Spontaneous Superior Mesenteric Artery Branch Pseudoaneurysm: A Rare Case Report

Mina Guirgis a, Jema Hua Xu b, Alar Kaard c, Bibombe P. Mwipatayi d,e,*

a Department of Vascular Surgery, Sir Charles Gairdner Hospital, Hospital Avenue, Nedlands, Perth, Australia
b Department of Vascular Surgery, Hollywood Private Hospital, Monash Ave, Nedlands, Perth, Australia
c Department of Radiology, Hollywood Private Hospital, Monash Ave, Nedlands, Perth, Australia
d Department of Vascular Surgery, Royal Perth Hospital, Wellington St, Perth, Australia
e School of Surgery, Faculty of Medicine, Dentistry and Health Sciences, Perth, Australia

Background: Visceral arterial pseudoaneurysms (VAPAs) are rare vascular entities with serious consequences. Traditionally, they are associated with trauma, infection, and inflammatory disease, or they can arise as a post-operative complication.

Report: An 87 year old man presented with abdominal pain and was found to have a spontaneous VAPA on a computed tomography angiogram. Serial imaging 4 months previously had demonstrated no aneurysm. Between scans, warfarin was changed to apixaban for aortic valve replacement, but he had no other changes to any other medications. He required urgent endovascular coiling of the pseudoaneurysm, with satisfactory recovery and outcome.

Discussion: VAPAs are extremely rare, with splenic artery VAPAs the most commonly reported. Regardless, fewer than 250 cases of splenic artery pseudoaneurysm have been reported. Superior mesenteric artery (SMA) pseudoaneurysms are the rarest type of VAPAs. Early identification and urgent treatment are warranted because of the associated high mortality risk, with a 50% risk of rupture in any given VAPA. Treatment options range from open operation to endoscopic and endovascular procedures. Apixaban has been proposed to contribute to pseudoaneurysm formation by slow and continuous bleeding that results in the formation of the pseudoaneurysm.

Conclusions: Spontaneous VAPAs are extremely rare and this is the first time a VAPA has been associated with the novel oral anticoagulant “apixaban”. Urgent management of any VAPAs is important because of the high risk of rupture and potential life threatening haemorrhage.© 2017 The Authors. Published by Elsevier Ltd on behalf of European Society for Vascular Surgery. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: Visceral arterial pseudoaneurysm, Superior mesenteric artery, Apixaban, Coils

INTRODUCTION

Visceral arterial pseudoaneurysms (VAPAs) are rare vascular entities with serious consequences. Traditionally, they are associated with trauma, infection, and inflammatory disease, or they arise as a post-operative complication. Only one reported case of a spontaneous VAPA has been reported in the literature, involving the splenic artery. Overall, there are fewer than a handful of reported cases of spontaneous pseudoaneurysms elsewhere in the body.

Although rare, VAPAs are of clinical significance because of their propensity to cause life threatening intra-abdominal or retroperitoneal haemorrhage. Therefore, awareness of all aetiologies and prompt treatment are crucial for all VAPAs, whether they are symptomatic, haemorrhagic, or incidentally found.

The first reported case of a spontaneous VAPA of the superior mesenteric artery (SMA) is described. Only one spontaneous VAPA has been reported previously in the literature, with the current case being the first to involve the SMA. Although rare, VAPAs are of clinical significance because of their propensity to cause life threatening haemorrhage. Therefore, awareness of their aetiology and prompt treatment are paramount.

CASE REPORT

An 86 year old Caucasian man presented to the emergency department of the teaching hospital in April 2016 with exacerbation of intermittent abdominal pain and vomiting after a routine colonoscopy. His vital signs were within normal limits and he remained afebrile throughout. A
mesenteric arterial Duplex scan demonstrated a high flow aneurysm within a proximal jejunal branch of the SMA, measuring 15 × 23 mm (antero-posterior [AP] × transverse [TV]) (Fig. 1A, B), and was followed by a computed tomography (CT) angiogram for work-up prior to any intervention. A CT scan performed 20 days previously because of abdominal discomfort demonstrated the same aneurysm measuring 19 × 15 mm (AP × TV), confirming a significant increase in aneurysmal size in the interim. His inflammatory markers, both white cell count and C-reactive protein, were not raised during his acute re-representation with abdominal pain, suggesting that the increased size of the VAPA was not associated with an inflammatory or infective process. Of note, just 4 months prior in December 2015, the patient presented with a right leg embolic event that was managed conservatively. The CT scan at that time did not demonstrate the presence of mesenteric vessel pseudoaneurysm but confirmed a high grade stenosis of the mid-femoral artery that was subsequently treated with a covered stent. The patient was discharged, and instructed to take apixaban 5 mg twice a day.

The patient had multiple comorbidities; in particular, a significant cardiac history, including congestive cardiac failure, a bioprosthetic aortic valve replacement, and recurrent pulmonary embolism, the last two warranting long-term anticoagulation therapy with apixaban. His non-cardiac medical history included type 2 diabetes mellitus, myasthenia gravis, and a left total hip replacement.

On discovery of this rapidly enlarging SMA pseudoaneurysm, semi-urgent endovascular repair was performed using a left brachial approach. A 90 cm, 6F Flexor Shuttle Guiding Sheath (Cook Medical, Bloomington, IN, USA) was introduced into the proximal portion of the SMA. A 100 cm Hinck catheter (Cook Medical) was inserted distally into the SMA. A 2.7 mm Progreat microcatheter (Terumo Medical Corp., Tokyo, Japan) was inserted into the Hinck catheter using a coaxial technique up to the jejunal aneurysmal sac, which was well visualised (Fig. 2A). The pseudoaneurysm and any branches feeding the aneurysm were coiled using an AZURCX and AZUR Framing Coil (Terumo Medical Corp.) (Fig. 2B).

The follow-up duplex scan of the mesenteric vessel at 14 weeks demonstrating normal flow in the SMA proximally.
Visceral pseudoaneurysms are extremely rare, with splenic artery VAPAs being those seen most commonly. Despite this, fewer than 250 reported cases of splenic artery pseudoaneurysms have been reported.\(^5\) SMA and branches pseudoaneurysms are the rarest VAPAs, accounting for approximately 6–8% of all VAPAs, with an incidence as low as 0.01%.\(^1,7\)

Despite being rare entities, early identification and urgent treatment are warranted because of the high mortality risk associated with them; there is a 50% risk of rupture in any given VAPA.\(^7\) Treatment options range from open endoaneurysmorrhaphy or covered stent placement.\(^8\) Recently, there has been a shift towards endovascular coil embolisation, as it is associated with reduced morbidity and improved outcomes.\(^6\)

The most commonly identified cause of SMA pseudoaneurysm is pancreatitis or trauma. The proposed mechanism of vascular injury in pancreatitis involves pancreatic autodigestion enzymes being released into the perivascular space, leading to enzymatic digestion of the arterial wall.\(^8\) Rarer causes of SMA pseudoaneurysms include infective endocarditis or uncontrolled hypertension.\(^7,9\)

To date, there has been no published report of an idiopathic SMA pseudoaneurysm.

The only change in this patient’s management was the recent commencement of apixaban for aortic valve replacement.

Apixaban, an oral anticoagulant, works by directly inhibiting both free and clot bound factor Xa, in turn preventing thrombin generation and further clotting.\(^10\) In the setting of procedural complications, apixaban has been found to cause VAPA, but this is extremely rare.\(^11\) Apixaban has not been found to cause a non-procedure related pseudoaneurysm in any major medical database. The commencement of apixaban in this patient is proposed to be related to the formation of his VAPA.

CONCLUSION

Spontaneous visceral pseudoaneurysms are extremely rare; this case report seems to be the first account of a visceral pseudoaneurysm associated with a novel oral anticoagulant, which in this patient was apixaban. It is of utmost importance to urgently manage any VAPAs because of the high risk of rupture and potential life threatening haemorrhage. It is important to recognise that there is no obvious correlation between the pseudoaneurysm size and risk of rupture.\(^12\) Among the options for treating VAPAs, endovascular coil embolisation is a safe and effective technique for definitive management, especially for poor surgical candidates.

CONFLICT OF INTEREST

None.

FUNDING

None.

REFERENCES

1. Tulsyan N, Kashyap VS, Greenberg RK, Sarac TP, Clair DG, Pierce G, et al. The endovascular management of visceral artery aneurysms and pseudoaneurysms. J Vasc Surg 2007;45:276–83.
2. Miller MT, Comerota AJ, DiSalle R, Kaufman A, Pigott JP. Endoluminal embolization and revascularization for complicated mesenteric pseudoaneurysms: a report of two cases and a literature review. J Vasc Surg 2007;45:381–6.
3. Salinas HM, Chessin DB, Gorfine SR, Katz LB, Bauer JJ. Postoperative mesenteric pseudoaneurysm in a patient undergoing bowel resection for Crohn’s disease. Colorectal Dis 2010;12:263–5.
4. Yan SL, Wu HS, Chou DA, Kuo CL, Huang HT, Lee YT, et al. Pseudoaneurysm of superior mesenteric artery branch after renal extracorporeal shock wave lithotripsy: case report and review. J Trauma 2007;62:770–3.
5. Schatz RA, Schabel S, Rockey DC. Idiopathic splenic artery pseudoaneurysm rupture as an uncommon cause of haemorrhagic shock. J Investig Med High Impact Case Rep 2015;3:1–5.
6. Duan XH, Ren JZ, Zhou GF, Zheng CS, Liang HM, Dong XJ, et al. Clinical features and endovascular treatment of visceral artery pseudoaneurysms. Ann Vasc Surg 2015;29:482–90.
7 Teixeira PG, Thompson E, Wartman S, Woo K. Infective endocarditis associated superior mesenteric artery pseudoaneurysm. *Ann Vasc Surg* 2014;28. 1563.e1—1563.e5.
8 Jesinger RA, Thoreson AA, Lamba R. Abdominal and pelvic aneurysms and pseudoaneurysms: imaging review with clinical, radiologic, and treatment correlation. *Radiographics* 2013;33:E71—96.
9 Dageforde LA, Dattilo J. Operative management of a large superior mesenteric artery pseudoaneurysm secondary to chronic uncontrolled hypertension. *Am Surg* 2012;78:E358—60.
10 Dempflie CE. Direct oral anticoagulants—pharmacology, drug interactions, and side effects. *Semin Hematol* 2014;51:89—97.
11 MIMS. Apixaban full product information. MIMS Australia. Retrieved April 10, 2017, from http://www.mims.com.au/.
12 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;38:969—74.