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Case Report

Covered stent placement for emergency repair of a ruptured superior mesenteric artery pseudoaneurysm in advanced pancreatic head cancer

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ABSTRACT

Superior mesenteric artery (SMA) pseudoaneurysms are rare but fatal. Surgical repair is an ideal treatment; however, it is inappropriate in patients with SMA pseudoaneurysm due to advanced cancer, and endovascular therapy is an alternative treatment for nonsurgical candidates. Here, we report a case of SMA pseudoaneurysm in a patient with advanced pancreatic cancer, which was successfully treated with the placement of a biliary covered stent.

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Introduction

Superior mesenteric artery (SMA) pseudoaneurysms are rarely encountered but can potentially result in significant morbidity and mortality [1]. SMA pseudoaneurysms can occur due

to arterial dissection, pancreatitis, trauma, tumor invasion, or iatrogenic conditions [2]. The treatment of SMA pseudoaneurysms has certain limitations associated with location and underlying diseases, with an approximate reported mortality rate of 60% due to the presence of SMA-duodenal fistulas [3].

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Ethical Approval: Our institutional review board requires no approval for publication of retrospective case reports.

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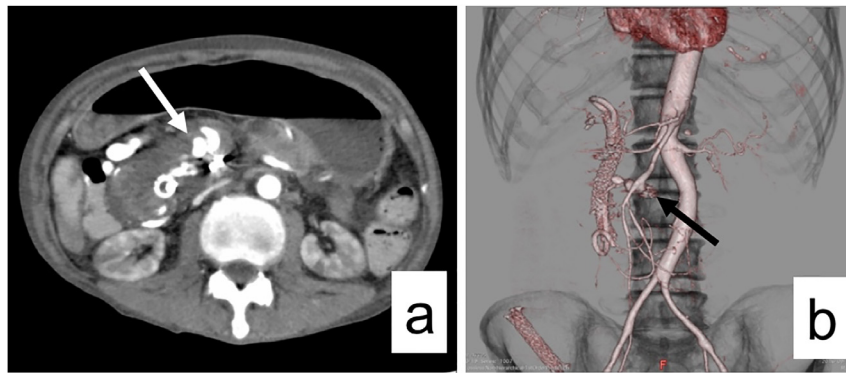


Fig. 1 – Contrast-enhanced computed tomography (CT) (a) CT showing an SMA pseudoaneurysm and extravasation leakage into the duodenum (white arrow) (b) 3D-CT clearly showing the anatomic position of the SMA pseudoaneurysm (arrow).

Although surgery is the ideal treatment choice for an SMA pseudoaneurysm, most patients are considered to be at high risk or inappropriate for surgery due to severe pancreatitis, advanced cancer, or other life-threatening conditions. Therefore, endovascular therapy is an alternative treatment for such nonsurgical candidates.

We report a case of SMA pseudoaneurysm in advanced pancreatic cancer, which was successfully treated with the placement of a biliary covered stent.

Case report

A 61-year-old man with advanced pancreatic head cancer, invading the SMA, portal vein, and duodenum, was admitted to our hospital for gastrointestinal bleeding. The patient had undergone endoscopic metallic stent placement for obstructive jaundice 9 months ago and had been receiving systemic chemotherapy. Additionally, arterial embolization of the posterior superior pancreaticoduodenal artery and inferior pancreaticoduodenal artery had been performed 5 months ago for hemobilia and anemia.

After emergency admission, laboratory tests revealed severe anemia, and contrast-enhanced computed tomography showed an SMA pseudoaneurysm (Fig. 1a, b). Surgical treatment was not indicated due to pancreatic cancer invasion. Moreover, coil embolization of the SMA trunk using an isolation technique was not appropriate because there was no collateral blood supply to the SMA via the pancreatic arcade due to previous embolization of the inferior pancreaticoduodenal artery. Hence, after written informed consent was obtained, we attempted covered stent placement in the SMA main trunk.

Immediately following entrance of the patient to the angiography room, the level of consciousness and blood pressure dropped. After the performance of intubation, red blood cell transfusion, and intravenous vasopressor injection, the blood pressure elevated to a certain extent, and we initiated angiography. A 4F catheter (CX catheter A-II, Sillux Medical Equipment, Saitama, Japan) was inserted into the SMA via the right femoral artery using an 8F long sheath. SMA angiography revealed a huge pseudoaneurysm of the SMA main trunk and

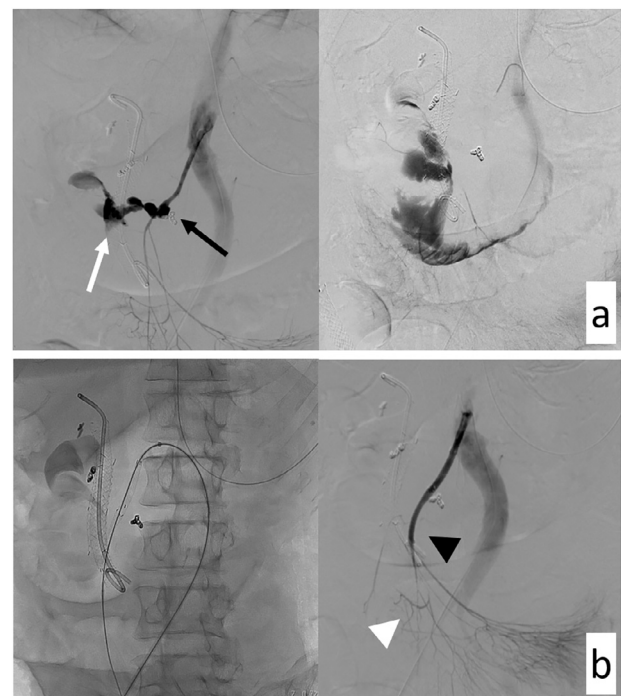


Fig. 2 – SMA angiography prior to (a) and following (b) stent placement. (a) Angiography revealing an SMA pseudoaneurysm (black arrow) and leakage of contrast media into the duodenum (white arrow). (b) Angiography revealing the disappearance of extravasation and the presence of a good blood flow in the SMA following the placement of a covered stent (although 1 jejunal artery arising from the SMA was obstructed by the stent [black arrowhead], the blood flow was supplied by collateral circulation on the angiogram [white arrowhead]).

extravasation leakage into the duodenum (Fig. 2a). Because there were no available covered stents for peripheral arteries in our country at that time, a biliary covered stent was used. The 4F catheter was advanced to the distal portion of the SMA pseudoaneurysm using a 0.035-in. hydrophilic guidewire (Radifocus, Terumo, Tokyo, Japan), which was exchanged with

a 0.035-in. 260-cm-long stiff guidewire (Amplatz Extra-Stiff Support Wire Guide, COOK, Bloomington). An 8F stent delivery system, as an endoscopic approach, was passed through the pseudoaneurysm portion over the guidewire, and a biliary full-covered self-expandable metallic stent (6 mm in diameter, 60 mm in length, Hanaro stent, M.I.Tech, Gyeonggi-do, Korea) was deployed across the pseudoaneurysm orifice. After stent placement, angiography revealed the disappearance of extravasation and the presence of a good blood flow in the SMA through the stent, followed by an immediate elevation of blood pressure (Fig. 2b). Although 1 jejunal artery arising from the SMA was obstructed by the stent, the blood flow was supplied by collateral circulation on the angiogram (Fig. 2b). Immediately following the procedure, antiplatelet therapy was initiated in addition to 100-mg aspirin (Bayaspirin, Bayer, Germany) daily.

The patient's general condition recovered gradually and he was discharged 14 days after the procedure; however, the patient was readmitted for cholangitis and sepsis 8 days later, and *Escherichia coli* (*E. coli*) was confirmed by blood culture. The infection reduced slightly by conservative treatments including a course of antibiotics; however, the patient complained of severe abdominal pain 7 days after admission. Contrast-enhanced computed tomography showed an SMA stent thrombosis, portal vein gas, and intramural bowel gas. The stent infection due to sepsis from *E. coli* may have caused the stent thrombosis, and we considered endovascular recanalization of the SMA stent; however, the patient's general condition did not permit the procedure. The patient died in our hospital due to multiple organ failure 47 days after the procedure.

Discussion

We report the successful treatment of an SMA pseudoaneurysm using a biliary covered stent. Although long-term survival was not possible, stent placement halted massive bleeding and enabled recovery from hemorrhagic shock, which resulted in discharge despite the patient being in a palliative stage.

Covered stent placement may be a treatment of choice for SMA pseudoaneurysms to avoid end-organ infarction without patient stress [4]. Cowan et al. reported the first successful use of a handmade polytetrafluoroethylene-covered stent in the repair of an SMA pseudoaneurysm [5]. Recent advancements in stent-graft technology and its commercial availability have led to an increasing number of reports describing stent-graft placement for visceral aneurysms and pseudoaneurysms [6]. Endovascular therapy for visceral artery pseudoaneurysms using a Viabahn-covered stent (Gore, Flagstaff, AZ) has been reported, and this stent was recently approved for traumatic and iatrogenic arterial injuries in our country [7]. Key points for the success of stent-graft placement are proper preprocedural sizing and adequate choice of stent type, length, and diameter [4].

In our case, a silicone biliary covered stent was used for repair of the SMA pseudoaneurysm because there were no available covered stents for peripheral arteries in our country at that time. A silicone-covered stent may increase the risk of stent thrombosis as compared with a polytetrafluoroethylene-

covered stent. As is the case with percutaneous coronary intervention, the use of anticoagulants (warfarin sodium) or dual antiplatelet therapy (aspirin and clopidogrel) should be considered to prevent early stent occlusion and distal embolization. However, anticoagulant therapy could not be introduced in our case due to bleeding diathesis; therefore, aspirin alone was used as antiplatelet therapy. Although stent thrombosis occurred in our case, it was considered that sepsis was caused by *E. coli*, and it has been reported that stent infection is a potentially fatal complication [8].

Covered stent placement in SMA has a risk of obstruction of branch arteries. Adequate choice of stent length is important in prevention of the obstruction of multiple branch arteries. In our case, the covered stent was of an adequate length and obstructed only 1 jejunal artery, which was being supplied from the collateral circulation, and bowel ischemia symptoms were not observed. A brachial approach may be suitable for endovascular stent placement in the SMA because the branch angle of the SMA is caudally acute. Fortunately, we were able to perform stent placement using the femoral approach, with a stiff guidewire and a flexible delivery system for endoscopic approach.

In conclusion, endovascular therapy using a biliary covered stent was effective for SMA pseudoaneurysm due to advanced pancreatic cancer at least in short term.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2018.10.012.

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