

Endovascular Repair of Giant Superior Mesenteric Artery Pseudoaneurysm - Complicated by Upper GI Bleeding: A Clinical Case Report

David Dimitris Chlorogiannis¹, Georgios-Ioannis Verras², Anargyros Chlorogiannis³, Nikolaos Vythoulkas-Biotis⁴, Angelos Samaras², Andreas Antzoulas², Marios-Platon Dimopoulos⁵, Michail Theofanis⁵, Konstantinos Bouchagier², Francesk Mulita²

¹Department of Research Methodology, Aristotle University of Thessaloniki, Thessaloniki, Greece, ²Department of General Surgery, General University Hospital of Patras, Greece, ³Department of Health Economics, Policy and Management, Karolinska Institutet, Stockholm, Sweden, ⁴Department of Internal Medicine, Sismanogleio Hospital, Athens, Greece, ⁵Department of Interventional Radiology, General University Hospital of Patras, Greece

ABSTRACT

Giant superior mesenteric artery (SMA) pseudoaneurysms are a very rare clinical entity and follow a spectrum of their initial clinical manifestation. Due to the inherent increased mortality risk, in the face of rupture, urgent treatment is warranted. In this case report, we report the case of a 51-year-old patient with chronic pancreatitis complicated by a giant SMA pseudoaneurysm inside the pancreatic pseudocyst, presenting with diffuse abdominal pain, upper gastrointestinal bleeding and hemodynamic instability. Endovascular treatment with stent placement was performed, completely excluding the pseudoaneurysm from the circulation. Endovascular treatment of giant SMA pseudoaneurysms with stenting is feasible and may be considered as an alternate treatment option in patients who refuse surgery or are poor surgical candidates, even in the emergency setting.

Key Words: *Pseudoaneurysm; chronic pancreatitis; pancreatic pseudocyst; superior mesenteric artery; endovascular repair*

INTRODUCTION

Visceral true arterial aneurysms and pseudoaneurysms (VAPA), are defined as weakening of the arterial wall with concomitant dilatation of all three layers or externally dilated haematomas with direct extravasation confined to

the vessel's wall, respectively. They develop most usually on the grounds of an inflammatory degenerative disease (eg. pancreatitis) [1] which may damage the arterial vessel wall and constitute a very rare pathological entity with an estimated prevalence of 0.1 to 2% [2,3], with morbidity due to rupture ranging from 25 to 80% [4].

According to the European Society of Vascular Surgery guidelines, in patients with asymptomatic pseudoaneurysms of the mesenteric arteries, intervention may be considered irrespective of its size, while for symptomatic pseudoaneurysms urgent treatment is warranted albeit with low level of evidence [5].

The present study is a case report of a middle-aged man

Corresponding author:

Francesk Mulita MD, MSc, PhD
Resident Surgeon at the Department of Surgery,
General University Hospital of Patras, Achaia, Greece
Tel.: +30 6982785142, e-mail: oknarfmulita@hotmail.com
ORCID Id: orcid.org/0000-0001-7198-2628

Submission: 08.05.2023, Acceptance: 10.07.2023

who presented with upper gastrointestinal (GI) bleeding due to the active extravasation in a pancreatic pseudocyst of a giant superior mesenteric artery pseudoaneurysm which was managed endovascularly with stent placement.

PATIENT INFORMATION AND CLINICAL FINDINGS

A 51-year-old man presented to the hospital's emergency room due to weakness and loss of consciousness. Three days prior to accessing the emergency room, the patient reported vomiting with coffee-ground appearance. In addition, the patient also reported that in the span of the past months, there was progressive unintentional weight loss accompanied with progressive weakness and low back pain. Moreover, the patient's history included excessive alcohol consumption, excessive smoking, and iron deficiency anaemia. Family history was unremarkable. During physical examination, the patient reported generalised slight abdominal tenderness without guarding or rigidity, on deep palpation. McBurney's sign was negative.

TIMELINE

Diagnostic Assessment and Therapeutic Intervention

Subsequent blood testing revealed significantly low haematocrit (Ht; 15,00%). An abdominal computed tomography (CT) scan was performed and revealed signs of chronic liver disease, chronic pancreatitis and atherosclerosis of the abdominal aorta. Inside the pancreatic head, there was a lesion with radiological features suggestive of pancreatic pseudocyst inside of which there was active contrast extravasation from the superior mesenteric artery. The walls of the superior mesenteric artery were well demarcated and had increased diameter (1,10cm), with radiological features suggestive of a possible SMA pseudoaneurysm. Understanding the risk of any potential surgical intervention, the patient declined the suggested treatment and was discharged against medical advice (AMA).

After two months, the patient's condition deteriorated and was admitted to the hospital's emergency department due to haemodynamic instability stemming from repeated bouts of hematemesis and haematochezia. Blood test revealed elevated c reactive protein (CRP; 2,44 mg/dl), normocytic anemia (Hemoglobin; 7,70mg/dl, Ht; 23,90%, Mean Corpuscular Volume; MCV 81,60 fL), while also presented increased fibrinogen (480 mg/dl) and increased liver function enzymes. After hemodynamic stabilization the patient underwent emergency abdominal CT with intravenous contrast, which revealed the increased dimensions of the SMA pseudoaneurysm

(~8,50 x 6,20cm greatest diameters in axial section) that actively extravasated into the cavity of the pancreatic pseudocyst and its radiographic features mimicked of an abdominal aorta aneurysm (Figure 1A, B).

THERAPEUTIC INTERVENTION

The present case was discussed in a multidisciplinary approach and the diagnosis of a superior mesenteric artery extravasating inside a pancreatic pseudocyst of the pancreatic head was made. Due to the high surgical complication risk stemming from the multiple comorbidities of the patient, the decision of endovascular exclusion of the aneurysm from the circulation was decided. In order to catheterise the SMA, the endovascular team decided to access it from right maxillary artery with an introducer sheath, since the lumen diameter of the right brachial artery was less than 3mm. The wide necked pseudoaneurysm was visualised with a selective arteriogram. Lastly, the treatment goal of excluding the giant superior mesenteric aneurysm was achieved with the placement of a coated 7x38mm stent in the SMA.

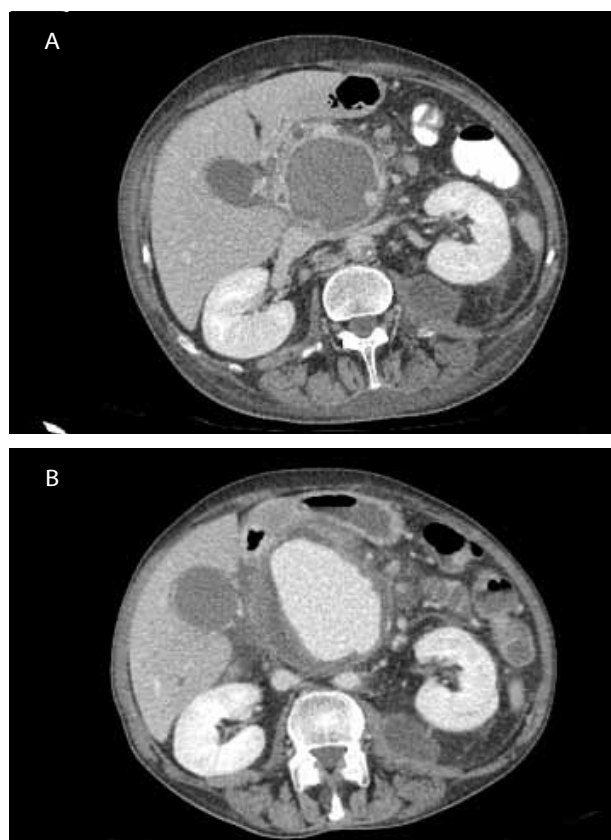


FIGURE 1. Computed tomography angiography (CTA) of the superior mesenteric artery in transverse section at the first (A) and second (B) hospitalisation.

Follow-up and outcomes

The prognosis of such a case is intertwined with the risk for complications of the underlying disease, mainly chronic liver disease and chronic pancreatitis. In the verifying arteriogram, complete exclusion of the pseudoaneurysmal sac was observed and with concomitant preservation of collaterality (Figure 2). During hospital stay, no vascular complications were observed, and the patient did not develop anaemia again. He was discharged ten days after the endovascular treatment.

DISCUSSION

Arterial pseudoaneurysms of the superior mesenteric artery are rare but can be a devastating sequela of pancreatitis, with the reported frequency due to chronic pancreatitis estimated to be 1.7% [6] with morbidity reaching 80% when ruptured [4]. Factors that contribute to the increased risk of rupture include complicated pancreatitis, with abscess or pseudocyst formation, sepsis with multiorgan failure and concomitant anticoagulant use [7,8].

Symptomatic disease depends on the anatomic location, however, abdominal pain will be the chief complaint in one third of the patients, which may also radiate to the back, mimicking the clinical features of pancreatitis [9]. Bleeding from the sac may also occur in different sites of the gastrointestinal tract like into the pancreatic duct (haemosuccus pancreaticus) in 1/5 of the cases, in the retroperitoneum, or also inside the pancreatic pseudocyst, as in this case report [10]. The most frequent site for



FIGURE 2. Selective arteriogram of complete exclusion of the pseudoaneurysm's sac post stent graft placement.

pseudo-aneurysms is the splenic artery which is involved in 35%-50% of occasions, while the gastroduodenal and pancreaticoduodenal vessels each constitute for 20%-25% of the cases. The remaining cases involve the rest of the visceral arteries (mesenteric, colic, and hepatic vessels) [11] [12]. The diagnostic modality of choice is CT angiography, with endovascular arteriography being considered the gold-standard since it may also allow for synchronous endovascular treatment if possible [13]. Angioembolisation was one of the first endovascular methods with favourable results in poor surgical candidates and included detachable framing coils with subsequent smaller coil placing inside the framework to achieve tight packing and vessel occlusion [14,15]. Nonetheless, the increased sac in giant MSA pseudoaneurysms makes stent placement techniques a more suitable choice. Stent placement in the visceral arteries is not without potential complications, however. The paucity of data concerning the long-term stent thrombosis or stenosis rates and if such complication arises and whether there is sufficient time for collateral circulation to develop [16,17]. Collateralisation is important, since end-organ ischaemia may occur and result in short bowel syndrome requiring parenteral nutrition [18].

The highlight of this case report is the indolent clinical presentation with iron deficiency, anaemia and unintended weight loss, with high suspicion for colonic cancer, while the serious and rapid evolution into gigantic sizes does not exclude endovascular treatment with stent. Endovascular stenting of gigantic SMA pseudoaneurysms is feasible and can be recommended as an alternate treatment option to surgery or angioembolisation. The lack of clear evidence on the long-term efficacy of such procedures, to solidify its role in the concurrent clinical practice is mandatory.

Conflict of interest: *There are no conflicts of interest to declare.*

Consent form: *W obtained from the patient for publication of this case report.*

Financial support and sponsorship: *None*

REFERENCES

1. Lu M, Weiss C, Fishman EK, Johnson PT, Verde F. Review of visceral aneurysms and pseudoaneurysms. *J Comput Assist Tomogr.* 2015 Feb;39(1):1-6.
2. Huang YK, Hsieh HC, Tsai FC, Chang SH, Lu MS, Ko PJ. Visceral artery aneurysm: Risk factor analysis and therapeutic opinion. *Eur J Vasc Endovasc Surg.* 2007 Mar;33(3):293-301.
3. Fankhauser GT, Stone WM, Naidu SG, Oderich GS, Ricotta JJ, Bjarnason H, et al. The minimally invasive management of visceral artery aneurysms and pseudoaneurysms. *J*

- Vasc Surg. 2011 Apr;53(4):966–70.
4. Roberts KJ, McCulloch N, Forde C, Mahon B, Mangat K, Olliff SP, et al. Emergency treatment of haemorrhaging coeliac or mesenteric artery aneurysms and pseudoaneurysms in the era of endovascular management. *Eur J Vasc Endovasc Surg.* 2015 Apr;49(4):382–9.
 5. Björck M, Koelemay M, Acosta S, Bastos Goncalves F, Kölbel T, Kolkman JJ, et al. Editor's choice - management of the diseases of mesenteric arteries and veins: Clinical practice guidelines of the European Society of Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg.* 2017 Apr;53(4):460–510.
 6. Udd M, Leppäniemi AK, Bidel S, Keto P, Roth WD, Haapiainen RK. Treatment of bleeding pseudoaneurysms in patients with chronic pancreatitis. *World J Surg.* 2007 Mar;31(3):504–10.
 7. Sharma PK, Madan K, Garg PK. Hemorrhage in acute pancreatitis: should gastrointestinal bleeding be considered an organ failure? *Pancreas.* 2008 Mar;36(2):141–5.
 8. Izaki K, Yamaguchi M, Kawasaki R, Okada T, Sugimura K, Sugimoto K. N-butyl cyanoacrylate embolization for pseudoaneurysms complicating pancreatitis or pancreatectomy. *J Vasc Interv Radiol.* 2011 Mar;22(3):302–8.
 9. Evans RPT, Mourad MM, Pall G, Fisher SG, Bramhall SR. Pancreatitis: Preventing catastrophic haemorrhage. *World J Gastroenterol.* 2017 Aug;23(30):5460–8.
 10. Tessier DJ, Stone WM, Fowl RJ, Abbas MA, Andrews JC, Bower TC, et al. Clinical features and management of splenic artery pseudoaneurysm: Case series and cumulative review of literature. *J Vasc Surg.* 2003 Nov;38(5):969–74.
 11. Bergert H, Hinterseher I, Kersting S, Leonhardt J, Bloomenthal A, Saeger HD. Management and outcome of hemorrhage due to arterial pseudoaneurysms in pancreatitis. *Surgery.* 2005 Mar;137(3):323–8.
 12. Mortelé KJ, Mergo PJ, Taylor HM, Wiesner W, Cantisani V, Ernst MD, et al. Peripancreatic vascular abnormalities complicating acute pancreatitis: Contrast-enhanced helical CT findings. *Eur J Radiol.* 2004 Oct;52(1):67–72.
 13. Chiang KC, Chen TH, Hsu J Te. Management of chronic pancreatitis complicated with a bleeding pseudoaneurysm. *World J Gastroenterol.* [Internet]. 2014 Nov [cited 2023 May 8];20(43):16132–7. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4239499/>
 14. Ferral H. Hydrogel-Coated Coils: Product Description and Clinical Applications. *Semin Intervent Radiol.* 2015 Dec;32(4):343–8.
 15. Georges RN, Lipman S, Silvestri F, Sussman B, Dardik H. Endovascular treatment of mycotic hepatic artery aneurysm in the hostile abdomen—a case report. *Vasc Surg.* 2001;35(6):477–81.
 16. Mansueto G, D'Onofrio M, Iacono C, Rozzanigo U, Serio G, Procacci C. Gastroduodenal artery stump haemorrhage following pylorus-sparing Whipple procedure: treatment with covered stents. *Dig Surg.* 2002;19(3):237–40.
 17. Pang TCY, Maher R, Ganamadha S, Hugh TJ, Samra JS. Peripancreatic pseudoaneurysms: a management-based classification system. *Surg Endosc.* 2014;28(7):2027.
 18. Lee HG, Heo JS, Choi SH, Choi DW. Management of bleeding from pseudoaneurysms following pancreaticoduodenectomy. *World J Gastroenterol.* 2010 Mar;16(10):1239. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2839177/>