CASE REPORT

Mesenteric venous collateral vessels mimicking cystic pancreatic neoplasm

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ABSTRACT. We report an unusual case of intrapancreatic mesenteric venous collateral vessels following partial pancreatic surgical resection resembling pancreatic neoplasm upon greyscale sonographic and unenhanced CT examinations.

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Cystic lesions of the pancreas can be divided into three broad categories: lesions without an epithelial lining (pseudocyst), lesions with an epithelial lining (mucinous and serous cystadenoma and cystadenocarcinoma) and degenerative or necrotic change within a solid neoplasm (solid pseudopapillary neoplasm and cystic degeneration of ductal adenocarcinoma or neuroendocrine tumour). Here we report an unusual aetiology for a cyst-like pancreatic lesion: intrapancreatic mesenteric venous collateral vessels developing after a previous partial pancreatic resection. Failure to recognise this condition, particularly during image-guided intervention such as biopsy, endoscopic retrograde cholangiopancreatography (ERCP) or during surgery, could result in a disastrous outcome.

Case report

A 61-year-old woman with a history of a mucinous cystic neoplasm of low malignant potential arising from the neck of the pancreas resected 6 years previously, with negative margins, was found to be anaemic upon routine surveillance. Her work-up included an upper and lower endoscopy, both of which failed to reveal a source of blood loss. Unenhanced abdominal CT demonstrated a 3 × 6 cm soft-tissue mass (Figure 1) within the head of the pancreas. Intravenous contrast material was not administered at the time of the CT examination owing to reported iodine allergy.

Given the patient's history of a previous subtotal pancreatectomy for a mucinous cystic neoplasm, she was referred to our institution for further evaluation. She denied abdominal pain, nausea or vomiting. For the

previous five years she had been treated with long-term anticoagulation (warfarin) for post-operative deep venous thrombosis and pulmonary embolism. Her medical and surgical history was significant for non-insulin-dependent diabetes mellitus. Notably, the patient did not have a history of acute or chronic pancreatitis. The patient's physical examination was unremarkable; in particular, her abdomen was soft without a palpable mass. In the light of the patient's history of a pancreatic neoplasm and the unenhanced abdominal CT findings, an endoscopic ultrasound (EUS) evaluation was performed to assess the residual pancreas for recurrent cystic neoplasm.

Endoscopic ultrasound findings

The patient underwent an EUS examination using a radial scanning probe (GF-UM130; Olympus America, Center Valley, PA), which confirmed the abdominal CT findings. There was a 3 cm anechoic multicystic lesion with multiple internal septations, occupying nearly the entirety of the remaining pancreatic head parenchyma (Figure 2). The main pancreatic duct was normal in calibre and was distinct from the lesion; a direct communication between the lesion and the duct was not definitively identified. The EUS appearance of the lesion was suspicious for a new or recurrent pancreatic malignancy. Neither fine needle aspiration (FNA) nor biopsy of the lesion was performed as the EUS appearances were felt to be characteristic for a multicystic pancreatic neoplasm. Subsequently, the patient was referred for consideration of surgical resection.

CT findings

Pre-operative assessment included a pancreatic parenchymal and portal venous phase dominant thin section (1.25 mm) CT of the upper abdomen performed

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Figure 1. Unenhanced axial CT image at the level of upper abdomen demonstrates a prominent mass-like residual pancreas (arrow) suspicious for malignancy. Arrowhead points to metallic surgical clip.

with iodinated intravenous low osmolar non-ionic contrast material (125 ml of Ultravist® (iopromide) 300 mg ml⁻¹, Bayer Healthcare, Wayne, NJ) and barium sulphate suspension (VoLumen, 0.1% barium sulphate, E-Z-EM, Lake Success, NY) used as a negative oral contrast medium. Owing to the prior reported allergy to intravenous contrast material, oral steroid and antihistamine pre-medication was administered. There were no reported adverse events following contrast material administration.

The CT scan demonstrated surgical absence of the spleen, pancreatic body and tail with prominence of the residual proximal pancreas. Complete thrombosis of the superior mesenteric vein (SMV) was evident. Innumerable uniformly dilated thin-walled serpentine blood vessels, measuring up to 1 cm in diameter, were present in the root of the small bowel mesentery, within the residual pancreas and circumferentially around the common bile duct (CBD); these vessels were continuous

Figure 2. Endoscopic ultrasound image illustrates a multi-septate anechoic lesion within the residual pancreas (arrow).

with one another and communicated directly with the extra-hepatic portal vein at the porta hepatis (Figure 3). During the pancreatic parenchymal phase, the lesions were less conspicuous as they were nearly isodense to the surrounding pancreatic parenchyma. However, they were easily appreciable during the portal venous phase images given their homogeneous high attenuation (Figure 3a–c). A focal pancreatic mass was not present and dominant feeding arteries, draining veins or nidus were not identified. Hence, these lesions were presumed to represent mesenteric venous collateral vessels.

Owing to the findings seen on the contrast-enhanced CT imaging and lack of clinical symptomatology, surgical intervention was not pursued and the patient returned to clinical management with long-term follow-up surveillance. The aetiology of the patient's anaemia was never determined, but it resolved upon cessation of warfarin.

Discussion

This report illustrates an unusual example of intrapancreatic mesenteric venous collateral vessels, or pancreatic varices, mimicking a cystic pancreatic neoplasm on endoscopic ultrasound due to reorientation of blood flow following iatrogenic extra-hepatic obstruction of the portal venous system. The operative report of the patient's prior subtotal pancreatic resection describes avulsion of a small branch of the portal vein that was repaired with suture ligation. The inferior mesenteric vein (IMV) and splenic vein were ligated during the initial pancreatic resection. We speculate that the intra-operative portal vein manipulation led to chronic thrombosis of the SMV, which, in combination with ligation of the IMV and splenic vein, led to the anomalous venous return from the small bowel mesentery coursing through the residual pancreatic parenchyma *via* many venous collateral vessels. These intrapancreatic vascular channels were misinterpreted during EUS as multiple small anechoic lesions simulating multiple thin-walled cysts that were thought to represent recurrent multicystic pancreatic neoplasms.

A single case of true pancreatic parenchymal varices has been previously reported in the electronic medical literature [1]. It is important to recognise that this is an unusual condition that may develop in the post-pancreatic resection patient and could mimic a recurrent cystic neoplasm. The EUS utilised in our patient did not have the technology to perform Doppler interrogation, precluding the ability to assess for vascularity. Evaluating a pancreatic lesion with colour and power Doppler sonography before FNA or biopsy may be crucial, as biopsy of one of these vascular channels has the potential to result in catastrophic haemorrhage. Although few reports highlight the utility of EUS-Doppler in differentiating chronic pancreatitis from carcinoma [2, 3], to our knowledge, there are no reports of true intrapancreatic benign mesenteric venous collateral vasculature diagnosed with EUS.

Typically, when the SMV is thrombosed, gastroepiploic collaterals form which drain into the splenic vein. Less common collateral pathways include the short gastric and left gastric veins draining into the portal vein and rarely from the IMV into the left colic vein [4]. Since, in this case, none of these pathways was available

Figure 3. Oral and intravenous contrast-enhanced abdominal CT images obtained during pancreatic (a) and portal venous phase (b, c) dominant phases. Arrowheads in (a) point to homogeneously enhancing normal, prominent residual pancreas. Axial (b) and coronal (c) reformatted images illustrate multiple uniformly enhancing dilated veins within the residual proximal pancreas (curved arrows) and in the small bowel mesentery (arrow).

given the patient's surgical history, we speculate that this patient formed collateral venous vasculature to circumvent the normal mesenteric venous pathway.

Varices involving the organs in the upper abdomen have been reported; usually they are portosystemic collateral pathways in patients with portal venous hypertension [5, 6]. Varices affecting the duodenum [7], small bowel [8], stomach [9], kidneys [10] and retroperitoneum [11] have also been reported. Isolated perigastric varices may develop in cases of splenic vein thrombosis or following spleen-preserving pancreatectomy, where splenic arteriovenous structures are ligated or resected [12]. Varices are also reported within the wall of the CBD [13, 14], resulting in CBD wall thickening. There was no thickening of the CBD wall since the collateral vessels in this case were present around, rather than within, the CBD wall. While peripancreatic varices are common in patients with portal venous hypertension, they are generally extrinsic to the pancreatic parenchyma and should be carefully identified on CT

to avoid confusing them with an enhancing pancreatic parenchymal mass [15].

In contradiction to the hepatofugal flow that occurs in response to intrahepatic portal obstruction, extra-hepatic portal obstruction results in hepatopedal portal flow [16]. In this case, it is clear that the pattern of portal flow is hepatopedal, since there was little or no enhancement during the arterial phase but there was homogeneous filling of these varices during the portal venous phase.

This report highlights the importance of evaluating a cystic pancreatic parenchymal mass with intravenous contrast material on CT and/or Doppler sonography to exclude a vascular lesion. Completely thrombosed intrapancreatic varices may represent an exception, as they may demonstrate neither the above-described vascular CT morphological characteristics nor Doppler ultrasound blood flow. Failing to recognise this post-operative collateral mesenteric venous blood flow through the pancreas could result in a life-threatening complication. Hence, we recommend ultrasound with Doppler interrogation or contrast-enhanced

cross-sectional imaging to be performed to exclude vascular lesions masquerading as cystic pancreatic lesions, particularly before sampling and surgical interventions.

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