The Spectrum and Natural History of Common Bile Duct Stenosis in Chronic Alcohol-Induced Pancreatitis

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Sixty patients with chronic alcohol-induced pancreatitis with endoscopic retrograde cholangiopancreatography evidence of common bile duct stenosis were studied to determine the clinical spectrum and natural history of this complication, as well as the indications for biliary bypass. In 17% of patients, common bile duct stenosis (CBDS) was an incidental finding at ERCP, while in the remaining cases pain and jaundice were the predominant symptoms in 35% and 48%, respectively. Biliary drainage was performed in 38% of patients for persistent or recurrent jaundice, cholangitis, and while undergoing pancreatic duct or cyst drainage procedures for pain. The benign nature of CBDS in chronic alcohol-induced pancreatitis (CAIP) in patients without persistent jaundice is emphasized. In particular, no histologically proved cases of secondary biliary cirrhosis were noted. The majority of patients with CBDS due to CAIP may be safely managed without biliary bypass but require close follow-up.

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THE LOWER COMMON bile duct transverses pancreatic tissue in most patients[1] and thus may become narrowed in neoplasms or inflammatory disorders of the pancreas. Common bile duct stenosis (CBDS) in association with pancreatitis may be due to edema, pseudocyst formation, progressive encasement by pancreatic fibrosis, or pancreatic carcinoma. A spectrum of clinical diseases associated with CBDS has been well documented,[2-8] but the long-term natural history of this complication has not been fully evaluated. The aim of this study was to report our experience with CBDS in a large series of patients with chronic alcohol-induced pancreatitis (CAIP), emphasizing the spectrum of the disease, its natural history, and the indications for surgical biliary drainage.

Clinical Materials and Methods

Sixty patients with CAIP associated with benign CBDS were identified from endoscopic retrograde cholangiopancreatography (ERCP) records for the 7-year period from 1979 to 1985. In addition the diagnosis of chronic pancreatitis was established by one or more of the following criteria: pancreatic calcification, impaired pancreatic response to secretin/pancreozymin stimulation, and diagnostic confirmation at laparotomy. Relevant clinical, biochemical, radiologic, and liver histopathologic features were extracted from patient records. Biliary strictures were categorized from endoscopic cholangiography according to recognized criteria.[5,9] Indications for surgical biliary decompression and long-term follow-up of patients treated by surgery or by nonsurgical management were noted. Statistical comparisons were made using the Student's t test or chi squared test when appropriate.

Results

The diagnosis of CBDS was made by ERCP at an mean interval of 8 years after the onset of abdominal pain (range, 0 to 19 years). There were 56 men and 4 women with mean age at diagnosis of CBDS of 44 years (range, 25 to 65 years).

The patients were classified into three arbitrary groups according to their respective dominant clinical presentations: group 1 (10 patients, asymptomatic or minimally symptomatic); group 2 (21 patients, significant epigastric abdominal pain); group 3 (29 patients, jaundice with or without cholangitis). Comparative data for the individual groups is given in Table 1.

TABLE 1. *Clinical Data for Patients with CBDS According to Initial Presentation*

Group (No. of Patients)	Group 1 (10) (asymptomatic)	Group 2 (21) (pain)	Group 3 (29) (jaundice)	Significance Levels
Age (years) at diagnosis of CBDS (mean) (range)	46 (28–59)	41 (25–58)	43 (26–65)	
Pancreatic calcification	8 (80%)	17 (81%)	29 (100%)	1 + 2 vs. 3 $p < 0.005$
Impaired glucose tolerance or diabetes	6 (60%)	8/16 (50%)	17/20 (85%)	1 + 2 vs. 3 $p < 0.05$
Steatorrhea (%)	6 (60%)	6/13 (46%)	14/17 (82%)	1 + 2 vs. 3 $p < 0.05$

CBDS, common bile duct stenosis.

Patients in group 3 had a significantly higher frequency of pancreatic calcification ($p < 0.005$), diabetes mellitus or impaired glucose intolerance ($p < 0.05$), and steatorrhea ($p < 0.05$) than did patients in groups 1 and 2 combined.

During the total follow-up period of the study (January 1979 to January 1986), 23 patients (38%) underwent surgical biliary drainage—none from group 1, 6 from group 2 (29%), and 17 from group 3 (59%). The bile duct was drained into the duodenum in 13 patients and into the jejunum in the remaining ten. Biochemical data at initial presentation and at last follow-up visit for patients treated with biliary drainage and those treated without drainage, respectively, are given in Table 2. Alkaline phosphatase (AP) and total serum bilirubin (TSB) levels at presentation were significantly higher ($p < 0.02$ and $p < 0.001$, respectively) in group 3 than in groups 1 and 2 combined. However a wide range of values within each group and marked overlap of values between groups were observed. Both AP and TSB were invariably elevated in group 3 patients. Significant elevation in AP with normal TSB was seen in 5 group 1 patients, 9 group 2 patients, and no group 3 patients. Although patients who underwent biliary drainage had significantly higher mean AP levels (571U vs. 302IU; $p < 0.01$) and TSB levels (100μmol/1 vs. 33μmol/1; $p < 0.05$), than those treated conservatively, marked overlap of values was noted.

TABLE 2. *Biochemical Data for Patients with CBDS*

A. No Biliary Drainage (37 patients)

Alkaline Phosphatase ($\bar{x} \pm$ SEM) (normal < 115IU)

Group (No. of Patients)	1 (10)	2 (15)	3 (12)	Significance Levels
Initial level	290 ± 103	182 ± 49	465 ± 96	1 + 2 vs. 3 $p < 0.02$
Last follow-up level	272 ± 92	157 ± 32	195 ± 63	1 + 2 vs. 3 NS
	NS	NS	NS	

Total Serum Bilirubin ($\bar{x} \pm$ SEM) (normal < 17 μmol/l)

Group (No. of Patients)	1 (10)	2 (15)	3 (12)	Significance Levels
Initial level	9 ± 2	13 ± 4	79 ± 38	1 + 2 vs. 3 $p < 0.001$
Last follow-up level	7 ± 2	13 ± 3	27 ± 13	1 + 2 vs. 3 NS
	NS	NS	NS	

B. Biliary Drainage (23 patients)

Alkaline Phosphatase

Group (No. of Patients)	1 (0)	2 (6)	3 (17)	Significance Levels
Initial visit	—	382 ± 111	638 ± 86	NS
Last follow-up level	—	166 ± 24	137 ± 13	NS
		NS	$p < 0.001$	

Total Serum Bilirubin

Group (No. of Patients)	1 (0)	2 (6)	3 (17)	Significance Levels
Initial level	—	10 ± 2	133 ± 27	$p < 0.02$
Last follow-up level	—	10 ± 2	13 ± 3	NS
		NS	$p < 0.001$	

NS, not significantly different.

TABLE 3. *Radiologic Data for Patients with CBDS*

Group (No. of Patients)	1 (10)	2 (21)	3 (29)	Significance Levels
Stricture type (1/2/3/4)	8/0/2/0	16/1/3/1	21/3/4/1	
Biliary dilatation	2 (20%)	6 (29%)	21 (72%)	1 + 2 *vs.* 3 $p < 0.005$
CBD calculi	0	0	4 (14%)	
Pancreatic pseudocysts	1 (10%)	9 (43%)	4 (14%)	

Radiologic data are shown in Table 3 and examples of stricture types are shown in Figures 1 to 3. The majority of patients exhibited type 1 or type 3 strictures, and there were no significant differences between the three groups in stricture type. However extrahepatic biliary dilatation (CBD diameter >10 mm) with or without intrahepatic dilatation was present in significantly more group 3 patients than groups 1 and 2 combined ($p < 0.005$) and was also significantly more frequent ($p < 0.01$) in patients who had biliary drainage (21 of 23) than in patients treated without drainage (8 of 37). Choledocholithiasis was found in four group 3 patients.

Twenty-nine patients underwent liver biopsy during the follow-up period (Table 4). Histologic evidence of extra-

FIG. 2. Abrupt "birds-beak" stenosis (type 2) of the distal common bile duct in a 45-year-old patient with severe chronic calcific pancreatitis. A calcified hydatid cyst in the right lobe of the liver is also present.
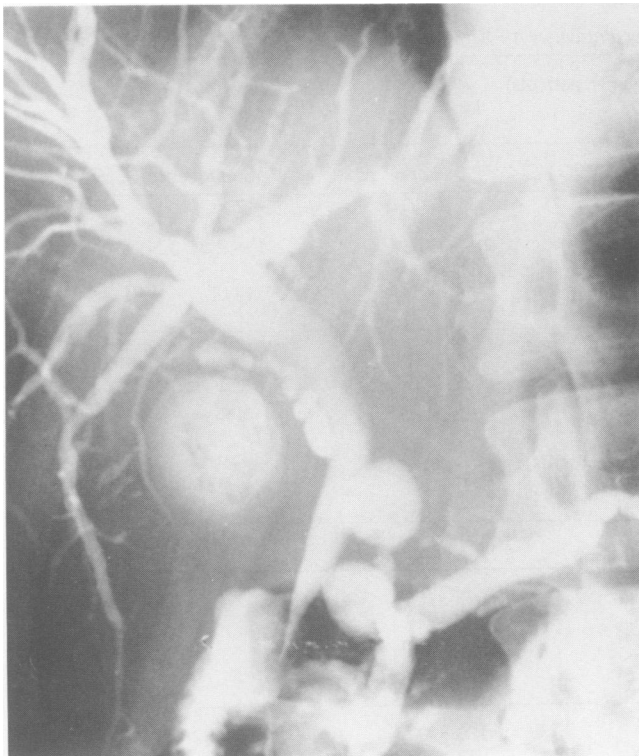

FIG. 1. Gradual tapering of the distal common bile duct (type 1 stricture) in a 40-year-old patient with chronic calcific pancreatitis, pseudocysts in the head of the pancreas, and gallstones.

hepatic biliary obstruction (EHBO)[10] was present in almost one half of the biopsies, but was significantly more frequent ($p < 0.05$) in group 3 patients when compared with groups 1 and 2. There were no cases of secondary biliary cirrhosis. EHBO was noted more frequently in patients treated with biliary decompression (11 of 18) than in patients treated without surgery (3 of 11), but the difference was not statistically significant.

Biliary drainage was not performed in any group 1 patients. Nine of ten patients in this group were asymptomatic at a mean follow-up time of 46 months after diagnosis of CBDS, and one had died of problems unrelated to his biliary tract. The mean AP and TSB levels remained unchanged during the follow-up period (Table 2).

Six group 2 patients had biliary drainage surgery in addition to a longitudinal pancreaticojejunostomy in five and pancreatic cystojejunostomy in one. In these patients, pancreatic drainage for pain was the primary indication for surgery, and the bile duct was drained concomitantly. At last follow-up, all six patients had done well in terms

FIG. 3. Type 3 ("hour-glass") stricture of the mid-portion of the common bile duct. This 39-year-old patient had chronic noncalcific pancreatitis.

of their biliary tract (mean follow-up, 43 months), but two had persistent pain. Of the 15 nonoperated patients, 6 of 10 for whom follow-up data were available were well at a mean interval of 29 months from diagnosis of CBDS. Persistent pain was the main problem in the remaining four patients. Nonsignificant mean AP reduction was noted in the patients who underwent biliary drainage and in the nonoperated patients.

Of 29 patients who presented with jaundice as the primary clinical problem, 17 (59%) initially improved with nonoperative treatment. However, five of these subjects, together with the remaining 12 who had persistent jaundice, underwent biliary bypass. Mean AP and TSB levels were not significantly different between group 3 patients undergoing biliary bypass and those treated without bypass, although there was a trend toward higher levels in the surgical patients (Table 2). The indications for surgery were jaundice in 13 patients, jaundice and cholangitis in 3, and jaundice and pain in 1 (on whom a concomitant pancreatic drainage procedure was performed). One patient died after operation of ischemic heart disease, 1 patient subsequently died of cardiac complications after a Puestow procedure, 2 have persistent pancreatic pain, and 2 have been lost to follow-up. The remaining 11 patients were well at a mean follow-up of 35 months. Mean AP

and TSB levels were significantly improved in group 3 patients who underwent biliary drainage (Table 2B). Biliary drainage was not performed in 12 patients with jaundice, most of whom had transient hyperbilirubinemia that lasted less than 1 month. Two have died subsequently (one cerebrovascular accident, and one diabetic patient after pancreatic cystoenterostomy complicated by sepsis), one has undergone Whipple's procedure for persistent pancreatic pain, and three have been lost to follow-up. Six patients were well at their last follow-up visit, at a mean interval of 26 months from diagnosis. A trend toward improved AP and TSB levels in nonoperated patients was observed (Table 2A).

Follow-up data were available in 29 of 37 patients managed without biliary drainage. Twenty-one of 29 patients (72%) were asymptomatic at their last follow-up. No patients had significant clinical biliary tract problems. Both AP and TSB levels showed a nonsignificant downward trend in each group, and values for groups 1 and 2 combined were no longer significantly different from group 3 (Table 2A).

The overall result of surgery was satisfactory in terms of the biliary system in 20 of 21 patients (95%) for whom follow-up data were available. Five of 20 patients (25%) who survived surgery have either died (1 patient) or have ongoing pancreatic pain (4 patients). Mean AP and TSB levels at last follow-up were significantly improved over preoperative levels and were not significantly different between groups (Table 2B).

Discussion

With the advent of modern imaging techniques, in particular ERCP, CBDS is now a frequent finding in patients with CAIP.[5,11-14] This complication appears to be more common in the advanced calcific form of the disease.[13] It may manifest as an incidental finding on ERCP or an isolated elevation of AP, or present with pain or jaundice with or without cholangitis.[2-8] The risk of developing secondary biliary cirrhosis has been stressed in many studies[4,15-18] but has been questioned by others.[5,13,19] The natural history of this condition is influenced by numerous factors, including reversible pancreatic edema or pseudocyst formation during acute relapses, and progressive

TABLE 4. Histopathologic Date for Patients with CBDS

Group (No. of Biopsies)	1 (6)	2 (8)	3 (15)	Significance Levels
Normal	2 (33%)	2 (25%)	2 (13%)	
EHBO	2 (33%)	2 (25%)	10 (67%)	1 + 2 vs. 3
				p < 0.05
Secondary Biliary Cirrhosis	0	0	0	
Alcoholic liver disease	1 (17%)	2 (25%)	2 (13%)	
Nonspecific changes	1 (17%)	2 (25%)	1 (7%)	

and irreversible pancreatic fibrosis and calcification during the end stage of the disease. Consequently planning a rational treatment strategy in a given patient has been difficult.

The incidental finding of CBD abnormalities in asymptomatic patients with or without an elevated AP is well recognized[2,5-7,14] and constituted 17% in this series. While a continued conservative approach would seem appropriate in relatively asymptomatic patients with a normal or minimally raised AP, many authors stress the need for a prophylactic biliary drainage procedure in those with a more markedly raised AP, hyperbilirubinemia not associated with alcoholic liver disease, and persistent or progressive CBDS in the absence of acute pancreatitis because of the perceived risk of cholangitis or secondary biliary cirrhosis.[4,6,7,15-18] In this study, however, most patients in this category were treated without biliary drainage, including those with disproportionate AP elevation. These patients have remained well over a follow-up period of up to 4 years without developing jaundice or secondary biliary cirrhosis, which is in keeping with the experience of others.[5,13,18,19] Although the mean AP level remains elevated, a trend toward improvement was noted. Our results to date are in keeping with the finding that the risk of secondary biliary cirrhosis is low in such patients.[5,13,14,19]

The second largest group of patients with CBDS in this study presented with pain as the predominant clinical feature. Although pain relief after biliary diversion has been documented,[4] we concur with others that the pain is more likely to be pancreatic in origin[8,17,20-22] unless there are associated biliary calculi. All the biliary drainage procedures in this group were performed in conjunction with drainage of a pseudocyst or dilated pancreatic duct. As in our asymptomatic group, patients not operated on did not develop biliary complications during a median follow-up period of almost 2.5 years and showed a trend toward reduced AP levels.

Extrahepatic cholestasis in chronic pancreatitis is frequently self-limiting due to transient edematous inflammation or resolution of a pseudocyst in the head of the pancreas.[5-7,12-14,19,20,23,24] Of 29 patients who presented with jaundice in this study more than one half initially improved and only five of them underwent biliary bypass at a later stage. Abstinence from alcohol may have played an important role, but reliable information was not available to substantiate this. Although histologic evidence of extrahepatic biliary obstruction was evident in two thirds of liver biopsies in patients with transient or recurrent jaundice at variable points in their clinical course, no case of secondary biliary cirrhosis was noted even in patients with persistent jaundice.

The timing of surgery in patients with jaundice due to CBDS is uncertain, but it seems reasonable to adopt an expectant policy for 2 to 3 weeks, awaiting spontaneous resolution. However in the presence of choledocholithiasis, cholangitis, or recurrent jaundice, early biliary decompression is indicated, particularly in the absence of recent alcohol ingestion. In all cases, assessment for surgery should include noninvasive radiology to identify pseudocysts that may cause reversible compression to the distal bile duct. Endoscopic or percutaneous cholangiography is mandatory to identify bile duct calculi, exclude carcinoma, and allow adequate surgical planning. In this regard, ERCP offers the added advantage of visualization of the pancreatic duct system. Preoperative liver biopsy may be warranted in some patients to assess the severity of liver damage from both extrahepatic obstruction and alcoholic liver disease. In patients considered to be definite candidates for biliary decompression, choledochoduodenostomy is preferable to choledochojejunostomy unless a Roux loop is required to drain a pseudocyst or when a pancreatic duct drainage procedure is needed.[8,17-19,20,23,25] Although pseudocyst drainage alone may relieve biliary obstruction, care should be taken not to overlook common bile duct stenosis due to pancreatic fibrosis. Intraoperative cholangiography should help to exclude this possibility.[23,25,26] Conversely biliary drainage should be considered in some patients in whom pancreatic surgery for pain is contemplated, particularly in the presence of significant biochemical and anatomic evidence of cholestasis.[22,27] Cholecystenterostomy or sphincteroplasty are inadequate procedures,[4,8,16-18,20] and permanent biliary stenting is inappropriate. Unnecessary biliary bypass procedures should be avoided because some patients present serious operative risks due to the presence of segmental portal hypertension and problems with malnutrition and brittle diabetes.

Complete resolution of jaundice and only minimal or mild common bile duct dilatation are reasonable prerequisites for conservative nonoperative therapy. Careful long-term observation of patients treated without biliary drainage should include serial estimations of AP and TSB, ultrasonography, ERCP, and perhaps liver biopsy. In addition, radionuclide cholescintigraphy may have a role in assessing the functional status of the biliary tree in these patients.[28]

This study stresses the limitations of clinical parameters and currently available investigations in determining the natural history of CBDS in CAIP. In the light of its relatively benign course, we would support the conservative approach followed by others.[7,13,14]

Acknowledgments

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