

Silent Threat in the Abdomen: A Pancreaticoduodenal Artery Aneurysm Unmasked by Recurrent Epigastric Pain

Sepideh Aarabi^{1,2*}

¹ Department of Emergency Medicine, Sina Hospital, Tehran University of Medical Sciences, Tehran, Iran

² Research Development Center, Sina Hospital, Tehran University of Medical Sciences, Tehran, Iran

Received: 2026-08-04;

Revised: 2026-09-19;

Accepted: 2026-10-09

Abstract

Pancreaticoduodenal artery aneurysms are rare visceral arterial aneurysms with a high risk of rupture, which is not necessarily related to aneurysm size. We report a 32-year-old woman with recurrent epigastric pain who was found to have a 20-mm inferior pancreaticoduodenal artery aneurysm associated with significant celiac artery stenosis and extensive collateral circulation through the pancreaticoduodenal arcade. Because embolization alone could compromise hepatic perfusion, an aorto-hepatic bypass was performed followed by staged coil embolization of the aneurysm two weeks later. Complete aneurysm exclusion and graft patency were confirmed at six-month follow-up, and the patient remained asymptomatic. This case highlights the importance of assessing celiac artery patency and collateral circulation when managing pancreaticoduodenal artery aneurysms. CTA is essential for diagnosis and treatment planning, and staged revascularization followed by aneurysm exclusion may be a safe option in patients with significant celiac artery disease.

Keywords: Pancreaticoduodenal Artery Aneurysm; Celiac Artery Stenosis; Abdominal Pain; Computed Tomography Angiography; Coil Embolization

Citation: Aarabi S. Silent Threat in the Abdomen: A Pancreaticoduodenal Artery Aneurysm Unmasked by Recurrent Epigastric Pain. *Acad J Surg*, 2026; 9(1): 1-5.

Introduction

Pancreaticoduodenal artery aneurysms (PDAAs) are uncommon visceral arterial aneurysms that can present with nonspecific abdominal symptoms or catastrophic intra-abdominal hemorrhage. Although they account for only a small proportion of visceral artery aneurysms, their clinical importance is disproportionate to their rarity because rupture can result in severe hemorrhage and death. Reported rupture rates may reach approximately 40%, with mortality exceeding 50% in some series [1].

A distinctive feature of PDAAs is their strong association with stenosis or occlusion of the celiac artery. The pancreaticoduodenal arcade forms an important collateral connection between the superior mesenteric artery (SMA) and the celiac circulation. When celiac artery flow is compromised, increased blood flow through these collateral vessels may

produce sustained hemodynamic stress and contribute to aneurysmal degeneration [2].

Unlike many other visceral artery aneurysms, aneurysm size does not reliably predict rupture risk in PDAAs. Consequently, treatment is generally recommended after diagnosis regardless of aneurysm diameter. Endovascular embolization is currently an important treatment option; however, the presence of significant celiac artery stenosis or occlusion may make isolated embolization hazardous when the pancreaticoduodenal arcade provides critical hepatic perfusion [1,3].

I report a case of a young woman with recurrent unexplained epigastric pain in whom CTA revealed an inferior pancreaticoduodenal artery aneurysm associated with significant celiac artery stenosis. The patient was successfully managed using a staged approach consisting of aorto-hepatic bypass followed by transarterial coil embolization.

* Corresponding author: Sepideh Aarabi, MD

Sina Emergency Ward, Sina Hospital, Tehran, Iran

Email: sepeidherabi@gmail.com



Copyright © 2026 Tehran University of Medical Sciences. Published by Tehran University of Medical Sciences
This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license (<https://creativecommons.org/licenses/by-nc/4.0/>).
Noncommercial uses of the work are permitted, provided the original work is properly cited.

Case Presentation

A 32-year-old woman presented to the emergency department with a two-month history of recurrent epigastric abdominal pain. The pain was intermittent and dull in character, occasionally radiating to the back. It was not related to food intake and did not respond adequately to over-the-counter analgesics. She denied nausea, vomiting, jaundice, hematemesis, melena, or weight loss.

Her medical history was unremarkable. In particular, there was no previous history of pancreatitis, abdominal trauma, or known vascular disease. She was a nonsmoker and reported no alcohol consumption.

On examination, the patient was hemodynamically stable with normal vital signs. Abdominal examination was benign, without tenderness, guarding, palpable masses, or other signs of acute abdomen. Complete blood count, liver function tests, pancreatic enzymes, and coagulation studies were within normal limits.

Because of the persistent and unexplained nature of her abdominal pain, contrast-enhanced computed tomography angiography (CTA) was performed. CTA demonstrated a 20-mm saccular aneurysm arising from the inferior pancreaticoduodenal artery, located adjacent to the pancreatic head (Figure 1). Sagittal imaging demonstrated the relationship between the aneurysm and the celiac artery (Figure 2). Three-dimensional reconstruction showed marked dilatation of the pancreaticoduodenal arcade (Figure 3).

Importantly, significant proximal celiac artery stenosis was identified. The imaging demonstrated collateral circulation from the SMA through the pancreaticoduodenal arcade, which appeared to

provide a major component of hepatic arterial perfusion. There was no evidence of retroperitoneal hematoma or active hemorrhage.

Following multidisciplinary discussion involving the vascular team, treatment was planned with consideration of both the aneurysm and the underlying celiac artery disease. Because the pancreaticoduodenal collateral circulation was important for hepatic perfusion, isolated embolization was considered potentially hazardous.

The patient therefore underwent a staged treatment strategy. During the first stage, an aorto-hepatic bypass using a prosthetic graft was performed to establish direct hepatic arterial perfusion. Two weeks later, transarterial coil embolization of the inferior pancreaticoduodenal artery aneurysm was performed through a femoral approach. Complete exclusion of the aneurysm was achieved while hepatic perfusion was maintained through the bypass graft.

The postoperative course was uneventful. Follow-up CTA at six weeks and six months demonstrated complete exclusion of the aneurysm and continued patency of the bypass graft. At six-month clinical follow-up, the patient remained asymptomatic and reported substantial improvement in her quality of life, with resolution of the previously unexplained abdominal pain.

Discussion

Visceral artery aneurysms are rare vascular abnormalities, with a reported incidence of approximately 0.01–0.2%. Pancreaticoduodenal artery aneurysms account for approximately 2% of visceral artery aneurysms. Despite their rarity,



Figure 1: Initial computed tomography angiography (CTA) in axial section revealed demonstrating a 20 mm aneurysm of the pancreaticoduodenal artery (indicated by white arrow).



Figure 2: Sagittal view illustrating the location of PDA and associated celiac trunk stenosis



Figure 3: Three-dimensional CTA showed markedly dilated pancreaticoduodenal artery (PDAs).

PDAAs are clinically important because of their considerable propensity for rupture[1, 2].

Rupture has been reported in up to approximately 40% of cases and may be associated with mortality exceeding 50%. This high risk is particularly relevant because patients may remain asymptomatic until rupture or may present with nonspecific abdominal symptoms that do not immediately suggest a vascular etiology[1,3].

Approximately 18% of PDAAs may be discovered incidentally, whereas abdominal pain is the most frequently reported symptom among symptomatic patients [3]. The present patient illustrates the diagnostic challenge of this disease: despite having a potentially dangerous visceral arterial aneurysm, she had only chronic intermittent abdominal pain, normal vital signs, normal laboratory findings, and no abdominal tenderness[4].

The most important pathophysiological feature of PDAA is their association with celiac artery stenosis or occlusion. Previous studies have reported celiac artery disease in approximately 59–85% of patients with PDAA [2].

The celiac trunk and SMA are connected through extensive collateral pathways, particularly the pancreaticoduodenal arcade. When the celiac artery becomes stenotic or occluded, blood destined for the celiac territory may be redirected through the SMA and pancreaticoduodenal arteries. This results in increased blood flow and pressure within the collateral vessels [2].

Persistent elevation of flow and wall stress may contribute to progressive arterial dilatation and aneurysm formation. This mechanism is commonly described as the “**stenosis-first theory**,” in which celiac artery stenosis precedes aneurysm development and increased collateral flow subsequently promotes aneurysmal degeneration [2].

This mechanism has important therapeutic implications. The pancreaticoduodenal artery may not simply be the site of aneurysmal disease; it may also constitute a critical collateral pathway supplying the liver. Consequently, embolization of the aneurysm without consideration of the celiac circulation may potentially compromise hepatic perfusion [4].

In the present case, CTA demonstrated significant proximal celiac stenosis and prominent collateral flow from the SMA through the pancreaticoduodenal arcade. This finding was therefore central to treatment planning.

The clinical spectrum of PDAA ranges from incidental detection to life-threatening rupture. The most common symptom is abdominal pain, reported in approximately 61% of patients. The pain may be epigastric, nonspecific, or occasionally radiate to the back. Because these symptoms overlap with common gastrointestinal, pancreatic, and hepatobiliary disorders, the diagnosis may be delayed [3].

Ruptured PDAA can present with acute abdominal pain, gastrointestinal hemorrhage, hypotension, or hemorrhagic shock. However, the absence of hemodynamic instability does not exclude rupture risk. Retroperitoneal tamponade may limit early blood loss and prevent the patient from developing obvious hemorrhagic shock despite significant arterial pathology [3].

Other reported manifestations include gastrointestinal bleeding, duodenal obstruction, and obstructive jaundice caused by the anatomical proximity of the pancreaticoduodenal vessels to the duodenum and pancreatic head [4].

The current case emphasizes another important presentation: persistent, unexplained abdominal pain in a young patient with otherwise normal clinical

and laboratory findings. The absence of abnormal pancreatic enzymes, liver tests, or inflammatory findings should not exclude a vascular cause when symptoms remain unexplained.

The diagnosis of PDAA requires a high index of suspicion, particularly in patients with unexplained abdominal pain or evidence of splanchnic vascular disease. Initial assessment should include a detailed history and physical examination, followed by laboratory evaluation directed toward common differential diagnoses. However, routine laboratory tests may be normal, as occurred in our patient [3,4].

Computed tomography angiography is the diagnostic modality of choice because it can simultaneously identify the aneurysm, determine its size and anatomical location, demonstrate associated celiac artery stenosis or occlusion, and characterize the collateral circulation [4].

CTA is particularly valuable for treatment planning because the clinician must determine not only where the aneurysm is located but also whether the pancreaticoduodenal arcade is functioning as a major collateral route between the SMA and celiac territories [4].

Three-dimensional reconstruction can further clarify the vascular anatomy and facilitate multidisciplinary procedural planning. In the present case, CTA demonstrated the aneurysm, celiac stenosis, and prominent collateral circulation, allowing the treatment strategy to be tailored to the patient's vascular anatomy [3,4].

Catheter angiography remains valuable when endovascular treatment is planned because it provides detailed dynamic assessment of arterial anatomy and allows therapeutic intervention during the same procedure [5].

Because PDAA have a significant risk of rupture that is not reliably predicted by aneurysm diameter, treatment is generally recommended regardless of aneurysm size [1,2]. This differs from the management strategy for some other visceral artery aneurysms in which size-based thresholds may be used [4].

Endovascular therapy, particularly transarterial coil embolization, has become an important and frequently preferred treatment option in hemodynamically stable patients. It avoids the morbidity of open surgery and allows direct exclusion of the aneurysm [5].

However, embolization must be planned carefully when celiac artery stenosis or occlusion is present. If the pancreaticoduodenal arcade provides substantial hepatic collateral flow, occlusion of the aneurysm-bearing artery without establishing an alternative arterial supply could compromise hepatic perfusion [4,5].

Open surgical treatment may involve aneurysm

ligation, aneurysm resection, arterial reconstruction, or bypass. Surgery remains particularly relevant when endovascular treatment is technically difficult, when vascular anatomy is complex, or when preservation or restoration of organ perfusion is necessary [5].

A hybrid or staged strategy can combine the advantages of surgical revascularization and endovascular aneurysm exclusion. In patients with significant celiac artery disease and dependence on pancreaticoduodenal collateral circulation, revascularization may be performed before embolization to establish a secure alternative source of hepatic arterial blood flow[5,6].

In our patient, an aorto-hepatic bypass was first performed to restore direct hepatic perfusion. Two weeks later, the aneurysm was successfully excluded using transarterial coil embolization. This approach allowed definitive treatment of the aneurysm while preserving hepatic circulation.

A similar principle was described by Murata et al. in patients with PDAAs associated with celiac artery occlusion, supporting the concept that treatment should address both the aneurysm and the underlying vascular hemodynamic abnormality [6].

The successful outcome in our patient further supports individualized treatment planning based on the relationship between the aneurysm and collateral circulation rather than relying solely on aneurysm diameter[6].

Conclusion

Pancreaticoduodenal artery aneurysm is a rare but potentially life-threatening vascular disorder that may present with nonspecific abdominal pain and normal laboratory findings. The diagnosis requires awareness of vascular causes of unexplained abdominal symptoms and appropriate use of CTA. The strong association between PDAA and celiac artery stenosis or occlusion is particularly important because the pancreaticoduodenal arcade may provide critical collateral hepatic perfusion. Therefore, evaluation of the celiac axis and collateral circulation should be an integral component of diagnostic assessment. Because rupture risk is not reliably related to aneurysm size, treatment should generally be considered after diagnosis. Endovascular embolization is an effective option in many patients; however, when the aneurysm-bearing collateral pathway is essential

for hepatic perfusion, isolated embolization may be hazardous.

A staged strategy involving restoration of direct hepatic perfusion followed by endovascular aneurysm exclusion can provide an effective alternative in selected patients with complex celiac artery disease.

Informed Consent

Written informed consent was obtained from the patient for publication of her medical information and clinical/radiological images.

Ethical Considerations

All patient data and radiological images were de-identified. The case was prepared in accordance with ethical standards for publication of case reports.

Conflict of Interest

The author declares no conflict of interest.

Funding

No funding was received for this study.

References

1. Pasha SF, Gloviczki P, Stanson AW, Kamath PS. Splanchnic artery aneurysms. *Mayo Clin Proc.* 2007;82(4):472-9. <https://doi.org/10.4065/82.4.472>
2. 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(4):906-11. <https://doi.org/10.1016/j.jvs.2003.09.049>
3. Moore E, Matthews MR, Minion DJ, Quick R, Schwarcz TH, Loh FK, et al. Surgical management of peripancreatic arterial aneurysms. *J Vasc Surg.* 2004;40(2):247-53. <https://doi.org/10.1016/j.jvs.2004.03.045>
4. Horowitz R, Hoffman S, Argaman M, Dadaev V, Shakkur W, Kanani F. Inferior Pancreaticoduodenal Artery Aneurysms: Diagnostic Challenges and Management Outcomes-A Systematic Review of 113 Cases. *Am Surg.* 2026;92(6):1123-35. <https://doi.org/10.1177/00031348261457634>
5. 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(2):276-83. <https://doi.org/10.1016/j.jvs.2006.10.049>
6. Stoecker JB, Eddinger KC, Glaser JD, Wang GJ, Shlansky-Goldberg RD, Fairman RM, et al. A large series of true pancreaticoduodenal artery aneurysms. *J Vasc Surg.* 2022;75(5):1634-42. <https://doi.org/10.1016/j.jvs.2022.01.021>