Royal Australasian College of Surgeons

Spontaneous rare visceral pseudoaneurysm presenting with rupture after COVID-19 vaccination

Spontaneous visceral pseudoaneurysm of the inferior pancreaticoduodenal artery (IPDA) is an extremely uncommon condition.[1] To our knowledge, most of these pseudoaneurysms were associated with either iatrogenic, traumatic or adjacent inflammatory conditions such as pancreatitis.[1] We report a patient presenting with a rupture of this unusual disorder, shortly after she received her COVID-19 vaccination.

The patient is a 52-year-old Chinese female. She had just undergone her second dose of her Moderna COVID-19 vaccine (mRNA-1273) injection 2 days prior. She presented with a sharp, constant right upper quadrant and epigastric pain consistent with biliary colic 6 h prior to presentation. Her initial biochemical investigations were unremarkable, and a bedside ultrasound that was performed confirmed the presence of cholelithiasis. She was treated symptomatically for biliary colic and was discharged. Serum amylase levels were normal.

However, she presented 4 h after discharge with sudden worsening of abdominal pain, associated with diaphoresis, vomiting, tachycardia and hypotension. A contrast computed tomography scan of the abdomen and pelvis was performed, which noted a large 9.5 cm ×5.1 cm haematoma in the right upper abdomen, posterior to the second part of the duodenum and pancreas, with active contrast extravasation (Fig. 1). Massive transfusion was instituted, and she subsequently underwent a mesenteric angiogram, which revealed active haemorrhage from a pseudoaneurysm of the distal end of the IPDA, which was subsequently embolized (Fig. 2). This was subsequently reported to the relevant authorities as a possible post-vaccination event. The patient subsequently had an unremarkable recovery.

Spontaneous pseudoaneurysm of the IPDA is very uncommon.[1] To our knowledge, most of these pseudoaneurysms were associated with adjacent inflammatory conditions, such as previous pancreatitis,[2] previous cholangitis or cholecystitis[3] and duodenal diverticulitis[4], iatrogenic,[5] or related to vascular abnormalities such as mycotic aneurysms[6] or aortic dissections.[7] To date, there were only two reports of spontaneous IPDA pseudoaneurysms of note.[1,8]

In our patient, she had her first episode of biliary colic just hours before her likely pseudoaneurysm rupture. Furthermore, her serum amylase levels were not elevated, and there was no significant cholecystitis noted on her computed tomography scan. Given the temporal course of her presentation, it was very unlikely that she suffered from any significant inflammatory sequelae resulting in the formation of an IPDA pseudoaneurysm.

The authors postulate four possible mechanisms to account for her spontaneous ruptured IPDA pseudoaneurysm. First, the patient may have an undiagnosed pre-existing IPDA pseudoaneurysm.

Alternatively, the patient may have episodes of subclinical pancreatitis in the past, which resulted in the eventual formation of her IPDA pseudoaneurysm and its subsequent rupture. This is especially so given that she has a history of cholelithiasis, which does predispose her to biliary pancreatitis.

Third, following her biliary colic, the passage of a gallbladder calculi through the common bile duct may potentially result in impacted and erosion of the IPDA, as it courses through the intrapancreatic portion of the bile duct. However, we note that there was no evidence of any choledocholithiasis, or any dilated common bile duct on computed tomography imaging to support this hypothesis.

Lastly, the authors also wonder whether her IPDA pseudoaneurysm might be related to her recent COVID-19 vaccination. To date, there were no such reported cases in literature. However, given the rare presentation and its close temporal relationship to her second dose of her COVID-19 vaccination, the authors have

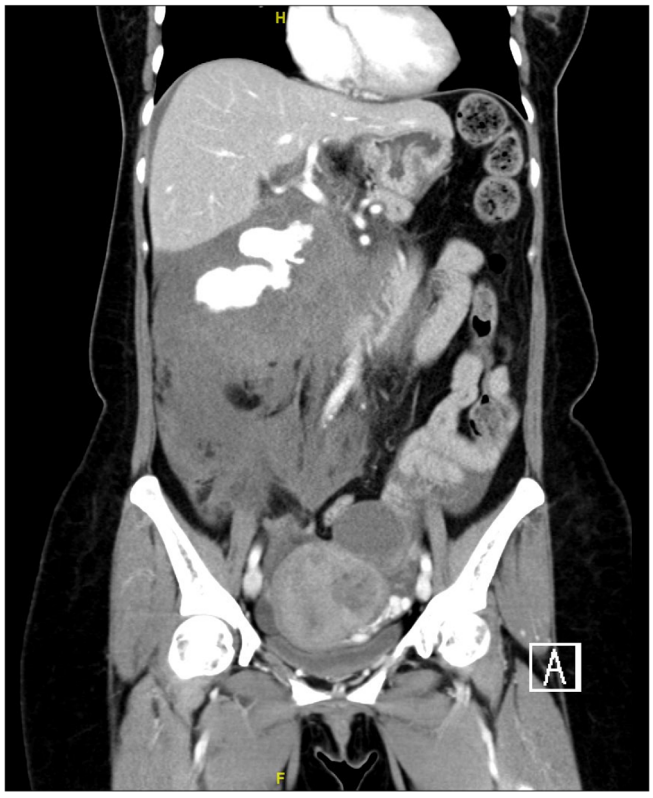

Fig. 1. Computed tomography image revealing active contrast extravasation with a large retroperitoneal haematoma occupying the entire right upper quadrant.

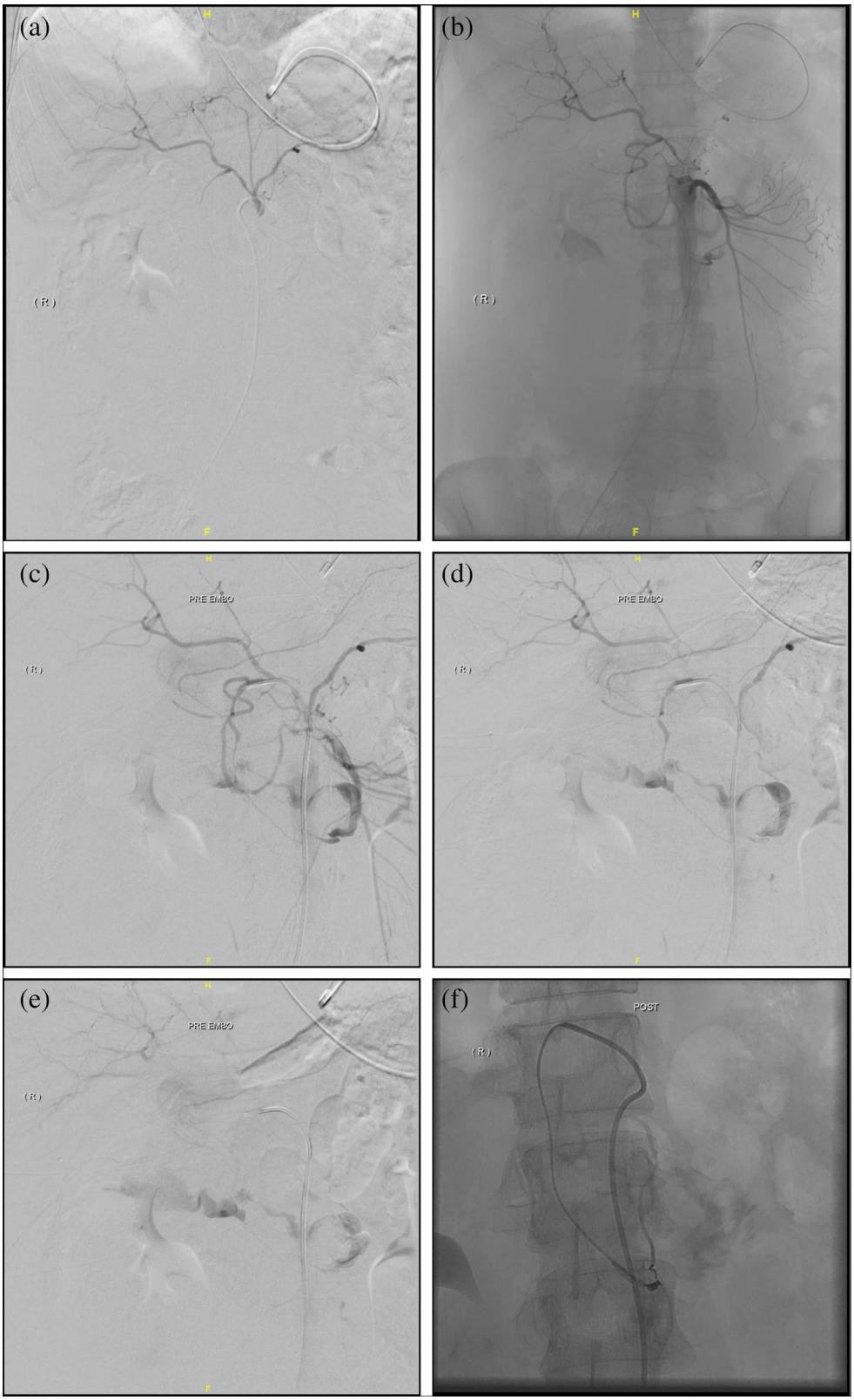

Fig. 2. (a) Normal coeliac artery angiogram. (b) Normal inferior mesenteric artery angiogram. (c–e) Superior mesenteric artery angiogram showing an active blush from the inferior pancreaticoduodenal artery. (f) This was subsequently embolized with embolization coils.

reported this case as a post-vaccination event to the Singapore government. The SARS-CoV-2 uses its spike proteins to bind to the angiotensin-converting enzyme 2 receptors expressed on endothelial cells.[9] Whether this leads to a direct infection of the endothelial cells is still controversial, but it results in endothelial dysfunction.[9] Furthermore, it has been suggested that SARS-CoV-2 infection may also precipitate arterial wall inflammation such as giant cell arteritis.[10] The authors hence wonder whether the mRNA-1273

COVID-19 vaccine, which allows for endogenous production of the viral spike protein, could have in any way induced any arterial wall inflammation that could lead to the formation of the patient's IPDA pseudoaneurysm.

It is hoped that the addition of this case regarding COVID-19 and COVID-19 vaccinations will help add to the body of literature on the various manifestations and complications in patients with COVID-19 and COVID-19 vaccination.

Informed consent was obtained from the patient for its publication.

Author contributions

Koy Min Chue: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; supervision; writing – original draft; writing – review and editing. **Nicholas Wee Kiat Tok:** Conceptualization; data curation; investigation; methodology; project administration; writing – original draft; writing – review and editing. **Yujia Gao:** Conceptualization; methodology; project administration; supervision; visualization; writing – original draft; writing – review and editing.

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Koy Min Chue,*† MBBS (Hons), MRCS (Edin), MSc, MMed (Surgery), FRCS (Edin)
Nicholas Wee Kiat Tok,‡
Yujia Gao,§¶ MBBS, MRCS (Edin), DFD (CAW), MMed (Surgery), FRCS (Edin)

**Department of Surgery, University Surgical Cluster, National University Hospital, National University Health System, Singapore, †Department of General Surgery, Sengkang General Hospital, Singapore, ‡Yong Loo Lin School of Medicine, National University of Singapore, Singapore, §Department of General Surgery, Ng Teng Fong General Hospital, National University Health System, Singapore and ¶Division of Hepatobiliary and Pancreatic Surgery, University Surgical Cluster, National University Hospital, National University Health System, Singapore*

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