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Hemosuccus pancreaticus successful treatment by double balloon-assisted coil embolization for active bleeding from the main trunk of the superior mesenteric artery

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ABSTRACT

We report a case of a 63-year-old man with hemosuccus pancreaticus due to large pseudoaneurysm originating from the main trunk of the superior mesenteric artery (SMA). The patient was treated successfully with the double balloon-assisted coil embolization technique combined with proximal and distal balloon inflation in the short segment of the SMA. This technique preserved the pancreaticoduodenal arterial arcade and the supply to the distal part of the SMA by embolizing SMA in a short segment.

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Introduction

Hemosuccus pancreaticus (HP) most commonly occurs in patients with chronic pancreatitis and is characterized by active bleeding into the pancreatic duct with pseudocyst infiltration to the adjacent visceral artery and visceral

artery branches, such as the splenic artery and the superior mesenteric artery (SMA) [1,2]. However, HP may be difficult to diagnose because of intermittent bleeding [1]. Here we report the successful treatment of HP due to active bleeding from a pseudoaneurysm in the SMA by double balloon-assisted coil embolization (dBACE) in a patient with chronic pancreatitis.

Competing Interests: All authors have no conflict of interest to declare.

Ethical approval: All procedures performed in this study involving human participants were performed in accordance with the ethical standards of the institutional and national research committees and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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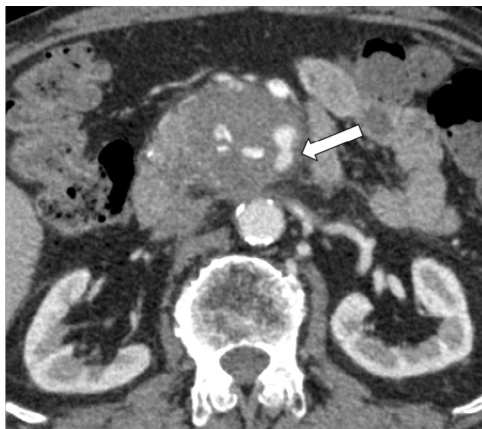


Fig. 1 – Contrast-enhanced computed tomography. A heterogeneous pseudoaneurysm (ϕ 40 mm) with a thrombus in contact with the main trunk of the SMA trunk (arrow).

Case report

A 63-year-old man presented to the emergency department because of upper abdominal pain with bloody bowel discharge and temporary loss of consciousness. After hospitalization, the patient's clinical symptoms had rapidly deteriorated, but he developed hemorrhagic shock (heart rate, 130 bpm; arterial blood pressure, 85/55 mm Hg). Biological tests indicated low hemoglobin (6.3 g/dL), high serum amylase (258 U/L), and high serum lipase (189 U/L) levels. Other biological parameters were within reference limits.

Contrast-enhanced computed tomography showed a heterogeneous pseudoaneurysm (ϕ 40 mm) (Fig. 1, arrow) with a mural thrombus in contact with the main trunk of the SMA and a defective hole (ϕ 5 mm) in the anterior wall of the SMA.

Selective angiography of the SMA was immediately performed, which showed extravasation and a pseudoaneurysm in the main trunk of the SMA that was thought to be the cause of HP. dBAACE of the pseudoaneurysm was planned to control bleeding and to secure peripheral blood flow from the collateral arteries. A microballoon catheter (Attendant LP, ϕ 8 mm; Terumo Clinical Supply, Tokyo, Japan) was passed through a 4-Fr long sheath inserted into the distal left femoral artery to where the SMA branches were not blocked. A proximal balloon (Selecon MP Catheter, J curve type, ϕ 9 mm; Terumo Clinical Supply) was passed through a 5-Fr sheath inserted from the right femoral artery. Selective angiography of the SMA during inflation of the 2 balloons showed extravasation from the main trunk of the SMA (Fig. 2A). Hemostasis of the pseudoaneurysm was temporarily achieved and the patient's condition was stabilized. Angiography from the distal balloon confirmed that blood flow in all SMA branches was maintained from the pancreatic arcade and the inferior mesenteric artery (IMA). Once the balloons were inflated (Fig. 2B), coil embolization was performed using detachable microcoils (ORBIT GALAXY Detachable Coil System; Codman & Shurtleff, Inc, Raynham, MA; first coil, ϕ 9 mm \times 25 cm; second coil, ϕ 8 mm \times 24 cm) and 5 Trufill pushable microcoils (6 mm \times 2 cm; Codman & Shurtleff, Inc).

After embolization, selective angiography of the celiac artery (CeA) revealed the development of a pancreaticoduodenal arterial arcade (Fig. 3A). CECT performed the next day showed good visualization of the distal branches of the SMA and intestinal enhancement because of the supply by the CeA via the pancreaticoduodenal arcade. Endoscopic retrograde cholangiopancreatography after embolization showed a fistula between the pseudoaneurysm originating from the main trunk of the SMA and the main pancreatic duct with no effect on the pseudoaneurysm in the main trunk of the SMA (Fig. 3B). The patient underwent pancreatic duct stent placement to drain the pancreatic juice.

After treatment, the patient was doing well and was finally discharged. There was no recurrence of abdominal symptoms or aneurysm at the 36-month follow-up examination.

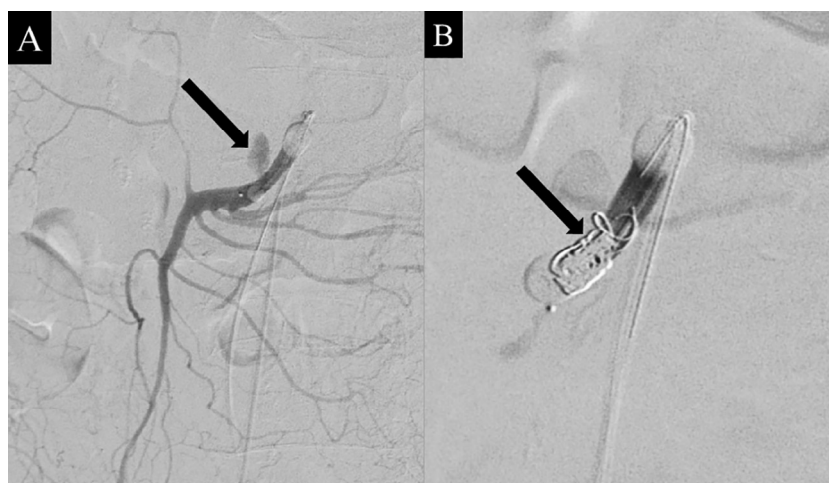


Fig. 2 – Superior mesenteric angiography. (A) Selective angiography of the superior mesenteric artery while inflating 2 balloons showed extravasation from the main trunk of the superior mesenteric artery (arrow). (B) While inflating these balloons, coil embolization was performed using detachable microcoils and pushable coils (arrow).



Fig. 3 – Celiac trunk angiography. (A) Angiography of celiac artery after superior mesenteric artery embolization showed the development of a pancreaticoduodenal arcade (arrow). (B) Endoscopic retrograde cholangiopancreatography after embolization revealed a fistula between the pseudoaneurysm that was in contact with the coils within the main trunk of the superior mesenteric artery and main pancreatic duct (arrow).

Discussion

HP, which was first described by Sandblom in 1970 [3], is estimated to occur in about 1 in 1500 cases of gastrointestinal bleeding [4]. HP is produced by arterial bleeding, which is often life threatening if the diagnosis is delayed. Angiography is the diagnostic reference standard to identify the causative artery, delineates the anatomy, and allow for therapeutic intervention. The sensitivity of angiography is usually greater than 90% [2,5,6]. There are 2 therapeutic options for HP: an interventional radiological approach and surgery. If the hemorrhage source can be located by angiography, arterial embolization is the first choice for initial management, which achieves good immediate results in 79%-100% of cases and an overall success rate of 67% [5-7]. Coil embolization is the most frequently described technique for interventional embolization during balloon tamponade and stent replacement.

Our patient was a 63-year-old man with chronic pancreatitis who was previously admitted for evaluation of melena. Upon the most recent admission, the patient was diagnosed with HP due to a pseudoaneurysm of the main trunk of the SMA, which is associated with a high risk of ischemic intestinal necrosis. This point is different from embolization of the SMA branches, CeA, and splenic artery. When embolizing the main trunk of the SMA, the anastomotic branches from the IMA and CeA should be preserved. A pancreaticoduodenal arterial arcade consists of the anastomotic branches the SMA and CeA, the arc of Riolan, and the marginal artery of Drummond as arterioarterial anastomotic branches between the SMA and IMA, which develop during SMA stenosis and obstruction [8,9]. The development of the pancreaticoduodenal arterial arcade is important collateral flow and necessary for the supply to distal branches of the SMA [8,9].

dBACE is defined as coil embolization with inflation of proximal and distal balloons, and is adopted when a feasible site for coil embolization is limited or strict positioning of the distal limit of coil embolization is required to preserve collateral flow

[10]. In the present case, the dBACE technique was used to embolize the main trunk of the SMA with dense coil packing in a short arterial segment while temporarily stopping bleeding and further preventing coil migration and the kickback phenomenon. As a result, it was possible to preserve the anastomotic branches.

In conclusion, we successfully treated a pseudoaneurysm of the SMA by complete embolization using the dBACE technique combined with proximal and distal balloon inflations.

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