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# Endoscopic Placement of Pancreatic Stents and Drains in the Management of Pancreatitis

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Although widely used in the biliary tree, little data is available on endoscopic placement of stents or drains within the pancreas. This report describes 17 patients, nine with acute relapsing pancreatitis and eight with chronic pancreatitis, who had drain or stent placement for hypertensive pancreatic duct (PD) sphincter, dominant ductal stenosis, duct disruption, or pseudocyst. Two patients have subsequently undergone surgery, and six other patients continue long-term stent placement with marked reduction of chronic pain or attacks of recurrent pancreatitis. All six pseudocysts resolved, although one recurred and required surgery. It is concluded that pancreatic drains or stents may obviate the need for surgery, temporize before definitive therapy, or direct a subsequent surgical procedure.

**E**NDOSCOPICALLY PLACED BILIARY DRAINS and stents have become widely used for a variety of benign and malignant conditions affecting the biliary tract.<sup>1-4</sup> Temporary pancreatic drains and semi-permanent stents have also been placed, but little data is available regarding usage patterns, results, and side effects.<sup>5,6</sup> We report our experience with this technology over a period of 12 months (March 1987–March 1988) in the setting of acute and chronic pancreatitis.

## Materials and Methods

### Technique

Patients underwent conventional ERCP, using an Olympus JF 1-T or JF 4.2 mm-channel duodenoscope (Olympus Corp., New Hyde Park, NY) after premedication with meperidine and/or diazepam and cefotetan antibiotic precoverage. Ductal disruption with pseudocyst

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formation was treated with free cannulation through the papilla or an incision through the duodenal wall using a needle-knife sphincterotome, guide-wire passage into the cyst, and placement of a 350-cm long 6 or 7 Fr drain (Wilson-Cook Medical Inc., Winston-Salem, NC) directly into the cyst (Figs. 1 and 2). The scope was removed while the drain was simultaneously advanced under fluoroscopic control to assure that the distal pigtail remained in the cyst. Thereafter, the drain was transposed to the nose by placing a 14 Fr nasal transfer tube through the nose, retrieving one end *per os*, and backfeeding the drain through the transfer tube, which was subsequently withdrawn. Drainage was continued until the output was negligible and no ductal communication was noted with transnasal pancreatography. Five to 10 Fr Amsterdam-type stents with additional side-holes or double pigtail stents (Wilson-Cook Medical, Inc., Winston-Salem, NC) were placed in the setting of persistent ductal disruption, dominant stricture with recurrent pain or pancreatitis, and as a diagnostic/therapeutic trial in patients with acute relapsing pancreatitis and hypertensive PD sphincter, as delineated by manometry (Fig. 3). Technically, larger stents required PD sphincterotomy. An .018–.035 inch guide wire was passed beyond the stenosis and preferably to the distal body or proximal tail of the gland (Fig. 4). Smaller stents could be pushed in place using an ERCP catheter, whereas larger stents required a special pushing tube.

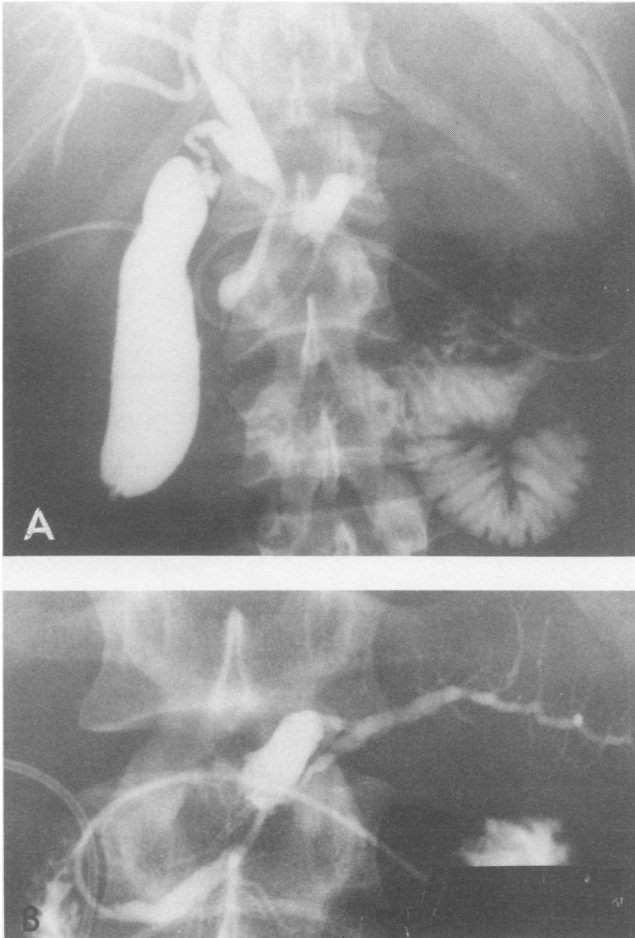
### Chronic Pancreatitis

Six patients had PD stents placed (in two patients, after PD sphincterotomy of the major ampulla), for dominant

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Submitted for publication: June 7, 1988.



FIGS. 1A and B. (A) Transnasal pancreatic drain through papilla and into pseudocyst at genu. Note percutaneous cholecystostomy in patient with acalculous cholecystitis and ductal disruption that occurred as a result of a motor vehicle accident. (B) Close-up of Figure 1A.

strictures (three patients) or disrupted ducts (one patient) and recurrent pseudocyst formation (two patients). Etiology of the chronic pancreatitis was alcohol (three patients), pancreas divisum with stenosed minor sphincteroplasty site (one patient), and idiopathic (two patients). One of the latter patients had two separate double pigtail stents 4 months apart through a stenosed pancreaticojejunostomy (Peustow procedure) anastomosis.

Two patients with alcoholic pancreatitis had nasopancreatic (NP) drains placed into infected pancreatic pseudocysts; one was placed into the pseudocyst through the papilla, the second directly into the cyst using a needle knife sphincterotome to incise the duodenal wall.

#### *Acute Pancreatitis*

Four patients with relapsing acute pancreatitis, previous endoscopic or surgical biliary sphincter section, and re-

sidual hypertensive pancreatic sphincter mechanism ( $> 40$  mmHg) had 5 Fr stents placed as a diagnostic/therapeutic trial. A fifth patient had stents placed into both the common bile and PDs (Fig. 3). A sixth patient had a stent placed through a proximal stricture resulting from a motor vehicle accident. Two patients had NP drains passed through the papilla and into pseudocysts, the result of a motor vehicle accident and post-ERCP pancreatitis, respectively. The latter patient subsequently had an ongoing ductal disruption stented. A final patient with a villous adenoma of the papilla and severe pulmonary compromise had endoscopic resection of the papilla for acute relapsing pancreatitis (Fig. 5). A NP drain was left at the PD genu to assure postpolypectomy ductal drainage.

## Results

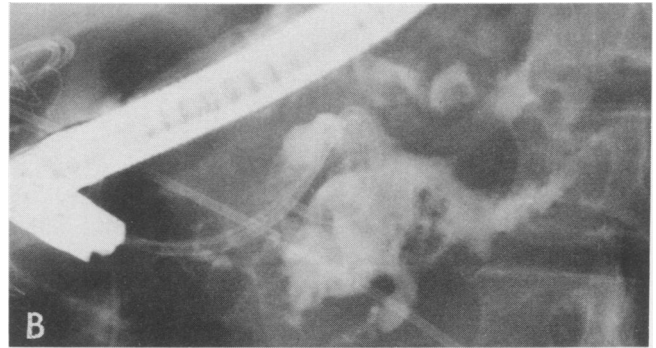
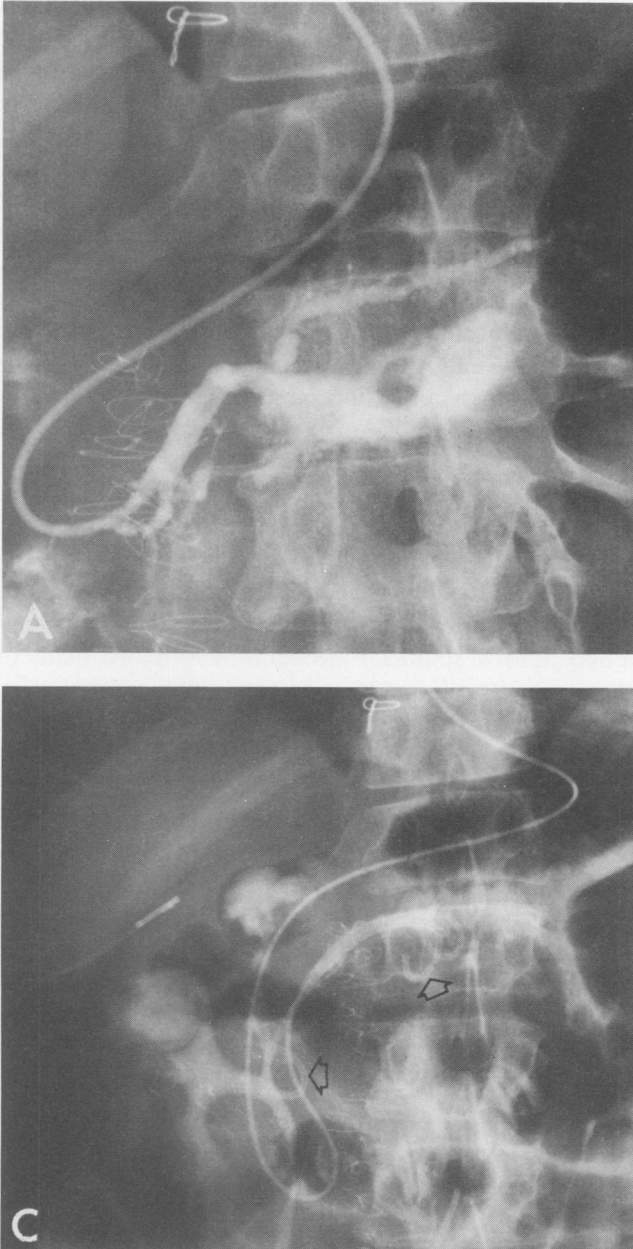
### *Chronic Pancreatitis*

Surgery has been avoided in five of the six stented patients, at a mean follow-up of 8 months. The sole exception was an alcoholic patient who continued to drink and suffered an additional ductal disruption at the PD genu with pseudocyst formation. His pseudocyst was controlled with an additional NP drain placement before partial pancreatectomy. The patient with the stenotic Peustow anastomosis became pain-free and gained 14 kg before developing recurrent symptoms 4 months after stent placement. An occluded 7 Fr stent was replaced with a 10 Fr prosthesis, and 5 months later, the patient is again asymptomatic. The other four patients have experienced a dramatic diminution in chronic pain, despite spontaneous stent passage in two patients at 4 and 6 months, respectively. An additional stent placement was undertaken in a patient with multiple pseudocysts and a pancreaticocholedochocutaneous fistula, who had been receiving hyperalimentation at home for 6 months before stent placement. He is currently pain-free and has not received hyperalimentation for the past 12 months.

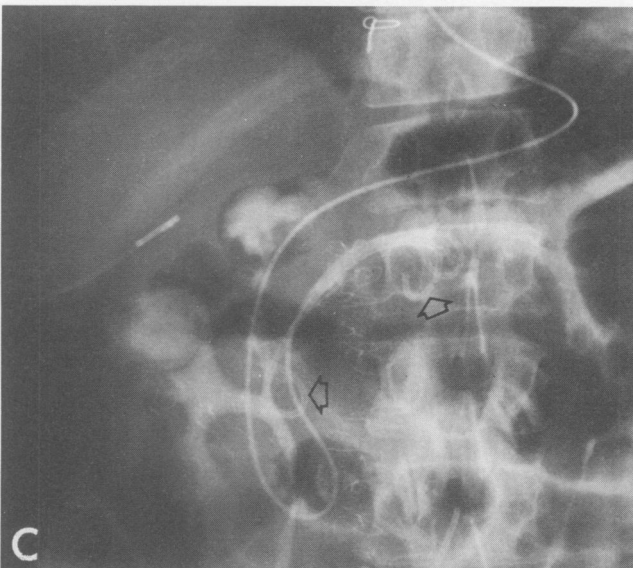
Both patients with infected pseudocysts were successfully drained endoscopically, although one patient required subsequent open drainage of a hepatic abscess.

### *Acute Pancreatitis*

Two of the five stented patients with sphincter hypertension experienced continued pain or recurrent pancreatitis. Stents were removed without change in the clinical course of these patients. In two patients, pain or recurrent pancreatitis resolved with stenting and will be treated medically because of surgery refusal (one patient) and infirmity (one patient). One patient spontaneously passed



FIGS. 2A–C. (A) Chronic pancreatitis with major ductal disruption, pseudocyst, and NP drain through papilla and into cavity. (B) 7 Fr double pigtail catheter inserted through papilla and into pseudocyst alongside of NP drain. (C) Arrows delineate PD stent alongside NP drain in patient depicted in Figures 2A and B. Note cholecystostomy tube for acalculous cholecystitis. Drain and stent were removed at 5 days and 2 months, respectively, after pseudocyst resolution.



her pancreatic stent after several weeks but retained a biliary stent that was placed at the same time (Fig. 3). She has undergone a surgical sphincteroplasty and septoplasty but continues to require recurrent hospitalization for relapsing pancreatitis. The patient who had severe ongoing pancreatitis after an automobile accident was asymptomatic 12 months after stent placement. This stent was subsequently removed at another institution, with noted improvement in her stenosis and no recurrence of her pancreatitis.

Both patients with NP drain placement into a pseudocyst cavity were successfully drained and surgery was

thereby avoided. One of these patients, who developed severe post-ERCP pancreatitis at another institution, had evidence of ongoing ductal disruption and was asymptomatic 3 months after stent placement.

The patient undergoing resection of his papilla had an uneventful course and was discharged 24 hours after the procedure, after repeat NP drain pancreatogram.

#### *Complications*

Mild pancreatitis occurred in two patients, one of whom also underwent a major sphincterotomy of the duct of

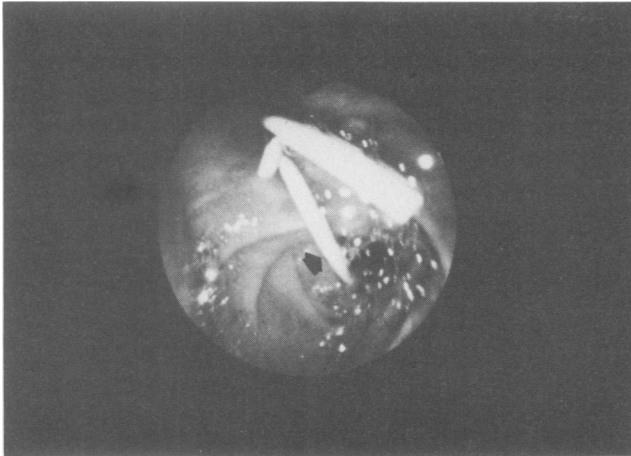


FIG. 3. Endoscopic view of PD stent (arrow) in patient who also had biliary stent placed for hypertensive sphincter and acute relapsing pancreatitis.

Wirsung. The patient with the Peustow procedure developed transient cholestasis (< 48 hours) with both stent placements. One stent occluded at 4 months, and three were passed spontaneously *per rectum* at variable time periods.

### Discussion

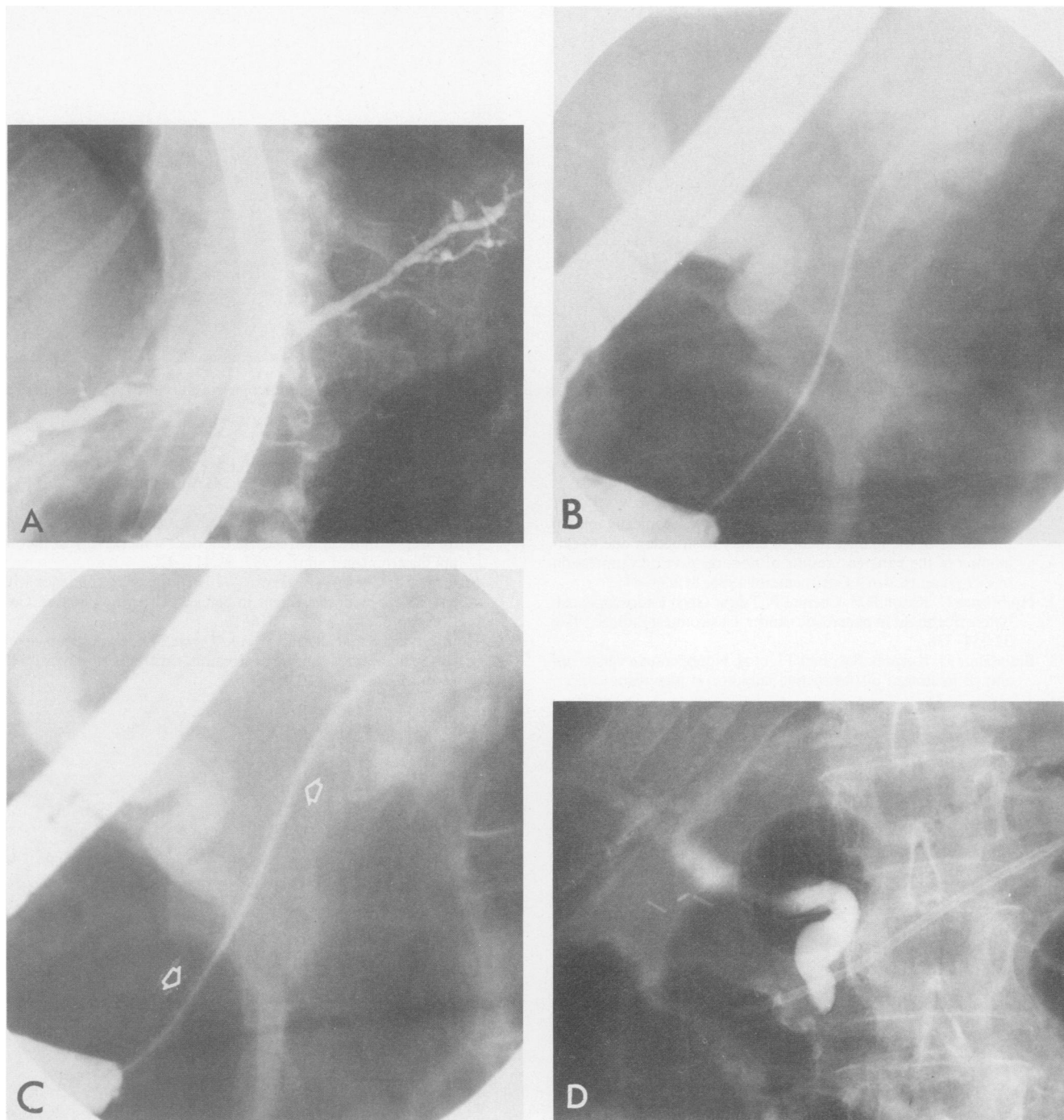
Endoscopically placed biliary stents are used primarily in the setting of malignant biliary obstruction, although less common indications include iatrogenic bile leak, and occasionally, choledocholithiasis.<sup>1-4</sup> By contrast, little has been written about indications and usage patterns for stent placement in the pancreas. Geenen et al.<sup>5</sup> attempted PD stent placement in two major patient groups. Stent placement was successful through the minor sphincter in 19 of 22 patients with chronic abdominal pain and pancreas divisum. Seventeen of these patients were reported to have experienced a significant decrease in pain, and stents were traded out at 6 month intervals. The second group in whom PD stents were placed was a heterogeneous group of 15 patients with recurrent or chronic pancreatitis, approximately half of whom improved after stent placement. Huijbregtse et al.,<sup>6</sup> in turn, used pancreatic drains and stents in patients with dominant strictures, ductal disruption, or pseudocysts. Used in conjunction with PD sphincterotomy and PD stone removal in a subset, a total of 32 patients were treated. Patients who had chronic pain as their primary problem fared significantly less well than those with bouts of relapsing pancreatitis.

Our series confirms that both stents (indwelling tubes) and drains (external conduits) can be used in the PD for

a variety of chronic inflammatory conditions. For instance, stent placement in chronic pancreatitis has, to date, obviated the need for surgery in five of six patients in whom they were placed. Both pain and recurrent pancreatitis attacks have improved markedly, suggesting that dominant strictures are not only the result of pancreatitis, but are also the cause of symptoms in some patients. NP drains also proved useful in treating chronic pancreatitis, allowing successful drainage of infected pseudocysts in both patients in whom it was attempted. In addition, two patients with acute pancreatitis and pseudocyst formation responded to endoscopically facilitated external drainage with pseudocyst resolution, and a third patient had an uncomplicated papilla of Vater resection after drain placement. Also, the patient with a tight proximal PD stricture responded clinically to stent placement, as did one of the patients with pseudocyst who demonstrated ongoing ductal disruption.

In contrast to the above, it remains uncertain what to do with the patient with acute relapsing pancreatitis and a hypertensive sphincter mechanism. Although many of these patients respond to endoscopic sphincterotomy,<sup>5</sup> a significant subset continue to have recurrent attacks of pain and hyperamylasemia. It is uncertain whether a residual hypertensive sphincter (residual sphincter of Oddi as measured through duct of Wirsung) is the cause or result of pancreatitis in these patients. It appears reasonable to place a prosthesis through the residual sphincter mechanism in these patients, reserving surgical septoplasty for those patients who become free of pain or hyperamylasemia attacks after stent placement. Alternatively, periodic stent exchange or endoscopic PD sphincterotomy could be undertaken in extremely high surgical risk patients. Two patients in this series had no relief with stent placement, one had early stent migration and underwent septoplasty without improvement, and two patients are currently undergoing continued treatment with internal stents.

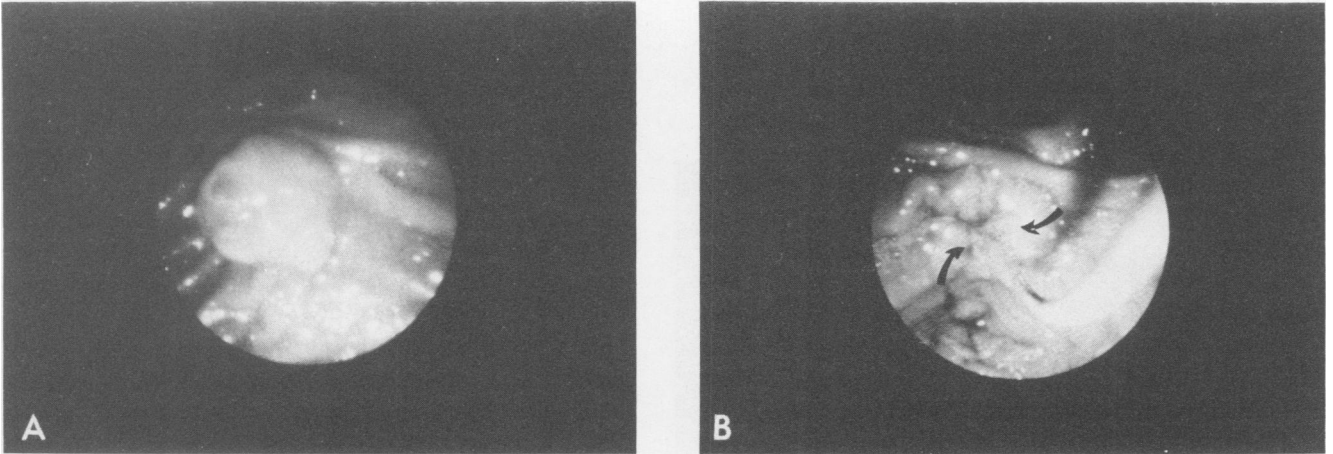
Because most of the patients treated with drains and stents were acutely and chronically ill, complications were difficult to define with certainty. Nevertheless, a mild pancreatitis flare was noted in two patients, as were two transient (48-hour) episodes of cholestasis, presumably related to pancreatic head edema. This compares with two episodes of pain exacerbation and two instances of stent migration into the pancreas in the Geenen series and two cases of pancreatitis in the Amsterdam series.<sup>5,6</sup> Also, in the latter group, a PD abscess secondary to an occluded stent developed in two patients, stent-induced ulceration developed in an additional two patients, and there was a single death related to duodenal perforation after PD sphincterotomy.



FIGS. 4A–D. (A) Chronic pancreatitis changes in patient with pancreas divisum and stenotic minor sphincteroplasty orifice. (B) Guide wire placement into dorsal PD through minor papilla. (C) Arrows depict 7 Fr stent being pushed over central wire and into PD. (D) 7 Fr Amsterdam stent well-situated in dorsal PD. Note moderately dilated CBD. Sphincter of Oddi manometry is normal.

Our series confirms and expands the data noted in the two previous publications on this topic. In short, PD stents and drains can be endoscopically placed safely in selected patients with acute and chronic pancreatitis. Their use

may obviate the need for surgery, temporize before definitive therapy, or direct a subsequent surgical procedure. Further data defining the ideal patient and the timing and need for stent exchange remain to be acquired.



FIGS. 5A and B. (A) Papilla of Vater with extensive villous adenomatous change confirmed at biopsy and endoscopic resection. (B) Arrows delineate cauterization burn after endoscopic resection of papilla; guide wire into PD.

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