# EUS-guided pancreatic duct drainage: ready for prime time?

The development of interventional EUS has provided better access to the region of the pancreas. Just as pancreatic fluid collections, such as pseudocysts, can be successfully drained from the stomach or duodenum by endoscopic cystenterostomy or cystgastrostomy, the same technique could be used to access a dilated pancreatic duct in cases in which the duct cannot be drained by conventional ERCP because of complete obstruction.<sup>1,2</sup>

The main indications are stenosis of pancreaticojejunal or pancreaticogastric anastomosis after Whipple resection, which induces recurrent acute pancreatitis (AP), main pancreatic duct (MPD) stenosis caused by chronic pancreatitis (CP), post-AP, or postpancreatic trauma after failure of ERCP. The pain associated with CP is caused, at least in part, by ductal hypertension. Both surgical and endoscopic treatments can relieve pain by improving ductal drainage. Endoscopic drainage requires transpapillary access to the pancreatic duct during ERCP. EUS-guided pancreaticogastrostomy or bulbostomy offers an alternative to surgery.

#### **TECHNICAL CONSIDERATIONS**

By using a linear interventional EUS endoscope, the dilated MPD can be well visualized. EUS-guided pancreatic duct drainage is then performed under combined fluoroscopic and US guidance, with the tip of the echoendoscope positioned such that the inflated balloon is in the duodenal bulb, whereas the accessory channel remained in the antrum. A 19G needle is inserted transgastrically or through the bulb into the proximal pancreatic duct, and contrast medium is injected. Opacification demonstrates a pancreaticogram. The needle is exchanged over a guidewire (0.025 or 0.035 inch) for a 6.5F or 8F diathermic sheath (prototype Cysto Gastro set; ENDO-FLEX, Voerde, Germany), which is then used to enlarge the channel between the stomach and the MPD. The sheath was introduced by using cutting current. After exchange over a guidewire (rigid 0.035-inch diameter), a 7F, 8-cm long pancreaticogastric stent is positioned. This stent will be exchanged for two 7F stents or one 8.5F stent 1 month after the first procedure. This technique was reported in the first paper on EUS-guided pancreatic duct

Copyright © 2013 by the American Society for Gastrointestinal Endoscopy 0016-5107/\$36.00 http://dx.doi.org/10.1016/j.gie.2013.10.019 drainage by François et al.<sup>3</sup> The technique used in the work published in this issue of GIE is little bit different.<sup>4</sup>

If the first steps are similar (puncture of the MPD, pancreatogram, and guidewire insertion), the authors used balloon dilation instead of the cystostome, as reported in the Princeps study and also in the work of Tessier et al.<sup>5</sup> Discussion should be on the preventive role of pancreatic juice leakage using diathermic technique versus the balloon dilation. In our experience, peripancreatic collection occurred more frequently when we used balloon dilation instead of a diathermic catheter, which prevents the leak of pancreatic juice by creation of fibrosis around the puncturing tract.

It is very difficult to define today the place of EUS-guided pancreatic duct drainage; in our experience, the best indication is anastomotic stenosis after Whipple procedure for benign pancreatic lesions.

The results of the first 3 series<sup>3,5,6</sup> of patients reported are much too preliminary in nature to recommend wider use of EUS-guided pancreatic duct drainage, which in any case should be restricted to tertiary centers specializing in biliopancreatic therapy with pain relief in 70% of cases. But the adverse event rate is still high, at approximately 15% including bleeding, pancreatic collection, and perforation. Nevertheless, the possibility of draining the MPD into the digestive tract through an endoscopically created fistula, with patency maintained by stent placement, might be interesting as an alternative method of drainage without the adverse event of stent occlusion that is associated with transpapillary drainage.

The largest series (36 patients) was reported by Tessier et al.<sup>5</sup> Indications were CP, with complete obstruction (secondary to a tight stenosis, a stone, or MPD rupture), inaccessible papilla or impossible cannulation (n = 20), anastomotic stenosis after a Whipple procedure (n = 12), complete MPD rupture after AP, and trauma (n = 4). EUS-guided pancreatic duct drainage or EPB was unsuccessful in 3 patients; 1 was lost to follow-up. Major adverse events occurred in 2 patients and included 1 hematoma and 1 severe AP. The median follow-up was 14.5 months (range 4-55 months). Pain relief was complete or partial

Ref.	No. of patients	Technique	Technical success, %	Clinical success, %	Adverse event rate, %
Will et al, <sup>9</sup> 2007	12	5 T/4 RDV	67	50	16.6
Tessier et al, <sup>5</sup> 2007	36	36 T	91.7	69	5.5
Kahaleh et al, <sup>6</sup> 2007	13	5 T/5 RDV	77	100	15.3
Brauer et al, <sup>10</sup> 2009	8	4 T/3 RDV	88	50	50
Barkay et al, <sup>11</sup> 2010	21	6 Pinj/4 RDV	48	100	28.5
Shah et al, <sup>12</sup> 2012	25	10 T/9 RDV/3 Pinj	88	—	16
Kurihara et al, <sup>13</sup> 2013	17	11 RDV/3 T	82	—	23.5

in 25 patients (69%, intention-to-treat). Eight patients treated had no improvement of their symptoms (4 were subsequently receiving a diagnosis of cancer). Stent dysfunction occurred in 20 patients (55%) and required a total of 29 repeat endoscopies.

Before the article published in this issue, there were 7 published studies involving 132 cases (Table 1).<sup>5,6,9-13</sup> Wiersema et al<sup>7</sup> reported the first case on pancreatic ductography in 1996, followed by DeWitt et al<sup>8</sup> in 2004 to localize minor papilla in a patient with pancreas divisum. The overall clinical success rate was 78.8% (104 of 132 patients) and the adverse event rate was 18.9% (25 of 132 patients). Adverse events included abdominal pain, bleeding, perforation, fever, severe pancreatitis, and peripancreatic collection.<sup>9</sup> Although there was no procedurerelated mortality, severe adverse events were noted when pancreatic drainage failed or if dilation of the puncturing tract was performed and a nondilated pancreatic duct (<6 mm). It is believed that EUS-guided pancreatic duct drainage is usually successful with a dilated pancreatic duct ( $\geq 4$  mm). The pancreatic stent types used were plastic (5F-10F, straight, single or double pigtail). In the largest reported pancreatic series by Tessier et al,<sup>5</sup> stent dysfunction was noted in 22 of 36 cases (55%). The median stent patency was 195 days (range 10-780 days).

It is very difficult to define today the place of EUSguided pancreatic duct drainage; in our experience, the best indication is anastomotic stenosis after a Whipple procedure for benign pancreatic lesions (cystadenoma, intraductal papillary mucinous neoplasm, neuro-endocrine tumor [NET]). EUS-guided pancreatic duct drainage offers an alternative to surgery, and the best results in the 7 series published (Table 1) were for this indication. On the other hand, surgery should be considered as an elective treatment of CP after failure by the endoscopic route. In our experience, the technique should be done in 2 steps: first, insertion of a 7F straight plastic stent of 7 or 9 cm in length. The second step is performed 1 month later; a second plastic stent is inserted in parallel. This permits maintaining an open gastropancreatic or bulbopancreatic fistula, even if the stent is occluded.

Today, therapeutic EUS as pancreaticogastrostomy represents an alternative to surgery. These techniques should be performed in endoscopic units experienced in therapeutic endoscopy. EUS-guided pancreatic duct drainage is a technically challenging procedure with a significant learning curve. The endoscopist should be expert in both EUS and ERCP. Unlike pancreatic pseudocyst drainage, there is the possibility of displacement between the puncture site and an obstructed pancreatic duct with resultant failure and adverse events. The creation or dilation of a fistula tract may be difficult because of fibrosis, as in CP. Care should be taken to avoid major vessels in the vicinity, such as the portal vein, hepatic artery, and splenic vessels. However, with increasing availability of endoscopists trained in both ERCP and EUS, the role of EUS-guided pancreatic duct drainage is likely to grow in clinical practice.

## DISCLOSURE

The author disclosed no financial relationships relevant to this publication.

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Abbreviations: AP, acute pancreatitis; CP, cbronic pancreatitis; MPD, main pancreatic duct.

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