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CASE REPORT

Endoscopic ultrasound-guided tissue sampling induced pancreatic duct leak resolved by the placement of a pancreatic stent: A case report

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Abstract

BACKGROUND

Pancreatic ductal leaks complicated by endoscopic ultrasonography-guided tissue sampling (EUS-TS) can manifest as acute pancreatitis.

CASE SUMMARY

A 63-year-old man presented with persistent abdominal pain and weight loss. Diagnosis: Laboratory findings revealed elevated carbohydrate antigen 19-9 (5920 U/mL) and carcinoembryonic antigen (23.7 ng/mL) levels. Magnetic resonance imaging of the pancreas revealed an approximately 3 cm ill-defined space-occupying lesion in the inferior aspect of the head, with severe encasement of the superior mesenteric artery. Pancreatic ductal adenocarcinoma was confirmed after pathological examination of specimens obtained by EUS-TS using the fanning method. Interventions and outcomes: The following day, the patient experienced severe abdominal pain with high amylase (265 U/L) and lipase (1173 U/L) levels. Computed tomography of the abdomen revealed edematous wall thickening of the second portion of the duodenum with adjacent fluid collections and a suspicious leak from either the distal common bile duct or the main pancreatic duct in the head. Endoscopic retrograde cholangiopancreatography revealed dye leakage in the head of the main pancreatic duct. Therefore, a 5F 7 cm linear plastic stent was deployed into the pancreatic duct to divert the pancreatic juice. The patient's abdominal pain improved immediately after pancreatic stent insertion, and amylase and lipase levels normalized within a week. Neoadjuvant chemotherapy was then initiated.

CONCLUSION

Using the fanning method in EUS-TS can inadvertently cause damage to the pan-

creatic duct and may lead to clinically significant pancreatitis. Placing a pancreatic stent may immediately resolve acute pancreatitis and shorten the waiting time for curative therapy. When using the fanning method during EUS-TS, ductal structures should be excluded to prevent pancreatic ductal leakage.

Key Words: Endoscopic ultrasound-guided tissue sampling; Pancreatitis; Pancreatic duct leak; Pancreatic stent; Case report

Core Tip: Endoscopic ultrasound guided tissue sampling is a crucial procedure for histological diagnosis of pancreatic lesions, but it may occasionally be accompanied by unforeseen complications. The Fanning method is a technique that can enhance diagnostic accuracy, but it also carries the risk of unintended ductal injury. Here, we report a case where the use of the Fanning method during endoscopic ultrasound guided tissue sampling resulted in leakage of the pancreatic duct. We successfully managed this complication by performing pancreatic duct stent *via* endoscopic retrograde cholangiopancreatography.

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INTRODUCTION

Endoscopic ultrasound-guided tissue sampling (EUS-TS) has become the gold standard for histological diagnosis of solid pancreatic lesions[1,2]. Although EUS-TS is considered relatively safe, unexpected complications inevitably arise. Acute pancreatitis is one of the more severe complications of EUS-TS, as it can delay the surgical schedule of resectable lesions and can even make curative treatment impossible[3]. Pancreatic ductal leaks often complicate the situation, while recent treatment guidelines for acute pancreatitis, such as early feeding, can be counterproductive. EUS-TS puts patients at risk of developing pancreatic ductal leaks if normal pancreatic ducts are damaged during the procedure[4]. Fortunately, pancreatic ductal leaks can be adequately treated by placing a pancreatic stent to divert the leaking pancreatic juice into the duodenal lumen[5]. According to our review of English-language scientific literature, this is the first recorded case of a pancreatic ductal leak developing after timely EUS-TS treatment with pancreatic stent placement. Therefore, clinical suspicion is key to promptly diagnosing and treating pancreatic ductal leaks in patients who present with acute pancreatitis after EUS-TS. Herein, we present a case of acute pancreatitis caused by a pancreatic ductal leak after EUS-TS that was treated with a pancreatic stent.

CASE PRESENTATION

Chief complaints

A 63-year-old man visited the outpatient department with a weight loss.

History of present illness

The weight loss has been significant, with a decrease of 14 kg over the past two months, and upper abdominal pain was occurred 10 d ago.

History of past illness

He had been diagnosed with hypertension and diabetes mellitus four years earlier.

Personal and family history

He was a chronic alcoholic and a current smoker.

Physical examination

The physical examination showed tenderness in the epigastric area without rebound tenderness.

Laboratory examinations

His white blood cell count was 3500/mm^3 (reference value: 6000–10000/mm^3), lipase level was 120 U/L (reference value: 7–60 U/L), carbohydrate antigen 19-9 level was 5920 U/mL (reference value: < 37 U/mL), and carcinoembryonic antigen level was 23.7 ng/mL (reference value: 0–4.7 ng/mL). All other laboratory test results were within the normal ranges.

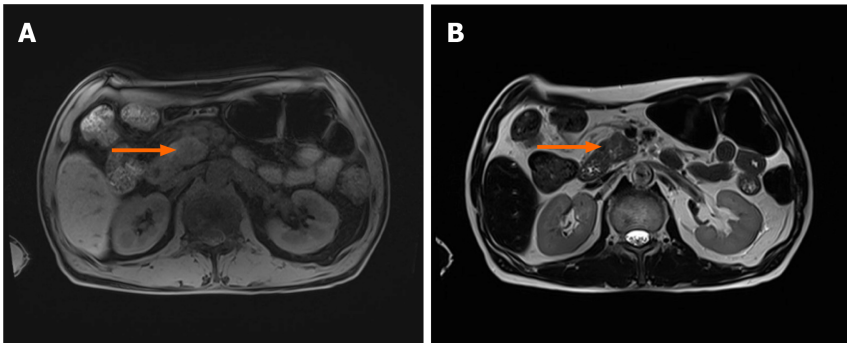

Figure 1 Magnetic resonance imaging. A and B: An approximately 3 cm, ill-defined, space-occupying lesion in the inferior aspect of the head with high signal intensity on T1- and T2-weighted imaging (orange arrows).

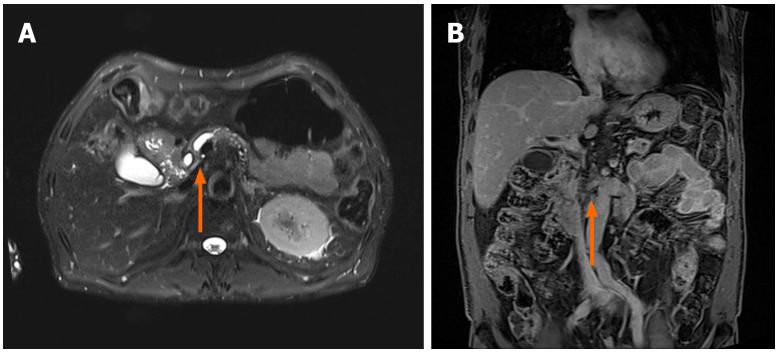

Figure 2 Magnetic resonance imaging. A: An ill-defined space-occupying lesion invading the distal common bile duct and main pancreatic duct, both of which were narrowed, and the upstream main pancreatic duct dilated (orange arrow); B: The lesion severely encased the superior mesenteric artery (orange arrow).

Imaging examinations

Magnetic resonance imaging of the pancreas showed an approximately 3 cm-sized, ill-defined space-occupying lesion in the inferior aspect of the head, with high signal intensity on T1- and T2-weighted imaging (Figure 1). The distal common bile duct and main pancreatic duct adjacent to the lesion were narrowed, the upstream main pancreatic duct was dilated, and the superior mesenteric artery was severely encased (Figure 2).

FINAL DIAGNOSIS

EUS-TS was performed for pathologic diagnosis, which demonstrated a 36.0 mm × 32.9 mm sized ill-defined, relatively heterogeneous, hypoechoic mass in the pancreatic head. EUS-TS was performed with a 22-gauge EZ shot (EZ shot 3 plus; Olympus, Tokyo, Japan) using the fanning method (Figure 3). Pathological examination confirmed a pancreatic ductal adenocarcinoma. The day after the procedure, the patient experienced severe abdominal pain in the right upper quadrant and epigastric areas. His follow-up amylase, lipase, and C-reactive protein levels were 265 U/L (reference range: 43–116 U/L), 1173 U/L (reference range: 7–60 U/L), and 27.7 mg/dL (reference range: 0–3 mg/dL), respectively. Computed tomography (CT) of the abdomen two days after EUS-TS revealed edematous wall thickening of the second portion of the duodenum with adjacent fluid collections and a suspicious leak from either the distal common bile duct or the main pancreatic duct in the head (Figure 4).

TREATMENT

During the initial endoscopic retrograde cholangiopancreatography (ERCP), selective biliary cannulation could only be achieved through the ampulla of Vater. Although no definitive dye leak from the distal CBD was observed, a 7F 7 cm double pigtail plastic stent (ZSO-7-7; Cook Medical, Indiana, United States) was deployed over the stricture to allow for effective biliary drainage (Figure 5). Selective pancreatic cannulation was attempted several times without success. Despite biliary diversion, the patient continued to experience severe abdominal pain for four days. Follow-up abdominal CT showed no resolution of the suspected leak, suggesting a pancreatic ductal leak. During the second ERCP, a separate orifice was observed below the biliary orifice, which was not observed in the first ERCP. Selective pancreatic cannulation was easily achieved through the orifice (Figure 6). As the pancreatogram showed a dye leak in the head portion of the

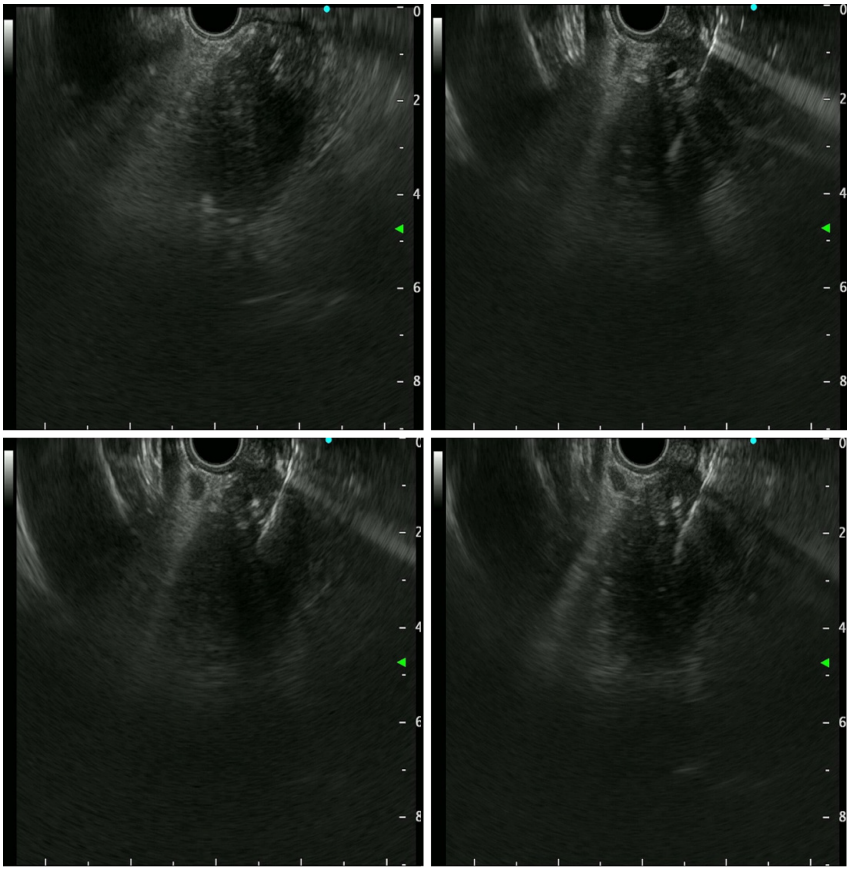

Figure 3 Endoscopic ultrasound-guided tissue sampling. Endoscopic ultrasound (EUS) showed a 36.0 mm × 32.9 mm sized ill-defined relative heterogeneous hypoechoic mass in the pancreatic head. EUS-guided tissue sampling (EUS-TS) was performed using a 22-gauge EZ Shot (EZ Shot 3 Plus; Olympus, Tokyo, Japan) using the fanning method.

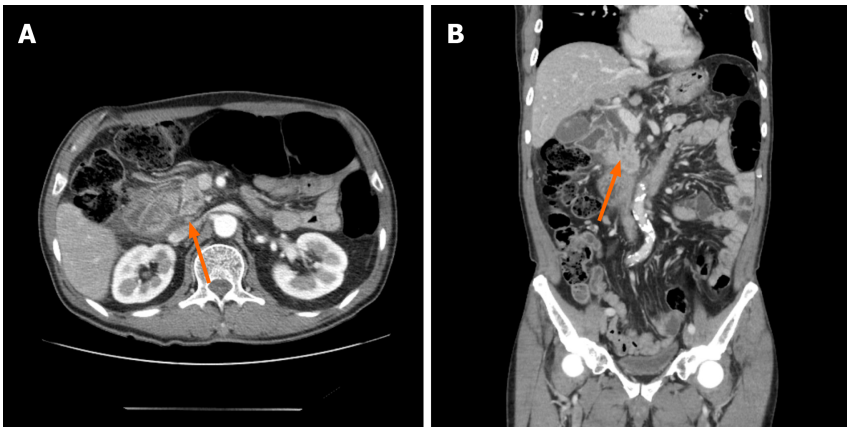

Figure 4 Computed tomography of the abdomen two days after endoscopic ultrasound-guided tissue sampling. A and B: Edematous wall thickening of the second portion of the duodenum with adjacent fluid collection was detected and a leak was suspected (orange arrows).

main pancreatic duct, a 5F 7 cm linear plastic stent was deployed to divert the pancreatic juice (Figure 7).

OUTCOME AND FOLLOW-UP

Immediately after insertion of the pancreatic stent, his abdominal pain markedly improved, and amylase and lipase levels normalized within a week. Two weeks after the pancreatic stent insertion procedure, follow-up abdominal CT imaging revealed the disappearance of adjacent fluid collection and edematous change of head of pancreas findings and healing of the duct leakage site (Figure 8). Based on these observations, neoadjuvant chemotherapy was initiated.

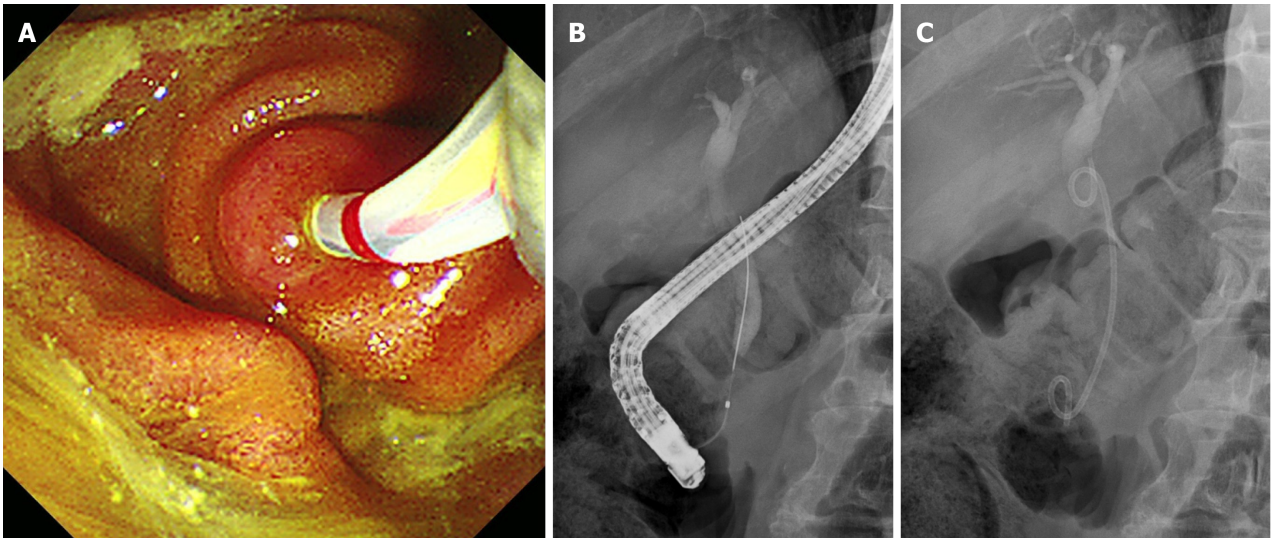

Figure 5 First endoscopic retrograde cholangiopancreatography. A: Selective biliary cannulation was achieved only through the ampulla of Vater; B: There is no definitive dye leakage from the distal common bile duct; C: A 7F 7 cm-sized double pigtail plastic stent was deployed for effective biliary drainage.

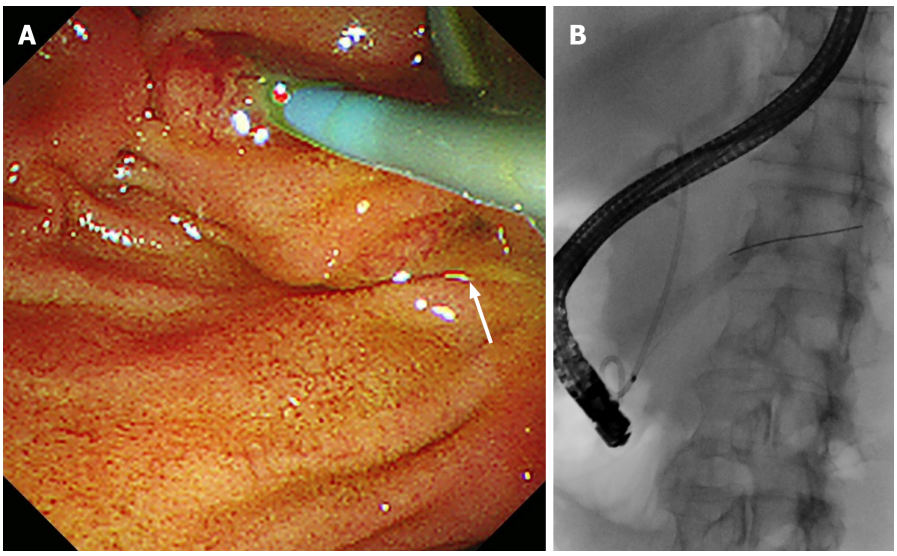

Figure 6 Second endoscopic retrograde cholangiopancreatography. A: A separate orifice below the biliary orifice that had not been observed during the first endoscopic retrograde cholangiopancreatography is noted (white arrow); B: Selective pancreatic cannulation was easily achieved through a separate orifice.

DISCUSSION

EUS-TS is a revolutionary technique that shifts the narrative surrounding the diagnosis of pancreatic lesions, such as cysts and solid lesions, and can target small pancreatic tumors. Before the advent of EUS-TS, ultrasonography-guided percutaneous transabdominal TS played a major role in significant seeding risk[5]. However, despite the many benefits of EUS-TS, it can also cause adverse side effects such as bleeding, pancreatitis, infection, duodenal perforation, abscesses, and sepsis[6]. Pancreatic ductal leaks are also a rare complication of EUS-TS, with only two cases reported thus far in the English-language scientific literature[1,7]. Unlike the current case, these cases involved pancreatic juice collected as a pseudocyst or as pancreatic ascites.

The patient in this case study was diagnosed with acute pancreatitis as he had suffered persistent severe pain over 24 h and had amylase and lipase levels more than three times the upper normal limit immediately after EUS-TS. Sequential abdominal CT imaging studies suggested a pancreatic ductal leak from the dilated main pancreatic duct, which a second ERCP confirmed. The patient recovered immediately after pancreatic stent placement to divert the leaking pancreatic juice from the intraperitoneal cavity to the duodenal lumen.

Acute pancreatitis (AP) is a rare EUS-TS complication. Recent research has demonstrated that a recent history of acute pancreatitis and undertaking EUS-TS through more than 5 mm of the normal parenchyma can lead to a much greater risk of acute pancreatitis[3]. However, a history of acute pancreatitis was not found in the current case, and the EUS-TS fine needle passed through less than 5 mm of the normal parenchyma. Another study reported that patients with a branch

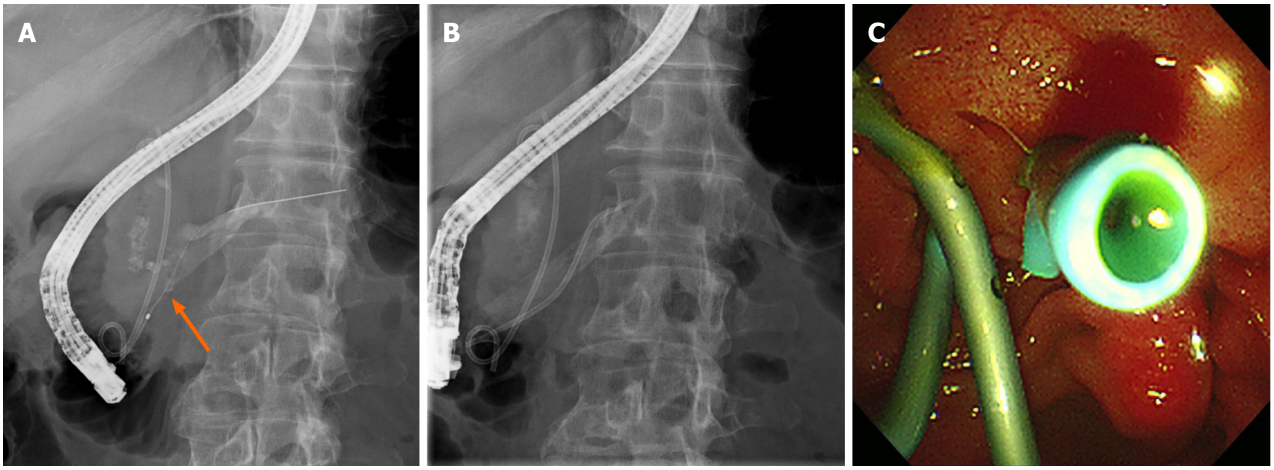

Figure 7 Second endoscopic retrograde cholangiopancreatography. A: A pancreatogram showing dye leakage in the head of the main pancreatic duct (orange arrow); B and C: A 5F 7 cm linear plastic stent was deployed to divert the pancreatic juice.

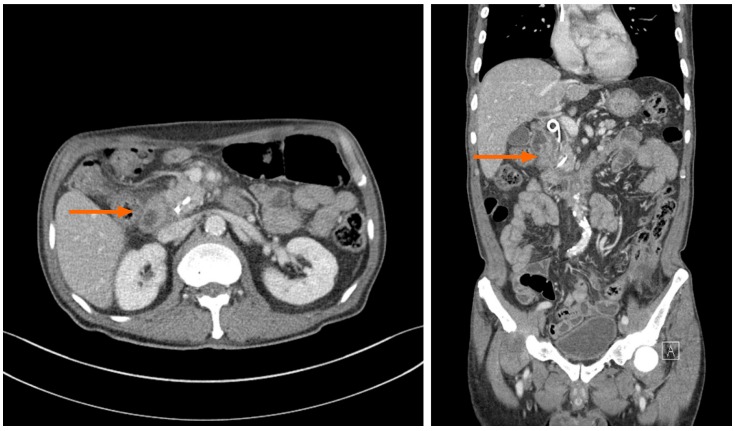

Figure 8 Computed tomography of the abdomen two weeks after pancreatic stent placement. Disappearance of adjacent fluid collection and edematous change of head of pancreas, and healing of the duct leakage site finding were seen.

duct-type intraductal papillary mucin-secreting neoplasm are at risk of developing acute pancreatitis after EUS-TS[2]. However, unlike that study, the current case involved pancreatic ductal adenocarcinoma (PDAC).

In the present case, the fanning method was used to achieve a high diagnostic accuracy. The fanning method in EUS-TS involves sampling by cycles of in-and-out needle passes addressed in multiple directions within a solid lesion to obtain more target tissue[8]. While blood vessels were visualized and excluded by color Doppler during EUS-TS in the current case, pancreatic ductal structures without color Doppler might have a greater chance of being damaged by the fanning technique than the standard technique. A retrospective analysis of the EUS images in the current case revealed a suspicious ductal structure within the target fanning area (Figure 9). When using the fanning method during EUS-TS, ductal structures without color Doppler imaging should be excluded to prevent pancreatic ductal leaks. To avoid pancreatic ductal injury, a thorough evaluation of the ductal structures should be performed before EUS-TS with Doppler imaging in the pancreatic mass, and the fanning method range should be limited in the field without suspicious ductal structures.

Although PDAC generally has a poor prognosis because it is frequently detected at an advanced stage, recent studies demonstrate that innovations in neoadjuvant chemotherapy have provided opportunities to proceed to curative surgery, thereby improving long-term outcomes in patients with borderline resectable and locally advanced PDAC[9]. Therefore, prompt treatment with neoadjuvant chemotherapy is critical for improving prognosis, while a delay in treatment could cause borderline resectable and locally advanced PDAC to become distant and metastatic. Acute pancreatitis initiates a hypercatabolic state caused by elevated protein catabolism and an inflammatory cytokine storm[10]. Recent guidelines dictate that patients with acute pancreatitis may benefit from early oral or enteral nutrition, which is in contrast to managing pancreatic ductal leaks as they require prolonged fasting and parenteral nutrition[4]. The hypercatabolic state and prolonged fasting in acute pancreatitis due to pancreatic ductal leaks could make PDAC patients unsuitable for toxic chemotherapy. In the current case, placement of the pancreatic stent helped to reduce the waiting interval for neoadjuvant chemotherapy, as the patient's acute pancreatitis was immediately resolved.

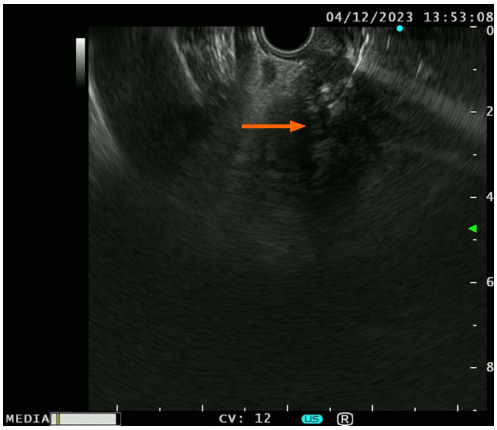

Figure 9 Retrospective analysis of endoscopic ultrasound imaging in the current case. Suspected ductal structure within the fanning area of the target (orange arrow).

CONCLUSION

In conclusion, pancreatic ductal leakage caused by EUS-TS can lead to acute pancreatitis. Therefore, imaging studies should be immediately performed after EUS-TS to rule out pancreatic ductal leaks in patients with clinical signs and symptoms of AP. If a pancreatic ductal leak is suspected, ERCP must confirm the leak. Pancreatic stent placement may allow patients to immediately recover from acute pancreatitis and shorten the waiting time for curative therapy. When using the fanning method during EUS-TS, ductal structures without color Doppler imaging should be excluded to prevent pancreatic ductal leaks.

FOOTNOTES

Author contributions: Kim KH, Cho E, Lee Y designed the research study; Kim KH and Park CH analyzed the data and wrote the manuscript; all authors have read and approve the final manuscript.

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Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

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