
Preoperative Endoscopic Retrograde Cholangiopancreatography (ERCP) in Patients with Pancreatic Pseudocyst Associated with Resolving Acute and Chronic Pancreatitis

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Experience with patients with pancreatic pseudocysts has led the authors to the hypothesis that preoperative evaluation of the pancreatic and bile ducts by ERCP will define those patients who may be inadequately treated by pseudocyst drainage alone without attention to associated pancreatic and biliary ductal abnormalities. In patients with certain ductal abnormalities, the pseudocyst operation was combined with a definitive operative drainage of the pancreatic duct and/or of the biliary tree where appropriate. A prospective evaluation of routine preoperative ERCP was undertaken over a 36-month period in all patients scheduled for operative treatment of pseudocyst of the pancreas. From an initial group of 44 patients with pseudocysts, three patients who had spontaneous regression of the pseudocyst were excluded. ERCP was successful in 39 of the remaining 41 patients. Among 41 operated patients, 24 were admitted with a diagnosis of pseudocyst that arose after an episode of acute pancreatitis, and 17 had chronic pancreatitis with pseudocyst. Nine patients, initially assumed to have acute pancreatitis, were recognized to have chronic pancreatitis on the basis of ERCP findings. Communication with the main pancreatic duct (MPD) was demonstrated in 18 of 41 pseudocysts, and the rate of communication was similar in patients with acute and chronic pancreatitis. Dilatation of the MPD was seen in 23 of 41 patients and was associated with chronic pancreatitis in 21. Dilatation of the common bile duct was found in 12 patients with chronic pancreatitis. The operative plan was altered by ERCP findings in 24 of 41 patients; 22 of the 24 patients had chronic pancreatitis. There were no complications of ERCP. These data suggest that ERCP should be performed in all patients with pseudocysts to establish correct diagnosis and to allow optimal choice of operation.

SILVIS AND COLLEAGUES¹ in 1974 showed that pseudocyst of the pancreas could be demonstrated effectively by endoscopic retrograde cholangiopancreatography (ERCP). Because ultrasonography and

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computed tomography (CT) are less invasive and offer more detail with regard to size and anatomic relations of the pseudocyst,² ERCP did not emerge as a standard technique for the evaluation of pseudocysts. Sugawa and Walt³ provided a detailed description of the various patterns of abnormalities of the pancreatic duct associated with pseudocysts. The differences between patients with acute pancreatitis and with chronic pancreatitis who have pseudocysts has been incompletely assessed.

Aranha and coworkers,⁴ in a retrospective evaluation of 81 patients with pseudocysts, attributed persistence of symptoms after operative drainage to the failure to recognize and treat obstruction and dilatations of the main pancreatic duct (MPD), a condition characteristic of chronic pancreatitis. In a subsequent report from the same authors, the simultaneous treatment of MPD dilatation and of pseudocysts is advocated. Retrospective analysis in that second study revealed that 22 of 87 chronic pancreatitis patients had an associated pseudocyst at the time of operation on their pancreatic duct and 12 of the 87 patients had undergone previous pseudocyst drainage, an overall rate of frequency of the coexistence of pseudocyst and MPD dilatation of 39%.⁵ A prospective evaluation of the routine use of ERCP in the preoperative evaluation of pseudocysts was undertaken on the basis of these findings.

Materials and Methods

The authors decided in October 1985 that all patients referred for operative treatment of pancreatic pseudocyst should undergo an ERCP prior to operation. The initial diagnosis of pseudocyst was established by either ultrasonography or CT. Patients were initially categorized as having either acute or chronic pancreatitis. They were

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evaluated for biliary lithiasis, a history of ethanol abuse, weight loss, and previous episodes of pancreatitis. This evaluation included abdominal radiography to assess glandular calcification, complete blood count, serum amylase, serum bilirubin, and liver enzymes as well as patient history. Patients were assessed for evidence of pancreatic functional impairment (steatorrhea, glucose intolerance, and abnormalities in gut hormonal homeostasis). Glandular calcification, steatorrhea, and glucose intolerance were considered indicative of chronic pancreatitis. A presumed diagnosis of acute pancreatitis was made in the absence of these findings and with a history suggesting recent exacerbation of symptoms.

At the discretion of individual surgeons, patients were observed while hospitalized or while at home for a period of one to five weeks. ERCP was performed on the day preceding operation.

ERCP

In order to minimize infectious complications, all ERCP procedures were performed the day before operation. Intravenous cefoxitin (1 g) was administered prior to each procedure and, when the contrast material filled the pseudocyst, cefoxitin was continued until operation. ERCP was performed in the conventional manner. After sedation with intravenous diazepam and meperidine, the Olympus JF-10 side-viewing duodenoscope was passed into the duodenum where the papilla of Vater was identified and cannulated. Intravenous glucagon (0.5 mg) was used to suppress duodenal motility. Water soluble contrast material was used to opacify the MPD and the biliary tree. All ERCP radiographs were evaluated for dilatation of the MPD, for strictures, stones, obstruction, or communication with the pseudocyst. Dilatation of the secondary ductules was evaluated. Cambridge criteria were used to establish the diagnosis of chronic pancreatitis.⁶ We also looked carefully for dilatation of the proximal biliary tree (common bile duct larger than 12 mm) and stricture of the distal (intrapaneatic) portion of the common bile duct (CBD).

The operative procedure depended on the choice of the individual surgeon. Drainage of the MPD was performed when the diameter of the duct exceeded 8 mm. Biliary drainage was performed when the triad of distal bile duct stricture, CBD dilatation, and persistent alkaline phosphatase elevation was present. Postoperative therapeutic responses were noted and carefully evaluated. Students' t-test and chi-square analysis were used for statistical evaluation.

Results

Forty-four patients with pancreatic pseudocyst who were admitted to the surgical service at the University of

TABLE 1. *Diagnosis Made After Initial Evaluation Before ERCP, Compared to Final Diagnosis After ERCP in 41 Pseudocyst Patients*

| | Chronic Pancreatitis (Number of Patients) | Acute Pancreatitis (Number of Patients) |
|-----------------------|--|--|
| Diagnosis before ERCP | 17 | 24 |
| Diagnosis after ERCP | 26 | 15 |

Texas Medical Branch at Galveston from October 1985 to October 1988 were enlisted in this study.

The etiology of pancreatitis was chronic alcoholism in all patients with chronic pancreatitis and in 12 of 15 patients with acute pancreatitis; the remaining three patients had biliary pancreatitis. Glandular calcification on abdominal radiographs was seen in 12 patients and these patients were all categorized as having chronic pancreatitis, as were an additional four patients who had glandular calcification documented by CT scan only. Steatorrhea was present in four patients and diabetes mellitus was found in three patients. Thus before performing ERCP, 17 pseudocyst patients were initially determined to have chronic pancreatitis, and 24 patients were found to have acute pancreatitis. After ERCP, nine of the 24 patients (38%), initially thought to have acute pancreatitis were rediagnosed as having chronic pancreatitis on the basis of the pancreatogram (Table 1). No patient initially diagnosed as having chronic pancreatitis was redesignated as having acute pancreatitis. We therefore studied 26 patients with chronic pancreatitis and 15 patients with acute pancreatitis.

There were 27 men and 14 women with a mean age of 39 years (range 21 to 68 years). Patients in the acute pancreatitis group (mean age, 36±5 yrs) were slightly younger than patients in the chronic group (mean age, 43±3 yrs). Seven patients developed pseudocysts during their hospitalization for acute pancreatitis, and these patients were observed for a mean interval of 4.2 weeks after diagnosis. Three of these seven patients who had spontaneous resolution of their pseudocyst were not operated upon and are excluded from this analysis. Two of these three patients had an ERCP performed later that revealed no abnormalities. A summary of preoperative findings is presented in Table 2. Hyperamylasemia was considerably more

TABLE 2. *Clinical and Biochemical Features of Patients with Pseudocysts Associated with Chronic Pancreatitis or Acute Pancreatitis Measured Prior to Operation*

| | Chronic Pancreatitis | Acute Pancreatitis | Total |
|------------------|-------------------------|-----------------------|-------|
| Pain | 26/26 | 14/15 | 40/41 |
| Pleural effusion | 1/26 | 5/15 | 6/41 |
| Hyperamylasemia | 6/26 | 12/15 | 18/41 |
| Jaundice | 2/26 | 3/15 | 5/41 |

TABLE 3. *Pseudocyst Characteristics in 41 Patients with Pseudocyst Associated with Chronic Pancreatitis or Acute Pancreatitis*

| | Chronic Pancreatitis | Acute Pancreatitis | Total |
|----------------------|----------------------|--------------------|-------------------------------------|
| Palpable mass | 12/26 | 8/15 | 20/41 |
| Mean diameter | 6.6 ± 2.1 cm | 5.1 ± 1.3 cm | 6.1 ± 1.9 cm (range 3.4–17.1 cm) |
| Location in pancreas | | | |
| Head | 7 | 7 | 14 |
| Body | 14 | 4 | 18 |
| Tail | 5 | 4 | 9 |

common in patients with acute pancreatitis (12/15) than in patients with chronic pancreatitis (6/26). The characteristics of the cysts are summarized in Table 3. The cyst diameters ranged from 3.4 cm to 17.1 cm with mean diameters that were similar in patients with acute pancreatitis and chronic pancreatitis. The presence of a thickened mature cyst wall was established by ultrasonography or CT before operation in all patients.

ERCP Findings

ERCP findings are summarized in Table 4. Pancreatography was successful in 39 of 41 patients (24 of 26 chronic pancreatitis patients and 15 of 15 acute pancreatitis patients). The operative strategy was strongly influenced or altered by ERCP information in 22 of 24 patients with chronic pancreatitis and in 2 of 15 patients with acute pancreatitis. The operative procedure in the 22 patients with chronic pancreatitis was pseudocyst drainage plus simultaneous drainage of the pancreatic duct in 19 patients and simultaneous drainage of the CBD in 11. The altered strategy in patients with acute pancreatitis was the decision to perform distal pancreatectomy in two patients whose MPD was obstructed by a pseudocyst in the tail of the pancreas.

Communication between MPD and the pseudocyst was seen in nearly one half of all patients studied (18/39), and

TABLE 4. *ERCP Findings on 39 Patients Who Had Successful Pancreatograms to Evaluate Pseudocysts*

| | Chronic Pancreatitis | Acute Pancreatitis | Total |
|-------------------------|----------------------|--------------------|-------|
| Patients | 24 | 15 | 39 |
| Communication with duct | 9/24 | 9/15 | 18/39 |
| MPD Stone | 6/24 | 0/15* | 6/39 |
| MPD obstruction | 3/24 | 2/15 | 5/39 |
| MPD dilatation | 21/24 | 2/15* | 23/39 |
| CBD dilatation | 12/24 | 3/15* | 15/39 |
| CBD stricture | 16/24 | 0/15* | 16/39 |

* $p < 0.05$ for differences between chronic pancreatitis and acute pancreatitis.

was somewhat more common in patients with acute pancreatitis. Figure 1 depicts the pancreatogram of a patient in whom MPD dilatation was the only evidence of chronic pancreatitis. No suggestion of this diagnosis was apparent prior to ERCP. Communication between the MPD and the pseudocyst is demonstrated. Stones within the MPD and distal bile duct strictures were found only in patients with chronic pancreatitis. MPD dilatation involving the entire duct was shown in 21 of 24 patients with chronic pancreatitis; this was present only in patients with chronic pancreatitis. Segmental MPD dilatation, proximal to an area of stricture, was seen in 2 of the 15 patients with acute pancreatitis.

Common bile duct abnormalities were considerably more common in patients with chronic pancreatitis (12/24) than in patients with acute pancreatitis (3/15). The 12 patients with chronic pancreatitis had CBD dilatation (mean, 22 mm) (Fig. 2), whereas, three patients with acute pancreatitis had attenuation of the duct caused by the pseudocyst. Biochemical confirmation of this finding was provided by a consistently elevated alkaline phosphatase (mean level of 841 IU/L) in the 12 patients with chronic pancreatitis who had dilated CBDs. The characteristic distal CBD stricture of chronic pancreatitis is demonstrated in the cholangiogram obtained by ERCP in Figure 3. Jaundice was rare in patients with chronic pancreatitis (2 of 12 patients). Each patient with acute pancreatitis required only pseudocyst drainage to resolve the restriction to bile flow. There were no episodes of pancreatitis or sepsis after ERCP.

Operations

Several operative procedures were used in the patients in this study (Table 5). Cystogastrostomy (CG) was used predominantly in patients whose pseudocysts were associated with acute pancreatitis. Roux-en-Y cystojejunostomy alone was used in three patients with acute pancreatitis.

Pancreaticojejunostomy, a modified Puestow procedure, was performed in 21 patients, all with chronic pancreatitis. In 19 patients, pseudocyst drainage with pancreaticojejunostomy was performed by enlarging the incision in the MPD to incorporate the pseudocyst. In two patients, a separate anastomosis was made between the pseudocyst and the end of the jejunal limb used for the pancreaticojejunostomy. In another patient, a CG was employed in addition to a pancreaticojejunostomy. Eleven of these 19 patients also had biliary drainage, either a choledochojejunostomy (8 patients) or a choledochoduodenostomy (3 patients).

There were no operative deaths in the 41 patients. One patient developed postoperative upper gastrointestinal hemorrhage after CG. This patient required three units

FIG. 1. Pancreatogram in a patient with an unanticipated diagnosis of chronic pancreatitis. Both MPD and secondary ductular abnormalities are apparent. The communication with a large pseudocyst is demonstrated.



of red blood cells and the hemorrhage stopped spontaneously. Two patients developed wound infections. No postoperative pancreatic fistulas were seen. No patient required reoperation. Pain relief was achieved in 39 of 41 patients (95%).

Discussion

Three major advances in the ability to diagnostically display the pancreas were made in rapid succession during the 1970s. ERCP, ultrasonography (US), and CT greatly sharpened the accuracy of anatomic information for evaluation of the pancreas. Prior to the availability of these methods, pseudocysts of the pancreas were evaluated by indirect means, such as displacement of the stomach or duodenum in upper gastrointestinal radiographic series. Soon after the development of ERCP, its effectiveness in demonstrating pseudocysts of the pancreas became apparent.¹ ERCP provides less information regarding size and the relationships to surrounding viscera than do US and CT scan and, therefore, US and CT have evolved as the conventional means for evaluating pseudocysts.⁷ In a retrospective report, Sugawa and Walt³ established the usefulness of ERCP in categorizing the ductal abnormalities seen in patients with pseudocysts prior to operation.

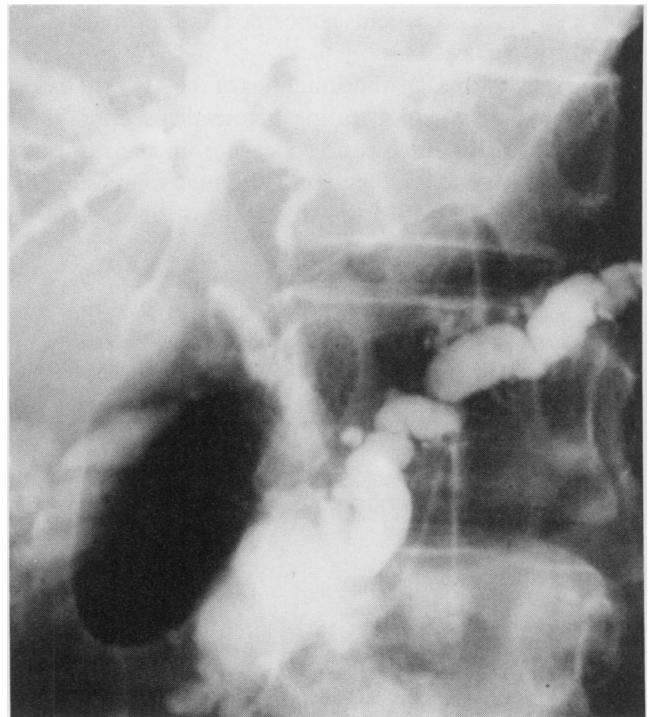


FIG. 2. ERCP that revealed marked MPD and CBD dilatation in a patient with pseudocyst and chronic pancreatitis.

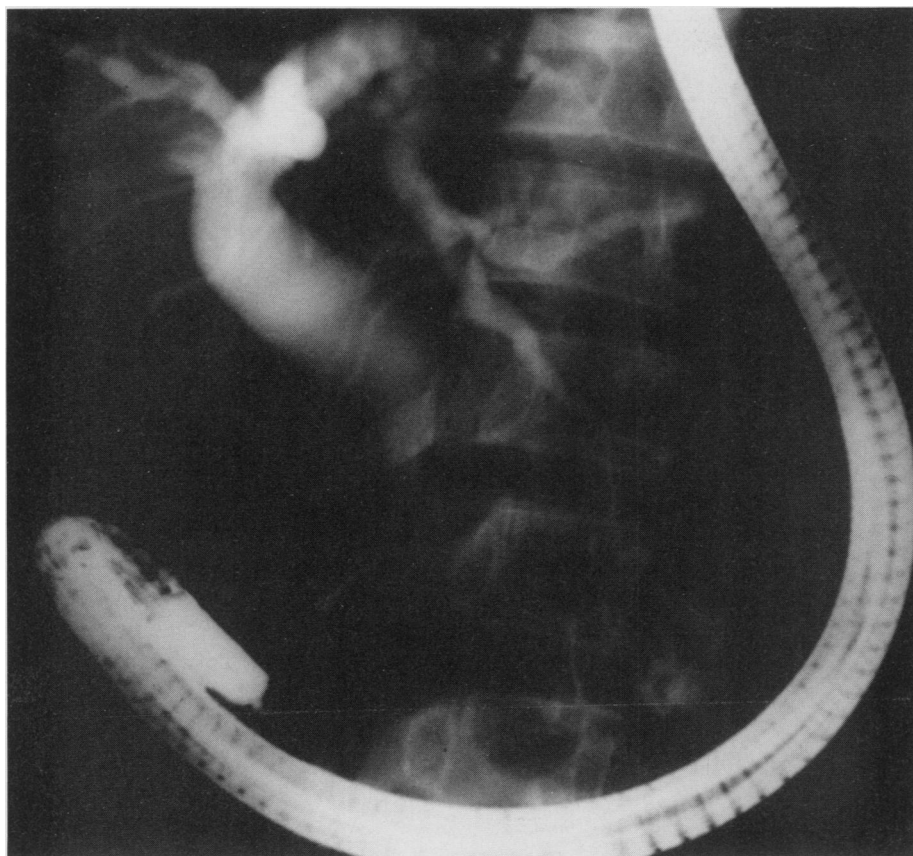


FIG. 3. The characteristic distal CBD stricture of chronic pancreatitis is displayed in this cholangiogram obtained by ERCP. Some distortion of the course of the distal CBD is caused by a pseudocyst in the head of the pancreas.

This analysis of 83 patients concerned itself primarily with diagnostic accuracy.

The suggestion that abnormalities of the MPD had been overlooked by surgeons treating pancreatic pseudocyst was first proposed by Aranha and colleagues⁴ in a retrospective review of 81 pseudocyst patients. Although many surgeons who are experienced in the treatment of diseases of the

pancreas will employ ERCP in the evaluation of pseudocysts, this practice is less uniform among those who treat these diseases infrequently. One recent report stated that ERCP added little to the management of pseudocyst patients.⁸ No prospective evaluation of the usefulness of ERCP has been reported previously. That unanticipated MPD abnormalities can be found is sufficient indication for routine ERCP. The authors' additional findings on ERCP are also pertinent.

In order to prospectively evaluate the usefulness of preoperative ERCP, we have established a policy of routine preoperative ERCP in all patients with pseudocyst of the pancreas. On the basis of this prospective analysis, the authors believe that ERCP is essential in order to arrive at a correct diagnosis and to determine correct operative strategy in pseudocyst patients. Notably, nine of the 24 patients who were originally thought to have pseudocysts as a complication of simple acute pancreatitis were found to have totally unanticipated ERCP evidence of chronic pancreatitis (Table 1). These patients represent the most unexpected of our findings. Neither glandular calcification nor exocrine nor endocrine functional status provided a clue to the diagnosis of chronic pancreatitis. These patients were not individuals whose chronic pancreatitis was appreciable without ERCP on the basis of associated find-

TABLE 5. Operative Procedures Employed in 41 Patients with Pancreatic Pseudocyst Associated with Chronic Pancreatitis or Acute Pancreatitis (CJ/PJ means an incorporation of the pancreaticojejunostomy and cystojejunostomy in one anastomosis)

| | Chronic Pancreatitis | Acute Pancreatitis | Total |
|---|-------------------------|-----------------------|-------|
| Cystogastrostomy (CG) | 1 | 9 | 10 |
| CG + Roux-en-Y pancreaticojejunostomy (PJ) | 1 | 0 | 1 |
| Cystoduodenostomy | 0 | 1 | 1 |
| Distal pancreatectomy (DP) | 3 | 2 | 5 |
| DP + biliary drainage (BD) | 1 | 0 | 1 |
| DP + PJ | 1 | 0 | 1 |
| Roux-en-Y cystojejunostomy (CJ) | 0 | 3 | 3 |
| CJ/PJ | 8 | 0 | 8 |
| CJ/PJ + BD | 11 | 0 | 11 |
| Total | 26 | 15 | 41 |

ings. These patients would surely not have been considered for pancreatic duct drainage without ERCP.

Approximately one half of the authors' patients had a communication, demonstrated by ERCP, between the MPD and the pseudocyst. Some have used this finding as a clue to the likelihood of pseudocyst recurrence after external drainage, either operative or percutaneous, although the data to support this supposition are sparse. The distribution of this communication was similar in patients with acute and chronic pancreatitis (Table 4). Another notable ERCP finding, dilatation of the entire MPD (characteristic of chronic pancreatitis), was seen in 21 of 24 patients with chronic pancreatitis. Only two of the 15 acute pancreatitis patients had MPD dilatation, and these were both in isolated segments of the tail where the pseudocyst was causing stenosis of the MPD (Table 4).

Operative strategy was altered on the basis of the ERCP findings in 22 of 26 chronic pancreatitis patients (Table 4). This includes the 21 patients who had pancreaticojejunostomy combined with the primary pseudocyst drainage or resection (Table 5). The ability to incorporate pseudocyst drainage with MPD drainage was reported by Munn and colleagues.⁵ They found that the addition of pancreaticojejunostomies in 26 patients with pseudocysts resulted in no increasing of mortality or morbidity rates. In the authors' 21 patients in whom pancreaticojejunostomy was employed, there were no deaths. In fact, there were no deaths in our 41 patients. Two wound infections were seen and one patient, who had combined CG and pancreaticojejunostomy, had postoperative bleeding located at the edge of the CG that stopped spontaneously. This incidence of both mortality and morbidity is considerably lower than rates of mortality and morbidity in most previous surgical reports.³⁻⁵

Our finding of frequent dilatation of the CBD due to distal bile duct stricture in patients with pseudocyst of the pancreas was an additional benefit gained by the routine use of ERCP. Recognition of these biliary abnormalities provided the anatomical information needed to permit a planned decompression of the CBD at the time of operative management of the pseudocyst. A distinction can be drawn between the characteristic distal CBD stricture of chronic pancreatitis and the "mass effect" occasionally seen in patients whose pseudocysts have occurred in acute pancreatitis. This distinction has pertinence to the operating surgeon because the distal bile duct stricture of chronic pancreatitis will persist after decompression of the pseudocyst. In contrast, the attenuation of the CBD associated with pseudocysts arising in acute pancreatitis requires pseudocyst drainage alone. Thus, ERCP determines the need for biliary decompression.⁹ When a patient with CBD dilatation and a distal stricture had evidence of persistently elevated alkaline phosphatase, CBD drainage was performed. The peril of long-standing cholestasis

in chronic pancreatitis patients is progression to biliary cirrhosis.^{10,11} In our study of pseudocyst patients, 12 of 26 chronic pancreatitis patients required biliary drainage, a frequency comparable to that reported by Prinz and colleagues.¹²

Cystogastrostomy is by far the most technically simple of the possible procedures to treat pseudocyst of the pancreas. The authors would advise it in all cases in which the posterior wall of the stomach is fused to the anterior wall of the pseudocyst in patients who do not have lesions of the MPD that require drainage. Pancreatic duct drainage combines poorly with CG because of the need to dissect the plane between the stomach and the pancreas (which disrupts the inflammatory adhesion of the pseudocyst to the stomach) in order to define the course of the MPD in the head of the gland. If a separate anastomosis to the pseudocyst is required (which is not often), we advise exclusive use of a Roux-en-Y cystojejunostomy in patients who have a simultaneous pancreaticojejunostomy. In the majority of patients, the pseudocyst can be drained by incorporating it within the pancreaticojejunostomy. We have reserved pseudocyst resection for those patients with pseudocyst in the tail of the gland.

In patients with pancreatic pseudocysts, the distinction between acute and chronic pancreatitis has not been uniformly considered. The correct diagnosis must be obtained in order to prevent inadequate treatment of patients who have abnormalities of the pancreatic and biliary ducts. The authors' data show that this can be most readily accomplished by ERCP; 22 of our patients with chronic pancreatitis had abnormalities of the pancreatic and biliary ducts.

The frequency of associated pancreatic and biliary ductal pathologic conditions in patients with pancreatic pseudocysts provides direct evidence against the increasingly popular decision to drain pseudocysts percutaneously. These associated lesions require operative intervention; they are unrecognized and are not adequately treated when treatment is limited to percutaneous drainage alone.

ERCP is essential in order to arrive at a correct diagnosis and to determine correct operative strategy in patients with pancreatic pseudocysts. On the basis of their findings, the authors recommend: (1) routine ERCP for all patients who have pancreatic pseudocysts; (2) simultaneous, combined decompression of the MPD and the pseudocyst, when appropriate; and (3) combined, simultaneous biliary drainage in patients with evidence of chronic biliary obstruction.

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DISCUSSION

DR. ROBERT ZEPPA (Miami, Florida): Dr. Polk, Dr. Jones, first I would like to thank Dr. Townsend for the honor of his request to discuss this paper, especially because we have no scientific data in support of this, but merely anecdotal information that does lead us to be in almost complete agreement.

The problem of pseudocyst, as is indicated in their paper, suggests that ultrasound and CT scans were useful in identifying the correct differential diagnosis between acute pancreatitis and chronic pancreatitis with ductal dilatation.

On the basis of your studies, how many of the patients had already been identified as having dilated ducts before ERCP was undertaken?

Second, were any of the patients drained percutaneously in this series? That was notably missing in the manuscript, and I must say that in our institution, most pancreatic pseudocysts are drained percutaneously and quite satisfactorily. The result is that we are doing fewer operative procedures.

The problem of recurrence in this population of patients needs to be addressed. I don't know how it is in Galveston, but I can tell you that in Miami those patients who have pancreatic disease secondary to alcohol abuse and who develop pseudocysts are extraordinarily difficult to find in terms of the follow-up, so I don't know what the recurrence rate for our group is with the percutaneous drainage. But so far, we have not identified more than a small handful of patients who have come back and those have been fairly soon after the percutaneous drainage.

I suspect that Courtney asked us to comment on this because some years ago Dr. Duane Hudson and I had presented a paper before the Southern on the operation drainage of pseudocysts, particularly cystogastrostomy. We presented a modest series of patients with cystogastrostomies from which data we tried to influence the Association into believing that when you have sutured the edges of the cystogastrostomy the anastomosis will be incompetent, and that the bleeding would occur from the pancreatic side because of the reflux of acid, something that was determined by Dr. Warren years before in some elegant studies he did while he was at Virginia.

I would like to close this brief discussion by apologizing to Jim Thompson for not providing rapt adulation for the paper, but we do not do ERCP on all patients, but we do believe that it is an extraordinarily useful procedure in patients who have complex cysts where you can't quite identify a track for simple percutaneous drainage.

DR. GEORGE L. JORDAN, JR. (Houston, Texas): Dr. Polk, Dr. Scott: I also would like to thank Dr. Townsend for the privilege of reviewing his manuscript that includes the report of a very interesting group of patients.

He is certainly to be congratulated on his low rates of morbidity and mortality in what often is a very complex group of individuals.

If I understand his manuscript correctly, all but three of his patients had alcoholic pancreatitis, and, therefore, the importance of ERCP becomes immediately important in that particular group.

Many other series have many patients who have pseudocysts following

acute attack of pancreatitis due to gallstones. They almost never have ductal abnormalities, and in that group ERCP is much less important. Consequently, we would use a selective approach rather than routine use of ERCP because we think that there are groups of patients in whom the probability of ductal abnormalities is so low that ERCP is not likely to be of benefit.

Another interesting fact, to me, in his paper is the small size of the pseudocysts. Back before we had ultrasound and CAT scans and ERCPs, we didn't diagnose pseudocysts unless we could palpate them and see them on displacement of the stomach in an upper GI series, so we were dealing with an entirely different group of people at that time. They were large pseudocysts, and when we have a pseudocyst that fills the entire lesser sac, I am not sure how I would do a Puestow procedure and drain that pseudocyst at the same time. Again, I feel that there needs to be some selection.

I would like to ask about the pathology because some of the slides that I saw suggested that some were true cysts, intrapancreatic cysts rather than what I call a pseudocyst, which is usually external to the pancreas per se.

The last thing I would like to comment on is the very high incidence of common-duct obstruction. That has certainly not been my experience. Certainly stricture of the common duct occurs in chronic pancreatitis, and I have combined the Puestow procedure with common-duct drainage in many instances, but once one relieves the pseudocyst and drains the pancreatic duct, the likelihood of progression to a severe-enough stricture for which subsequent reoperation is necessary or from which permanent damage to the liver occurs is very, very small in my experience.

Consequently, I would like to ask what their follow-up data are in patients before they did this study, which would indicate the incidence of hepatic damage in those who did not have common-duct drainage—patients who were not jaundiced—because that is the group I am talking about, and, again my question about pathology.

DR. JOAQUIN S. ALDRETE (Birmingham, Alabama): I congratulate Drs. Nealon, Townsend, and Thompson for their carefully planned, skillfully executed, and elegantly presented analysis of the usefulness of ERCP in the operative treatment of patients with pseudocysts of the pancreas. Their contribution is important to the field of pancreatic surgery because it clarifies several aspects of pancreatic pseudocysts that have great relevance to their appropriate operative treatment. I have a few comments and some questions that I hope will be pertinent.

Because of the use of ERCP, the authors modified their categorization of acute to chronic pancreatitis in nine of 24 patients (38%); however, the criteria they used for the pre-ERCP categorization into chronic pancreatitis was the presence of pancreatic calcification, steatorrhea, or glucose intolerance. We know that some patients with chronic pancreatitis do not have any of these three manifestations. In fact, in a group of nearly 150 cases of chronic pancreatitis that we have analyzed over the last few years, we found that 16% of them do not have pain at all, 20% never drank alcohol, and many do not have dilated pancreatic ducts as assessed by ERCP or CT. At any rate, the authors established that 63% of their patients treated for PPSC had chronic pancreatitis and 37%