

Hemosuccus Pancreaticus in a Patient with Iodine Allergy: Successful Diagnosis with Magnetic Resonance Imaging and Treatment with Transarterial Embolization Using Carbon Dioxide as the Contrast Medium

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Abstract Hemosuccus pancreaticus (HP) is defined as gastrointestinal bleeding via the pancreatic duct and duodenal papilla. Since the bleeding is usually intermittent, it often remains undetected by endoscopy. Most cases are diagnosed by contrast-enhanced computed tomography (CT) or angiography, and the first-line treatment is transarterial embolization (TAE). However, in general, these modalities require a large amount of iodinated contrast medium. Here, we report the case of a 50-year-old female with HP due to chronic pancreatitis. Contrast-enhanced CT and ordinary angiography were contraindicated for her, as she was allergic to iodine. She was diagnosed with HP following gadolinium-enhanced magnetic resonance imaging and successfully treated by TAE of the splenic artery with metallic coils using carbon dioxide as the contrast medium.

Keywords Hemosuccus pancreaticus · Chronic pancreatitis · Arterial embolization · Iodinated contrast medium allergy · Gastrointestinal bleeding

Introduction

Hemosuccus pancreaticus (HP) is defined as gastrointestinal (GI) bleeding via the pancreatic duct and duodenal papilla. The most common underlying illness is chronic pancreatitis. The diagnostic role of contrast-enhanced computed tomography (CT) has become increasingly significant for such cases, as is the case with regard to other conditions, and diagnostic angiography and transarterial embolization (TAE) are considered to offer safe and effective management of patients suffering from HP, particularly in cases where the surgical approach is limited by poor systemic condition and chronic inflammation. Unfortunately, all these modern standard procedures usually require a high dose of iodinated contrast medium, which sometimes leads to severe allergic reactions. Here we report the case of a patient with pancreatitis-induced HP that was complicated by iodine allergy. Gadolinium-enhanced dynamic magnetic resonance imaging (MRI) was used for the diagnosis, and the patient was successfully treated by TAE of the splenic artery with metallic coils using carbon dioxide as the contrast medium.

Case Report

A 50-year-old female was referred to our institute for refractory pancreatitis and several recent episodes of gastrointestinal (GI) bleeding. She had been suffering from alcoholic chronic pancreatitis for the past 8 years. She had been hospitalized three times in the previous year due to the deterioration of pancreatitis. Even small amounts of oral intake would repeatedly lead to severe abdominal pain, and she was on total parenteral nutrition for 4 months before the current admission. A contrast-enhanced CT

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conducted several months before she was admitted to our institute led to a drop in blood pressure and skin rash, suggesting iodine allergy. Her medical history also included rheumatoid arthritis, autoimmune hemolytic anemia, antiphospholipid antibody syndrome, and diabetes mellitus. She had been treated with oral prednisolone at a dosage of 10 mg/day, proton pump inhibitors, antihypertensive drugs, and self-injection of insulin. She had experienced two episodes of hematemesis and one episode of melena in the preceding 2 months. Emergent upper GI endoscopy conducted by the previous institute revealed a clot in the descending portion of the duodenum but failed to detect the source of the hemorrhage.

Physical examinations conducted following her admission to our institute did not reveal any abnormalities except for moderate epigastralgia on pressure. The results of the laboratory tests revealed elevated serum levels of amylase (231 IU/l) and C-reactive protein (2.47 mg/dl; normal, <0.3 mg/dl). Her anemia was under control by blood transfusion (blood hemoglobin, 10.7 g/dl). After admission, the patient experienced severe abdominal pain that was induced by meals; therefore, the total parenteral nutrition could not be discontinued. A ruptured pseudoaneurysm was suspected to be the cause of bleeding. Upper GI endoscopy at our hospital also failed to detect the bleeding site. Abdominal ultrasonography (US) revealed a cystic lesion with an unspecific solid nodule; however, the flow signal failed to visualize the pseudoaneurysm. During inquiry regarding her detailed allergic history, she underwent an emergent unenhanced MRI, which revealed a cystic lesion with a centrally located solid component (Fig. 1A). The fluid component of the lesion appeared as a hyperintense region on T1- and T2-weighted images. The solid component appeared as a hyperintense region on a T1-weighted image and a hypointense region on a T2-weighted image, suggesting a fresh clot. On coronal balanced turbo-field echo (b-TFE) imaging, the hypointense clot seemed to be attached to a nodular protrusion from the splenic artery (Fig. 1B). After confirming the patient's allergic history, MRI was repeated, with gadolinium enhancement. On an arterial-phase, gadolinium-enhanced, T1-weighted image, the nodular protrusion seen on the b-TFE image showed a strong enhancement similar to that of the splenic artery (Fig. 1C). The intracystic clot disappeared on subsequent b-TFE images, and the cystic lesion was connected to the main pancreatic duct (Fig. 1D). These MRI findings confirmed the diagnosis of HP due to a splenic arterial pseudoaneurysm protruding into a pseudocyst located in the pancreas.

Since iodine was contraindicated in this case, TAE of the splenic artery was performed with metallic coils and by using carbon dioxide instead of iodine as the contrast medium. A 4-Fr sheath was inserted via the right femoral

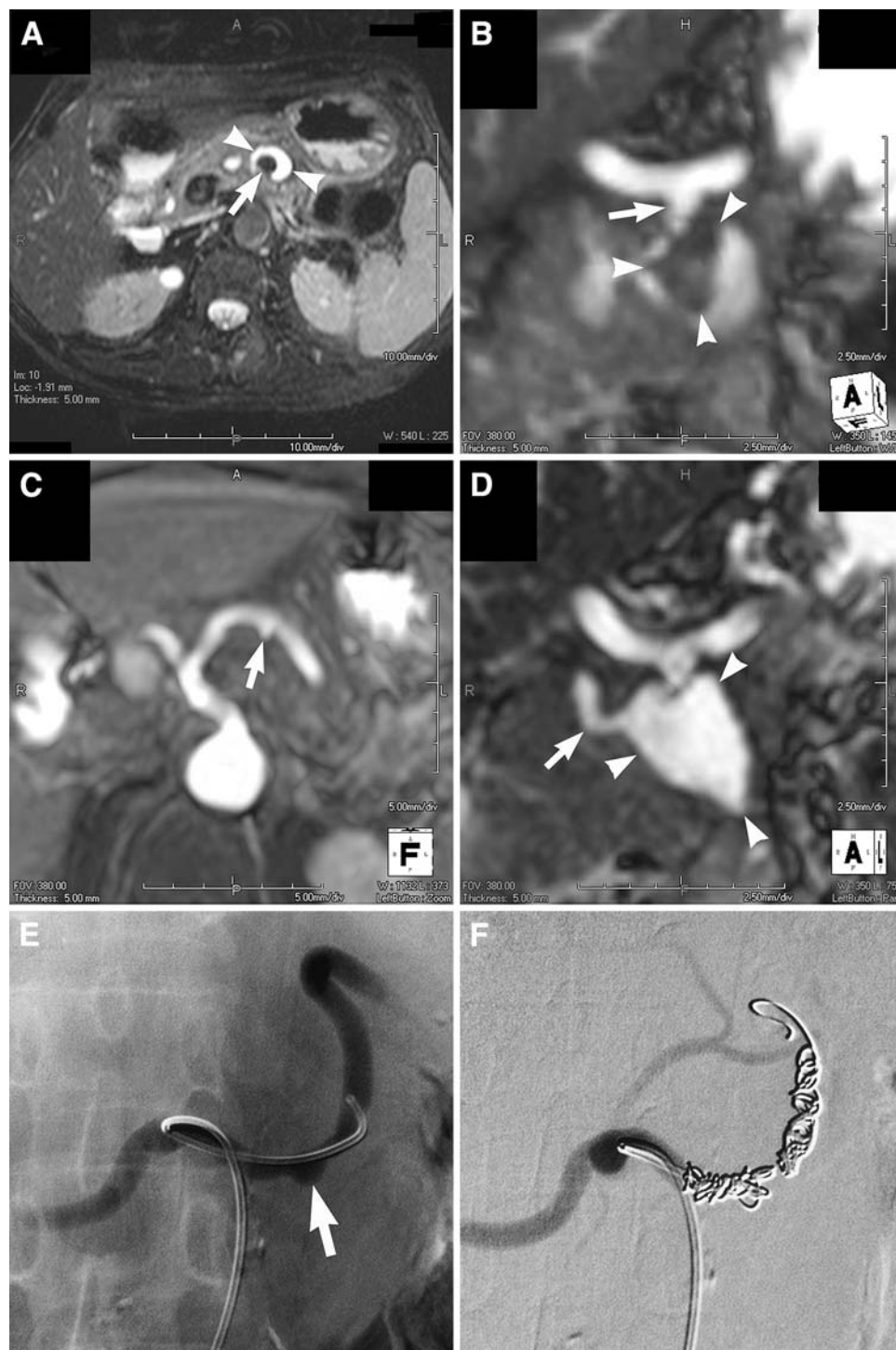
Fig. 1 The 50-year-old female with iodine allergy suffering from ▶ hemosuccus pancreaticus associated with chronic pancreatitis. **A** A transverse T2-weighted image (TR/TE, 2960/90) revealed a pseudocyst located in the pancreas (arrowheads). A centrally located solid component is present in the pseudocyst (arrow). It is considered to be a fresh clot since it is hyperintense on the T1-weighted image (not shown) and hypointense on the T2-weighted image. **B** Maximal-intensity projection image reconstructed from coronal balanced turbo field echo (b-TFE) sequence (TR/TE, 3.3/1.7) shows the hypointense clot (arrowheads) attaching to a protrusion from the splenic artery, suggesting a pseudoaneurysm (arrow). **C** Maximal-intensity projection image reconstructed from the transverse arterial-phase, gadolinium-enhanced, T1-weighted images (TR/TE, 17/6.2) shows strong enhancement of the splenic artery pseudoaneurysm (arrow). **D** Maximal-intensity projection image reconstructed from the repeated coronal balanced turbo field echo (b-TFE) sequence does not show the clot in the pseudocyst, suggesting active bleeding (arrowheads). The pseudocyst is connected to the main pancreatic duct (arrow). **E** Splenic arteriogram using carbon dioxide as the contrast medium shows the pseudoaneurysm protruding caudally from the proximal splenic artery (arrow). **F** Digital subtraction angiography with carbon dioxide obtained after transarterial embolization with metallic coils shows complete occlusion of the parent splenic artery

artery by the Seldinger technique. A 4-Fr cobra-type catheter was inserted into the celiac axis. Celiac arteriography confirmed the MRI finding of a sessile pseudoaneurysm protruding caudally from the proximal splenic artery. This part of the pseudoaneurysm was carefully crossed with a 0.035-in. guidewire, and the cobra-type catheter was advanced to the distal side of the pseudoaneurysm (Fig. 1E). The splenic artery was then embolized from the distal to the proximal side of the pseudoaneurysm with a total of 12 metallic coils. The splenic arteriography conducted after the embolization confirmed complete occlusion of the pseudoaneurysm (Fig. 1F). The distal splenic artery was visualized via the collateral circulation through the gastroepiploic artery. On postprocedural day 12, the patient resumed oral intake, and no abdominal symptoms were observed. Her serum amylase level remained within normal limits until she was discharged from our hospital on postprocedural day 19 (32 days after admission).

At 1 year follow-up, her pancreatitis was noted to have deteriorated, but no rebleeding was observed clinically. Repeated US showed no evidence of recanalization in the splenic artery. Despite the metallic devices, the follow-up MRI visualized the embolized splenic artery and the shrunken pseudoaneurysm inside the pseudocyst in the b-TFE images.

Discussion

Chronic pancreatitis causes various vascular complications, including asymptomatic venous thrombosis, variceal hemorrhage, and arterial pseudoaneurysm [1], some of



which are often life-threatening. Ruptured pseudoaneurysm is an uncommon, but one of the most severe, complications of pancreatitis. Bargert et al. reported severe bleeding complications in 36 patients from a series of 541 patients with chronic pancreatitis [2]. Ruptured pseudoaneurysm was observed in 25 patients; however, bleeding involving the pancreatic duct was seen in only four cases, which

included one case of bleeding from the splenic artery and three of bleeding from the pancreaticoduodenal artery.

HP can be directly diagnosed by endoscopic detection of bleeding from the pancreatic papilla. However, direct detection is sometimes difficult because the bleeding is often intermittent. Doppler US may demonstrate the flow signal of the pseudoaneurysm inside a pseudocyst.

Multiphasic contrast-enhanced CT can also visualize the pseudoaneurysm and extravasation of the contrast material. In a series of nine patients with bleeding pseudoaneurysms reported by Hsu et al. [3], the diagnosis was based on the results of angiography (seven of seven patients who underwent the procedure), CT (four of seven), and US (two of five) and on surgical findings (two of two). To our knowledge, there are few reports with respect to the MRI feature of pancreatic pseudoaneurysms [4], and there is only one previously reported case of HP where both contrast-enhanced CT and MRI were used for the diagnosis [5]. In our case, contrast-enhanced CT was contraindicated due to the patient's history of iodine allergy, and MRI played the main role in the diagnosis. Among the acquired sequences, the b-TFE sequence provided the most impressive images. The b-TFE is one of the steady-state free precession MR techniques used for achieving rapid and high signal-to-noise ratio images and yields strong signals for blood vessels and body fluids [6]. Accordingly, it demonstrated that the pseudoaneurysm was protruding from the splenic artery into the pseudocyst located in the pancreas, which was connected to the main pancreatic duct, without requiring any contrast agent. Blood clots can show varying signal intensity, depending mainly on their age. A combination of high signal intensity on T1-weighted images and low signal intensity on T2-weighted images implies an early subacute stage of hemorrhage [7].

The two standard treatment methods for HP are surgery and TAE; however, there is still some controversy with regard to the optimal therapy. Some reports have shown better survival rates in patients who underwent TAE [2], whereas some have shown a lower success rate for TAE or a higher risk of rebleeding after TAE [3, 8]. In a recent review of 12 reports on hemorrhagic complication in pancreatitis, Kirby et al. [1] concluded that prompt angiography and TAE should be the treatment of choice.

In cases of patients with iodine allergy or limited renal function, angiography can be performed using carbon dioxide as the contrast medium since it is not nephrotoxic and does not cause allergic reactions [9]. Gadolinium contrast medium can also be used as an alternative; however, its maximum tolerable dose is relatively low, and in

recent studies on nephrogenic systemic fibrosis, the use of gadolinium in cases of patients with limited renal function has been restricted. Some investigators have reported that digital subtraction angiography with carbon dioxide was sensitive for detecting extravasation because carbon dioxide has a very low viscosity and does not cause mucosal stain that looks similar to extravasation [10].

In conclusion, we have reported a case of HP associated with chronic pancreatitis complicated by iodine allergy. The patient was successfully diagnosed using gadolinium-enhanced MRI and treated by metallic-coil TAE of the splenic artery using carbon dioxide as the contrast medium.

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