Case Report

Ruptured pancreaticoduodenal artery aneurysm presenting with duodenal obstruction

Nakul Reddy, MDa,* , Zeyad Ahmed Metwalli, MDb

aDepartment of Interventional Radiology, The University of Texas MD Anderson Cancer Center, 1515 Holcombe Blvd., Unit 1471, FCT14.6008, Houston, TX, USA
bDepartment of Radiology, Michael E. DeBakey VA Medical Center, Houston, TX, USA

ARTICLE INFO

Article history:
Received 11 December 2018
Revised 3 February 2019
Accepted 3 February 2019

Keywords:
Pancreaticoduodenal artery aneurysm
Duodenal stenosis
Duodenal obstruction

ABSTRACT

Visceral aneurysms of the pancreaticoduodenal arcades are rare. Although these aneurysms are often asymptomatic and identified incidentally on cross-sectional imaging, aneurysm rupture presents significant morbidity. Ruptured pancreaticoduodenal arcade aneurysms typically present with abdominal pain, hemorrhagic shock, or gastrointestinal bleeding. A 72-year-old male presented with nausea and vomiting and was found to have imaging evidence of duodenal obstruction. This was due to a duodenal intramural hematoma caused by a ruptured submucosal aneurysm supplied by a branch of the inferior pancreaticoduodenal artery in the presence of median arcuate ligament compression of the celiac artery. This was subsequently treated with endovascular embolization with clinical improvement in duodenal obstruction. This case illustrates an unusual presentation of a ruptured pancreaticoduodenal arcade aneurysm.

© 2019 Published by Elsevier Inc. on behalf of University of Washington.
This is an open access article under the CC BY-NC-ND license.
(http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

Visceral aneurysms and pseudoaneurysms in the pancreaticoduodenal arcades are a rare entity [1]. Pseudoaneurysms are caused by inflammatory conditions or trauma, whereas true aneurysms are commonly associated with celiac stenosis [2].

These aneurysms are typically asymptomatic, but when ruptured, present with gastrointestinal bleeding or hemorrhagic shock [3]. We present an unusual case of duodenal obstruction from a bleeding inferior pancreaticoduodenal aneurysm associated with celiac stenosis caused by median arcuate ligament compression.

Funding: This study was not supported by any funding.
Conflicts of interest: The authors declare that they have no conflict of interest.
Ethical approval: For this type of study formal consent is not required.
Informed consent: For this type of study informed consent is not required.
Consent for publication: Consent for publication was obtained for every individual person’s data included in the study.

* Corresponding author.
E-mail address: nreddy3@mdanderson.org (N. Reddy).
https://doi.org/10.1016/j.radcr.2019.02.002
1930-0433/© 2019 Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)
poststenotic Narrowing
ing enhanced sic sweep per ministered exam

gastric atrial mal were
tal pressure ment
Institutional Case

The Irregular (arrowhead) (arrow passage Fig. 1 – Fluoroscopic upper gastrointestinal exam. Minimal passage noted from stomach into the duodenal sweep (arrow denotes second portion). Circumferential luminal narrowing of the third portion of the duodenum (arrowhead) likely denoting extrinsic compression. Irregular mucosal folds at the second and third portions of the duodenum are suggestive of edema.

Case report

Institutional review board approval was not required for this report. A 72-year-old male presented to the emergency department with a 3-day history of nausea and bilious emesis. Blood pressure was elevated at 160/90 mmHg, but his remaining vital signs were normal. On physical exam, the patient exhibited mild epigastric tenderness to palpation. Laboratory studies were significant for an elevated creatinine to 2.5 mg/dl, normal hemoglobin (14.2 g/dl), and an international normalized ratio of 3.0 secondary to warfarin use for treatment of chronic atrial fibrillation. Computed tomography (CT) of the abdomen and pelvis without contrast showed a markedly distended stomach and proximal duodenum with mass-like thickening of the third portion of the duodenum (Fig. 1).

The patient was hospitalized for further evaluation and gastric decompression. Fluoroscopic upper gastrointestinal exam performed with water-soluble iodinated contrast administered through a nasogastric tube showed minimal contrast passage from the stomach into the duodenum secondary to obstruction of the third portion of the duodenum. Upper endoscopy showed edematous and erythematous mucosa causing luminal narrowing just beyond the duodenal sweep (Fig. 2). Luminal narrowing was attributed to extrinsic compression as no mucosal lesion was visualized. After resolution of the patient’s acute kidney injury, a contrast-enhanced CT was obtained. This revealed diffuse thickening of the third portion of the duodenum without discrete mass compatible with an intramural hematoma (Fig. 3). Additionally, an 8 mm ovoid focus of contrast accumulation was noted in the submucosa of the duodenum (not shown). Narrowing of the origin of the celiac artery, with associated poststenotic dilatation, was also noted secondary to median arcuate ligament compression (Fig. 4). Interventional radiology was consulted and a mesenteric angiogram was performed.

Superior mesenteric angiogram showed a saccular aneurysm arising from a branch of the inferior pancreaticoduodenal artery (PDA) (Fig. 5). The feeding vessel was then selected with a 2.4 French Progreat microcatheter (Terumo Medical, Somerset, NJ). The vessel was then coil embolized proximal and distal to the aneurysm neck using a total of 4 Azur CX detachable 0.018” embolization coils (Terumo). Completion angiogram showed no further opacification of the aneurysm (Fig. 6). Follow-up unenhanced abdominal CT 4 days later showed decreased size of the duodenal hematoma (Fig. 7). The patient’s symptoms of duodenal obstruction improved, and tube feeding was initiated 5 days after the embolization procedure. However, his hospital course was complicated by hypoxic respiratory failure, acute respiratory distress syndrome, atrial fibrillation with rapid ventricular response, as well as a right parietal ischemic stroke. The patient died 8 days after the embolization procedure from cardiac arrest.

Fig. 2 – Upper endoscopy demonstrates high-grade luminal narrowing of the third portion of the duodenum secondary to extrinsic compression without visible mucosal lesion.

Fig. 3 – Contrast-enhanced CT of the abdomen. Diffuse thickening of the second and third portions of the duodenum (arrowheads). Partially visualized gastric body is also fluid filled and distended (arrow).
Fig. 4 – Contrast-enhanced sagittal CT image shows high-grade narrowing at the origin of the celiac artery with associated poststenotic dilatation secondary to median arcuate ligament compression.

Fig. 5 – Superior mesenteric angiogram demonstrates a saccular aneurysm (*) arising from a branch of the inferior pancreaticoduodenal artery.

Fig. 6 – Successful coil embolization of the inferior pancreaticoduodenal artery. The aneurysm is no longer opacified with contrast.

Fig. 7 – Noncontrast CT of the abdomen obtained 6 days after embolization showed retained contrast (*) within the pancreaticoduodenal artery branch aneurysm adjacent to the embolization coil. Wall thickening of the third portion of the duodenum had also decreased when compared to the CT obtained at presentation.

Discussion

True aneurysms of the splanchnic vessels are very rare, and PDA aneurysms are among the rarest subset. PDA aneurysms have been associated with celiac stenosis or occlusion [2]. Stenosis or occlusion itself may arise from atherosclerotic disease or median arcuate ligament compression [3,4]. The pathophysiology of these true aneurysms is poorly understood but thought to be similar to flow-related aneurysms. These aneurysms range between 6 mm and 2 cm in diameter, although unruptured aneurysms may be up to 6 cm [2].

A retrospective review of 36 gastroduodenal and PDA aneurysms by Corey et al identified 13 symptomatic aneurysms [5]. Presenting symptoms included abdominal pain, hemodynamic instability, and gastrointestinal hemorrhage [5]. Aneurysm rupture at presentation was identified in 7 patients (19%) [5]. Because of the high incidence of
aneurysm rupture, endovascular occlusion is the preferred method of treatment with a high technical success rate [2,5].

This is an unusual case of duodenal obstruction caused by a splanchnic aneurysm and highlights the varied presentation of aneurysms of the pancreaticoduodenal arcade. Although rupture of PDA aneurysms is more commonly associated with abdominal pain and hemorrhagic shock, rupture of a submucosal aneurysm can present with an intramural duodenal hematoma and secondary luminal obstruction related to extrinsic mass effect. Finally, endovascular treatment of aneurysms of the pancreaticoduodenal arcade warrant treatment given the potential complications of aneurysm rupture and varied presentation, which may delay prompt diagnosis.

**Supplementary materials**

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2019.02.002.

**REFERENCES**

[1] Shanley CJ, Shah NL, Messina LM. Uncommon splanchnic artery aneurysms: pancreaticoduodenal, gastroduodenal, superior mesenteric, inferior mesenteric, and colic. Ann Vasc Surg 1996;10:506–15. doi:10.1007/BF02000601.

[2] Kallamadi R, deMoya M, Kalva S. Inferior pancreaticoduodenal artery aneurysms in association with celiac stenosis/occlusion. Semin Interv Radiol 2009;26:215–23. doi:10.1055/s-0029-1225671.

[3] Ducasse E, Roy F, Chevalier J, Massouille D, Smith M, Speziale F, et al. Aneurysm of the pancreaticoduodenal arteries with a celiac trunk lesion: current management. J Vasc Surg 2004;39:906–11. doi:10.1016/j.jvs.2003.09.049.

[4] Ikeda O, Tamura Y, Nakasone Y, Kawanaka K, Yamashita Y. Coil embolization of pancreaticoduodenal artery aneurysms associated with celiac artery stenosis: report of three cases. Cardiovasc Interv Radiol 2007;30:504–7. doi:10.1007/s00270-006-0083-y.

[5] Corey MR, Ergul EA, Cambria RP, Patel VI, Lancaster RT, Kwolek CJ, Conrad MF. The presentation and management of aneurysms of the pancreaticoduodenal arcade. J Vasc Surg 2016;64(6):1734–40. doi:10.1016/j.jvs.2016.05.067.