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Innovations in therapeutic endoscopic ultrasound

Initial evaluation of a new plastic pancreatic duct stent for endoscopic ultrasonography-guided placement

Takao Itoi, Atsushi Sofuni, Takayoshi Tsuchiya, Kentaro Ishii, Nobuhito Ikeuchi, Reina Tanaka, Junko Umeda, Ryosuke Tonozuka, Mitsuyoshi Honjo, Shuntaro Mukai, Takako Takayama, Fuminori Moriyasu

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Endoscopic decompression of the pancreatic duct by transpapillary placement of a stent/nasopancreatic drain is an effective therapeutic modality for the treatment of pain and various complications of chronic pancreatitis.[1,2] However, in certain situations like inaccessible major or minor papilla or tight nonnegotiable pancreatic duct strictures endoscopic retrograde cholangiopancreatography (ERCP) fails and transpapillary drainage is not possible. Conventionally these patients with failed ERCP have been treated surgically. However, with the advancement in the technique of endoscopic ultrasound (EUS) as well as availability of better accessories, EUS guided access as well as drainage of the pancreatic duct has become possible.[3,4] The EUS guided pancreatic duct drainage is feasible and appears attractive, but high frequency of failures, as well as adverse effects such as pancreatic duct leaks, stent migration and pancreatitis even in the best hands, limits its widespread use.[3,4] Lack of dedicated accessories and stents for EUS guided pancreatic drainage is one of the factors responsible for poor results. The authors of the current study devised a new dedicated single-pigtail, plastic, pancreatic duct stent for EUS-guided placement in the pancreatic duct and evaluated its feasibility and safety in eight patients (3 Males) with recurrent pancreatitis due to main pancreatic duct (MPD) stricture or stenotic pancreaticojejunostomy (Whipple resection [$n = 6$], middle pancreatectomy [$n = 1$], and subtotal gastrectomy with Roux-en-Y reconstruction [$n = 1$]). The strictures were located in the pancreaticojejunostomy site in six patients and MPD in two patients with five patients (62.5%), having undergone unsuccessful ERCP.

The new plastic stent had a total length of 20 cm with an effective length of 15 cm (Gadelius Medical Co. Ltd., Tokyo, Japan). The stent had four flanges; two in the distal end and two at the proximal end. A pigtail was present at the proximal end, and the distal end was tapered with one side hole. The procedure was done using therapeutic echoendoscope with carbon dioxide insufflation in all the patients. The pancreatogram was obtained by puncturing the pancreatic duct by a 19G or 22G needle under EUS guidance.

Following that, an insulated guide wire was advanced antegrade into the duct, and an attempt was made to pass the wire passed across the pancreatic duct stricture and major papilla or pancreaticojejunostomy. If successful, dilation of the needle tract and anastomotic site was carried out using a standard or tapered catheter, cautery dilator (6.5 Fr; Endoflex, Voerde, Germany), or a 4-mm-diameter dilating balloon. After successful dilatation, the new 7-Fr, pancreatic duct stent was placed. An attempt was made to position the distal tapered end of the stent across the papilla or anastomotic site and the proximal end in the stomach. The technical success was defined as successful stent placement in the pancreatic duct whereas the treatment success was defined as complete resolution of symptoms.

The mean MPD diameter at the time of puncture was 3.2 mm (range 1.6–6.0 mm) and a 19-G needle was used in four patients, and a 22-G needle was used in the other four patients. The guide wire could not be negotiated across the pancreatic duct stricture in two patients. In the remaining six patients, the guide wire could be pushed across the across the MPD stricture or anastomosis and stents placed into the duodenum or jejunum. The technical success rate was 100% with a mean procedure time of 37.5 min. One patient had self-limited post procedural abdominal pain. All patients had successful clinical outcome with all of them being asymptomatic over a mean follow-up of 7.4 months.

Commentary

Endoscopic ultrasound guided pancreatic duct drainage is a very complex therapeutic procedure with complications being common and severe.[3,4] Even after adequate dilatation, placement of pancreaticogastrostomy stents can be difficult because of resistance encountered at gastric or duodenal wall, site of anastomosis or the stricture.[3,4] The authors reported that this new stent dedicated for EUS guided pancreatic duct drainage decreased the risk of complications as well as increased the procedural success rates. The tapered and straight distal tip of the stent could be easily advanced into the needle tract and across the stricture with four flanges and pigtail helping in better anchorage. Furthermore, a 15-cm effective stent length made it possible to use it in all patients irrespective of underlying. The authors hypothesized that relatively large apertures below the flanges and four small holes in the distal end of the stent will lead on to better ductal drainage with the absence of a hole in the middle part of the stent reducing the

risk of leakage. In spite of limitations, such as small sample size, lack of a control group, inclusion of only a single operator, and absence of long-term results, this study is indeed a step forward. This small sample size study has shown that the new pancreatic duct stent designed specifically for EUS guided pancreatic duct drainage is safe and effective and possibly makes the procedure simpler with markedly reduced risk of complications.

Endoscopic ultrasound-guided sutured gastropexy for transgastric endoscopic retrograde cholangiopancreatography in patients with Roux-en-Y gastric bypass: A novel, single-session, minimally invasive approach

Rajeev Attam, Daniel Leslie, Mustafa A. Arain, Martin L. Freeman, Sayeed Ikramuddin

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Endoscopic retrograde cholangiopancreatography (ERCP) is difficult in patients with Roux-en-Y gastric bypass (RYGB) because of the difficulty in accessing the papilla in partitioned gastric anatomy. The ERCP in these patients is currently done either using an enteroscope or by doing an ERCP through a gastrostomy that is either done by an interventional radiologist or by deep enteroscopy retrograde percutaneous endoscopic gastrostomy (PEG) or surgically.[5,6] The authors of the current study have previously described endoscopic ultrasound (EUS)-guided insufflation of the gastric remnant in RYGB for the purposes of gastrostomy tube placement and access to the remnant stomach and subsequently developed a technique for securing gastrostomy by sutured gastropexy using laparoscopic suture passing needle.[7-9] In this study, the authors combined the two techniques to create a secure gastropexy so as to perform a single-session transgastric ERCP in 10 RYGB patients. The procedures were performed in the operating theatre after intravenous prophylactic antibiotics, under general anesthesia and using carbon dioxide for endoscopic insufflation.

After inserting the linear echoendoscope into the proximal portion of the Roux limb, the excluded gastric remnant was identified by sonographic characteristics. Under EUS guidance, the gastric remnant was punctured using 19-G needle that was pre flushed with contrast and preloaded with a 0.021-inch guide wire (Tracer Metro; Cook Endoscopy) through a side arm Y adapter. After confirming the needle position by injecting 5–10 ml of contrast, the guide wire was advanced and coiled into the remnant. The air was then pushed into the gastric remnant (400–500 ml) so as to push the anterior wall of the remnant against the anterior abdominal wall. The air distended remnant was confirmed on fluoroscopy and was punctured using an 18-gauge introducer needle (Flexiflo Lap G Kit; Ross Laboratories, Columbus, Ohio, USA) under fluoroscopic guidance. Two 0.018-inch guide wires (Roadrunner; Cook Endoscopy) were then passed, in tandem, through the needle into the gastric remnant. The EUS-fine needle aspiration needle with its guide wire and the echoendoscope was withdrawn. Thereafter, a 20-mm stone extraction balloon was passed over the first wire (safety wire) to provide counter-traction as the second wire (running wire) was used to dilate the tract up to 24 Fr using rigid serial dilators. Following successful dilatation, a 20-Fr peel-away sheath (Cook Endoscopy) was inserted through the dilated tract and through it, a small-caliber endoscope (GIF XP180N; Olympus Endoscopy) was introduced and retroflexed to provide an endoscopic view of the gastrostomy. Under endoscopic vision, endoscopic sutured gastropexy was then performed using a 2-mm laparoscopic suture passing needle, using a technique described previously by the authors.[9] Following endoscopic sutured gastropexy, ERCP was performed using a duodenoscope (TJF 160-VF; Olympus Endoscopy) that was inserted through the trocar and advanced to the descending duodenum in an antegrade fashion.

Endoscopic ultrasound-guided sutured gastropexy for transgastric ERCP (ESTER) was successfully performed in 9/10 patients with procedure failing in one patient because of inability to achieve percutaneous access because of the presence of intervening loops of small bowel anterior to the stomach. The median procedure time was 88 min with no immediate side effects. A 20-Fr gastrostomy tube was placed post procedure in the gastric remnant to achieve future access.

Commentary

With the availability of EUS, one can access the structures adjacent to the gastrointestinal tract including bowel structures and thus do a number of advanced therapeutic procedures.[10-12] ERCP in RYGB is very difficult and although advent of deep enteroscopy-assisted ERCP has made us possible to do pancreaticobiliary intervention in these patients but still the success rates are a modest of up to 63% and there is also risk of bowel perforation.[13] Laparoscopy assisted ERCP has high technical success in these patients but is invasive, requires surgeons assistance, is associated with complications, and there is a possibility of conversion into an open procedure in few patients.[6] The authors in this paper have described a minimally invasive technique of ESTER for doing ERCP in RYGB patients. This technique has been shown to be safe and effective and also decreases the cost because of being one stage process. Recently, Kedia *et al*. also described a similar technique with few modifications for performing ERCP in RYGB patients.[14] They described a two-stage minimally invasive technique of EUS-directed transgastric ERCP (EDGE) where, in the first stage, a 16-Fr PEG was placed in the gastric remnant using EUS guidance, followed by ERCP through the gastrostomy and a transcutaneous fully covered esophageal metallic stent in the second stage. As in the current study, they also showed that this technique is safe and effective with high success rates.

Surinder S. Rana

Department of Gastroenterology,
Post Graduate Institute of Medical Education and
Research (PGIMER), Chandigarh, India

Address for correspondence:
Dr. Surinder Singh Rana,
Department of Gastroenterology, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh - 160 012, India.
E-mail: drsurinderrana@gmail.com

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