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CASE REPORTS

Pancreatic pseudocyst drainage performed with a new prototype forward-viewing linear echoendoscope

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ABSTRACT

Interventional endoscopy is a field that continues to grow rapidly. A novel prototype forward-viewing echoendoscope (FV-EUS) has been recently developed in an attempt to overcome some of the limitations of conventional curved linear-array echoendoscopes (OV-EUS).

We present a case of a successful endoscopic ultrasound-guided drainage of a pancreatic pseudocyst using a forward-viewing echoendoscope. Although the use of this newly developed echoendoscope has not yet become widespread, its unique characteristics can help to easily perform routine therapeutic procedures and contribute to the expansion of interventional endoscopic ultrasound.

Key words: Drainage. Pseudocyst. Endoscopic ultrasound. Forward viewing echoendoscope.

INTRODUCTION

Endoscopic ultrasound-guided drainage has become the first line therapy in the management of pancreatic pseudocysts (1) . This treatment modality allows for real-time access and visualization of fluid collections and adjacent structures, avoiding accidental puncture of blood vessels. Since its introduction in the early 90's, this procedure is widely performed using an oblique-viewing echoendoscope. However, a major disadvantage of OV-EUS is that needles and other device are deployed through the working channel at a 45° angle with respect to the longitudinal axis of the endoscope. This provides a tangential approach to the lesion, which may sometimes hamper the technical success of the procedure.

In the last decade, a new type of echoendoscope combining both endoscopic and ultrasound forward-view has been developed, allowing device deployment along the axis of the scope. Several experts have recently suggested that FV-EUS modifications could help to overcome limitations of conventional OV-EUS by offering a perpendicular access to the target (2-4).

There is little experience with this new prototype and its diffusion in the market is still scarce. After reviewing the literature we have found no studies evaluating its potential diagnostic and therapeutic applications. This is, to our knowledge, the first report of a pancreatic fluid collection drainage using a FV-EUS in our country.

CASE REPORT

A 43-year old woman was previously diagnosed in our center with moderately differentiated adenocarcinoma of the splenic flexure of the colon, infiltrating the adipose tissue of the pancreatic tail. The patient underwent a left hemicolectomy and distal pancreatic resection followed by adjuvant chemotherapy. The postoperative period had a torpid course, with multiple complications including anastomotic dehiscence, pancreatic fistula and development of intra-abdominal fluid collections that lead to several surgical re-interventions, until the patient was indefinitely discharged from the hospital.

After a 6-month follow-up, a 62 x 67 mm fluid collection was still present, provoking persistent nausea, vomiting, early satiety and left upper quadrant pain. Considering the patient's personal history of malignant disease, an endoscopic ultrasound-guided fine-needle aspiration was initially performed. The endoscopic ultrasound revealed a 65 x 70 mm, round, fluid collection with echogenic material located in the area of the body and tail of the pancreas. Biochemical, cytological and tumor marker analysis of the sample excluded tumor recurrence and were consistent with a pancreatic pseudocyst (amilase 40,750 U/L, Ca 19.9 12,80 ng/mL, negative cytology). In the absence of malignancy and presence of persistent symptoms, subsequent ultrasound-guided drainage was performed a second time by using a forward-viewing echoendoscope (FV-CLA; TGF-UC180J Olympus). After placing the endoscope in

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the subcardial area and by clockwise-anticlockwise rotation and up/down angulation of the tip, a suitable window was obtained to adequately visualize the fluid collection. A transgastric pseudocyst puncture was thereafter performed using a 19-gauge needle (EzShot, Olympus Inc.), confirming its correct positioning after obtaining yellowish material by aspiration (Fig. 1). Once the target lesion was punctured, routine steps for endoscopic ultrasound-guided drainage were followed. Under fluoroscopic control, a 0,035-inch guide wire (Jagwire, Boston Scientific) was introduced into the cyst and several loops were created inside the cavity. After that, a needle-type sphincterotome (Boston Scientific) was deployed, and a fistula between the stomach and the pseudocyst was created by electrocautery application. After dilation of the fistula with a 6-mm-diameter balloon (Boston Scientific), a fully covered self-expanding metal biliary stent (10 x 60 mm Wallflex, Boston Scientific) was successfully placed, allowing effective drainage of the pseudocyst content into the stomach. Finally, a 7 Fr x 6 cm double pigtail biliary stent was passed through the metal stent in order to prevent obstruction or migration of the latter (Fig. 2). No substantial complications occurred during the procedure and the patient was discharged from the hospital after 72 hours.

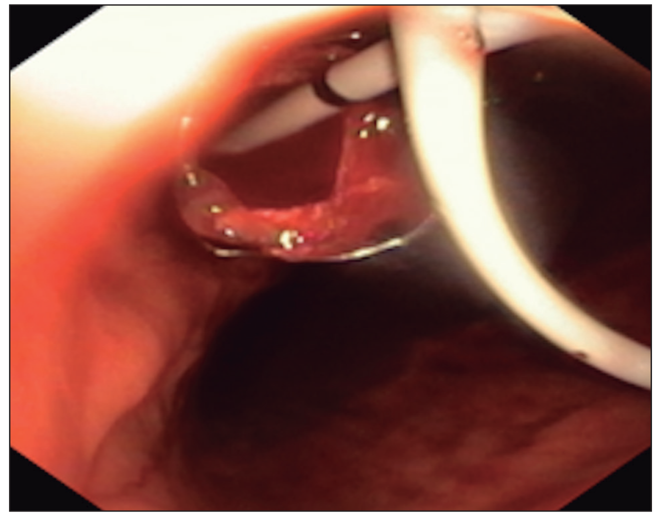

Fig. 2. Endoscopic view of the self-expanding metal biliary stent (10 x 60 cm Wallflex, Basten Scientific) and double pigtail biliary stent (7 Fr x 6 cm).

DISCUSSION

We present a case of a pancreatic pseudocyst drainage guided by a prototype forward-viewing linear echoendoscope. As previously mentioned, this model offers several advantages over the conventional therapeutic oblique-viewing echoendoscope. The latter provides an oblique approach to the targeted area at an acute 45° angle (3,6). A major disadvantage of this tangential approach is that the tip of the endoscope should be in a straight position to allow the deployment of the accessories. Furthermore, the force applied to the needle may not be fully exerted, pushing the endoscope away from the lesion or elongating the gut wall that must be traversed (3,4).

Main modifications of FV-EUS are:

- A working channel parallel to the longitudinal shaft of the scope, allowing deployment of device in a straight line and perpendicular access to the lesion, which results in a better transmission of the force that is applied (3,4,6).
- Front endoscopic and US view, which permits the endoscopist to switch between endosonographic and endoscopic views by slightly pulling back the endoscope, without the need of complex reorientation maneuvers as usually occurs with conventional echoendoscopes (2,4). Specifications of both conventional and forward-viewing echoendoscope are summarized in table I, to ensure better understanding for the reader.

In our experience, FV-EUS can facilitate EUS-guided therapeutics procedures by allowing maximal device deployment force and a simultaneous endoscopic and US view.

We intuitively used the up-down knob and rotational movements to achieve an adequate needle orientation, without the need of an elevator (which is not provided with the FV-EUS). Nevertheless, it should be noted that the lack of an elevator function of the accessory channel may condition loss of guide wire access during device exchange. This theoretical drawback might be avoided by using drainage systems which do not require over-the-wire exchange, such as the novel Axios-apposing stent (Boston Scientific).

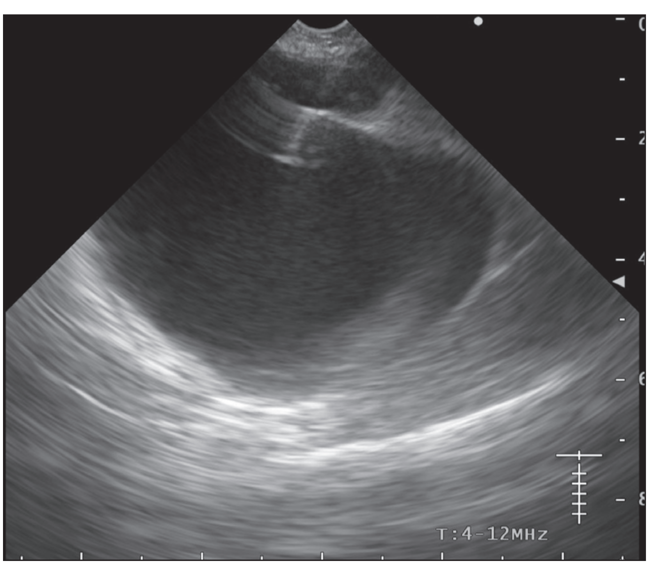

Fig. 1. Pseudocyst puncture with a 19-gauge needle.

Table I. Comparison of specifications between the conventional and the forward-viewing echoendoscope

	Oblique-viewing echoendoscope	*Forward-viewing echoendoscope*
Optical system		
Direction of viewing	Oblique	Forward
Field of view	100°	120°
Ultrasound system		
Scanning range	180°	90°
Frequencies	5, 6, 7.5, 10	5, 6, 7.5, 10
Insertion tube		
Insertion tube outer diameter	12.6 mm	11.8 mm
Distal end outer diameter	14,6 mm	14.2 mm
Working lengh	1,250 mm	1,250 mm
Working channel		
Direction of device deployment	Oblique with scope axis	Along with scope axis
Elevator function	Available	Not available
Inner diameter	3.7 mm	3.7 mm
Angulation range		
Up	130°	180°
Down	90°	100°
Lateral	90°	100°

Voermans et al. reported their initial experience with the FV-echoendoscope for transmural drainage of seven pancreatic pseudocyst in a non-controlled study. In their cohort, drainage was not feasible in two patients that had a collection adjacent to the fundus of the stomach, a difficult to reach location with the standard oblique echoendoscope. It is remarkable that, in both cases, drainage was successfully performed with the prototype forward-viewing scope (3). However, it should be taken into account that these authors have extensive experience in the drainage field, and more particularly in endosonographic-guided therapy of pancreatic pseudocysts.

On the other hand, as reported in a subsequent review, the combined front endoscopic and US view allows difficult locations of the gastrointestinal tract to be reached that can be challenging with the OV-EUS, such as the gastric fundus, the third-fourth portions of the duodenum, or the proximal colon up to the cecum (6). With regard to the limitations of the FV-EUS, increased difficulty in intubating the cervical esophagus has been reported, which can be explained by the modification of the tip design (4,6). Another potential disadvantage reported in the literature is the narrower scanning range of the FV-EUS (90º) in comparison with the standard scope (180°) (2,3,6). Nevertheless, a non-controlled study assessing visualization and image quality of abdominal structures with both FV and OV-EUS, showed no statistically significant differences between the two echoendoscopes, but instead a superior image quality of the common hepatic duct was achieved with the FV-EUS (4).

A prospective, controlled, randomized study comparing feasibility and safety of FV-EUS *versus* conventional OV-EUS in draining 52 pancreatic pseudocysts failed to show any significant difference in terms of intervention time and ease of performance (5). However, since these procedures were again performed by skilled endoscopists, it would be of interest to assess if less experienced endoscopists might benefit from the advantages of this novel prototype (6).

Finally, it has been proposed that this newly developed echoendoscope may also be potentially useful in technically demanding procedures, such as EUS-guided choledocoduodenostomy, hepaticogastrostomy and cholecystogastrostomy (7). In our opinion, the FV-EUS provides an adequate visualization of some structures such as the gallbladder or the left intrahepatic bile duct, and may thereby be easily accessible for therapeutic procedures (endosonographic cholangiopancreatography or ESCP). Nevertheless, prospective studies are required at this respect.

In conclusion, we report a case of an EUS-guided cystogastrostomy performed with a new forward viewing echoendoscope with favorable results. The unique features of this new prototype can make routine therapeutic and diagnostic procedures easier to accomplish and contribute to further expand interventional applications of EUS.

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