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CASE REPORT

Pancreatic pseudoaneurysm mimicking pancreatic tumor: A case report and review of literature

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Abstract

BACKGROUND

Pancreatic pseudoaneurysm is a rare vascular complication of chronic pancreatitis (CP) or necrotizing pancreatitis with an incidence of 4% to 17%, but it is potentially life-threatening. It is well known that most pancreatic pseudoaneurysms are clinically associated with pancreatic pseudocysts and are usually in the peripancreatic body-tail. A minority of intrapancreatic pseudoaneurysms occur in the absence of pseudocyst formation. Noninvasive computed tomography (CT) and magnetic resonance imaging (MRI) are most commonly used examinations for screening pancreatic pseudoaneurysms. Notably, the rare intrapancreatic pseudoaneurysm in the pancreatic head can mimic a hypervascular solid mass and be misdiagnosed as a pancreatic tumor.

CASE SUMMARY

We report the case of a 67-year-old man who had been admitted to our hospital due to recurrent abdominal pain for 1 mo that was aggravated for 5 d. CT and MRI revealed a mass in the pancreatic head with significant expansion of the main pancreatic duct and mild atrophy of the pancreatic body-tail. He was admitted to the department of hepatobiliary and pancreatic surgery due to the possibility of a pancreatic tumor. The patient was then referred for endoscopic ultrasonography (EUS) with possible EUS-FNA. However, EUS showed a cystic lesion in the pancreatic head with wall thickness and enhancing nodules, which was doubtful because it was inconsistent with the imaging findings. Subsequently, color doppler flow imaging demonstrated turbulent arterial blood flow in the cystic lesion and connection with the surrounding vessel. Therefore, we highly suspected the possibility of CP complicated with intrapancreatic pseudoaneurysm, combined with the patient's long-term drinking history and the sonographic features of CP. Indeed, angiography revealed an oval area of contrast medium extravasation (size: 1.0 cm × 1.5 cm) at the far-end branch of the superior pancreaticoduodenal artery, and angiographic embolization was given imme-

diately at the same time.

CONCLUSION
EUS is an important differential diagnostic tool when pancreatic pseudoaneurysm mimics the imaging appearance of a hypervascular pancreatic tumor.

Key Words: Pancreatic pseudoaneurysm; Chronic pancreatitis; Pancreaticoduodenal artery; Endoscopic ultrasonography; Case report

Core Tip: Pancreatic pseudoaneurysm is a rare vascular complication of chronic pancreatitis, and the most commonly used clinical screening methods are computed tomography (CT) and magnetic resonance imaging (MRI). We report an even rarer case of an intrapancreatic pseudoaneurysm that mimicked a pancreatic neuroendocrine tumor on the axial view of contrast-enhanced CT and MRI. Finally, the diagnosis was confirmed by endoscopic ultrasonography; the patient was successfully treated with angiographic embolization. The imaging findings of pancreatic pseudoaneurysm mimicking pancreatic tumor is a concern.

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INTRODUCTION

Pancreatic pseudoaneurysm is an uncommon complication of chronic pancreatitis (CP). Life-threatening lastingly existing pseudoaneurysms lack a complete vascular wall structure and have a high risk of spontaneous rupture[1-3]. Hence, timely diagnosis and treatment are of great clinical significance.

Although angiography is the gold standard for diagnosing pancreatic pseudoaneurysms and can simultaneously provide management of therapy, given its invasive and expensive nature as well as the nonspecific clinical manifestations of pseudoaneurysm, can only be performed in cases of suspected pseudoaneurysm on computed tomography (CT) or magnetic resonance imaging (MRI)[4,5]. Most unruptured pancreatic pseudoaneurysms are incidentally diagnosed by CT or MRI. These relatively uncommon lesions are being incidentally detected with greater frequency as a result of the widespread use of high-resolution imaging techniques. The typical imaging appearance of a pancreatic pseudoaneurysm was described as a rapidly enhancing lesion with enhancement and attenuation similar to those of the aorta, which provide an accurate diagnosis of pancreatic pseudoaneurysm even in cases where the diagnosis is not suspected[6].

However, the diagnosis of pancreatic tumors also relies on CT and/or MRI. They are most often manifested as hypoechoic masses, and if combined with the mass effect of upstream main pancreatic duct dilation and distal pancreas atrophy[7,8], there can be high suspicion for the diagnosis of pancreatic tumor. Herein, we report a case of intrapancreatic pseudoaneurysm associated with CP mimicking pancreatic tumor.

CASE PRESENTATION

Chief complaints

A 67-year-old male who complained of upper abdominal pain for 1 mo that was aggravated for 5 d was referred to our hospital.

History of present illness

One month previously, he had suffered dull abdominal pain that was around the epigastric area and radiated to the lower back without nausea, hematemesis, melena or fever. This discomfort worsened for 5 d. The patient was referred to our hospital.

History of past illness

The patient had no previous medical history.

Personal and family history

He had a long-term drinking personal history for 43 years (liquor 250 g/d) and no family history of malignant tumors or

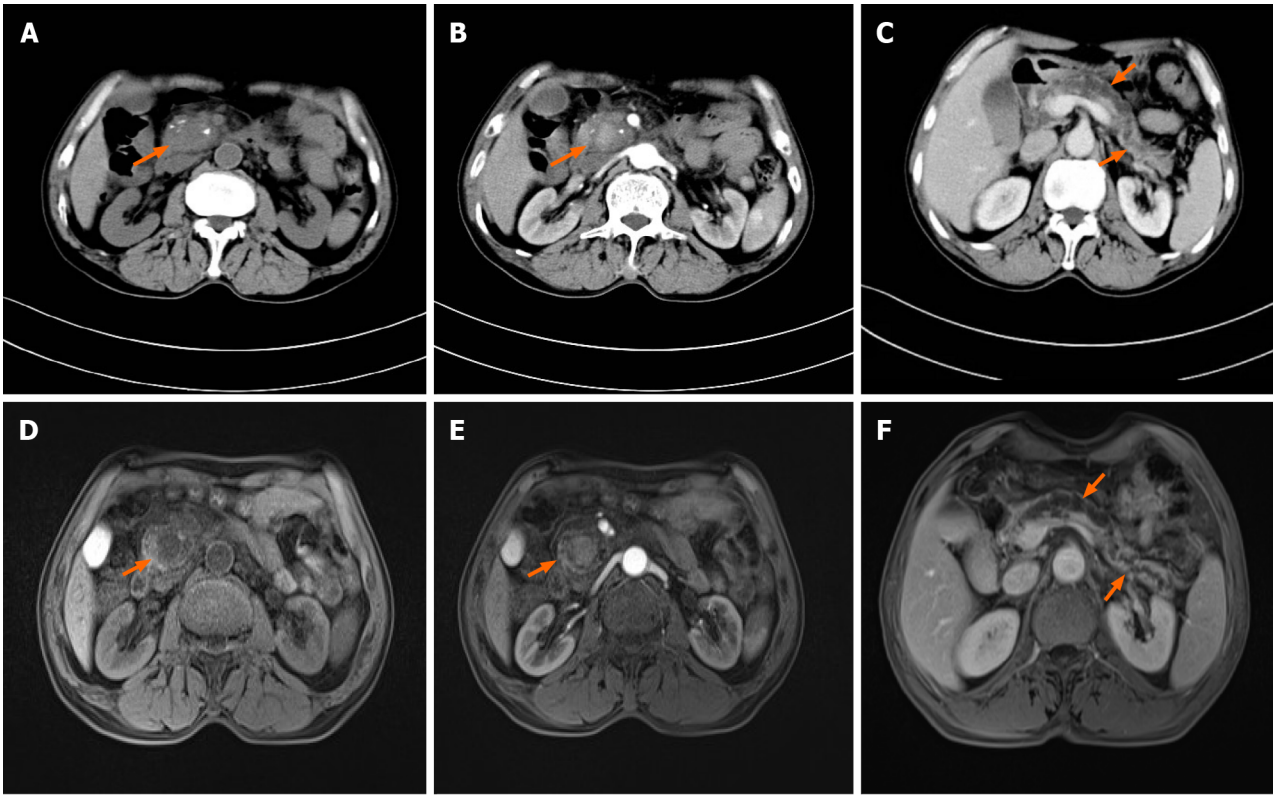

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Figure 1 Representative computed tomography and magnetic resonance imaging. A: Computed tomography (CT) showing enlargement of the pancreatic head with unclear borders and scattered irregular calcifications (orange arrow); B: Axial view of contrast-enhanced CT reveals a slightly enhanced intrapancreatic lesion in the head of the pancreas (orange arrows); C: CT show generalized dilatation of the main pancreatic duct and mild atrophy of the distal pancreas (orange arrow); D: Magnetic resonance imaging (MRI) showing a low attenuation lesion in the center of the pancreatic head (orange arrow); E: Contrast-enhanced MRI axial view reveals uniformly mild enhancement within the lesion (orange arrows); F: MRI show significant dilatation of the main pancreatic duct with mild atrophy of the distal pancreas (orange arrows).

genetic diseases.

Physical examination

His vital signs were stable. Abdominal examination revealed mild tenderness in the epigastric area and negative peritoneal irritation signs.

Laboratory examinations

The serum tumor markers were within the normal range. Other laboratory examinations were normal except for a slight elevation in serum amylase (232 U/L).

Imaging examinations

Abdominal CT showed enlargement of the pancreatic head with unclear borders and scattered irregular calcifications. The intrapancreatic lesion was slightly enhanced with uneven density on contrast-enhanced imaging (Figure 1A and B), and the main pancreatic duct was markedly dilated (Figure 1C), indicating a tumor in the pancreatic head with surrounding inflammation. MRI described the enlargement and deformation of the pancreatic head, and the contrast-enhanced scan showed uniformly mild enhancement within the lesion (Figure 1D and E). The pancreatic duct was generally dilated, and the pancreatic body and tail showed slight atrophy (Figure 1F). Neuroendocrine tumors of the pancreatic head with pancreatitis were considered.

Further diagnostic work-up

Gastroscopy showed that the shape of the duodenal papilla was normal, and there was no abnormal secretion (Figure 2A). Endoscopic ultrasonography (EUS) revealed mild atrophy of the pancreatic body and tail, obvious dilation of the main pancreatic duct that was 10 mm in diameter and no dilation of the bile duct. An irregular cystic lesion (size: 1.5 cm × 1.8 cm) was found in the central parenchyma of the pancreatic head with wall thickness and enhancing nodules (Figure 2B and C). Color doppler flow imaging (CDFI) indicated turbulent blood flow in the lesion with intense vascular flow and connection with the surrounding vessel (Figure 2D and E). Its blood flow filling frequency was consistent with that of the abdominal aorta, and the arterial blood flow signal was indicated by the doppler spectrum (Figure 2F). Arteriography was further preformed, and an oval area of contrast medium extravasation was finally discovered at the far-end

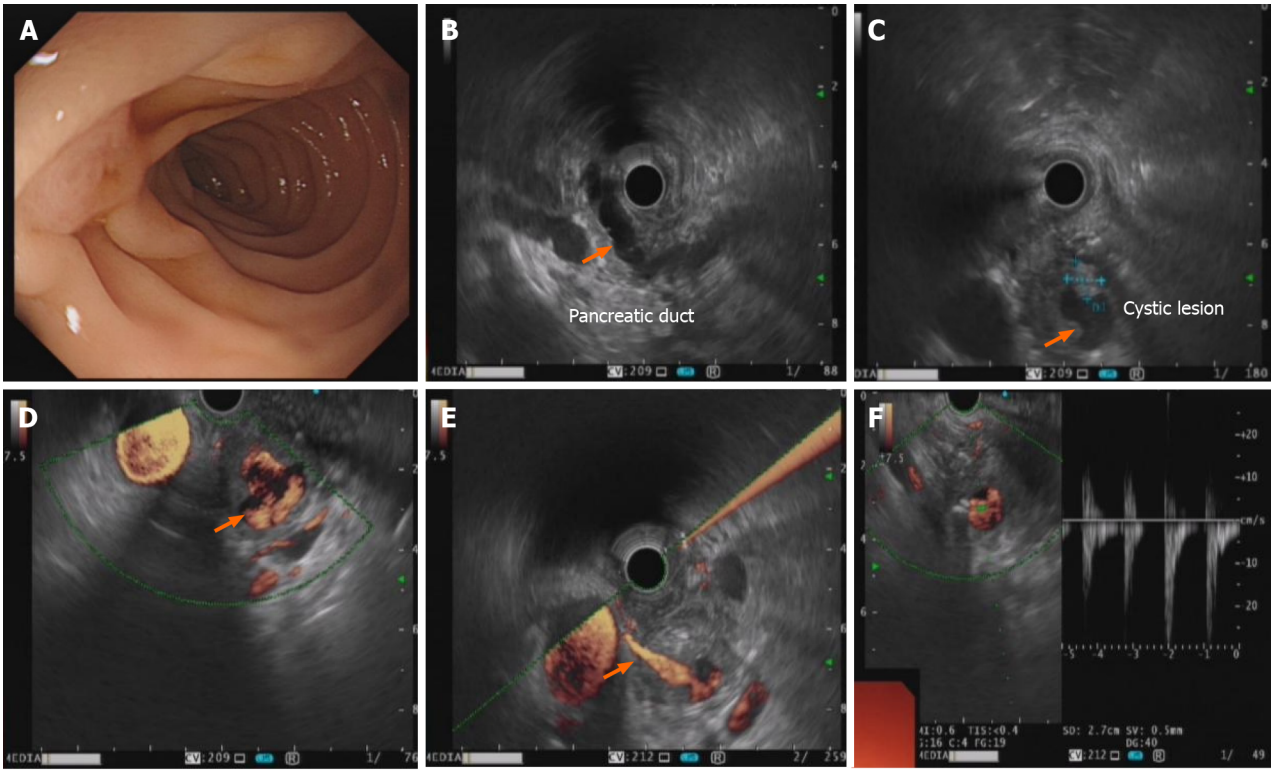

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Figure 2 Representative endoscopic ultrasonography imaging. A: The duodenal papilla is normal; B: Endoscopic ultrasonography (EUS) showing obvious dilation of the main pancreatic duct in the pancreatic body and tail (orange arrow); C: EUS showing a cystic lesion with wall thickness and enhancing nodules in the pancreatic head (orange arrow); D: Color doppler flow imaging (CDFI) revealed turbulent blood flow in the cystic lesion (orange arrow); E: CDFI showing the lesion connected with the surrounding vessel by dynamic and continuous scans (orange arrow); F: Doppler spectrum showing an arterial blood flow signal within the lesion.

branch of the superior pancreaticoduodenal artery after two injections of contrast medium (Figure 3A).

FINAL DIAGNOSIS

He was finally diagnosed with acute exacerbation of CP complicated with a pancreaticoduodenal artery pseudoaneurysm considering his personal history, EUS and arteriography examinations.

TREATMENT

Angiographic embolization was immediately performed after the blood flow source of the pseudoaneurysm was confirmed, and no contrast medium spillage was found after embolization (Figure 3B). Comprehensive treatment with antibiotics, somatostatin, proton pump inhibitors and nutritional support was given during hospitalization.

OUTCOME AND FOLLOW-UP

He was discharged after undergoing the therapy for 10 d, and abstinence from liquor was strongly advised. He reported no discomfort by telephone follow-up and underwent follow-up CT and EUS at local hospital 1 year later, in which the diagnosis was CP, and absorption of the lesion and metal density shadow were revealed in the pancreatic head (Figure 3C).

DISCUSSION

Pseudoaneurysm associated with CP is a rare complication resulting from the erosion of pancreatic or nearby vessels by leaked pancreatic juice[9]. The arteries involved with the greatest frequency are the spleen artery (40%), followed by the

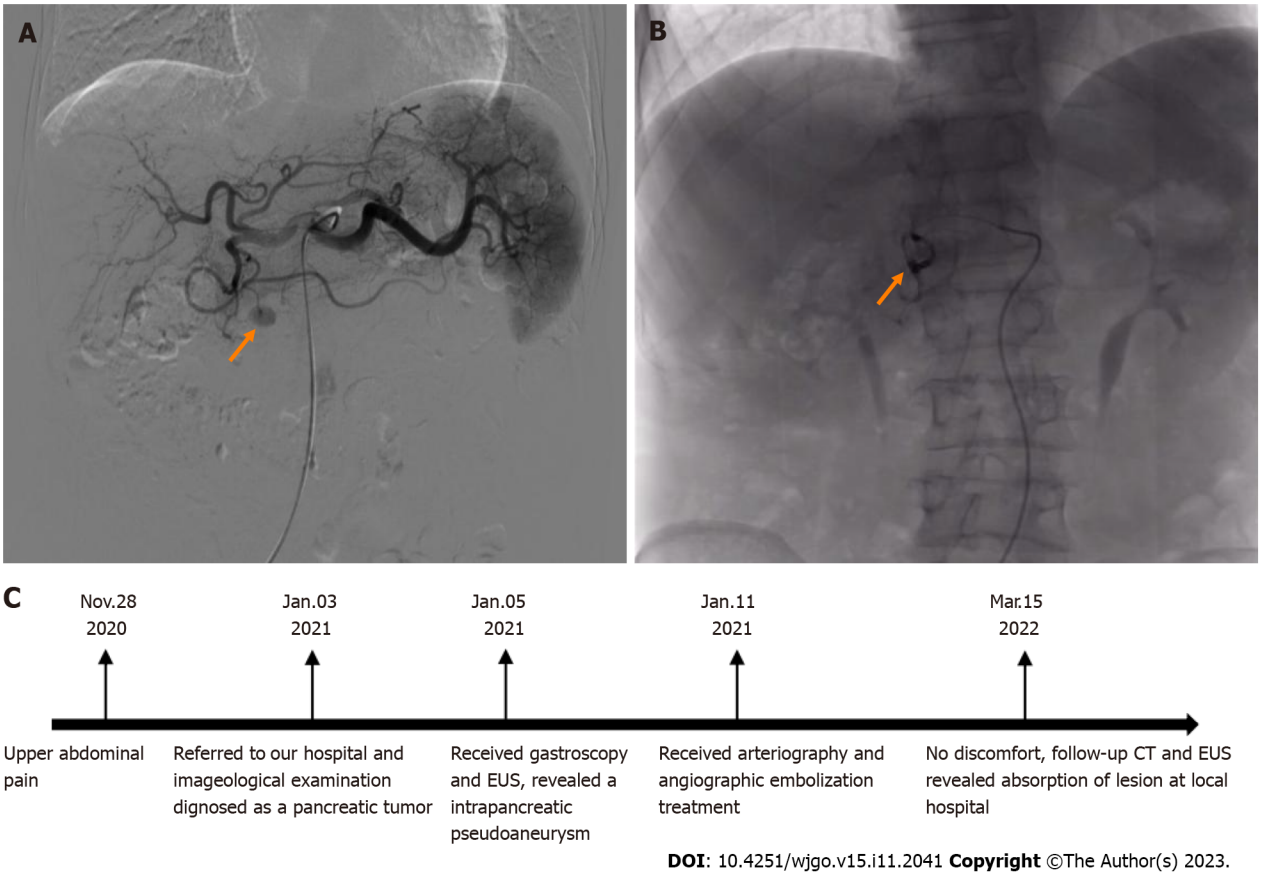

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Figure 3 Angiography images and postoperative interventional embolization. A: Angiography reveals an extravasation of contrast medium (size: 1.0 cm × 1.5 cm) at the far-end branch of the superior pancreaticoduodenal artery (orange arrow); B: Angiography showing no contrast medium spillage after embolization (orange arrow); C: Timeline. EUS: Endoscopic ultrasonography; CT: Computed tomography.

gastroduodenal artery (30%), the superior and inferior pancreaticoduodenal artery (20%), the left gastric artery (5%), the hepatic artery and branches (2%)[10,11]. Clinically, most pseudoaneurysms associated with CP are formed in relation to longstanding pancreatic pseudocysts caused by vascular erosion from enzymes within the pseudocyst, direct compression, or ischemia, thereby converting the pseudocyst into a large pseudoaneurysm, as well as usually being in the peripancreatic body-tail[12,13]. However, intrapancreatic and small pseudoaneurysms unrelated to pancreatic pseudocysts are extremely rare.

In our case, a hypoechoic mass in the head of the pancreas showed mild enhancement in the arterial phase (Figure 1B and E) and delayed enhancement in the venous phase (Figure 4). Due to the lack of pseudocyst formation and combined indirect signs of pancreatic head tumors, such as obvious dilation of the pancreatic duct and atrophy of the distal pancreas, it was more likely to be misdiagnosed as a pancreatic tumor, especially a neuroendocrine tumor, because it can be markedly hyperattenuating in the arterial or pancreatic phase[12,14]. In fact, the kind of indirect imaging signs are also in accordance with the diagnostic criteria of CP. Therefore, a diagnostic pitfall will be encountered when the lesion location is unusual and is a hypervascular solid mass.

Notably, these unusual imaging findings may be related to the formation mechanism of pseudoaneurysms. Pseudoaneurysms have no normal vessel wall structure, are merely composed of hematoma and surrounding fibrous tissue, are not continuous with the arterial lumen, and have a leaking hole on the artery wall[15-17]. Hence, we thought that when the diameter of the leaking hole on the arterial wall was extremely small and the access connected to the hematoma was narrow and twisted, hemodynamic alterations occurred in which the blood flow was slow in the arterial phase and stagnant in the venous phase, which gave rise to no significantly enhanced lesion on CT and MRI after injection of the contrast medium. Relevant literature also proposed that vascular endoleaks are usually evaluated with static multiphasic CT that includes noncontrast, arterial, and delayed phases. However, static CT may miss some endoleaks, particularly low-flow endoleaks that emerge in the late arterial phase[18]. This hypothesis was supported during angiography, as we did not find the lesion until two injections of contrast medium were performed. To our knowledge, this is a rare report describing the CT and MRI findings of CP with intrapancreatic pseudoaneurysm mimicking a pancreatic tumor.

As described above, CT and MRI are fast and noninvasive imaging modalities that provide an easy diagnosis of pancreatic pseudoaneurysm according to typical imaging features, namely, markedly enhanced lesions in the arterial phase (similar to the aorta) on enhanced scans[19]. A combination retrospective case series and literature review reported that a pitfall on CT and MRI axial images is likely misinterpretation of a pseudoaneurysm as a solid pancreatic neoplasm[20-22], as seen in our case. However, only a few cases have been reported, and most of these patients were diagnosed during surgical procedures or due to a ruptured pseudoaneurysm[23-25].

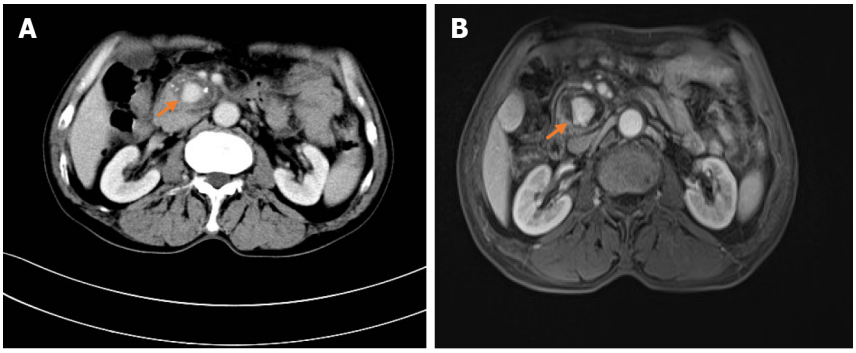

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Figure 4 Computed tomography and magnetic resonance imaging venous phase imaging. A: Axial view of contrast-enhanced computed tomography reveal delayed enhancement in the venous phase (orange arrow); B: Axial view of contrast-enhanced magnetic resonance imaging show delayed enhancement in the venous phase (orange arrow).

It is well known that EUS has been extensively applied in the detection, diagnosis and treatment of pancreatic disease. The advantage of EUS with the auxiliary function of CDFI lies in dynamically reflecting the peripheral blood flow signal and clearly delineating the extent and size of the pseudoaneurysm[26]. Not only does EUS play an important role in the noninvasive detection of pancreatic pseudoaneurysms, but the convenience of monitoring and follow-up is also a significant advantage of EUS. In conclusion, even though the initial CT or MRI imaging was misunderstood, when EUS examination of suspected pancreatic cystic lesions in the background of CP is performed, we should remain clinically suspicious of a pseudoaneurysm regardless of the location and size, thereby effectively avoiding pitfalls in differential diagnosis.

So far, angiography embolization has been widely accepted in the management of pseudoaneurysms because of its higher rates of diagnosis and successful embolization in the meanwhile. Surgical treatment is merely suitable for patients in whom angiographic embolization has failed or who have active bleeding with unstable vital signs[27]; a few case reports and small case series have appeared in the literature showing the feasibility of EUS-guided obliteration of pancreatic pseudoaneurysm by means of glue or thrombin injection, alone or combined with coil deployment[28-30]. Some experts also have indicated that for patients with repeated angiography or embolization failure, the advent of thrombin instillation through EUS guidance has opened an altogether new arena for managing difficult pseudoaneurysms and thereby avoiding surgical risks, but it is essential to note that it relates to increased embolic risk. Studies are needed to provide more data on the efficacy of this method[31].

CONCLUSION

Although CT and MRI have a high diagnostic rate for pancreatic pseudoaneurysm, the rare location and unusual imaging findings still likely led to a misdiagnosis. EUS has an irreplaceable advantage in the noninvasive diagnosis of pancreatic pseudoaneurysms. Through continuous dynamic scanning, combined with color doppler flow and spectrum, it can efficiently make a correct diagnosis. We hope that this case report can provide more clinical experience for the diagnosis and differential diagnosis of pancreatic pseudoaneurysm.

FOOTNOTES

Author contributions: Yang Y drafted the manuscript and collected data; Liu XM and Li HP diagnosed the patient; Xie R and Wu HC performed the operation; Tuo BG and Wu HC guided the operation and revised the manuscript; All authors have approved the final draft submitted.

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