pain, fever, and jaundice associated with a leukocytosis. All of these data points were established before operation. Biochemical and clinical evaluation was repeated at approximately 6-month intervals. Radiographic re-evaluation was used only in those patients whose clinical condition mandated and in all patients with a diagnosed condition of chronic pancreatitis. Return of bilirubin and AP levels to normal range was considered to be biochemical evidence of an absence of restriction to flow of bile. Data from the operative procedures also were collected, including operative mortality, numbers of units of blood transfused, use of perioperative stents and drains, presence of bile fistula after operation, complications of operation, and total length of stay. Patients who were readmitted to hospitals also were monitored.

Data were gathered for all patients. For further evaluation, the patients were divided into three groups. Patients who had sustained common bile or hepatic duct injury during cholecystectomy were designated as postoperative injury (POI). Those patients with a diagnosis of chronic pancreatitis and with documented common bile duct dilatation, distal stenosis, and associated persistent AP elevation (>400 units/L) were designated as chronic pancreatitis-related stenoses (CP). Finally, a group of patients with a variety of bile duct strictures or stenoses not associated with CP or with injury at the time of cholecystectomy were designated as nonchronic pancreatitis-related strictures (NCP). Comparison of the three groups was performed.

Table 1. PATIENT POPULATION*

Patient Type	No. of Patients
POI	31
CP	64
NCP	16

* Total population 111 patients; 76 male, 35 female; mean age 47 years.
POI = patients with postoperative injuries after cholecystectomy; CP = patients with chronic pancreatitis; NCP = patients with benign strictures not associated with chronic pancreatitis.

RESULTS

Over the study period, there have been 111 patients who have had initial evaluation and subsequent operative management of benign bile duct strictures. Mean follow-up for this group of patients has been 60 months. Population characteristics are presented in Table 1. There have been 114 operations performed. Two reoperations were performed for bleeding in the immediate postoperative period,

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Table 2. POSTOPERATIVE INJURIES AFTER CHOLECYSTECTOMY (n = 31)

Timing of Recognition of Injury	No. of Patients
Laparoscopic cholecystectomy	23
Injury recognized at operation	16
Injury recognized at early postoperation	4
Injury recognized at late postoperative	3
Open cholecystectomy	8
Injury recognized at operation	6
Injury recognized at early postoperation	2
Conversion from laparoscopic before injury	3
Prior common bile duct exploration with T tube > 1 year	3

and one patient required drainage of a subhepatic collection 3 weeks after operation.

Among the study population, there were 31 patients in the POI category, 64 in CP, and 16 in NCP. The specific characteristics of each of these three groups are listed in Tables 2 through 4, respectively. Operative biliary bypass was performed using a Roux-en-Y jejunal limb in all patients. The level of proximal diversion for all patients in the POI group is listed in Table 5. A significant increase in proximal injuries is noted among patients who had sustained injury during laparoscopic cholecystectomy. All patients in the CP group underwent distal end-to-side choledochojejunostomy. Additional procedures performed at the time of bilioenteric bypass in this group of patients are delineated in Table 3. The anatomic site of stricture was mixed among patients in the NCP category.

Postoperative Strictures

Among the postoperative strictures after cholecystectomy, seven patients had some form of attempted repair by the original operating surgeon. Four of these efforts were aborted. Twenty-two of the 31 patients in the POI group arrived with a drain in the subhepatic space. Seven of these were nonfunctional. All of those seven patients and an additional three patients who did not have a drain at the time of transfer had clinical and radiographic (computed tomographic scan) evidence of subhepatic (seven patients) or free spillage of intraperitoneal bile. In all patients, this was managed by placement of percutaneous subhepatic drains.

Table 3. CHRONIC PANCREATITIS ASSOCIATED BILE DUCT STENOSIS (n = 64)

Etiology of Chronic Pancreatitis	No. of Patients
ETOH, induced	59
Idiopathic	4
Familial	1
Operative procedures	
Choledochojejunostomy + pancreaticojejunostomy	62
Choledochojejunostomy alone (prior pancreaticojejunostomy)	2
Simultaneous pseudocyst drainage	21

ETOH = ethanol.

Table 4. BENIGN STRICTURES NOT ASSOCIATED WITH CHRONIC PANCREATITIS

Causes of Stricture	
Pseudocyst (acute pancreatitis)	4
Papillary stenosis	3
Mirizzi syndrome	2
Postendoscopic sphincterotomy stricture	2
Trauma	2
Histoplasmosis	1
Choledochal cyst/recurrent cholangitis	2

Every effort was made to delay repair while stabilizing the patient and treating infectious complication. This delay also provided an opportunity to define anatomic structures and to clarify the boundaries of the strictures. For this reason, the mean time interval from injury to repair was 27 ± 6 days.

There were no operative deaths. Overall length of stay for the entire group was 91 days (range, 4–18 days). Length of stay for each individual group was 7.6 days (range, 6–8 days) for POI, 12.1 days (range, 8–18 days) for CP, and 6.8 days (range, 5–8 days) for NCP. Overall mean postsurgical stay was 6.2 days (range, 5–16 days); for POI, 6.3 days (range, 5–7 days), for CP, 9.6 days (range, 7–16 days), and for NCP, 5.8 days (range, 4–7 days). Postoperative subhepatic drains were used in all

Table 5. LEVEL OF INJURY AMONG PATIENTS WITH POSTOPERATIVE INJURY AFTER CHOLECYSTECTOMY

	No. of Patients		
Site	Total	LC	OC
Common bile duct	6	1	5
Common hepatic duct	19	16	3
Right hepatic duct	4	4	0
Bifurcation	2	2	0

POI = postoperative injury after cholecystectomy; LC = laparoscopic cholecystectomy; OC = open cholecystectomy.

patients. Bile was seen in drains in 12 of 111 patients. In two of these patients, the drainage exceeded 100 mL in 24 hours. These two patients simply required a longer period of drainage (8 days and 11 days). Blood transfusion in the perioperative period was necessary in nine patients. Six of these patients had a preoperative hematocrit less than 30%. Two patients had reoperation for surgical bleeding. Preoperative imaging was used in all patients, ERCP in 82 patients, and PTC in 31 patients. Often, studies were performed at outlying hospitals. Preoperative efforts at endoscopic therapy were used in 12 patients, 3 POI, 4 CP, and 5 NCP. Preoperative invasive radiographic techniques were attempted in 13 patients, 9 POI, 2 CP, and 2 NCP. Preoperative percutaneous transhepatic stents were used to facilitate anatomic dissection in 23 of 111 patients overall. Stents were used in 21 of 31 patients with POI and in 2 patients in the NCP category. Intraoperative liver biopsy was performed in 33 of 111 patients overall, none of whom were part of the POI group, 4 of 16 patients in the NCP group, and 29 of 64 patients in the CP group. Although findings consistent with obstructive jaundice were found, no evidence of biliary cirrhosis was seen.

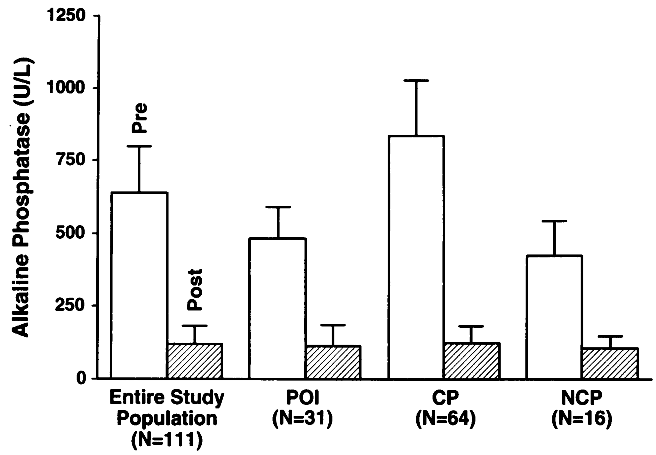

Figure 1. Serum alkaline phosphatase level (units/L) is measured before operation and after bilioenteric bypass in the study population (N = 111) and in 3 subgroups. POI = patients who sustained bile duct injury after cholecystectomy (N = 31). CP = patients who have benign bile duct stenosis related to chronic pancreatitis (N = 64). NCP = patients with benign bile duct stricture from a variety of causes not related to chronic pancreatitis (N = 16). Values expressed as mean ± standard error of the mean; normal value range is 34 to 122 units/L.

Biochemical Indicators

Preoperative AP level was elevated in all patients with a mean level of 640 units/L (range, 280–1860 units/L) (normal range, 34–122 units/L). These results varied among the three groups. In the POI group, the mean AP was 480 units/L (range, 350–720 units/L), in the CP group, the mean AP was 836 units/L (range, 490–1860 units/L), and in the NCP group, the mean AP was 424 units/L (range, 310–650 units/L). Alkaline phosphatase levels required a range of 14 to 56 days of follow-up testing before reaching a stable value. Only 3 of 111 patients had persistent abnormal AP. The mean AP value for all patients after operation was 118 units/L (range, 86–210 units/L). Among the three groups of patients, the mean postoperative AP was 112 units/L (range, 86–118 units/L) for patients in the POI group, 121 units/L (range, 108–210 units/L) for patients in the CP group, and 106 units/L (range, 89–112 units/L) for the patients in the NCP group. Serum TB also was monitored. Before operation, 56 of 111 patients had abnormally elevated TB (normal, 0.1 mg/dL). No patients had hyperbilirubinemia after operation. The mean preoperative TB overall was 5.1 mg/dL (range, 0.2–11.6 mg/dL). The mean preoperative TB for all patients with a value elevated above normal was 9.2 mg/dL (range, 2.2–11.6 mg/dL). After operation, the mean TB among all patients was 0.9 mg/dL (range, 0.1–1.1 mg/dL), and among all those whose bilirubin was elevated before operation, the mean TB was 1.0 mg/dL (range, 0.8–1.1 mg/dL).

Among the patients in individual groups, the distribution of TB elevation was not uniform. In the POI category, 28 of 31 patients had preoperative elevations, whereas 18 of 64 patients with CP had elevations and 11 of 16 patients in the NCP group were abnormally elevated. The magnitude of elevation also differed measurably among the three groups. The mean overall TB level for patients in the POI group before operation was 8.1 mg/dL (range, 0.9–11.6 mg/dL), and among the patients in the POI group with abnormally elevated values, the mean TB level was 10.6 mg/dL (range, 3.9–11.6 mg/dL). This contrasts with the values of the CP group, whose mean overall TB value before operation was 1.1 mg/dL (range, 0.4–3.2 mg/dL), and among the patients in the CP group with elevated TB values before operation, the mean value was 2.5 mg/dL (range, 2.2–3.2 mg/dL). The patients in the NCP group had a broader mixture of TB values. Mean overall TB value was 3.9 mg/dL (range, 1.0–6.9 mg/dL), and the mean value among the patients in the NCP group with elevated TB levels was 5.2 mg/dL (range, 2.8–6.9 mg/dL). The AP and TB data are depicted graphically in Figures 1 and 2.

Clinical Assessment

Data for the observation of CJ draw a further distinction among the three groups of patients. Clinically apparent jaundice was observed in 49 of 111 patients before operation. In the POI group, 28 of 31 patients were observed to have CJ, whereas only 10 of 64 patients in the CP group had CJ and 11 of 16 patients in the NCP group had CJ. No CJ was seen after operation.

Clinical evidence of cholangitis was identified in 37 of

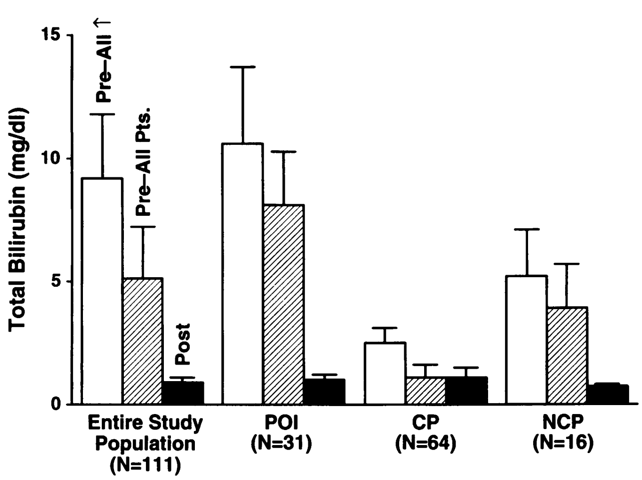

Figure 2. Serum total bilirubin level (mg/dL) is measured before operation and depicted as mean ± standard error of the mean of all patients with elevated levels and all patients in the study group and compared with levels after bilioenteric bypass. POI = patients who sustained bile duct injury after cholecystectomy (N = 31). CP = patients who have benign bile duct stenosis related to chronic pancreatitis (N = 64). NCP = patients with benign bile duct stricture from a variety of causes not related to chronic pancreatitis (N = 16). SEM = standard error of the mean; ↑ = elevated above normal values; normal total bilirubin range is 0.1 to 1.1 mg/dL.

111 patients overall before operation. This observation was distributed in a nonuniform manner similar to that of the biochemical data. In the POI group, 27 of 31 patients had preoperative episodes of cholangitis. After operation, three of these patients had cholangitis, and each of these patients had percutaneous stents in place that had become contaminated and obstructed. This distribution differs markedly from that of the CP group, among whom no episodes of preoperative or postoperative cholangitis were noted. Cholangitis was diagnosed in 10 of 16 patients in the NCP group before operation and 2 of 16 patients after operation, 1 of whom had evidence of early sclerosing cholangitis at the time of operation and has had recurrent attacks over 4 years.

Abdominal pain was present in 109 of 111 patients before operation, including 29 of 31 patients in the POI group, 64 of 64 patients in the CP group, and 16 of 16 patients in the NCP group. Persistent pain was seen in 7 of 111 patients after operation, and all of these patients were in the CP group. Pruritus was elicited as a troubling symptom in 39 of 111 patients before operation. This symptom persisted intermittently in the patient with early signs of sclerosing cholangitis only.

DISCUSSION

Historically, the implications of benign strictures to the bile ducts in general and of operative injury to the bile ducts in particular were so dreaded that the operative management of these relatively rare clinical entities were reserved for only the most highly skilled and the most intrepid surgeon. Success rates in surgical reports were modest, and complication rates were high. The methods available to the surgeon to define the anatomic relationships of stricture and thereby develop a strategy for repair at that time were limited. Imaging techniques, such as ultrasonography, computed tomography, PTC, and ERCP, currently provide the surgeon a wealth of information before undertaking operative repair of benign strictures. At the same time, a recognition of the anatomy of the celiac, hilar, and umbilical plates has facilitated access to proximal lesions.[1] With the enhancement of expertise in both PTC and ERCP, opportunities have arisen in which these techniques have been used as a bridge between injury and definitive repair. Recently, some attention has been directed toward the possibility that these nonoperative techniques might be used as definitive treatment for benign bile duct strictures.[2,3] Interestingly, the reports on each of these proposed alternatives to operative management often have compared their success rates to antiquated surgical reports in which successes have been modest and outcomes poor.[3] The pertinence of this issue recently has increased because of the rash of bile duct injuries, which has accompanied the use of laparoscopic cholecystectomy.[7-11] The present study documents the high success rate of operative repair of benign bile duct strictures by evaluation of long-term results. A number of authors have reported series with relatively short follow-up in which the safety of operative repair has been documented.[10,11]

Although the mean follow-up for the entire group under discussion is 60 months, the mean follow-up after repair of bile duct injury after cholecystectomy is much shorter (mean, 32 months). Despite this fact, there are data to suggest most late strictures will have occurred in this amount of follow-up. A larger number of reports regarding laparoscopic injury have documented possible mechanisms and causes of injury after laparoscopic cholecystectomy. Features such as surgeons' experience, a diagnosis of acute cholecystitis, failure to define anatomy by using intraoperative cholangiogram, and difficulty in controlling hemorrhage all have been identified as risk factors.[8,9,11,12] Traverso et al.[12] have provided vital information regarding anatomic variability in the area (39% in the series). Their report and others have urged that intraoperative cholangiogram be performed more commonly than may have been the practice during open cholecystectomy.

The significance of nonoperative measures, such as ERCP and PTC, in the diagnosis and delineation, bridging, and, when appropriate, definitive correction of benign bile duct strictures cannot be overstated. The support for these methodologies is uniform among reports reviewed.[4,8-11,13] The yet-unanswered question, therefore, is not whether to use these nonoperative measures, but under what circumstances would each method best be used. The question relates primarily to the use of these measures for bridging and for definitive care. The use of all available methods to define the anatomy of these injuries in maximal detail is essential to ensure a favorable outcome. Bridging suggests an ability to stabilize a patient before definitive therapy, and the ability to permit a patient to achieve optimal status before operation provides obvious advantages and must be considered alone as one of the reasons that the results of operative management have improved. Bridging maneuvers may include PTC and proximal drain placement, passage of the drains past an area of stricture with internal drainage, U-tube combined drainage, and percutaneous drainage of subhepatic or other related intra-abdominal collections as well. Endoscopic placement of internal stents[2] also may serve as a bridge. Definitive management of strictures using these methods may include balloon dilatation, prolonged stent placement, or even permanent expandable stents.[2-4,14,15] Questions arising regarding the choice of one of these alternative methods include the episodes of cholangitis and sepsis, which may occur during prolonged intubation of the biliary tree, the total number of interventional procedures required, total number of imaging procedures required, total time of morbidity, and the overall long-term success rates. Similar current measures must be available for comparison regarding operative management.

The present study provides no data regarding success rates of alternative methods. We have provided evidence that operative repair of benign biliary strictures can be performed safely with a high likelihood of long-term patency. We have measured patency on the basis of biochemical and clinical information. Although one may argue that significant narrowing may coexist with normal biochemical and clinical measures, one might expect, if such narrowing were present, that recurrent episodes of postoperative cholangitis might be seen. Recurrent cholangitis is a recognized phenomenon, even in patients with widely patent anastomoses.[16] In the current study, 37 patients had clinical and biochemical evidence of cholangitis before operation and 5 have had postoperative cholangitis. Among this group, four were patients with percutaneous stents in place. In each of these patients, both radiographic and manometric study showed widely patent anastomoses with no evidence of restriction to flow. Although one report strongly supports the use of prolonged stent placement after repair of strictures,[13] we have favored a strategy of removal early after operation, and our limited data regarding this question have supported our practice, advocated by Blumgart[1] among others. Our data suggest that multiple recurrent attacks of cholangitis should be rare. Our one additional patient with cholangitis has had four episodes over 4 years of follow-up.

Our amount of data regarding cholecystectomy are not large. The changing frequency of these injuries may be reflected in the fact that only 5 patients with injuries sustained during cholecystectomy were referred during the first 6 years of this study and 26 patients in the last 4 years. Our mean follow-up for postoperative injury after cholecystectomy is 32 months. The anatomic location of injury for this group is consistent with those defined in prior reports.[7-11] There appears to be a predilection for more proximal injuries during laparoscopic cholecystectomy. This phenomenon is likely because of the ease with which this area may be accessed by the laparoscope. However, it certainly has troubling implications regarding the operative management of benign strictures because the technical challenge of successfully accessing this anatomic area is considerably greater than for more distal injuries. Blumgart has popularized and facilitated the recognition of the anatomy of the celiac, hilar, and umbilical plates.[1] Using this approach, it is possible to access extremely proximal, intrahepatic biliary ducts by simply lowering these plates into view in the operative field. Preoperative placement of percutaneous stents in the right and left hepatic ducts through two separate sites greatly facilitates palpation and delineation of the ducts within these plates, particularly when prior surgery has caused scarring and distortion of the anatomic relations. The portal, arterial, and biliary structures tend to intermingle in such a fashion that the palpable stent is invaluable.

The stenoses associated with chronic pancreatitis are arguably appropriate for inclusion in this study. The lesion is associated with restriction to the flow of bile with proximal dilatation of the biliary tree. As can be seen from our biochemical and clinical data, these patients often have a markedly elevated level of alkaline phosphatase with a less pronounced increase in total bilirubin. Although 11 of the patients in the CP group were found to have CJ, each of these were minimally so with mild elevations of the TB. There are two primary indications of operative drainage of the biliary tree in this setting. The first indication overlaps with the indication for simultaneous decompression of the main pancreatic duct (as was done in 62 of 64 patients), the relief of chronic unremitting abdominal pain. The second indication for drainage is the purported risk of prolonged biliary stricture and prolonged intraparenchymal injury as reflected by persistent elevations of the alkaline phosphatase finally resulting in biliary cirrhosis.[16] We have found, as have others, that biliary stenosis occurs in a high percentage of patients with chronic pancreatitis.[5] We propose that the appropriateness of including this group of patients in this discussion depends on the fact that these certainly represent inflammatory strictures, and our biochemical data suggest that long-term patency may be achieved despite the risk of ongoing inflammation due to the pancreatic disease. We have subdivided our population to define any bias created by these disparate populations, and our evaluation suggests no significant difference in outcome, although the mean follow-up is shorter. Abdominal pain, as a component of chronic pancreatitis, explains, we think, the higher rate of residual pain in this subgroup of patients.

The rate of return to normal levels of TB and AP may be prolonged. Although some reduction in abnormal levels after operation commonly was seen during the remaining hospitalization after operation, we typically required between 1 and 2 months for AP levels to return to normal values. This observation was particularly noted in the CP subgroup of patients. The CJ resolved by far the most rapidly.

Our data regarding needs for rehospitalization and length of stay must be considered rather carefully. An advantage of operative intervention that must not be minimized is the length of stay, which is considerably shorter than those noted for PTC treatment and biliary strictures, and rehospitalization and repeat imaging also are much less common in our population.[3]

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Discussion

DR. KEITH D. LILLEMOE (Baltimore, Maryland): Thank you, Dr. Thompson. I would like to thank Dr. Nealon for supplying me with the manuscript and asking me if I would discuss this fine paper. I would like to compliment him on a very excellent result, which I do believe provides a gold standard for which the other techniques must be compared.

I would like to focus on some of the points from the manuscript. First approximately half of the patients with postcholecystectomy injuries were recognized at the time of cholecystectomy, which is a higher percentage than what we have seen and what Bill Meyers has reported from Duke. I would ask him how those patients were managed when the injury was recognized and if indeed those patients had an attempted repair at that initial operation. It has been our observation that if an attempt at repair has been done and the patient develops a problem and ends up in our hands to be managed, that these tend to be higher injuries and probably more difficult to repair. Certainly if that is the case you deserve extra credit for the success rate that you report. I also notice in your report that the number of injuries at the bifurcation or higher were a rather small percentage. I would appreciate your comments about the management of these patients.

I would also like to ask what percent of your patients presented with a biliary fistula? The management of those patients is extremely difficult because you often have not only sepsis but also to control the leak and the contamination that is taking place in the peritoneal cavity and the associated inflammation. How do you time your repair in those patients?

I would like to compliment you, although this was not the purpose of the study, on your success rate in controlling pain in the difficult chronic pancreatitis patients. I was quite surprised that you observed no pain in the patients after repair of a postcholecystectomy injury. Certainly in a fair number of our patients who have had a successful repair with normal biochemical studies still do have some chronic right upper quadrant pain. Maybe in many of our patients, this may be related to ongoing litigation. But still, I would like your comments about this point.

Finally, I would like to caution you, although your mean follow-up in this group is 60 months, in the subgroup of patients with injuries following laparoscopic cholecystectomy, the follow-up is significantly less. Although I would agree that once these patients get out to be a couple of years, you can relax a little bit, I would hope that you would continue your diligent