

# Successful endovascular treatment of post-traumatic inferior pancreaticoduodenal artery pseudoaneurysm

Leong B D K, Chuah J A, Kumar V M, Mazri M Y, Zainal A A

## ABSTRACT

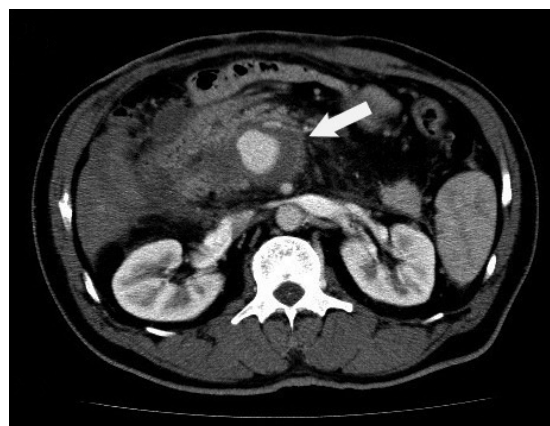
True and pseudoaneurysms of the visceral arteries are uncommon. They represent 0.1–0.2 percent of all vascular aneurysms. Visceral artery aneurysms (VAAs) should be treated due to their propensity to rupture and associated high mortality. We describe a 58-year-old man with pseudoaneurysm of the inferior pancreaticoduodenal artery and who presented with post-motor vehicle accident abdominal pain and a pulsatile epigastric mass. Computed tomography (CT) showed a pseudoaneurysm of the visceral artery, and selective mesenteric angiography showed the aneurysm to be arising from the inferior pancreaticoduodenal artery. The aneurysm was successfully treated with endovascular coil embolisation. CT angiogram at one month post-procedure revealed persistent occlusion of the aneurysm. To the best of our knowledge, this is the first reported pseudoaneurysm of inferior pancreaticoduodenal artery secondary to blunt abdominal trauma from a motor vehicle accident and also the first reported VAA from Malaysia.

**Keywords:** endovascular embolisation, inferior pancreaticoduodenal artery, motor vehicle accident injury, pseudoaneurysm, visceral artery aneurysm

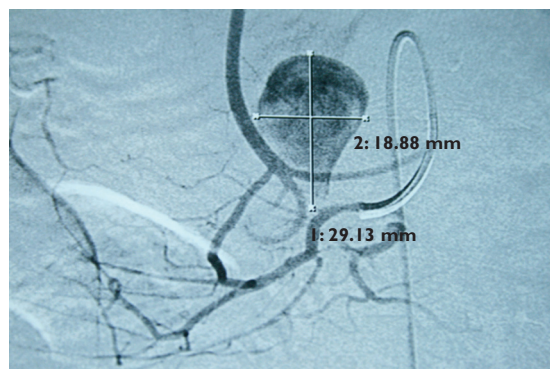
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## INTRODUCTION

True and pseudoaneurysm of the visceral arteries are uncommon,<sup>(1)</sup> but they form an important entity of vascular pathology. Visceral artery aneurysms (VAAs) represent 0.1%–0.2% of all vascular aneurysms and were also found in 0.1% of autopsies.<sup>(2,3)</sup> They most commonly affect the splenic (60%), hepatic (20%) and superior mesenteric (9%) arteries.<sup>(1)</sup> Treatment is usually advisable for VAAs due to their propensity to rupture and associated high mortality.<sup>(4)</sup> We describe a case of pseudoaneurysm of the inferior pancreaticoduodenal artery which was treated successfully with endovascular embolisation.



**Fig. 1** Axial CT image of the abdomen shows a pseudoaneurysm (arrow).



**Fig. 2** Selective mesenteric angiogram shows a pseudoaneurysm of the inferior pancreaticoduodenal artery.

## CASE REPORT

A 58-year-old man was referred to Queen Elizabeth Hospital, Kota Kinabalu, Malaysia, for investigation of a tender pulsatile epigastric mass. He presented with progressive epigastric pain which became severe over two weeks after being involved in a motor vehicle accident, where there was a direct impact of his abdomen with the steering wheel. The pain was associated with nausea and dizziness. He had two laparotomies 20 years ago for perforated peptic ulcer repair and common bile duct exploration for choledocholithiasis. He did not give a history of acute or chronic pancreatitis. He also has non-insulin dependent diabetes mellitus and hypertension. Computed tomography (CT) of the abdomen showed a

Department of Surgery,  
Queen Elizabeth  
Hospital,  
Kota Kinabalu 88300,  
Malaysia

Leong BDK, MRCS,  
MS  
Clinical Specialist

Chuah JA, MS, FRCS  
Consultant and Head

Kumar VM, MS, FRCS,  
FACS  
Consultant

Department of Surgery,  
Kuala Lumpur Hospital,  
Jalan Pahang,  
Kuala Lumpur 50586,  
Malaysia

Mazri MY, MS  
Consultant Vascular  
Surgeon

Zainal AA, MS, FRCS  
Consultant Vascular  
Surgeon and Head

**Correspondence to:**  
Dr Benjamin Leong Dak  
Keung  
Tel: (60) 1 3884 4882  
Fax: (60) 8 8252 818  
E-mail: bleongdk@  
yahoo.com



**Fig. 3** Postembolisation angiogram shows the aneurysm successfully occluded with preservation of inferior pancreaticoduodenal artery patency.



**Fig. 4** CT angiogram shows occlusion of the aneurysm with coil *in situ* (arrow).

pseudoaneurysm of a branch arising from the superior mesenteric artery (SMA) (Fig. 1), causing compression to the common bile duct with intrahepatic duct dilatation. He had no jaundice and liver function parameters were in the upper normal limits.

The patient was then referred to Kuala Lumpur Hospital, which has a dedicated vascular unit for further management. Selective mesenteric angiography was performed, and diagnosis of pseudoaneurysm of the inferior pancreaticoduodenal artery (first branch of SMA) was made (Fig. 2). It measured 1.9 cm × 2.9 cm and arose approximately 2 cm from the SMA arterial bed. There were sufficient collaterals noted. The aneurysm was subsequently embolised with coils. Endovascular access was obtained through the right femoral artery with a 6F sheath and a 4F catheter were used for selective angiogram. A platinum-tungsten alloy coil (Matrix™) 3 mm × 6 cm was used as the embolising agent. Postembolisation SMA and coeliac angiography showed that the aneurysm was completely obliterated with no antegrade and retrograde refilling (Fig. 3). Blood flow through the parent inferior pancreaticoduodenal artery was preserved. The procedure was uneventful and the patient showed good recovery. He was discharged two days post-procedure. CT angiogram one month post-procedure showed that the aneurysm was successfully coiled and persistently occluded (Fig. 4) with reduction in the intrahepatic duct dilatation. He was doing well with no symptom of mesenteric ischaemia or pain on follow-up.

## DISCUSSION

Aneurysms of the pancreaticoduodenal artery are rare and make up less than 2% of VAAs.<sup>(5)</sup> Major aetiologies of VAAs in general include arteriosclerosis, media defects, vasculitis, infection and trauma, while pseudoaneurysms of the pancreaticoduodenal artery are principally observed with acute or chronic pancreatitis.<sup>(6,7)</sup> Given

the history of direct trauma to the patient's abdomen from a motor vehicle accident and that symptoms started after the incident, the trauma appears to be the most likely cause of the pseudoaneurysm in this case. From a literature search and to the best of our knowledge, this case is the first reported pseudoaneurysm of the inferior pancreaticoduodenal artery secondary to blunt abdominal trauma from a motor vehicle accident. The only known previously-reported case of a blunt abdominal traumatic pseudoaneurysm of inferior pancreaticoduodenal artery was following a traditional Irish sporting injury, published in 2003.<sup>(8)</sup> Our case is also the first reported VAA from Malaysia, likely due to under-reporting of previously-encountered cases.

Aneurysms of the pancreaticoduodenal artery commonly present clinically with aneurysmal rupture (30%–69%),<sup>(7,9)</sup> with clinical manifestations ranging from non-specific abdominal pain to gastrointestinal bleed and haemorrhagic shock. Haemorrhage will usually be confined in the retroperitoneal space, which may subsequently rupture into the peritoneal cavity or the gastrointestinal tract if treatment is delayed. Non-ruptured aneurysms often present with abdominal discomfort or are picked up incidentally during radiological studies.<sup>(8)</sup> With the advent and increasing use of non-invasive, high definition imaging studies for a variety of non-vascular abdominal conditions, the diagnosis of VAAs is on the rise in asymptomatic patients.<sup>(10)</sup>

Rupture of pancreaticoduodenal artery aneurysm carries a mortality rate of 21%, and the size of aneurysm does not predict the risk of rupture.<sup>(11)</sup> Hence, it is advocated that all pancreaticoduodenal artery aneurysms diagnosed should be treated actively. Treatment options mainly consist of open surgical excision or ligation or endovascular embolisation. Recently, there is emerging evidence of the role of radiological-guided thrombin injection in managing such lesions.<sup>(12)</sup> Open surgery has remained the gold standard of VAA repair, but the advent

of endovascular techniques has offered a new paradigm of VAA management. Endovascular techniques include the usage of coils, glue, or more recently, stent graph to embolise or exclude the aneurysm from visceral circulation. The usage of stent graph in splenic artery aneurysm has gained increasing popularity due to the potential advantage of maintaining postinterventional splenic perfusion and thus, preventing splenic infarction and splenectomy.<sup>(13)</sup>

To date, there has not been a randomised controlled trial comparing endovascular intervention with open surgery. Sachdev et al, in a retrospective review of 59 patients with VAA, reported that there were no significant differences in 30-day mortality, complications and need for re-intervention between open surgery and endovascular techniques, but elective cases treated by endovascular techniques had a shorter hospital stay compared to cases treated surgically ( $2.4 \pm 1.6$  days vs.  $6.6 \pm 4.7$  days).<sup>(4)</sup> Meanwhile, Ducasse et al, in their review on pancreaticoduodenal artery aneurysms with coeliac trunk lesions, revealed no mortality in six patients treated by embolisation, but three mortalities in 23 patients treated surgically.<sup>(7)</sup> Recently, a report by Tulsyan et al revealed four (8.2%) mortalities in 48 patients with VAA treated by endovascular means. All four deaths occurred in patients treated under an emergency setting.<sup>(14)</sup> Endovascular interventions are not without risk. Reported complications include aneurysmal reperfusion, aneurysmal rupture, migration of coils, inadvertent occlusion of other vessels and infection. Secondary endovascular interventions were reported to be effective in managing endovascular complications,<sup>(5)</sup> but a significant number eventually warranted surgical interventions. Melissano and Chiesa reported two cases of postendovascular treatment of VAA complicated by reperfusion which necessitated surgical treatment.<sup>(15)</sup> The usage of radiodense materials, such as coils and glue, in endovascular techniques may also result in suboptimal postprocedure radiological surveillance.<sup>(14)</sup>

With embolisation being a less invasive and shorter procedure with a good success rate and associated with a shorter hospital stay, endovascular embolisation appears to be a valuable alternative therapy especially for patients with significant medical comorbidities. Long-term durability and need for possible reintervention are the main concerns. Due to the scarcity of these lesions, more

cases in the future with longer duration of follow-up are needed to elucidate the optimal and durable treatment for pancreaticoduodenal artery aneurysms.

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