

Novel treatment with double scope technique for disconnected pancreatic duct syndrome with external pancreatic fistula ▶

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ABSTRACT

Background and study aims External pancreatic fistula in association with disconnected pancreatic duct syndrome is a common sequelae of the percutaneous step-up approach for infected pancreatic necrosis and is associated with significant morbidity. The present study aimed to report the initial outcome of a novel technique of two-scope guided tractogastrostomy for management of this condition.

Patients and methods The present study was a retrospective analysis of data from patients with external pancreatic fistula and disconnected pancreatic duct syndrome, who underwent two-scope-guided tractogastrostomy. All the patients had a 24F or larger drain placed in the left retroperitoneum. Transgastric echo endoscopy and sinus tract endoscopy were performed simultaneously to place a stent between the gastric lumen and the sinus tract. Technical success was defined as placement of the stent between the tract and the stomach. Clinical success was defined as successful removal of the percutaneous drain without the occurrence of pancreatic fluid collection, ascites, external fistula, or another intervention 12 weeks after the procedure.

Results Three patients underwent two scope-guided tractogastrostomy. Technical and clinical success were achieved in all the patients. No procedure-related side effects or recurrence occurred in any of the patients.

Conclusions Two-scope-guided tractogastrostomy for treatment of external pancreatic fistula due to disconnected pancreatic duct syndrome is a feasible technique and can be further evaluated.

Introduction

The step-up approach has emerged as the preferred treatment option for the management of symptomatic pancreatic necrosis [1]. Endoscopic or percutaneous step-up approaches are performed depending on the location of the collection, feasibility, and institutional preference [2]. The endoscopic approach has a lesser chance of external pancreatic fistula (EPF) forma-

tion than the percutaneous approach [2]. Pancreatic juices secreted by the viable pancreatic parenchyma take the path of least resistance through the drainage catheter. Partial disruption can be treated with endoscopic retrograde cholangiopancreatography (ERCP), sphincterotomy, and bridging the site of disruption with a prosthesis. In patients with disconnected pancreatic duct syndrome (DPDS), due to complete disruption of the pancreatic duct, bridging of the leakage site may fail during

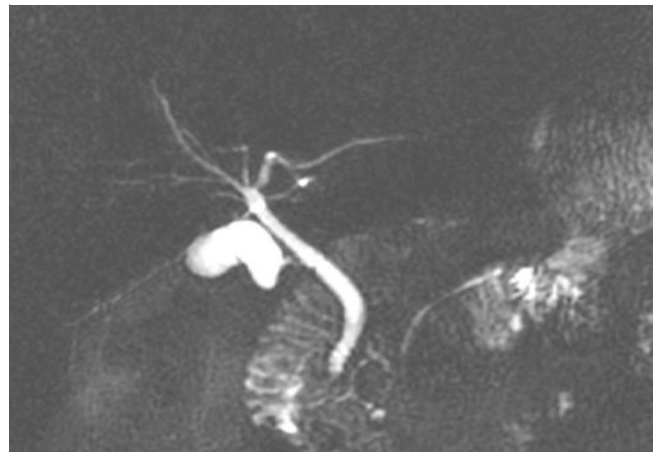
ERCP, and is a predictor of failure [3]. Surgery and complex endoscopic techniques have been advocated for the management of these patients, with variable success rates [4,5,6]. Technically easier, reproducible, and safer techniques with wider acceptability are required for management of the complex situation of DPDS with EPF. We are treating patients with DPDS and EPF with a novel technique using two endoscopes, in which a stent is placed between the stomach and the drainage tract, diverting pancreatic secretions from the tract to the gastric lumen. The present study aimed to present initial experience with this novel technique in patients with DPDS and EPF.

Patients and methods

The present study was a retrospective analysis of a prospectively collected database of patients with EPF following a percutaneous step-up approach for acute pancreatitis. The database between July 2021 to December 2023 was searched to identify patients with DPDS who underwent internalization of EPF using a novel two-scope technique. The institutional review board approved the study protocol (BHR/RS/MSSH/DDF/SKT2/IEC/LGS/23–21). EPF was defined as draining of > 100 mL of amylase-rich fluid through the percutaneous tube, which persisted after stabilization of an episode of acute pancreatitis. DPDS was defined based on magnetic resonance cholangiopancreatography (MRCP) findings [7,8]. MRCP criteria were complete ductal discontinuation with residual upstream pancreatic parenchyma (► Fig. 1).

Technique for endoscopic treatment of EPF

A novel EUS-guided drainage technique was attempted in patients of DPDS with EPF who had percutaneous drain (PCD) placed of at least 24F in the left retroperitoneum to facilitate easy passage of the ultrathin endoscope inside the tract (► Video 1). Informed consent for the procedure was obtained from all the patients. All the procedures were performed in the supine position, under general anesthesia and endotracheal intubation. For this novel technique, simultaneous sinus tract endoscopy and peroral transgastric echo endoscopy were performed by two different endoscopists using CO₂ insufflation. The PCD tube was removed, followed by insertion of an ultrathin endoscope (5.2 mm, Olympus, Gurugram, India) into the drain tract (► Fig. 2). After endoscopic evaluation of the tract and residual cavity, normal saline was flushed through the accessory channel of the ultrathin scope. At the same time, an endoscopic ultrasound examination was performed with a linear echoendoscope (Olympus GF UCT 180, ME-2 premium plus processor, Gurugram India), and the pancreas was scanned through the duodenal bulb and proximal gastric body. Saline flushed through the ultrathin scope led to transient fluid pool formation in the tract, which could be visualized with an echoendoscope in the proximal stomach. The pool of fluid was punctured with a 19G needle (Expect 19G, Boston Scientific, Gurugram, India), followed by passage of a guidewire (0.025-inch 450 cm, J shape, Visiglide, Olympus) through the needle. Both the needle and the guidewire could be visualized in the

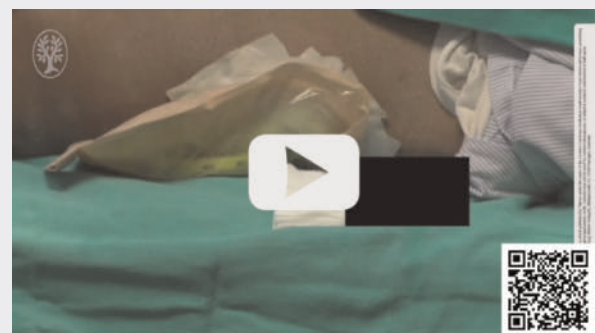


► Fig. 1 MRCP image showing main pancreatic duct disconnection in the pancreatic body region.



► Fig. 2 Ultrathin Scope inside the sinus tract.

► VIDEO



► Video 1 Two-scope-guided tractogastrotomy for treatment of disconnected pancreatic duct syndrome with external pancreatic fistula

tract under direct vision with ultrathin scope. The wire was grasped with forceps passed through the accessory channel of the ultrathin endoscope. Both the ultrathin scope and the forceps were pulled out of the sinus tract and the wire was secured at the percutaneous site. Through the echoendoscope, over-the-wire dilatation was performed with a 6F cystotome (Endoflex, GmbH, Voerde, Germany, pure cut mode, effect 5, 100W) and 6-mm balloon (Hurricane, Boston Scientific, Gurugram, India). Either one or two double pigtail plastic stents (10F × 5 cm, C-Flex Boston Scientific, Gurugram, India) were placed between the gastric lumen and tract. After completion of the procedure, a stoma bag was attached to the PCD site. Daily output was monitored and the stoma bag was removed after complete cessation of fluid discharge through the PCD site. Broad-spectrum injectable antibiotic ceftriaxone was administered before the procedure and continued for 3 days after the procedure. Patients were extubated in the Operating Room and were monitored for vital signs and pain abdomen. In the absence of any complications, a liquid diet was started 24 hours after the procedure. In case of uneventful recovery, patients were discharged 72 hours after the procedure and followed in the clinic.

During follow-up, ultrasonography was performed at 15 days, every month for 3 months, and then every 6 months. Computed tomography scan or magnetic resonance imaging was performed if ultrasonography was non-informative or in case of suspicion of complication.

Study definitions

Procedure time was defined as the time between insertion of the ultrathin scope into the sinus tract and placement of the stent between the gastric lumen and the sinus tract. Technical success was defined as successful placement of the stent between the gastric lumen and sinus tract to create tractogastrostomy. Clinical success was defined as successful closure of EPF with complete cessation of drainage of pancreatic juice from the cutaneous site and no formation of new fluid collection or ascites 12 weeks after the procedure with no need for an additional endoscopic or surgical procedure.

Results

Three male patients underwent EUS-guided tractogastrostomy for EPF associated with DPDS (► **Table 1** and ► **Table 2**). All three of them developed EPF after drain placement as part of a percutaneous step-up approach for acute pancreatitis. The minimum duration between onset of acute pancreatitis and stent placement was 62 days. One patient had developed EPF after severe pancreatitis and two patients had moderately severe pancreatitis. All patients had undergone sinus tract necrosectomy because of persistent sepsis.

The duration of the first procedure was 75 minutes and was reduced to 25 minutes in the third procedure. The drain tube

► **Table 1** Baseline characteristics of patients undergoing tractogastrostomy with new 2-scope technique.

| | Patient 1 | Patient 2 | Patient 3 |
|--|----------------------|----------------------|----------------------|
| Age, years | 48 | 27 | 36 |
| Gender | Male | Male | Male |
| Etiology | Biliary | Idiopathic | Idiopathic |
| Number of percutaneous catheters | 1 | 1 | 1 |
| Site of drain | Left retroperitoneum | Left retroperitoneum | Left retroperitoneum |
| Site of pancreatic ductal disconnection | Pancreatic body | Pancreatic body | Pancreatic body |
| Interval between onset of acute pancreatitis and procedure, days | 62 | 65 | 90 |
| Amount of fluid per day, mL/day | 170 | 190 | 130 |
| Fluid amylase value, units/L | 12200 | 25300 | 14200 |

► **Table 2** Procedure related details of patients undergoing tractogastrostomy with newel 2 scopes technique

| | Patient 1 | Patient 2 | Patient 3 |
|--|------------|------------|------------|
| Duration of the endoscopic procedure, minutes | 75 minutes | 45 minutes | 25 minutes |
| No of stents placed between the tract and gastric lumen | 2 | 1 | 1 |
| Immediate complication | Nil | Nil | Nil |
| Postoperative complication | Nil | Nil | Nil |
| Hospital stay after the procedure, days | 2 | 3 | 2 |
| Total duration of follow-up after the procedure, months | 28 | 15 | 18 |
| Recurrence of fluid collection or need for endoscopic/surgical intervention during follow-up | Nil | Nil | Nil |

could be easily identified with an echoendoscope and removed, followed by ultrathin scope placement inside the tract in all patients. The fluid-filled tract could be well appreciated with an echoendoscope, followed by successful puncture in all the patients. Two stents were placed in one patient and one stent was placed in each of the other two patients. Technical and clinical success were achieved in all patients. The fistula was closed in all patients at 24 hours. No procedure-related complications occurred. None of the patients developed recurrence of fluid collection or complications during follow-up.

Discussion

EPF can occur during the percutaneous step-up approach for acute pancreatitis and can be treated conservatively or with ERCP [9]. DPDS with EPF is a predictor of failure of ERCP and warrants either surgery or complex endoscopic treatments. The principle of the treatment is either resection of the upstream pancreas or diversion of the secretion from the upstream pancreas to either the gastric or the intestinal lumen. Various complex endoscopic techniques have been described to achieve these goals. Either the sinus tract or pancreatic duct, if dilated, can be connected to the gastric or intestinal lumen. Tractogastrostomy, connecting the residual sinus tract to the gastric lumen, involves passing a wire across the wall of the tract into the gastric or intestinal lumen or vice versa, followed by placement of a stent between the tract and intestinal or gastric lumen. The limiting step of the procedure is puncture of the collapsed tract. The wall of the tract can be punctured from the luminal side or the drain site and both techniques have been described previously.

In the transgastric puncture technique, the tract is distended with fluid either by clamping the external drain or injecting fluid through the catheter leading to the formation of fluid collection, which can be drained endoscopically. The technique may not be successful in all cases because collection formation may not occur due to fibrosis of the wall of the residual cavity or leakage of fluid along the drain. In a previous study, EUS-guided tractogastrostomy was performed by injecting fluid through the catheter, which could be visualized through the gastric wall under echo-endoscopic guidance [10]. Transient fluid-filled space was punctured with a needle followed by passage of guidewire in the tract, which was manipulated to exit alongside the catheter, and a stent was placed between the tract and gastric lumen. The technique required enhanced manipulation of the guidewire to get the wire to exit through the PCD site.

The other technique involves puncture through the wall of the residual tract from the drain site to the gastric or duodenal lumen. A combined endoscopic and percutaneous rendezvous technique to close EPF associated with DPDS has been explained, in which a stiff guide wire and the transjugular intrahepatic portosystemic shunt needle were passed from the existing percutaneous site by an interventional radiologist under fluoroscopic guidance [5]. Thereafter, the impression of the needle was seen during endoscopy, which guided the puncture site. An important limitation of the technique is that it is a blind

outside-to-inside puncture with a theoretical risk of injury to blood vessels around the stomach or duodenum.

Tractogastrostomy from the drain or the luminal site appears feasible and may obviate the need for the surgery. However, the technique remains challenging and is not widely practiced. The highlight of the present study was use of two scopes simultaneously, which is likely to increase the success and safety of the procedure because the whole procedure is carried out under endoscopic and ultrasonographic guidance, which might lead to wider adoption of this technique. The potential benefits of using an ultrathin scope and an echoendoscope simultaneously are: 1) ability to maneuver the flexible ultrathin endoscope in the sinus tract and create a fluid pool at the desired location; 2) optimum distention of the tract because fluid can be injected through the larger channel of the ultrathin endoscope; 3) visualization of needle and wire within the tract sinus tract, which can prevent inadvertent passage of needle and wire in the false tract; 4) ease of bringing the wire to the percutaneous site because the wire can be visualized and pulled out of the tract with an ultrathin endoscope; and 5) prevention of inadvertent puncture of the perigastric vessels because echoendoscopy with Doppler is used.

The ease of the procedure is substantiated by the duration of the procedure, which was reduced from 75 minutes in the first case to 25 minutes in the third case

Potential disadvantages of the present procedure over the previously described techniques [6, 10], in which fluid was infused through PCD and only a linear echoendoscope was used, are the complex set-up, which requires two endoscopy towers equipped with CO₂ insufflation and the requirement for two expert endoscopists to perform the procedure.

The main limitation of the present study was the small number of patients. The results of the study need to be replicated in larger studies before the technique can be used widely.

Conclusions

To summarize, the novel two-scope technique is safe and feasible and may result in better outcomes and wider acceptability of this technique in management of EPF.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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