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CASE REPORT

Embolization of a Large Pancreatic Pseudoaneurysm Converted from Pseudocyst (Hemorrhagic Pseudocyst)

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ABSTRACT

Context Bleeding pancreatic pseudoaneurysms are a rare complication of chronic pancreatitis with a severe prognosis and high mortality. Conversion of a pancreatic pseudocyst into a pseudoaneurysm is a potentially lethal complication because, when rupture occurs, there is a high mortality rate.

Case report We describe a case of pancreatic pseudoaneurysm converted from a pseudocyst. A 57-year-old man with chronic pancreatitis and alcoholic liver cirrhosis presented with abdominal pain in the upper epigastric region. CT and a selective angiogram of the superior mesenteric artery showed a large bleeding pancreatic pseudoaneurysm. The pseudo-aneurysm was successfully treated with coil embolization of the feeding artery.

Conclusion Endovascular trans-catheter embolization for the treatment of pancreatic pseudoaneurysms is a safe, effective and repeatable procedure with high success rates and it should be used as a treatment of choice in appropriate patients, either as a temporizing measure to control active bleeding and allow hemodynamic stabilization for a surgical procedure or as a definitive treatment.

INTRODUCTION

Bleeding pancreatic pseudoaneurysms are rare complication of chronic pancreatitis with a severe prognosis and high mortality. The conversion of a pancreatic pseudocyst into a pseudoaneurysm is a potential lethal complication because, when rupture occurs, there is a mortality rate of up to 40% [1, 2, 3]. Endovascular embolization is well-established treatment of choice for treating pseudo-aneurysms.

CASE REPORT

A 57-year-old male cachectic patient was referred to our interventional radiology department from a county hospital and we were asked to perform an abdominal angiography. The patient was a chronic alcohol abuser with hepatic cirrhosis and chronic pancreatitis with a large pseudocyst, and had had radical neck dissection 2 years earlier following a diagnosis of pharyngeal cancer. He also had a metastatic lesion in the left upper lung lobe.

At admittance, he was anemic and weighed 40 kg, with abdominal pain and tenderness in the upper epigastric region, melena and low blood pressure (90/60 mmHg). Blood tests revealed low levels of platelets (13 g/L; reference range: 158-424 g/L), hematocrit (29.3%; reference range: 41.5-53.0), hemoglobin (108 g/L; reference range: 138-175 g/L) and red blood cells (3.46 $x10^{12}$/L; reference range: 4.34-5.72 $x10^{12}$/L), and elevated leukocytes (25 $x10^{9}$/L; reference range: 3.4-9.7 $x10^{9}$/L).

A CT scan carried out a few hours earlier in the county hospital (single slice scanner, slice

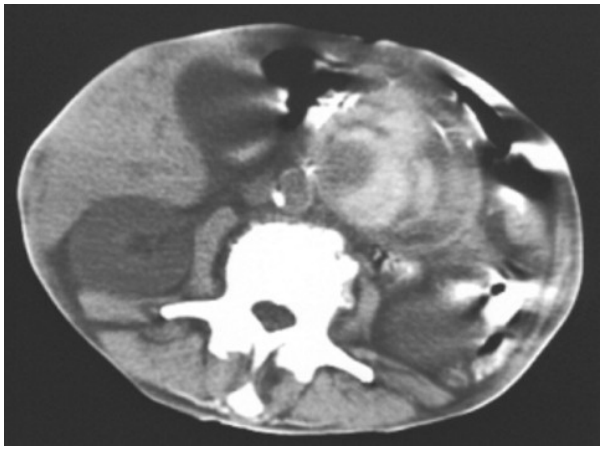

Figure 1. Non-contrast CT-hyperdense layers of fresh and old blood in the cyst.

thickness 10 mm; SCT 7000, Shimadzu Co., Kyoto, Japan) revealed a large pseudocyst (Figures 1 and 2) measuring 8.2x6.0 cm with mural calcifications, layers of hyperdense areas with HU values of fresh blood (75HU); active bleeding into cyst was suspected. Intravenous contrast medium administration (60 mL; Visipaque® 320, GE Healthcare Ireland, Carrigtwohill, Cork, Ireland) showed intense intra-cystic round area of high contrast uptake which was suspected to be the source of the bleeding (Figure 2) but the feeding artery (arteries) could not be identified.

As the patient was in poor general condition and a high risk surgical candidate, the decision was made to perform emergency diagnostic angiography and intervention under general anesthesia. Digital subtraction angiography of the abdominal aorta showed a slight curving to the right side and an atypical

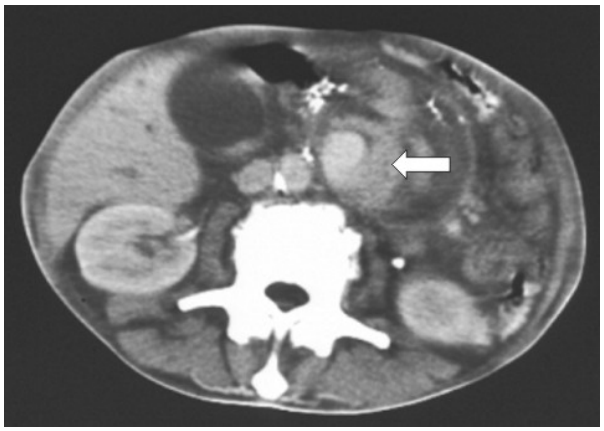

Figure 2. Post-contrast scan: site of active bleeding (arrow).

Figure 3. Aortogram: frank extravasation in the left lower portion of the L3 vertebra (white arrow); displaced superior mesenteric artery findings (black arrow).

position of the superior mesenteric artery which was displaced cranio-laterally.

There was a faint, but inconclusive, extra-luminal contrast blush in the left lower portion of the L3 vertebra (Figure 3). A selective angiogram of the celiac trunk was devoid of pathological finding. A selective angiogram of the superior mesenteric artery revealed a large pseudoaneurysm being fed by

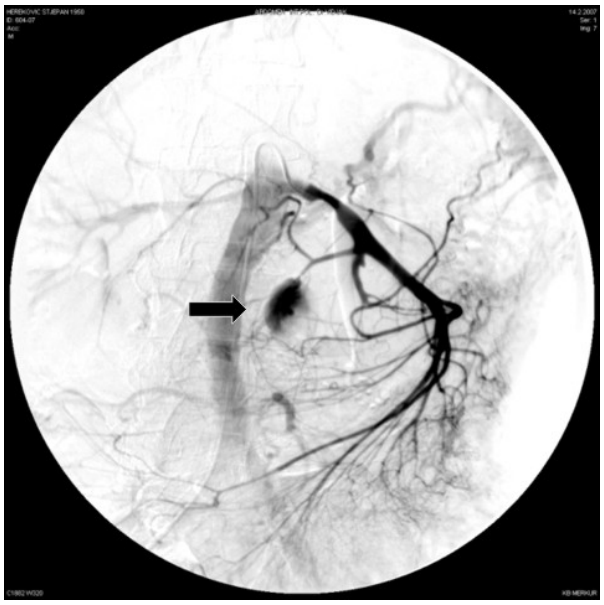

Figure 4. Selective superior mesenteric artery angiogram: contrast filling of pseudoaneurysm; good correlation with CT.

the first branch of the superior mesenteric artery (inferior pancreaticoduodenal artery) which corresponded with the CT findings (Figures 4 and 5).
After excluding any other vascular supply to the pseudoaneurysm, the vessel was super-selectively engaged with a 7F renal guiding catheter (renal double curve, Boston Scientific, Nattick, MA, USA), a coaxially-introduced cobra II shaped diagnostic 5F catheter (Cordis, Johnson & Johnson, Miami Lakes, FL, USA) and a single platinum 3/5-30 mm coil (Vortex, Boston Scientific,) was deployed. Control angiography confirmed total exclusion of the pseudoaneurysm (Figure 5).
The patient was then referred to the surgical department and operated on the following day. Cystojejunoanastomosis and adhesyolysis were carried out. There were no signs of rebleeding in the following 8 days (follow-up with ultrasound and color Doppler), but then the patient had a massive pulmonary embolism and died.

DISCUSSION

According to the literature, the incidence of pancreatic pseudoaneurysms in patients with chronic pancreatitis is less than 10%, and the incidence of spontaneous hemorrhage arising from a pancreatic pseudocyst reportedly ranges from 1.4 to 8.4% [1, 4, 5]. When bleeding occurs, mortality rates can reach as high as 40% [2, 3, 6].
Three mechanisms are now recognized to cause pseudoaneurysm formation: i) enzymatic autodigestion of the pancreas and peripancreatic tissues with arterial wall damage and weakening; ii) the conversion of a pseudocyst into a pseudoaneurysm (which means the pseudocyst eroding into the visceral artery wall); iii) pseudocyst eroding into the bowel wall and bleeding from the mucal surface [2]. Whatever the cause, all these forms are called pseudoaneurysms because the end result is the formation of a cystic vascular structure surrounded by a fibrous wall.
Pseudoaneurysms can rupture into the peritoneal cavity, retroperitoneum, GI tract and biliary tract (hemobilia, hemosuccus pancreaticus) [7]. The most common vessel involved is the splenic artery (30-50%) [8] as it runs along the pancreatic bed before reaching the spleen, then the gastroduodenal (17%) and pancreaticoduodenal arteries (11%) [3, 9] as well as the superior mesenteric artery [10], the celiac trunk [11], etc..
Clinical signs of bleeding pseudoaneurysms in patients with chronic pancreatitis are recurrent pain and tenderness in upper abdomen, weight loss, anemia, melena, intermittent massive bleeding into the gastrointestinal tract and a pulsatile palpable mass in the upper abdomen, etc..
Imaging methods for detection and diagnosis include ultrasound and color Doppler, CT and digital subtraction angiography. Ultrasound can help in localizing the lesion, assessing the surrounding structures and, with the use of color Doppler, it can help in distinguishing between a pseudoaneurysm and cystic pancreatic structures [10]. When using dynamic contrast-enhanced spiral CT, especially new multislice scanners (16-64 slice) with high spatial resolution, multiplanar reconstructions can depict even small pseudoaneurysms, although some could be missed [8, 10, 12]. CT scan has its limitations

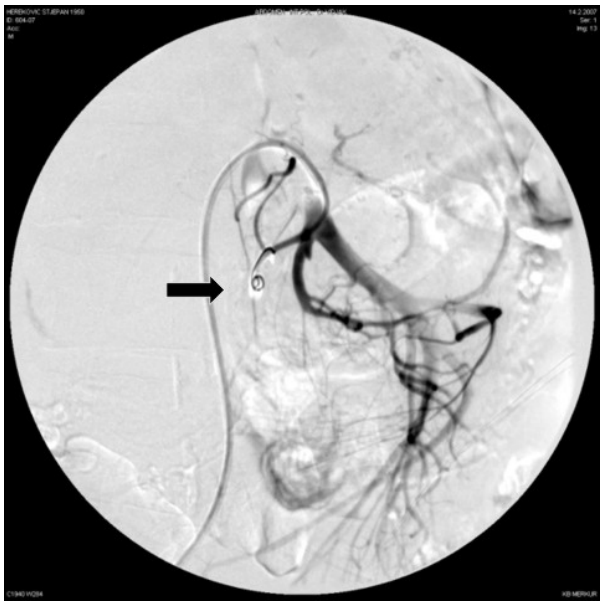

Figure 5. Complete exclusion of pseudoaneurysm after coil deployment.

in unstable patients with massive gastrointestinal bleeding and these patients should undergo emergency angiography which is still the gold standard for diagnosing vascular complications in pancreatitis [13]. Digital subtraction angiography has a high sensitivity for detecting pseudoaneurysms (95-100%) [2] and also allows immediate intervention-therapeutic embolization.

Endovascular treatment has several advantages over open surgical repair (standard procedure including celiotomy, ligation of the celiac trunk or a partial pancreatectomy) which has mortality rates up to 37% [14]. Endovascular treatment allows precise localization of the pseudoaneurysm and assessment of the collateral vessels, it is much less invasive than surgery; therefore, it is an important treatment option because the majority of these patients are chronically ill patients in poor general condition and with comorbidities [15]. If rebleeding occurs, the procedure can be repeated.

In recent years with the development of micro-catheters, further improvements have been made as the superselective embolization technique was introduced.

In this case, we used a single platinum coil to obliterate the feeding vessel. Other embolic materials such as microcoils, acrylic glues (N-butyl-2-cyanoacrylate) [16] or a stent graft [17, 18] can be used for pseudoaneurysm exclusion. Some authors [19] have been using gelatin sponge particles but they only provide temporal occlusion of the target vessel and represent a potential risk of rebleeding and rupture.

Direct percutaneous embolization of pseudoaneurysms with thrombin is also mentioned in case of technical difficulty with the endovascular route [20]. Reported success rates for trans-catheter embolization in the treatment of pancreatic pseudoaneurysms are between 78 and 100%, with rebleeding occurring in 6-37% and a low periprocedural mortality below 3% [7, 9, 21].

Potential complications include partial or complete splenic infarction, intestinal necrosis and a few reports of pseudoaneurysm rupture during the procedure [9, 21, 22].

Endovascular trans-catheter embolization for the treatment of pancreatic pseudoaneurysms is a safe, effective and repeatable procedure with a high success rate and should be used as a treatment of choice in appropriate patients, either as a temporizing measure to control active bleeding and allow hemodynamic stabilization for surgical procedure or as a definitive treatment.

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