



# Spectrum of Atypical Vascular Pathologies Mimicking Duodenal Submucosal Tumor and Directly Bleeding into Duodenal Lumen: A Case Series Study with Management by Interventional Radiology

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## Abstract

Gastrointestinal (GI) bleeding is a life-threatening medical condition and requires a multidisciplinary approach for proper diagnosis and management. Various vascular pathologies in and around the duodenum can lead to bleeding into the duodenum either directly or through the bile duct or pancreatic duct, and the patients present with melena or hematemesis. Sometimes, these lesions present as a submucosal tumor with active bleeding or present like a bleeding duodenal ulcer. These cases must be investigated thoroughly before any endoscopic interventions; otherwise, patient may land up in life-threatening situations. Radiology plays an important role in both diagnosing and treating these vascular lesions. Here, we have presented a few cases where the vascular pathologies mimicking duodenal submucosal tumors caused direct bleeding into the duodenum.

## Keywords

- ▶ duodenal bleed
- ▶ duodenal submucosal tumor
- ▶ pseudoaneurysm
- ▶ case series

## Introduction

Gastrointestinal (GI) bleeding is a life-threatening medical condition and requires a multidisciplinary approach for proper diagnosis and management. Upper GI bleeding can occur due to various causes other than peptic ulcer disease, varices, and infection. Various vascular pathologies in and around the duodenum can also lead to bleeding directly into the duodenum, and the patients present with melena or hematemesis. These lesions need to be diagnosed at the earliest and image-guided interventions can be lifesaving with a very good success rate.<sup>1,2</sup>

In this article, we have presented a few cases of atypical vascular pathologies mimicking duodenal submucosal tumors directly bleeding into the duodenal lumen. The duodenal site of bleed was identified on upper GI endoscopy. This was followed by computed tomography (CT) angiography and endovascular management.

## Cases

The patients presented with complaint of hematemesis and melena. The upper GI endoscopy revealed active duodenal bleed. The primary etiologies were chronic pancreatitis, trauma, choledochoduodenal fistula and iatrogenic. The vascular lesions were diagnosed on contrast-enhanced CT (CECT) of the abdomen, which were confirmed on digital subtraction angiography (DSA) and treated endovascularly.

### Case No. 1

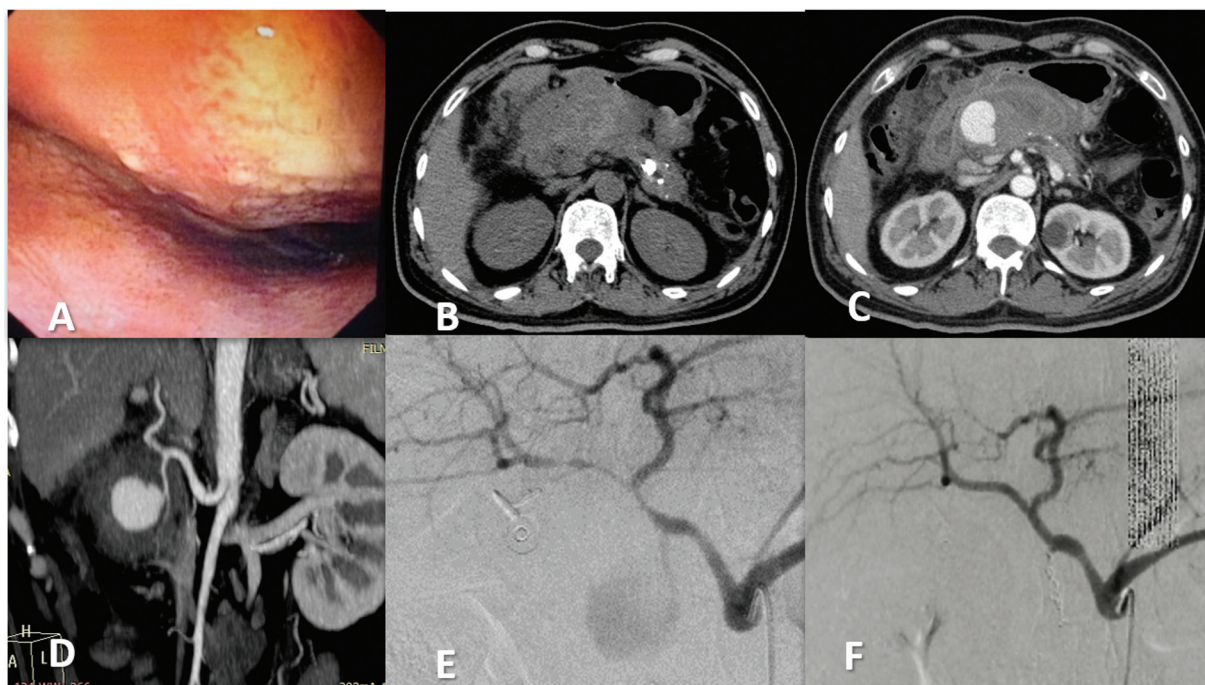
A 49-year-old man with underlying chronic pancreatitis presented to the emergency department with severe upper abdominal pain, melena, and deranged vitals (▶ **Fig. 1**). After initial resuscitation, upper GI endoscopy revealed a large compressive duodenal submucosal tumor-like lesion at the anterior wall of the duodenal bulb with a small ulcer on its surface. CECT scan revealed chronic pancreatitis with a large

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**Fig. 1** A 49-year-old man with severe upper abdominal pain and melena. (A) Upper gastrointestinal (GI) endoscopy showing compressive duodenal submucosal tumor-like lesion at the anterior wall of the duodenal bulb with a small ulcer on its surface. (B, C) Contrast-enhanced computed tomography (CECT) of the abdomen. Chronic pancreatitis with pseudoaneurysm within hematoma, which is abutting the duodenal bulb, head, and body of the pancreas. (D) CT coronal reformatted image showing pseudoaneurysm arising from the gastroduodenal artery. (E) Coeliac angiogram showing a pseudoaneurysm arising from the gastroduodenal artery and (F) after coil embolization of the same by the trap technique.

hematoma abutting and anterior to the head and body of the pancreas. Pseudoaneurysm seen within hematoma arising from the gastroduodenal artery (GDA). Arteriography confirmed a pseudoaneurysm arising from GDA. Then, selective transcatheter arterial embolization of the GDA was performed with intravascular stainless steel coils using the trap technique. The first coil was deployed distal to the neck of the pseudoaneurysm and the subsequent coils were placed across and proximal to the neck. The patient recovered well with complete resolution of the GI bleed on 6 months of follow-up.

#### Case No. 2

A 36-year-old man presented with vague upper abdominal pain and hematemesis, 2 weeks after laparoscopic cholecystectomy (► Fig. 2). Upper GI endoscopy revealed a focal bulge and ulceration with oozing blood from the lateral wall of the second part of the duodenum. CECT scan of the abdomen revealed a pseudoaneurysm arising from the right hepatic artery. It was abutting the second part of the duodenum, with edema and focal breach in the duodenal wall suggesting fistulization (arterio-duodenal fistula). DSA documented a pseudoaneurysm of the right hepatic artery and it was embolized with coils using the trap technique.

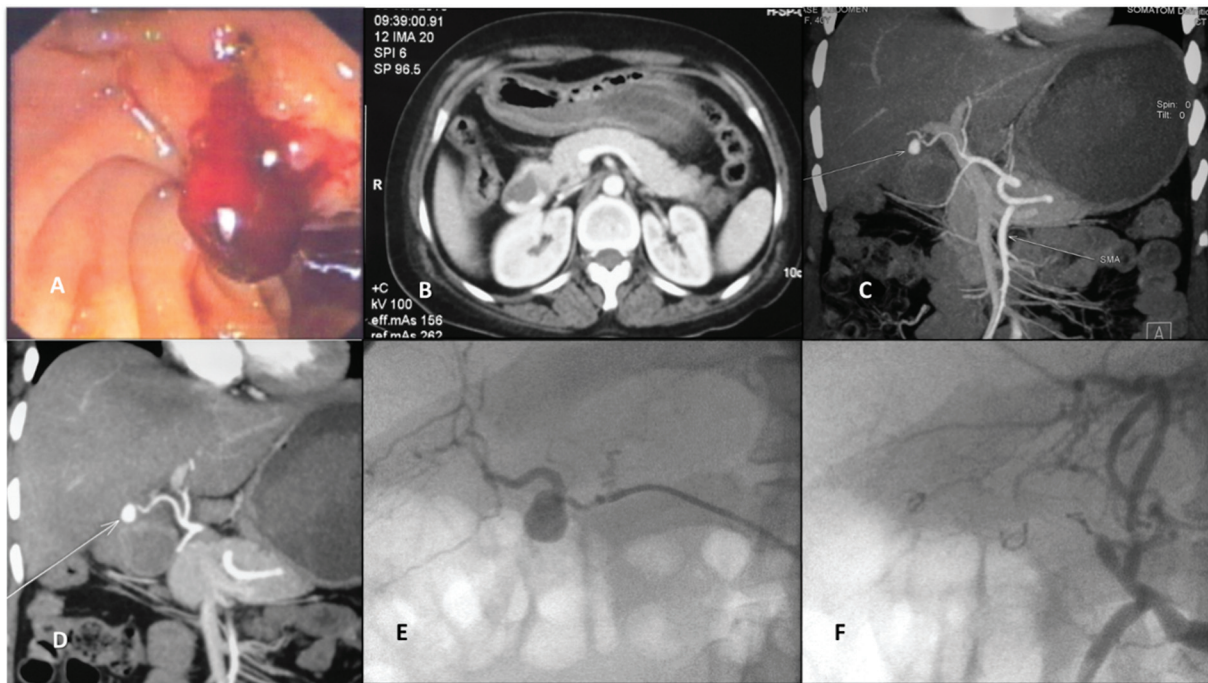
#### Case No. 3

A 45-year-old woman came with complaint of hematemesis (► Fig. 3). She had a history of sphincterotomy for sphincter

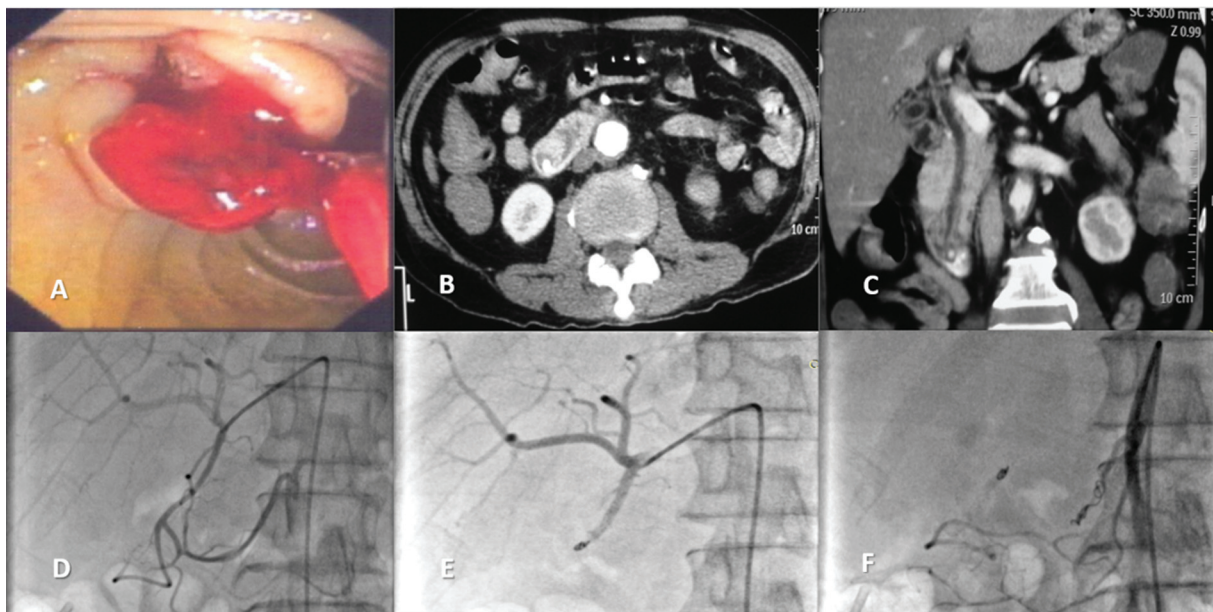
of Oddi dysfunction a few weeks ago. Her vitals were stable and her blood parameters were within normal limits. Upper GI endoscopy revealed blood oozing near the major duodenal papilla. CECT of the abdomen revealed a pseudoaneurysm at the major papilla, which was arising from a branch of the GDA. The patient underwent coil embolization of the GDA using the front door technique followed by coil embolization of the inferior pancreaticoduodenal artery using the back door technique to prevent repressurization. The patient has recovered well on follow-up.

#### Case No. 4

A 74-year-old male patient came with hematemesis and unstable vitals (► Fig. 4). He had a history of cholelithiasis and chronic cholecystitis. Upper GI endoscopy revealed a focal bulge with ulceration and active oozing of blood in the second part of the duodenum. A CECT scan of the patient revealed a contracted gallbladder with a focal contrast-filled outpouching within, arising from its wall. The gallbladder was abutting the second part of the duodenum with edema and focal breach in the duodenal wall. The diagnosis was considered a ruptured pseudoaneurysm of a small branch of the cystic artery located in the gallbladder wall, secondary to chronic cholecystitis with associated choledochoduodenal fistula. Because the cystic artery is an end artery, coil embolization was done using the front door technique. The hematemesis and melena reduced completely and the patient recovered well.



**Fig. 2** A 36-year-old man with vague upper abdominal pain and hematemesis, 2 weeks following laparoscopic cholecystectomy. (A) Upper gastrointestinal (UGI) endoscopy shows focal bulge with ulceration and oozing of blood from the duodenal wall. (B) Contrast-enhanced computed tomography (CECT) of the abdomen revealed a hyperdense collection in the duodenum in late arterial phase representing active bleed. No hyperdense collection is seen within the common bile duct, which rules out hemobilia. (C, D) Coronal reformatted image showing pseudoaneurysm (white arrow) arising from the right hepatic artery. This is closely abutting the duodenal wall. (E) Hepatic angiogram showing a pseudoaneurysm from the right hepatic artery and (F) postembolization of the same by the trap technique.

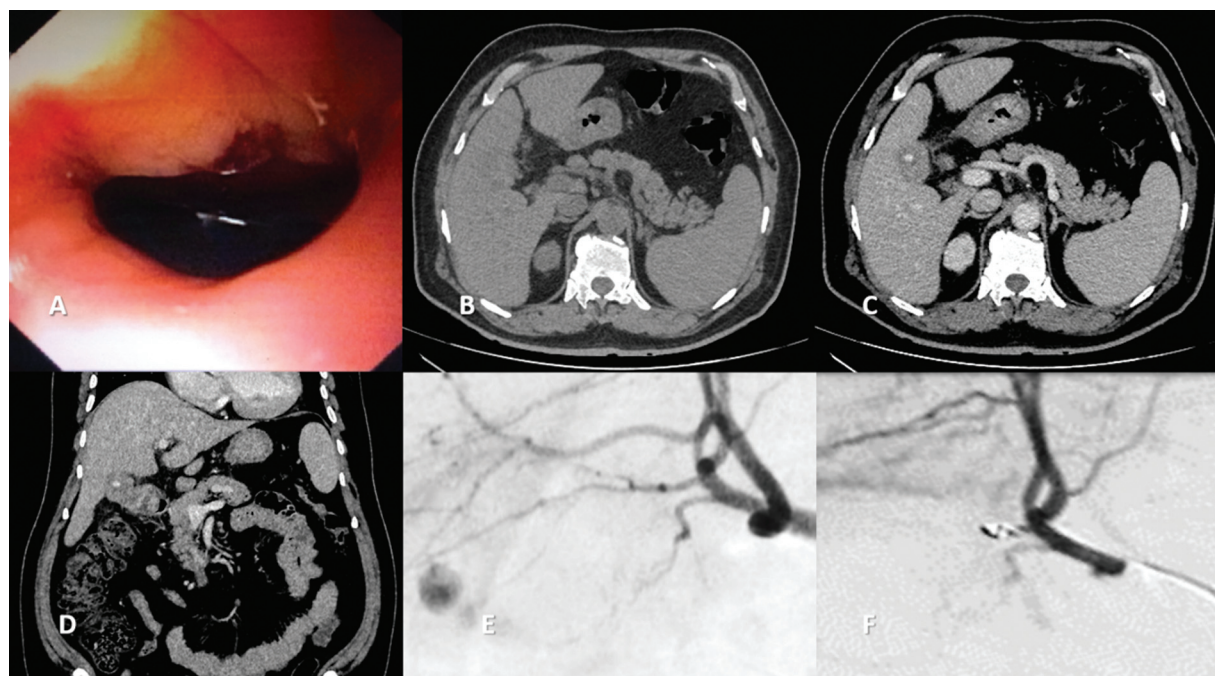


**Fig. 3** A 45-year-old woman with complain of hematemesis, 2 weeks postsphincterotomy. (A) Upper gastrointestinal (GI) endoscopy shows blood oozing from a focal bulge in the duodenal wall adjacent to the major papilla. (B, C) Contrast-enhanced computed tomography (CECT) of the abdomen shows contrast-filled outpouching adjacent to the major duodenal papilla that is compressing the duodenal wall. (D) Coeliac artery angiogram shows irregularity in the gastroduodenal artery (GDA). (E) Coil embolization of the GDA by the front door technique and (F) inferior pancreaticoduodenal artery by the back door technique.

## Discussion

Various vascular pathologies in and around the duodenum can lead to bleeding into the duodenum either directly or

through the bile duct (hemobilia) or pancreatic duct (hemossuccus pancreaticus), and the patients present with melena or hematemesis. We have presented here a few cases of GI bleeding secondary to vascular lesions that mimicked A



**Fig. 4** A 74-year-old male patient with hematemesis and unstable vitals. (A) Upper gastrointestinal (GI) endoscopy reveals an ulcerative submucosal tumor-like lesion with active oozing of blood in the second part of the duodenum. (B–D) Contrast-enhanced computed tomography of the abdomen. The gallbladder is contracted with abutment and loss of fat plain with the duodenum. (C, D) Postcontrast images show a contrast-filled outpouching in the gallbladder arising from its wall likely to be cystic artery pseudoaneurysm. (E) Hepatic artery angiogram shows a pseudoaneurysm arising from the cystic artery. (F) Postembolization status of the cystic artery using the front door technique.

duodenal submucosal tumor and directly bled into the lumen. Two of the cases were due to underlying inflammation—chronic pancreatitis and chronic cholecystitis.

Aneurysms of the GDA rarely cause extrinsic compression to the duodenal wall and present as a submucosal tumor. Such aneurysmal bleeding usually has an abrupt onset and a high risk of rebleeding. Hence, rapid diagnosis and early intervention are necessary. These lesions should be included in the differential diagnosis of duodenal bleeding. It is not wise to treat all cases of duodenal bleeding by endoscopy. One should try to search for the etiology and treat it. A submucosal tumor-like lesion on endoscopy must be investigated with other imaging modalities before any intervention is planned.<sup>3,4</sup>

Pseudoaneurysm can develop in the postoperative period following cholecystectomy or sphincterotomy, as described here. GI bleeding in the postoperative period is concerning and should be evaluated with cross-sectional imaging to come to a definite diagnosis and plan further lines of management.<sup>5</sup>

Hepatic artery pseudoaneurysm is an uncommon cause of upper GI bleeding. It usually presents as bleeding into the biliary tract or hemobilia and presents with right upper quadrant pain and jaundice. Fistulous communications between the hepatic artery and the GI tract are very rare. Some cases of vascular-enteric fistula have been reported after liver transplant.<sup>6,7</sup>

We report here an unusual case of hemorrhagic cholecystitis due to a ruptured pseudoaneurysm of a small branch of the cystic artery located in the gallbladder wall, secondary to chronic cholecystitis with associated choledochoduodenal fistula. The patient had history of gallstones. The cystic

artery pseudoaneurysm may be due to erosion of the gallbladder wall by the calculi. There was favorable follow-up after transcatheter arterial embolization.<sup>8,9</sup>

The multidetector computed tomography (MDCT) with 3D reconstruction plays an important role both in the diagnosis and preprocedural planning for embolization. It provides high-resolution, multiplanar images of pseudoaneurysm, and surrounding vascular anatomy, which are critical in planning approaches and selecting hardware for embolization.<sup>10</sup>

Pseudoaneurysm needs to be differentiated from aneurysm as it changes the treatment approach. An aneurysm is the dilatation of the artery and contains all three layers of the arterial wall. It can be treated by embolization, stent graft placement, or surgery. On the other hand, pseudoaneurysm occurs when there is a breach in the arterial wall (intima or media). It can be treated by compression, thrombin injection, embolization, or surgery.<sup>11</sup>

## Conclusion

Hematemesis or melena, although not an uncommon presentation at the outdoor or indoor department, may be secondary to atypical vascular lesions around the duodenum, like the cases discussed in the text. If proper care is not taken, the patient may land up in life-threatening situations. Vascular aneurysmal lesions and arterio-duodenal fistula should be included in the differential diagnosis of upper GI bleed. Finally, further workup like CT must be obtained as soon as possible to clarify the lesion and guide further management. Proper treatment with interventional radiology and endovascular embolization can be lifesaving with a very good success rate.

**Ethics Approval and Consent to Participate**

The procedure described was in accordance with the institutional ethical guidelines and conform to the World Medicine Association declaration of Helsinki regarding the ethical principles for medical research involving human subjects.

**Consent for Publication**

Written informed consent was obtained from the patient and the patient's relatives for publication of the article.

**Funding**

None.

**Conflict of Interest**

None declared.

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