

Primary Aortoduodenal Fistula: A Case Report and Recent Literature Review (2021-2025)

Jonathan Emery¹, Ioannis Rotas², Claude Haller³, Pierre-Emmanuel Marti⁴, Adrien Gross⁵

Review began 09/13/2026

Review ended 10/18/2026

Published 10/20/2026

© Copyright 2026

Emery et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.118205

1. Anaesthesiology and Reanimation, Hôpital du Valais, Sion, CHE 2. General Surgery, Hôpital du Valais, Sion, CHE 3. Vascular Surgery, Hôpital du Valais, Sion, CHE 4. Intensive Care Unit, Hôpital du Valais, Sion, CHE 5. Anesthesiology and Reanimation, Hôpital du Valais, Sion, CHE

Corresponding author: Jonathan Emery, jon87.emery@gmail.com

Abstract

Primary aortoduodenal fistula (PADF) is a rare but life-threatening cause of gastrointestinal bleeding, most commonly resulting from an abdominal aortic aneurysm eroding into the duodenum. Diagnosis is particularly challenging because of its nonspecific clinical presentation and the limited sensitivity and technical challenges of endoscopy.

We present the case of an 89-year-old man with significant cardiovascular comorbidities, who developed acute abdominal pain and transient malaise, followed by massive upper gastrointestinal bleeding leading to hemorrhagic shock. Initial management included aggressive resuscitation with crystalloids, vasopressors, and initiation of a massive hemorrhage protocol. Due to severe hemodynamic instability, we could not perform a computed tomography angiography (CTA), and the patient underwent emergent laparotomy. Intraoperative upper endoscopy via surgical gastrotomy revealed a fistula between the infrarenal aorta and the fourth portion of the duodenum. Surgical intervention included end-to-end aorto-aortic bypass with a prosthetic graft, and primary duodenal repair with omental interposition. The postoperative course was complicated by ischemic colitis, respiratory failure, and progressive multi-organ failure. Despite maximal supportive measures, the patient's condition deteriorated, and care was ultimately transitioned to comfort-focused management.

In our review, one key finding is the increasing trend toward endovascular and hybrid approaches for managing PADF. These strategies may facilitate more rapid hemodynamic stabilization in critically ill patients. More recently, exclusively endovascular or endoscopic procedures have been reported as potential destination therapies in carefully selected cases, particularly when conventional open repair is not feasible.

PADF remains a surgical emergency with a high risk of mortality. This case highlights the importance of early recognition, aggressive resuscitation, and prompt surgical intervention. Multidisciplinary collaboration and individualized decision-making, including consideration of hybrid endovascular and open techniques, are essential to optimize outcomes in this rare but catastrophic condition.

Categories: General Surgery, Cardiac/Thoracic/Vascular Surgery, Gastroenterology**Keywords:** abdominal aortic aneurysm, case report, gastrointestinal bleeding, primary aortoduodenal fistula, vascular surgery

Introduction

Primary aortoduodenal fistula (PADF) is an exceedingly rare and life-threatening condition that carries very high mortality if not diagnosed and treated promptly. It most often arises from atherosclerotic abdominal aortic aneurysms (AAAs) eroding into the third or fourth portion of the duodenum [1]. The pathophysiological mechanism is thought to involve chronic mechanical compression and pulsatile forces exerted by the expanding aneurysmal wall, leading to local inflammation, ischemia, adhesion, and progressive erosion of the aortic and duodenal walls. The third and fourth portions of the duodenum (D3 and D4) are most frequently involved because they are relatively fixed in the retroperitoneum and lie directly anterior to the abdominal aorta, resulting in a close and relatively immobile anatomical relationship. When aneurysmal involvement is absent, inflammatory or infectious conditions may instead contribute to the pathophysiology.

Only a few hundred cases have been reported; for example, one review found just 253 cases from 1951 to 2010 [2]. The incidence of primary aortoenteric fistula (PAEF), which includes PADF, is usually reported at approximately 0.07% in the general population [3]. However, this estimate is largely extrapolated from older autopsy series and may not accurately reflect the true prevalence in contemporary clinical practice.

Clinically, PADF is notorious for its nonspecific presentation. The classic triad of gastrointestinal bleeding, abdominal pain, and a pulsatile abdominal mass occurs in only a minority of patients (less than 10-25% at most) [1]. Often a brief "herald" bleed precedes massive hemorrhage, but this warning sign can be transient

How to cite this article

Emery J, Rotas I, Haller C, et al. (October 20, 2026) Primary Aortoduodenal Fistula: A Case Report and Recent Literature Review (2021-2025). Cureus 18(10): e118205. DOI 10.7759/cureus.118205

or unrecognized [4]. In practice, clinicians rely on a high index of suspicion and multimodal testing including computed tomography angiography (CTA) or emergent endoscopy. However, the diagnostic difficulties contribute to the historically high perioperative mortality rate associated with PADF (44% extrapolated from Rodrigues dos Santos et al. [2])

Therapeutic management of PADF remains controversial due to the lack of large studies or consensus guidelines. Definitive treatment requires disconnecting the aortic circulation from the gastrointestinal tract, but opinions vary on the optimal approach. Open repair, including in situ aortic grafting or extra-anatomic bypass (EAB) with duodenal repair, has traditionally been the mainstay of treatment. In situ reconstruction consists of replacing the diseased aortic segment with a prosthetic graft, which may be performed using a straight tube graft or a bifurcated aortoiliac or aortofemoral graft. Alternatively, an EAB, such as an axillofemoral bypass, can be performed to restore lower-limb perfusion while avoiding placement of the graft within the contaminated aortic field. Definitive repair of the duodenal defect remains essential and may involve primary closure or segmental bowel resection according to the extent of tissue destruction.

More recently, endovascular aneurysm repair (EVAR), consisting of the deployment of a covered stent-graft within the aorta to exclude the site of bleeding, eventually associated with an endoscopic approach, has been used emergently to control hemorrhage, either as a bridge to delayed open surgery or, in selected cases, as definitive therapy [5–7]. No randomized trials exist, and most authors agree that “surgical management of PADF is heterogeneous, and there is no agreed consensus” [8]. Current literature emphasizes rapid diagnosis, broad-spectrum antibiotics, and a tailored multidisciplinary surgical plan, often involving hybrid endovascular and open techniques.

This article aims to report a severe case of PADF presenting with hemorrhagic shock and to provide an updated overview of its diagnosis and management based on cases published between 2021 and 2025.

Case Presentation

We present the case of an 89-year-old male with a history of coronary artery disease treated with triple coronary artery bypass grafting in 1999 and subsequent stent placements in 2003 and 2004, as well as atrial fibrillation on rivaroxaban. The patient’s chronic medications included metoprolol 200 mg once daily, rivaroxaban 20 mg once daily, and atorvastatin 5 mg once daily. No relevant prior imaging was available, apart from an old echocardiogram and images from a previous coronary angiography.

The patient was brought by ambulance to the emergency department with sudden-onset diffuse upper abdominal pain, predominantly epigastric, associated with a brief episode of malaise without loss of consciousness.

On arrival of the prehospital team (15 minutes after symptom onset), the patient was alert but dyspneic and seated. Airway was patent with mild tachypnea. Cardiovascular exam showed absent radial pulse and rapid, irregular central pulse. The patient was pale with delayed capillary refill. Abdomen was soft with epigastric tenderness, without guarding. Initial vital signs revealed unmeasurable blood pressure, HR 130 bpm (irregular), unmeasurable SpO₂, and respiratory rate of 25/min. ECG showed ST-segment elevation in II, III, and aVF consistent with inferior myocardial ischemia. The patient developed hematemesis shortly thereafter. En route, IV esomeprazole (80 mg) and 250 mL of crystalloids were administered.

On admission to the emergency department (30 minutes after the prehospital team’s initial contact), the patient required supplemental oxygen via nasal cannula and had a blood pressure of 102/73 mmHg, with clinical signs of hypoperfusion, including cold extremities and prolonged capillary refill time (CRT). No pulsatile mass was palpable, and a digital rectal examination was not performed. Laboratory test results are summarized in Table 1.

Laboratory test	Measured value	Unit	Reference range
Leukocytes	11.9	G/L	4.0-10.0
Hemoglobin	132	g/L	133-177
Platelets	221	G/L	150-350
Prothrombin time	96	%	70-140
Partial thromboplastin time	26	seconds	25-36
Anti-Xa level	13	µg/L	Not provided
Creatinine	169	µmol/L	<106
Estimated glomerular filtration rate (eGFR)	30	mL/min	<90
High-sensitivity troponin T	16	ng/L	<13
Arterial blood gas	7.18	pH	7.37-7.45
PaO ₂	20	kPa	11.0-13.9
PaCO ₂	4.6	kPa	4.7-6.1
Bicarbonate	12.3	mmol/L	21-26
Ionized calcium	1.05	mmol/L	1.17-1.32
Lactate	3.6	mmol/L	0.5-2

TABLE 1: Laboratory test results at admission

The clinical picture rapidly evolved with worsening hematemesis and onset of hemodynamic instability, prompting initiation of a massive hemorrhage protocol, tranexamic acid, and continuous esomeprazole infusion. Vasopressor support with norepinephrine and phenylephrine was required to maintain mean arterial pressure above 65 mmHg.

Rapid sequence intubation was performed using fentanyl, propofol, and succinylcholine to secure the airway in the context of massive hematemesis and hemodynamic instability. He was urgently transferred for CTA because the large volume of bleeding and its bright-red appearance raised suspicion of an arterial source, particularly a PADF, despite the absence of a known history of AAA.

However, while on the CT table, the patient developed profound hypotension requiring repeated high-dose epinephrine boluses. The CT scan could not be performed, and the patient was immediately transferred to the operating room for emergency exploratory laparotomy. The incision was performed 2 hours and 20 minutes after symptom onset.

During surgery, general anesthesia was maintained with sevoflurane, fentanyl, and a norepinephrine infusion titrated up to 24 µg/min. Extensive resuscitation, guided by thromboelastography, included 9 units of packed red blood cells, 3 units of fresh frozen plasma, 1 unit of platelet concentrate, 2 g of fibrinogen, 2 g of albumin, 4000 IU of prothrombin complex concentrate (PCC), 3 doses of 2.25 mmol calcium, 100 mL of 8.4% sodium bicarbonate, and 4 L of crystalloids. Over 700mL of blood recovered via the cell salvage system was retransfused to the patient. Empiric broad-spectrum antibiotic with piperacillin-tazobactam was also initiated.

Exploratory laparotomy via a midline xipho-pubic incision revealed no hemoperitoneum but marked gastrointestinal distension, particularly of the stomach. After dissection and exposure of the aorta via opening of the lesser omentum and diaphragmatic crura, the thoracic aorta was clamped. This maneuver, performed rapidly in coordination with the anesthesia team, allowed hemodynamic stabilization of the patient, thereby preventing an imminent cardiac arrest and further supporting the hypothesis of a subdiaphragmatic hemorrhage. A longitudinal gastrotomy evacuated large blood clots originating from the esophagus and duodenum, without visible gastric lesions. An intraoperative oral endoscopy performed by the gastroenterologist revealed no esophageal or cardiac lesions (Figure 1); subsequent endoscopy through the gastrotomy identified an adherent clot on the lateral wall of the fourth portion of the duodenum without active bleeding.



FIGURE 1: Intraoperative endoscopy performed by the gastroenterologist through the gastrotomy

The gastroenterologist is positioned on the patient's left side. As the stomach was initially filled with blood clots, upper endoscopy was inconclusive and did not allow adequate inspection of the duodenum. The laparotomy with an Alexis-type wound retractor is visible, with the greater omentum maintained in its anatomical position to facilitate access to the stomach. Endoscopy through a surgical gastrotomy subsequently allowed visualization of an adherent blood clot at D4, with no active bleeding or fistula orifice identified. The photograph was taken from the anesthesiologist's position at the head of the patient.

Mobilization of the ligament of Treitz allowed localization of the lesion externally; an aortoduodenal fistula was confirmed as the bleeding source (Figure 2). The aortic lesion was identified as a saccular aneurysm, with no gross macroscopic evidence of infection. Unfortunately, no tissue or fluid samples were obtained during surgery for microbiological or pathological analysis. The thoracic clamp was released, and infrarenal abdominal aortic clamping was applied. The duodenal fistula was resected, with vascular reconstruction including an end-to-end aorto-aortic bypass with an 18 mm SilverGraft prosthesis. The aneurysmal sac was opened, lumbar arteries ligated, and the proximal and distal anastomoses performed with Prolene sutures. Hemostasis was achieved, and the aneurysmal sac was closed with Vicryl sutures. The duodenal defect was debrided and closed with two interrupted Maxon 4-0 sutures. The gastrotomy was closed in two layers using extramucosal Maxon 4-0 sutures.

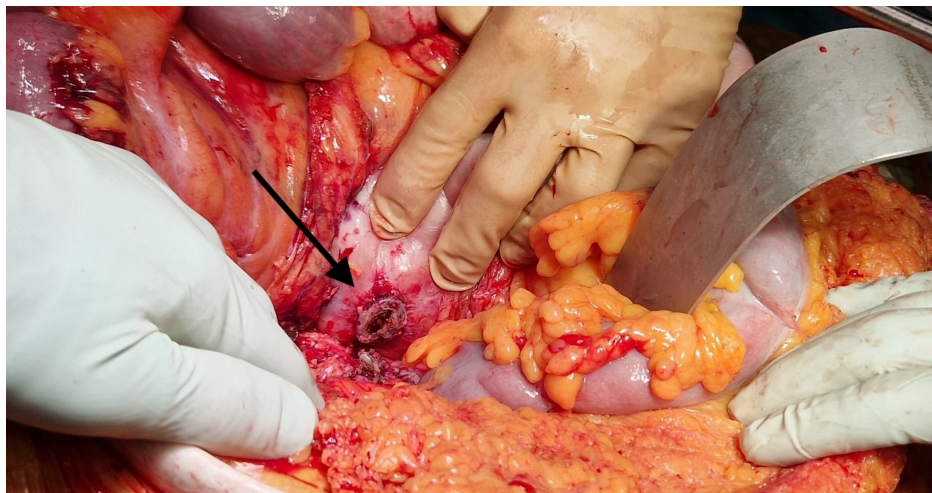


FIGURE 2: Intraoperative view of the aortoduodenal fistula after exposure

The photograph shows the posterior aspect of the fourth portion of the duodenum, which has been retracted. The fistula (black arrow) can be clearly identified, extending subsequently to the aneurysmal sac, which is not visible in the image. The photograph was taken from the patient's feet, on the patient's left side. The colon has been retracted using a Mayo swivel retractor to expose the fistula and facilitate access to it.

At ICU admission, the patient remained intubated, sedated, and hemodynamically unstable, requiring norepinephrine and vasopressin infusions. Three days after the initial procedure, the patient underwent a

second operative intervention. In this procedure, the vacuum-assisted closure (VAC) laparostomy was removed, the peritoneal cavity was irrigated, and a portion of the omentum was mobilized and interposed between the aorta and the duodenal suture. A multi-tube drain was placed in the same space and exteriorized through the left flank. Inspection confirmed well-perfused small and large bowel, intact gastrotomy closure, and no bleeding from the aortic prosthesis. The abdominal wall was closed in layers, and a sterile dressing was applied.

After initial hemodynamic stabilization, the patient was extubated on the fifth postoperative day but subsequently developed respiratory failure requiring non-invasive ventilation, high-flow nasal cannula support, and bilateral pleural drainage. Despite maximal supportive care, he experienced confusion, persistent weakness, and profound exhaustion. Given the poor clinical trajectory and progressive neurological deterioration, the decision was made, in agreement with the family, to transition to comfort-focused care on the eighth postoperative day, with gradual withdrawal of vasopressors and initiation of a morphine infusion.

Discussion

Review

We conducted a literature search covering the period from 01.01.2021 to 31.12.2025 using MEDLINE and Google Scholar. The search terms included “primary,” “aortoenteric,” “aortoduodenal,” “aortoesophageal,” “aorto-enteric,” “aorto-duodenal,” “aorto-esophageal,” and “fistula,” combined with the Boolean operators AND and OR. We excluded case reports in which the aortoduodenal fistula was not defined as primary, as well as all aortoenteric fistulas (AEFs) not involving the duodenum. As we did not follow a formal systematic-review methodology, including independent study selection and data extraction by multiple reviewers, we consider our work to be a narrative review of published PADF cases rather than a systematic review. The characteristics of the studies selected for inclusion and the corresponding extracted data are detailed in Table 2.

Author	Publication year	Location	Age	Sex	Symptoms	Herald bleeding	Sequential preoperative workup	Diagnosis made by	HD instability at ED admission	Cause	Duodenum location	Management	Outcome	Deceased within 30 days postop
Berner-Hansen et al. [9]	2021	Denmark	74	M	LGIB (m), LGIB (hc), APM	Y	UE, CT	UE	N	kAAA	D3	Endoclips	POD (14 months)	N
Do et al. [10]	2021	Australia	80	M	UGIB, LGIB (m)	Y	CT	CT	Y	uAAA (Coxiella burnetii)	D3 + D4	1) EVAR, PDR; 2) EAB, PDR	AF (5 months)	N
Fuchigami et al. [7]	2021	Japan	76	M	UGIB, LGIB	N	UE, CT	UE	Y	uAAA	D?	1) Endoscopic clips; 2) EVAR	AF (11 months)	N
Georgeades et al. [11]	2021	USA	64	M	LGIB (m)	N	CT	CT	Y	uAAA (MSSA)	D3	1) EVAR; 2) EAB	POD (14 months)	N
Hazra et al. [12]	2021	India	70	M	UGIB, LGIB (m)	N	UE, CT	CT	Y	uAAA (Salmonella typhi)	D?	ISG, PDR, OI	AF (5 years)	N
Kallier et al. [13]	2021	Romania	66	M	UGIB, LGIB (hc), AP	N	CT	CT	Y	kAAA	D3	AFB, PDR	DP	Y
Kim and Kim [14]	2021	Korea	75	M	LGIB (m), AP	N	UE, CT	UE	N	kAAA	D3	Emergent laparotomy	DI	Y
Lahmidani et al. [15]	2021	Morocco	45	M	LGIB (m), AP, APM	N	UE, LE, CT	CT	Y	uAAA (Behcet)	D?	AIB	POD 2	Y
Le et al. [16]	2021	Vietnam	48	M	LGIB (hc)	Y	CT	CT	Y	uAAA (Burkholderia pseudomallei)	D3	PDR, ISG with renal vein graft, OI	AF	N
Luo et al. [17]	2021	China	21	M	LGIB (hc), AP, UGIB	Y	UE, LE, CT	CT	Y	u	D?	EVAR	POD 42	N
Luo et al. [17]	2021	China	61	M	AP, LGIB (hc)	Y	UE, LE, CT	CT	Y	u	D?	EVAR	AF	N
Marine et al. [18]	2021	Chile	67	M	LGIB (m), AP	Y	US	US	Y	uAAA	D?	ISG, PDR, OI	AF	N

Marine et al. [18]	2021	Chile	67	M	UGIB, AP	Y	CT	CT	Y	kAAA	D3	ISG, DR + duodenojejunostomy, OI	AF	N
Marine et al. [18]	2021	Chile	82	M	LGIB, AP	Y	CT	CT	Y	uAAA	D3	ISG, DR + gastrojejunostomy, OI	POD 8	Y
Osella et al. [19]	2021	Italy	69	M	UGIB, LGIB (m)	Y	UE, LE, 99Tc, CT	CT	Y	AA atheromatosis	D?	EVAR	DP	Y
Sakurai et al. [20]	2021	Japan	48	M	LGIB (hc)	N	CT	CT	Y	Metastatic testicular cancer	D3	EVAR	POD 18	Y
Stoyanov et al. [21]	2021	Bulgaria	75	M	AP, UGIB, LGIB (hc)	N	None	None	Y	kAAA	D3	None	DPR	
Stuart et al. [22]	2021	USA	58	M	UGIB, LGIB (m, hc)	Y	CT, UE, CT	CT	Y	Bare metal duodenal stent	D3	None	DPR	
Azuma et al. [23]	2022	Japan	79	F	LGIB (m)	N	CT, UE	UE	Y	uAAA (<i>Mycobacterium tuberculosis</i>)	D3	EVAR	POD (10 months)	N
Capace et al. [24]	2022	USA	54	M	AP	N	CT	CT	N	uAAA (MSSA)	D?	PDR	AF	N
Jiber et al. [25]	2022	Morocco	50	M	AP, APM, UGIB, LGIB (hc)	Y	UE, LE, CT	CT	Y	uAAA (Behcet)	D3	ISG, PDR	POD (7 months)	N
Kehagias et al. [6]	2022	Greece	58	F	UGIB, LGIB (hc)	N	UE, CT	UE	Y	Bare metal duodenal stent	D3	EVAR	AF (10 months)	N
Mudadla et al. [26]	2022	India	49	F	LGIB (m), UGIB	N	UE, CT	CT	Y	uAAA (MRSA)	D4	ISG with renal graft + DR + duodenojejunostomy	AF (10 months)	N
Ngoc et al. [27]	2022	Vietnam	40	M	LGIB (m), AP, APM	Y	CT	CT	Y	uAAA	D3	EAB, DR + duodenojejunostomy	AF (2 months)	N
Noda et al. [5]	2022	Japan	91	M	LGIB (m), UGIB	Y	CT	CT	N	uAAA	D?	1) EVAR; 2) Endoclips	AF (6 months)	N
Rebelo et al. [28]	2023	Portugal	83	M	UGIB, AP	Y	UE, CT	CT	Y	uAAA	D4	ISG, PDR, OI	POD 22	Y
Vacca et al. [29]	2022	Italy	74	M	LGIB (hc)	Y	UE, CT, AG	CT	Y	AA atheromatosis	D4	ISG, DR + duodenojejunostomy, OI	POD 1	Y
Winston et al. [30]	2022	Australia	48	M	LGIB (m), UGIB	N	CT	CT	N	uAAA	D3	1) EVAR puis; 2) PDR, OI	AF (18 months)	N
Zhu et al. [31]	2022	China	67	M	AP, APM, UGIB	N	CT	CT	Y	uAAA	D3	AIB, DR + duodenojejunostomy, OI	AF (3 months)	N
Benjelloun et al. [32]	2023	Morocco	64	F	LGIB (hc)	N	UE, LE, CT	CT	N	AA atheromatosis	D3	EVAR	AF	N
Hai et al. [33]	2023	Vietnam	73	F	LGIB (m)	Y	US, UE, LE	US	N	uAAA	D2	EVAR	DP	Y
Hosseinzadeh et al. [34]	2023	Iran	53	M	AP, LGIB, APM	Y	UE, LE, CT	CT	N	uAAA (Brucella)	D3	AIB, PDR, OI	AF (1 year)	N
Jaber et al. [35]	2023	USA	80	F	UGIB, LGIB (hc)	Y	CT, UE, 99Tc	99Tc	Y	kAAA	D?	EVAR	POD (?d)	Y
Kuo et al. [36]	2023	Taiwan	67	M	UGIB, LGIB (m),	Y	UE, LE, CT, capsule	CT	N	uAAA	D4	EVAR, DR +	AD	N

AP															endoscopy, 99Tc, CT															duodenojejunostomy														
De Flaviis et al. [37]	2023	Italy	69	M	AP, APM	N	CT	CT	N	kAAA	D3	1) EVAR; 2) DR + duodenojejunostomy, AIB	AD	N																														
Rejab et al. [8]	2023	Tunisia	64	M	UGIB, AP, shock	N	UE, CT	CT	Y	uAAA	D4	Direct aortic suture, PDR	POD 8d	Y																														
Jahanshahi et al. [38]	2024	Iran	55	M	UGIB, LGIB (hc), APM	nr	US, CT	US	Y	kAAA (Brucella)	D4	AIB, DR + duodenojejunostomy	AD	N																														
Gregg et al. [39]	2024	USA	80	M	UGIB, LGIB (m)	Y	CT, UE	UE	Y	kAAA (Streptococcus, Lactobacillus, Veillonella)	D4	PDR, AFB, OI	AF (2 months)	N																														
Gregg et al. [39]	2024	USA	79	F	UGIB, AP	N	CT	CT	Y	uAAA (Klebsiella, Candida, Streptococcus)	D3	PDR, ISG, OI	AD	N																														
Alshubaily et al. [40]	2024	SAU	65	M	UGIB, LGIB (m), AP	Y	UE, LE, CT	CT	Y	uAAA (Aspergillus)	D4	PDR, ISG, OI	AF	N																														
Kärjä et al. [41]	2024	Finland	80	M	LGIB (m), AP	N	UE, LE, CT	CT	N	uAAA	D?	PDR, ISG, OI	AF	N																														
Rezaei et al. [42]	2024	Iran	61	M	UGIB, LGIB (m), AP	Y	UE, US, CT	US	Y	uAAA	D4	ISG, DR + duodenojejunostomy, OI	POD	Y																														
Stanley et al. [43]	2024	Australia	60	M	UGIB, AP	N	CT	CT	Y	kAAA	D3	Emergent laparotomy	DI	Y																														
Velicescu et al. [44]	2024	Romania	62	M	LGIB (m), AP	nr	UE, CT	CT	N	uAAA	D?	ISG, PDR, OI	AF (3 years)	N																														
Ziani et al. [45]	2024	Morocco	90	M	LGIB (m), UGIB, APM	Y	UE, CT	CT	Y	uAAA	D3	None	DPR																															
Akabane et al. [46]	2025	Japan	71	M	LGIB (m)	N	CT	CT	Y	uAAA	D3	ISG, PDR, OI	POD (3 months)	N																														
Arzivian et al. [47]	2025	Australia	77	M	LGIB, UGIB	N	UE	UE	Y	kAAA	D3	ISG, PDR	AF	N																														
Gupta et al. [48]	2025	India	64	M	LGIB	N	UE	UE	Y	uAAA	D3	EVAR	POD 11	Y																														
Ramani [49]	2025	Pakistan	65	M	UGIB, LGIB, AP	N	UE, UE, LE, CT	CT	Y	uAAA	D3 + D4	ISG, PDR, OI	POD 2	Y																														
Santoro et al. [50]	2025	Italy	88	F	UGIB, APM	nr	CT	CT	Y	uAAA	D?	1) EVAR; 2) PDR	POD 5 weeks	N																														
Sassi [51]	2025	Morocco	39	F	UGIB, LGIB, AP	Y	UE, CT	CT	N	uAAA	D3	ISG, PDR	AF	N																														
Akhavan et al. [52]	2025	USA	60	M	AP, UGIB	N	UE	UE	Y	uAAA	D3	1) EVAR; 2) aneurysmoraphy, PDR, OI	AF (3.5 months)	N																														
Máli et al. [53]	2025	Burkina Faso	41	F	UGIB, LGIB (hc)	Y	UE, LE, CT	CT	Y	uAAA	D3	None	DPR																															

TABLE 2: Primary aortoduodenal fistula case reports from 2021 to 2025

HD: hemodynamic; ED: emergency department. Sex: M: male; F: female. Signs and symptoms: UGIB: upper gastrointestinal bleeding; LGIB (hc): hematochezia; LGIB (m): melena; APM: abdominal pulsatile mass; AP: abdominal pain. Preoperative workup: CT: computed tomography ; UE: upper

endoscopy; US: abdominal ultrasound; 99Tc: 99Tc tagged red blood cells; AG: aortography. Management: PDR: primary duodenal repair; DR: duodenal resection; ISG: in-situ graft; OI: omental interposition; EAB: extra-anatomic bypass; AIB: aorto-iliac bypass; AFB: aorto-femoral bypass. Causes: uAAA: previously unrecognized abdominal aorta aneurysm; kAAA: known abdominal aorta aneurysm; AA atheromatosis: abdominal aorta atheromatosis; u: unknown. Outcome: AF: alive at follow-up; AD: alive at discharge; DP: death postoperatively; DI: death intraoperatively; DPR: death preoperatively; POD: death postoperatively at day _ N: no; Y: yes; nr: not reported.

To our knowledge, the two most recent literature reviews are those by Saers and Scheltinga [1], covering the years 1994-2003, and Georgeades et al. [11], covering the years 2015-2020.

Regarding the demographic characteristics of the 53 patients included in our review, the mean age was 65 ± 14.3 years, and 81.1% were men. An AAA was reported as the cause of the fistula in 84.9% of cases, with involvement of the third portion of the duodenum in 52.8%. These proportions are consistent with the findings reported by Saers and Scheltinga, except for a slightly lower male-to-female ratio. These characteristics are reported in Table 3.

Variable	n (%)
Total patients	53
Age (mean ± SD)	65.0 ± 14.3
Age -- available data	53 (100.0%)
Age -- missing data	0 (0.0%)
Male sex	43 (81.1%)
Female sex	10 (18.9%)
Sex -- missing data	0 (0.0%)
Aneurysmal etiology (uAAA + kAAA)	45 (84.9%)
uAAA	34 (64.2%)
kAAA	11 (20.8%)
Duodenal location D3	28 (52.8%)
Duodenal location D4	9 (17.0%)
Other/undetermined duodenal location	16 (30.2%)

TABLE 3: Demographic characteristics, etiologies, and locations of PADF included in the review
PADF: primary aortoduodenal fistula; uAAA: unknown abdominal aortic aneurysm; kAAA: known abdominal aortic aneurysm.

As reported in Table 4, gastrointestinal bleeding was reported in 96.2% of patients, with 81.1% presenting with lower gastrointestinal bleeding (LGIB) and 60.4% with upper gastrointestinal bleeding (UGIB). The classic triad, pulsatile abdominal mass, gastrointestinal bleeding, and abdominal pain, was reported in only 9.4% of cases. Hemodynamic instability was present in 75.5% of patients, and herald bleeding was described in 47.2%.

Variable	n	%	95% CI
GIB (UGIB and/or LGIB)	51	96.2	87.0-99.5
UGIB	32	60.4	46.0-73.5
LGIB: all forms	43	81.1	68.0-90.6
LGIB (hc): hematochezia	14	26.4	15.3-40.3
LGIB (m): melena	19	35.8	23.1-50.2
Hemodynamic instability at ED	40	75.5	61.7-86.2
APM	10	18.9	9.4-32.0
AP	27	50.9	36.8-64.9
Triad (APM + AP + GIB)	5	9.4	3.1-20.7
Herald bleeding	25	47.2	33.3-61.4

TABLE 4: Signs and symptoms of PADF included in the review
GIB: gastrointestinal bleeding; UGIB: upper GIB; LGIB: lower GIB; ED: emergency department; APM: abdominal pulsatile mass; AP: abdominal pain.
95% CI calculated using the exact Clopper-Pearson method.

Regarding diagnostic procedures (reported in Table 5), CT was performed in 48 patients (90.6%), in 21 cases following a negative endoscopy, and in 20 cases as the first diagnostic modality (37.7%). Upper endoscopy (UE) was performed in 33 patients, including 28 cases as the initial diagnostic step (52.8%). CT demonstrated a detection rate of 79.2%, in contrast to UE, which showed a markedly lower detection rate of 27.3%. Compared with Saers and Scheltinga, CT demonstrates a slightly higher detection rate, whereas UE remains essentially unchanged.

Workup	n	%	Detection rate (%)	95% CI
CT	48	90.6	79.2	65.0-89.5
Upper endoscopy	33	62.3	27.3	13.3-45.5

TABLE 5: Main diagnostic modalities used in the cases included in the review and their associated detection rates
95% CI calculated using the exact Clopper-Pearson method.

Among the 49 patients who underwent surgery, 15 died within 30 days of the procedure, corresponding to a 30-day mortality rate of 30.6% (15/49; 95% confidence interval, 18.3-45.4%, calculated using the exact Clopper-Pearson method), which is slightly lower than that reported by Saers and Scheltinga (34%). There was a marked increase in the use of endovascular procedures, with 20 patients (40.8%) benefiting from endovascular treatment, compared with 10.3% in the review by Saers and Scheltinga [1]. Notably, 13 patients (26.5%) were managed exclusively with endovascular and/or endoscopic treatments. The mortality rate in this subgroup was 30.8%, which is comparable to that of the classic one-stage open surgical procedure (34.5%). Mortality outcomes should be interpreted with caution given the very small sample sizes and the heterogeneous, non-randomized nature of the available evidence. The reported mortality rates are subject to substantial selection and publication bias, among others. All the details can be found in Table 6.

Management	n (%)	30-day mortality (%)
Death before procedure/palliative care	4 (7.5%)	NA
One-stage procedure (open approach)	29 (54.7%)	34.5
One-stage procedure (endovascular/endoscopic approach)	13 (24.5%)	30.8
Two-stage procedure: (1) endovascular; (2) open	7 (13.2%)	0.0
Direct aortic suture	1 (1.9%)	100.0
ISG	18 (34.0%)	27.8
AIB/AFB	6 (11.3%)	16.7
EAB	3 (5.7%)	0.0
PDR	22 (41.5%)	18.2
OI	19 (35.8%)	26.3
Intestinal resection	10 (18.9%)	30.0

TABLE 6: Operative management and associated mortality rates in the cases included in the review

ISG: in situ graft; AIB/AFB: aorto iliac or femoral bypass; EAB: extra-anatomic bypass; PDR: primary duodenal repair; OI: omentum interposition.

Twenty-six patients underwent open vascular surgery at some point during management, most commonly in situ grafting (ISG) for 18 patients, followed by aortobiiliac (AIB) or aortobifemoral (AFB) bypass in six patients, and EAB in only three patients. Regarding visceral surgical procedures, most patients underwent primary duodenal repair, while 10 patients (18.9%) required intestinal resection.

Discussion

PADF is a rare entity, with a historically reported incidence of approximately 0.07% in large autopsy series and occurring in only 0.7-2% of all AAAs [3]. This incidence is likely underestimated due to underreporting. The vast majority arise from AAA eroding into the adjacent duodenum. This is consistent with our review, which found an 84.9% prevalence of AAA associated with digestive fistula. Less frequent etiologies include infectious aortitis, for example caused by Brucella species [34], neoplastic invasion [20], prior radiotherapy [54], post-traumatic [55], and foreign body ingestion [56]. Certain inflammatory conditions, notably Behçet’s disease, have also been reported as rare predisposing factors for fistula formation, reflecting the diverse pathophysiological mechanisms capable of compromising the aortic wall and adjacent structures [25].

The clinical presentation of AEF is often nonspecific and contributes to delayed diagnosis. The so-called “classic triad” of gastrointestinal bleeding, abdominal pain, and a palpable abdominal mass is infrequently encountered, occurring in only 11% of patients in a large review [1]. In the same review, shock is encountered in 32% of patients. The clinical hallmark of PADF is gastrointestinal bleeding with a reported prevalence of 94% [1]. A well-known sign is also the herald or sentinel bleed, which typically precedes massive hemorrhage, affecting just under 50% of patients in our review.

Diagnosis of aortoduodenal fistula remains challenging due to its rarity and nonspecific presentation. Upper gastrointestinal endoscopy is often the first-line investigation in the context of bleeding, but its diagnostic yield is limited, particularly in patients with massive hematemesis or hemodynamic instability, where visualization of the duodenum is technically difficult. Even in more stable patients, endoscopy frequently fails to detect a fistula, as only the proximal duodenum can usually be visualized. In such cases, push enteroscopy should be considered to allow examination of the more distal portions of the duodenum (D3-D4), where most fistulas are located. In the review by Saers and Scheltinga, the overall detection rate was as low as 25% [1].

For patients presenting with UGIB, CTA demonstrates superior diagnostic performance compared with endoscopy, correctly identifying the bleeding site in 100% of cases and the underlying etiology in 90.9%, versus 72.7% and 54.5%, respectively, with endoscopic evaluation [57]. CTA has become increasingly important in the diagnostic workup of gastrointestinal bleeding, particularly in unstable patients. According to the 2024 guidelines jointly issued by the American College of Gastroenterology (ACG) and the Society of Abdominal Radiology (SAR), CTA should be prioritized as the initial diagnostic modality in patients with

LGIB who are hemodynamically unstable or in whom ongoing active bleeding is strongly suspected [58]. The diagnostic accuracy of CTA is strongly influenced by bleeding severity, with higher bleeding rates associated with greater sensitivity [59]. Importantly, a positive CTA does not guarantee subsequent identification of the bleeding source on endoscopy. Conversely, a negative CTA does not exclude clinically significant hemorrhage, as intermittent bleeding may not be captured at the time of imaging [60].

On CTA, the hallmark of active gastrointestinal bleeding is extravasation of intravenous contrast into the bowel lumen. In cases of low-flow bleeding from a PADF, Vacca et al. [29] emphasized the potential value of adding a very delayed acquisition, obtained approximately 5 minutes after contrast administration. This additional phase may improve detection of PADF, as the presence of contrast material within the duodenal lumen represents a suggestive imaging finding that should heighten both clinical and radiological suspicion of an aortoduodenal fistula.

In the specific context of PADF, CTA may reveal indirect features that, when combined, strongly suggest the diagnosis even in the absence of direct contrast extravasation. These include periaortic free fluid of low attenuation or soft-tissue edema, loss of the fat plane separating the aorta and adjacent gastrointestinal tract, focal thickening of the intestinal wall, or presence of ectopic gas bubbles or hematoma [21].

Managing and diagnosing the source of severe acute UGIB is discussed in numerous international guidelines, depending on whether variceal bleeding is suspected [61-63] or not [64-66]. Timing to UE is a matter of debate. For example, the European Society of Gastrointestinal Endoscopy (ESGE) recommends that, “in patients with suspected variceal hemorrhage, endoscopic evaluation should take place within 12 hours from the time of patient presentation, provided the patient has been hemodynamically resuscitated” [61]. The UK guidelines of the British Society of Gastroenterology (BSG) on the management of variceal hemorrhage in cirrhotic patients suggests to “offer endoscopy to unstable patients with severe acute UGIB immediately after resuscitation” [62].

In our case, the presence of shock and profuse, bright red hematemesis, without suspicion of variceal bleeding, led us to prefer CTA over upper endoscopy. Despite the absence of a known aneurysm in the medical history, the clinical presumption of a PADF was highly motivating for the decision. Immediately after the patient was transferred onto the CT table, severe hemodynamic instability with impending cardiac arrest prompted a change in management, leading to immediate transfer to the operating room for emergency laparotomy. To our knowledge, there is no consensus for immediate or emergent laparotomy in a very unstable patient with acute gastrointestinal bleeding, but an analogy with the management of an unstable trauma patient regarding ATLS guidelines could be made. In fact, a longer time to surgery is associated with reduced survival among patients with a positive FAST (focused assessment with sonography for trauma) examination (which can be assimilated to exsanguination to the gastrointestinal tract) requiring emergent laparotomy [67].

Concerning the surgical open strategy, two aspects should be considered: the vascular and the visceral time.

Regarding the visceral time, according to the indications for surgery in patients with peptic duodenal ulcers, when the fistula is small (<1 cm) [68] or involving <50% of the circumference [69], direct closure appears to be a viable option. Duodenal resection may be necessary when the fistula is large (>75%) [70]. Omental interposition is commonly performed and has been advocated as a preventive measure against secondary AEF following aortic surgery [71,72]. Omentoplasty ranges from the mobilization of an omentum strip to seal the fistula (with or without suture of the duodenal wall) to diverse pediculated flaps applied anteriorly to the transverse colon or in a transmesocolic manner [72,73]. In a big review of 791 ADF, Rodrigues et al. found that univariate analysis revealed no statistically significant differences between simple and complex procedures (a segmentary bowel resection and/or an anastomosis were performed), with a trend toward increased survival in patients who had undergone complex treatments [2]. The use of omentum, regardless of the other procedures used, led to a significant reduction in mortality, with an OR of 0.385 (95% CI: 0.221-0.669; $p < 0.001$) [2].

Concerning vascular repair, direct closure of the aortic defect has been associated with high mortality rates, as previously reported, and is therefore not recommended [1]. This is also found in Rodrigues et al., where in situ graft revascularization has lower mortality (OR: 0.580; $p = 0.02$), while direct closure of an aortic defect was associated with high rates of mortality (OR: 2.625; $p = 0.004$) [2]. Among conventional surgical treatment options (i.e., in situ reconstruction and EAB), EAB revascularization is generally considered the preferred approach for patients with severe infection, particularly in the presence of extensive purulence or associated complications such as vertebral erosion, osteomyelitis, or retroperitoneal/psoas abscesses. However, this approach has important limitations, including prolonged operative and limb ischemia time, and carries risks such as limb loss, graft occlusion, and aortic stump rupture [74].

Nevertheless, the two following papers demonstrated similar outcomes between reconstruction techniques: (1) in the first paper, a retrospective multicenter nationwide study of 126 infected graft and endograft comparing outcomes of radically treated aortic graft infection, no differences in survival or re-infection rate could be identified comparing EAB and in-situ reconstruction [75], and (2) in the second paper, a

retrospective multicentre worldwide study of 182 patients treated for secondary aortoenteric fistula (SAEF), “ISB does not offer a survival advantage compared with EAB and does not decrease the risk of postoperative aorta-related haemorrhage”. After repair, <50% of SAEF patients survive 10 months. Each week of antibiotic use decreases mortality by 8%” [76]. This last point emphasizes the fact that most PADF are infected through enteric or more specific germs.

The advent of endovascular procedures has significantly reduced the mortality and morbidity associated with open surgical repair of PADF. Consequently, open surgery is no longer considered the only first-line approach. EVAR is particularly beneficial for patients in extremis, those with hostile abdomens, or advanced malignancy, achieving hemodynamic stabilization in up to 86% of cases [77,78]. In Rodrigues dos Santos et al., patients treated with an endovascular approach had lower mortality rates compared with those undergoing open surgery (OR: 0.340; 95% CI: 0.114-1.014; $p = 0.043$) [2].

However, EVAR is not without limitations. It is associated with re-bleeding, recurrent infection, and the risk of persistent sepsis due to graft contamination [79]. Antoniou et al. reported recurrent infection or bleeding in 44% of patients following EVAR [79]. Long-term or even lifelong antibiotic prophylaxis is generally recommended [80]. While EVAR is usually regarded as a “bridge to surgery,” allowing definitive open repair once the patient is stabilized, some cases have shown durable success with EVAR alone, though mechanisms remain unclear and require further study [81-83].

Conclusions

PADF remains a rare entity and a major diagnostic and therapeutic challenge, largely due to its presentation with massive gastrointestinal hemorrhage frequently associated with profound hemodynamic instability or shock. This instability often limits diagnostic evaluation and contributes to delayed recognition, despite the availability of modalities such as endoscopy and CT angiography, whose performance may be compromised in actively bleeding and unstable patients. Recently published cases demonstrate increasing use of endovascular techniques, particularly for initial hemorrhage control and hemodynamic stabilization. However, available evidence is insufficient to establish the superiority of one strategy, and definitive management should be individualized according to hemodynamic status, anatomy, infection/contamination, and local expertise.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Jonathan Emery, Adrien Gross, Ioannis Rotas, Claude Haller, Pierre-Emmanuel Marti

Acquisition, analysis, or interpretation of data: Jonathan Emery, Adrien Gross

Drafting of the manuscript: Jonathan Emery

Critical review of the manuscript for important intellectual content: Jonathan Emery, Adrien Gross, Ioannis Rotas, Claude Haller, Pierre-Emmanuel Marti

Supervision: Adrien Gross

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Acknowledgements

The authors sincerely thank Jean Perrenoud for his assistance with the literature search and Loïc Rossier for the preparation of the statistical tables for this review. During the preparation of this work the authors used ChatGPT (OpenAI, L.L.C, San Francisco, CA, USA) in order to optimize syntax and ensure grammatical accuracy throughout the text. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

References

- Saers SJ, Scheltinga MR: Primary aortoenteric fistula. *Br J Surg*. 2005, 92:143-52. [10.1002/bjs.4928](#)
- Rodrigues dos Santos C, Casaca R, Mendes de Almeida JC, Mendes-Pedro L: Enteric repair in aortoduodenal fistulas: A forgotten but often lethal player. *Ann Vasc Surg*. 2014, 28:756-62. [10.1016/j.avsg.2013.09.004](#)
- Kane JM, Meyer KA, Kozoll DD: An anatomical approach to the problem of massive gastrointestinal hemorrhage. *AMA Arch Surg*. 1955, 70:570-82. [10.1001/archsurg.1955.01270100096017](#)
- Goshtasby P, Henriksen D, Lynd C, Fielding LP: Recurrent aortoenteric fistula: Case report and review. *Curr Surg*. 2005, 62:638-43. [10.1016/j.cursur.2005.03.022](#)
- Noda K, Yokawa K, Dan N, Matsuda H: Endovascular and endoscopic treatment for primary aortoduodenal fistula: A case report. *Ann Vasc Dis*. 2022, 15:154-6. [10.3400/avd.cr.22-00015](#)
- Kehagias D, Mulita F, Marlafeke I, Verras GI, Panagiotopoulos I, Kehagias I: Primary aortoenteric fistula: A rare complication of an eroding duodenal stent. *Kardiochir Torakochirurgia Pol*. 2022, 19:161-3. [10.5114/kitp.2022.119768](#)
- Fuchigami J, Miyamoto K, Shibata N, Yonemitsu T, Ueda K, Kato S: Aortoduodenal fistula successfully treated with endovascular repair. *Clin Case Rep*. 2021, 9:1039-40. [10.1002/ccr3.3641](#)
- Rejab H, Fendri S, Bouzid A, Dammak A, Ben Jemaa H, Trigui A, Boujelben S: Primary aortoduodenal fistula presenting as a rare cause of upper gastrointestinal bleeding. *Clin Case Rep*. 2023, 11:e6888. [10.1002/ccr3.6888](#)
- Berner-Hansen V, Olsen AA, Brandstrup B: Endoscopic treatment of primary aorto-enteric fistulas: A case report and review of literature. *World J Gastrointest Endosc*. 2021, 13:189-97. [10.4253/wjge.v13.i6.189](#)
- Do CN, Mar EO, Sim B, Looke D: Primary aortoduodenal fistula and chronic Q fever infection. *BMJ Case Rep*. 2021, 14:e238373. [10.1136/bcr-2020-238373](#)
- Georgeades C, Zarb R, Lake Z, Wood J, Lewis B: Primary aortoduodenal fistula: A case report and current literature review. *Ann Vasc Surg*. 2021, 74:518.e13-23. [10.1016/j.avsg.2020.12.046](#)
- Hazra D, Kota AA, Agarwal S: Salmonella aortitis causing primary aortoenteric fistula. *Indian J Surg*. 2021, 83:937-40. [10.1007/s12262-021-02787-1](#)
- Kaller R, Mureşan AV, Popa DG, Arbănaşi E-M, Russu E: Fatal aortoduodenal fistula caused by a ruptured abdominal aortic aneurysm - A case report. *J Cardiovasc Emergencies*. 2021, 7:129-32. [10.2478/jce-2021-0015](#)
- Kim BY, Kim KB: Primary aortoduodenal fistula causes massive melena: A case report. *Korean J Gastroenterol*. 2021, 77:132-5. [10.4166/kjg.2021.006](#)
- Lahmidani N, Figui M, Abid H, Yousfi ME, Abkari ME, Ibrahim SA, Benajah DA: Aortodigestive fistula: A rare cause of digestive bleeding. *Case Rep Clin Med*. 2021, 10:126-32. [10.4236/crcm.2021.104015](#)
- Le PT, Nguyen TH, Nguyen KT, Lam NV: Left renal vein as a graft for aortic reconstruction in a patient with primary aortoenteric fistula secondary to a mycotic aneurysm. *J Vasc Surg Cases Innov Tech*. 2021, 7:176-9. [10.1016/j.jvscit.2020.11.005](#)
- Luo J, Tang W, Wang M, Xiao Y, Tan M, Jiang C: Case series of aortoenteric fistulas: A rare cause of gastrointestinal bleeding. *BMC Gastroenterol*. 2021, 21:49. [10.1186/s12876-021-01629-4](#)
- Marine L, Mertens R, Torrealba I, Valdés F, Bergoeing M, Vargas F, Yáñez H: [Rupture of abdominal aortic aneurysm into the duodenum: Uncommon cause of massive gastrointestinal bleeding]. *Rev Med Chil*. 2021, 149:132-6. [10.4067/S0034-98872021000100132](#)
- Osella G, Reddavid R, Potenza E, Calandri M, Veltri A, Degiuli M: Primary aorto-duodenal fistula in association with chronic ischemic enteritis: A case report. *Ann Vasc Surg*. 2021, 73:561-5. [10.1016/j.avsg.2020.12.056](#)
- Sakurai H, Kawai K, Onozawa M, Akahane M, Takizawa R, Miyazaki J: Primary aortoduodenal fistula in testicular cancer: A fatal complication associated with retroperitoneal lymph node metastasis. *Urol Case Rep*. 2021, 39:101746. [10.1016/j.eurc.2021.101746](#)
- St Stoyanov G, Dzhenkov D, Petkova L: Primary aortoduodenal fistula: A rare cause of massive gastrointestinal hemorrhage. *Autops Case Rep*. 2021, 11:e2021301. [10.4322/acr.2021.301](#)
- Stuart R, Duarte H, Pervez A, Leonhardt LP: Catastrophic aortoenteric fistula due to an eroding bare metal duodenal stent. *Cureus*. 2021, 13:e16115. [10.7759/cureus.16115](#)
- Azuma S, Fukuhara S, Yasuyoshi Y: Endovascular treatment of a tuberculous aneurysm of the pararenal abdominal aorta leading to an aortoduodenal fistula. *J Vasc Surg Cases Innov Tech*. 2022, 8:549-52. [10.1016/j.jvscit.2022.07.011](#)
- Capace A, Polman J, Reddy K: S3464 Primary aortoduodenal fistula as a complication of mycotic aortitis. *Off J Am Coll Gastroenterol ACG*. 2022, 117:2182. [10.14309/01.ajg.0000870496.09495.23](#)
- Jiber H, Naouli H, Bouarhroum A: Primary and secondary aorto-digestive fistulas in Behçet's disease: A case report and review of the literature. *J Med Vasc*. 2022, 47:145-9. [10.1016/j.jdmv.2022.06.002](#)
- Mudadla R, Kamal H, Purushothaman G, Satyanesan J: Primary aorto enteric fistula as a cause of massive upper gastro-intestinal bleed-A very rare case presentation. *Int Surg J*. 2022, 9:1635-9. [10.18203/2349-2902.isj20222243](#)
- Thang DN, Uoc NH, Phuong TH, Hieu TM, Quyen PV, Thau CM, Son PDH: Primitive aorto-duodenal fistula - A propos a successfully treated case at Viet Duc hospital and review the literature. *Vietnam J Cardiovasc Thorac Surg*. 2022, 36:90-6. [10.47972/vjcts.v36i.745](#)
- Chálím Rebelo C, Moura DB, Costa Santos V, Pereira JR, Duarte MA: Mycotic aortic aneurysm as a rare case of constipation and weight loss. *Port J Card Thorac Vasc Surg*. 2023, 29:65-7. [10.48729/pjctvs.241](#)
- Vacca G, De Berardinis C, Cappabianca S, Vanzulli A: A singular case of primary aorto-duodenal fistula without pre-existing abdominal aortic aneurysm: Why and when you should suspect it. *BJR Case Rep*. 2022, 8:20210143. [10.1259/bjrcr.20210143](#)
- Winston J, Lovelock T, Kelly T, Vasudevan T: A case of successful endovascular aortic repair of primary aortoenteric fistula without aortic explantation. *J Endovasc Ther*. 2022, 29:962-5. [10.1177/15266028211067734](#)
- Zhu J, Lv L, Dai X, et al.: Primary aortoduodenal fistula in a patient with multiple duodenal diverticula. *Ann*

- Vasc Surg. 2022, 80:394.e1-4. [10.1016/j.avsg.2021.10.024](https://doi.org/10.1016/j.avsg.2021.10.024)
32. Benjelloun Z, Roudi S, Errami AA, Oubaha S, Samlani Z, Krati K: Aorto-digestive fistula: A serious cause of gastrointestinal bleeding. *SAS J Med*. 2023, 9:433-4. [10.36347/sasjm.2023.v09i05.010](https://doi.org/10.36347/sasjm.2023.v09i05.010)
33. Hai PD, Nhi PY, Huyen NT, Thanh NH: A case report of primary aortoduodenal fistula: A forgotten cause of gastrointestinal bleeding. *Radiol Case Rep*. 2023, 18:1556-9. [10.1016/j.radcr.2022.12.064](https://doi.org/10.1016/j.radcr.2022.12.064)
34. Hosseinzadeh A, Zehra J, Davarpanah MA, Farsani MM, Gorji MG, Shahriarirad R: Aortoduodenal fistula and abdominal aortic aneurysm as a complication of Brucella Aortitis managed with insitu aortic aneurysm repair: A case report. *Clin Case Rep*. 2023, 11:e8269. [10.1002/ccr3.8269](https://doi.org/10.1002/ccr3.8269)
35. Jaber F, Alsakarneh S, Sanders K, Ibrahim A, Ghaz H, Clarkston W, McMahon C: It is not always diverticular bleeding: Fatal subtle primary aorto-duodenal fistula associated with abdominal aortic aneurysm. *Cureus*. 2023, 15:e34461. [10.7759/cureus.34461](https://doi.org/10.7759/cureus.34461)
36. Kuo CL, Chen CF, Su WK, Yang RH, Chang YH: Rare finding of primary aortoduodenal fistula on single-photon emission computed tomography/computed tomography of gastrointestinal bleeding: A case report. *World J Clin Cases*. 2023, 11:7162-9. [10.12998/wjcc.v11.i29.7162](https://doi.org/10.12998/wjcc.v11.i29.7162)
37. De Flaviis M, Di Sario I, Palermo S, Franceschini E, Sacco L, Pagliariccio G, Colangelo E: Pancreas sparing duodenectomy and aortic reconstruction with custom-made bovine pericardial tubular graft for primary aorto duodenal fistula. Case report. *Ann Ital Chir*. 2023, 12:S2239253X23039798.
38. Jahanshahi F, Naderi D, Khaleghian M, Sarafi M, Ahmadi V, Saberi A: Primary aortoduodenal fistula: As a first presentation of brucellosis; a case report. *Int J Surg Case Rep*. 2024, 118:109609. [10.1016/j.ijscr.2024.109609](https://doi.org/10.1016/j.ijscr.2024.109609)
39. Gregg A, Sly M, Williams T: Two cases of primary aortoenteric fistulas diagnosed by computed tomography . *Cureus*. 2024, 16:e63406. [10.7759/cureus.63406](https://doi.org/10.7759/cureus.63406)
40. Alshubaily F, Fatani JA, Almufarrih A, Osman I: Aspergillus species as a rare cause of primary mycotic aneurysm with aortoenteric fistula. *Cureus*. 2024, 16:e75960. [10.7759/cureus.75960](https://doi.org/10.7759/cureus.75960)
41. Kärjä I, Soini V, Hautero O, Venermo M: Primary aorto-enteric fistula with a subsequent secondary aorto-enteric fistula. *EJVES Vasc Forum*. 2024, 61:132-5. [10.1016/j.ejvsf.2024.05.005](https://doi.org/10.1016/j.ejvsf.2024.05.005)
42. Rezaei H, Ghasemi F, Johari HG, Gholami MA: A complicated case of primary aortojejunal fistula: A case report. *Int J Surg Case Rep*. 2024, 120:109842. [10.1016/j.ijscr.2024.109842](https://doi.org/10.1016/j.ijscr.2024.109842)
43. Stanley B, Nguyen V, Sivasuthan G, Burstow M: Massive gastrointestinal bleed due to a primary aortoenteric fistula. *BMJ Case Rep*. 2024, 17:e258320. [10.1136/bcr-2023-258320](https://doi.org/10.1136/bcr-2023-258320)
44. Velicescu C, Teleman PA, Vițalariu A-I, Strobescu-Ciobanu C, Cazan I, Baroi LG: Rare complication of ruptured abdominal aortic aneurysm presented in emergency. *Med Surg J*. 2024, 128:545-51. [10.22551/MSJ.2024.03.12](https://doi.org/10.22551/MSJ.2024.03.12)
45. Ziani C, Missaoui Z, Oukrid K, et al.: Case report - Computed tomography diagnosis of an abdominal aortic aneurysm complicated with primary aortoduodenal fistula. *Radiol Case Rep*. 2024, 19:1980-5. [10.1016/j.radcr.2024.01.078](https://doi.org/10.1016/j.radcr.2024.01.078)
46. Akabane K, Tajima Y, Toyama S, Tamate Y, Watanabe T, Uchida T: Case report: Primary aortoduodenal fistula caused by a 30-mm inflammatory abdominal aortic aneurysm. *Front Surg*. 2025, 12:1582823. [10.3389/fsurg.2025.1582823](https://doi.org/10.3389/fsurg.2025.1582823)
47. Arzivian A, O'Neill R, Lockart I: The herald bleed-A fortunate endoscopic diagnosis of an aorto-duodenal fistula secondary to a mycotic aortic aneurysm with abscess formation. *Clin Case Rep*. 2025, 13:e70615. [10.1002/ccr3.70615](https://doi.org/10.1002/ccr3.70615)
48. Gupta A, Kapoor D, Vats R, Bukhari SN, Goel D: Primary aorto-duodenal fistula: A case report and review of literature. *Surg Case Rep*. 2025, 4:100080. [10.1016/j.sycrs.2024.100080](https://doi.org/10.1016/j.sycrs.2024.100080)
49. Ramani R, Parvez SS, Ain AN, Shahid U, Hussain A, Yaqoob M: Aortoduodenal fistula with ruptured aortic aneurysm: A challenging case with fatal outcome. *Clin Res*. 2025, 6:29. [10.35702/clinres.10029](https://doi.org/10.35702/clinres.10029)
50. Santoro R, Antolino L, Maruca D, et al.: Management of aorto-duodenal fistula: Case series and technical notes. *Ann Ital Chir*. 2025, 96:1-6. [10.62713/aic.3920](https://doi.org/10.62713/aic.3920)
51. Sassi M, Jiber H, El Youbi S, Naouli H, Bouarhroum A: Hematemesis revealing a primary aortodigestive fistula. *Int J Clin Stud Med Case Rep*. 2025, 51:1-3. [10.46998/ijcmcr.2025.51.001263](https://doi.org/10.46998/ijcmcr.2025.51.001263)
52. Akhavan AR, West CA, Deitch JS, Crawford JL: Endovascular repair of a primary aortoenteric fistula with staged open aortoplasty and omentopexy with duodenal repair. *Ann Vasc Surg - Brief Rep Innov*. 2025, 5:100407. [10.1016/j.avsur.2025.100407](https://doi.org/10.1016/j.avsur.2025.100407)
53. Mâli K, Mohamed TZZ, Delphine Z, Dominique B, Nogogna Z, Sami M, Appolinaire S: Digestive hemorrhage of rare causes: A case report of primary aortoduodenal fistula in the Hepato-Gastroenterology Department of the Souro Sanou University Hospital of Bobo-Dioulasso (Burkina Faso). *Gastroenterol Hepatol Dig Disord*. 2025, 8:10.33425/2639-9534.1102
54. Estrada FP, Tachovsky TJ, Orr RM Jr, Boylan JJ, Kram BW: Primary aortoduodenal fistula following radiotherapy. *Surg Gynecol Obstet*. 1983, 156:646-50.
55. Feliciano DV, Schwaartzberg SD, DuBose JJ: Aortoduodenal fistula after repair of a stab injury to the abdominal aorta. *Trauma Surg Acute Care Open*. 2022, 7:e000882. [10.1136/tsaco-2022-000882](https://doi.org/10.1136/tsaco-2022-000882)
56. Grosfeld JL, Eng K: Right iliac artery-duodenal fistula in infancy: Massive hemorrhage due to "whisk-broom" bristle perforation. *Ann Surg*. 1972, 176:761-4. [10.1097/0000658-197212000-00016](https://doi.org/10.1097/0000658-197212000-00016)
57. Frattaroli FM, Casciani E, Spoletini D, et al.: Prospective study comparing multi-detector row CT and endoscopy in acute gastrointestinal bleeding. *World J Surg*. 2009, 33:2209-17. [10.1007/s00268-009-0156-6](https://doi.org/10.1007/s00268-009-0156-6)
58. Sengupta N, Kastenberger DM, Bruining DH, et al.: The role of imaging for GI bleeding: ACG and SAR consensus recommendations. *Radiology*. 2024, 310:e232298. [10.1148/radiol.232298](https://doi.org/10.1148/radiol.232298)
59. García-Blázquez V, Vicente-Bártulos A, Olavarria-Delgado A, Plana MN, van der Winden D, Zamora J: Accuracy of CT angiography in the diagnosis of acute gastrointestinal bleeding: Systematic review and meta-analysis. *Eur Radiol*. 2013, 23:1181-90. [10.1007/s00330-012-2721-x](https://doi.org/10.1007/s00330-012-2721-x)
60. Kim J, Kim YH, Lee KH, Lee YJ, Park JH: Diagnostic performance of CT angiography in patients visiting emergency department with overt gastrointestinal bleeding. *Korean J Radiol*. 2015, 16:541-9. [10.3348/kjr.2015.16.3.541](https://doi.org/10.3348/kjr.2015.16.3.541)
61. Gralnek IM, Camus Duboc M, Garcia-Pagan JC, et al.: Endoscopic diagnosis and management of

- esophagogastric variceal hemorrhage: European Society of Gastrointestinal Endoscopy (ESGE) Guideline. Endoscopy. 2022, 54:1094-120. [10.1055/a-1939-4887](#)
62. Tripathi D, Stanley AJ, Hayes PC, et al.: U.K. guidelines on the management of variceal haemorrhage in cirrhotic patients. Gut. 2015, 64:1680-704. [10.1136/gutjnl-2015-309262](#)
63. de Franchis R, Bosch J, Garcia-Tsao G, Reiberger T, Ripoll C: Baveno VII - Renewing consensus in portal hypertension. J Hepatol. 2022, 76:959-74. [10.1016/j.jhep.2021.12.022](#)
64. Sung JJ, Chiu PW, Chan FK, et al.: Asia-Pacific working group consensus on non-variceal upper gastrointestinal bleeding: An update 2018. Gut. 2018, 67:1757-68. [10.1136/gutjnl-2018-316276](#)
65. Laine L, Barkun AN, Saltzman JR, Martel M, Leontiadis GI: ACG clinical guideline: Upper gastrointestinal and ulcer bleeding. Am J Gastroenterol. 2021, 116:899-917. [10.14309/ajg.0000000000001245](#)
66. Gralnek IM, Stanley AJ, Morris AJ, et al.: Endoscopic diagnosis and management of nonvariceal upper gastrointestinal hemorrhage (NVUGIH): European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2021. Endoscopy. 2021, 53:300-32. [10.1055/a-1369-5274](#)
67. Barbosa RR, Rowell SE, Fox EE, et al.: Increasing time to operation is associated with decreased survival in patients with a positive FAST examination requiring emergent laparotomy. J Trauma Acute Care Surg. 2013, 75:S48-52. [10.1097/TA.0b013e31828fa54e](#)
68. Jurkovich G: Injuries to the pancreas and duodenum. ACS Surgery: Principles and Practice 2006. BC Decker, New York; 2006. 1219:41.
69. Diebel L: Stomach and small bowel. Trauma. Mc Graw Hill Professional, New York; 2008. 681-700.
70. Snyder WH 3rd, Weigelt JA, Watkins WL, Bietz DS: The surgical management of duodenal trauma. Precepts based on a review of 247 cases. Arch Surg. 1980, 115:422-9. [10.1001/archsurg.1980.01380040050009](#)
71. Goldsmith HS, De los Santos R, Beattie EJ Jr: Experimental protection of vascular prosthesis by omentum. Arch Surg. 1968, 97:872-8. [10.1001/archsurg.1968.01340060050004](#)
72. Bunt TJ, Doerhoff CR, Haynes JL: Retrocolic omental pedicle flap for routine plication of abdominal aortic grafts. Surg Gynecol Obstet. 1984, 158:591-2.
73. Foy H, Fay S, Johansen K: Bowel obstruction following omental patching of aortic grafts. Am Surg. 1985, 51:661-3.
74. Lee CH, Hsieh HC, Ko PJ, Li HJ, Kao TC, Yu SY: In situ versus extra-anatomic reconstruction for primary infected infrarenal abdominal aortic aneurysms. J Vasc Surg. 2011, 54:64-70. [10.1016/j.jvs.2010.12.032](#)
75. Gavali H, Mani K, Furebring M, et al.: Editor's choice - Outcome of radical surgical treatment of abdominal aortic graft and endograft infections comparing extra-anatomic bypass with in situ reconstruction: A nationwide multicentre study. Eur J Vasc Endovasc Surg. 2021, 62:918-26. [10.1016/j.ejvs.2021.09.033](#)
76. Janko MR, Woo K, Hacker RI, et al.: In situ bypass and extra-anatomic bypass procedures result in similar survival in patients with secondary aortoenteric fistulas. J Vasc Surg. 2021, 73:210-221.e1. [10.1016/j.jvs.2020.04.515](#)
77. Leonhardt H, Mellander S, Snygg J, Lönn L: Endovascular management of acute bleeding arterioenteric fistulas. Cardiovasc Intervent Radiol. 2008, 31:542-9. [10.1007/s00270-007-9267-3](#)
78. Spanos K, Kouvelos G, Karathanos C, Matsagkas M, Giannoukas AD: Current status of endovascular treatment of aortoenteric fistula. Semin Vasc Surg. 2017, 30:80-4. [10.1053/j.semvascsurg.2017.10.004](#)
79. Antoniou GA, Koutsias S, Antoniou SA, Georgiakakis A, Lazarides MK, Giannoukas AD: Outcome after endovascular stent graft repair of aortoenteric fistula: A systematic review. J Vasc Surg. 2009, 49:782-9. [10.1016/j.jvs.2008.08.068](#)
80. Xiomeritis K, Dalainas I, Stamatakis M, Filis K: Aortoenteric fistulae: Present-day management. Int Surg. 2011, 96:266-73. [10.9738/0020-8868-96.3.266](#)
81. Jayarajan S, Napolitano LM, Rectenwald JE, Upchurch GR Jr: Primary aortoenteric fistula and endovascular repair. Vasc Endovascular Surg. 2009, 43:592-6. [10.1177/1538574409335275](#)
82. Burks JA Jr, Faries PL, Gravereaux EC, Hollier LH, Marin ML: Endovascular repair of bleeding aortoenteric fistulas: A 5-year experience. J Vasc Surg. 2001, 34:1055-9. [10.1067/mva.2001.119752](#)
83. Keunen B, Houthoofd S, Daenens K, Hendriks J, Fourneau I: A case of primary aortoenteric fistula: Review of therapeutic challenges. Ann Vasc Surg. 2016, 33:230.e5-230.e13. [10.1016/j.avsg.2015.11.033](#)