

Hemobilia: Etiological Diversity and Endovascular Management

—A Series of Six Cases

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Abstract

Hemobilia is a rare but potentially life-threatening cause of gastrointestinal bleeding, resulting from an abnormal communication between a vessel of the splanchnic circulation and the biliary tree. Its diagnosis is often challenging due to polymorphic clinical presentations. We report a retrospective, single-center study conducted in the Department of Hepato-Gastroenterology at Hassan II University Hospital in Fez between March 2022 and March 2026, including six patients managed for confirmed hemobilia. Gastrointestinal bleeding was the main presenting feature in all patients, sometimes associated with jaundice or biliary pain. Etiologies were predominantly post-surgical iatrogenic causes, particularly following cholecystectomy, as well as tumoral causes. Endoscopy allowed suspicion of the diagnosis in several cases, while computed tomography angiography and selective arteriography identified the vascular source of bleeding. Transcatheter arterial embolization achieved effective bleeding control in the majority of cases, avoiding the need for surgical management. This series highlights the diversity of mechanisms and clinical presentations of hemobilia and confirms the central role of interventional angiography in its modern management.

Keywords

Hemobilia, Gastrointestinal Bleeding, Arterial Pseudoaneurysm, Transcatheter Arterial Embolization, Interventional Angiography

1. Introduction

Hemobilia is defined as bleeding into the biliary tree resulting from an abnormal

communication between a vascular structure (arterial, portal, or hepatic venous) and the biliary system [1] [2]. First described by Sandblom in 1948 in the context of abdominal trauma, hemobilia represents a rare but potentially serious cause of gastrointestinal bleeding [1]. Clinically, it most commonly presents as upper gastrointestinal bleeding, manifesting as hematemesis, melena, or less frequently hematochezia, and may be associated with signs of biliary obstruction such as right upper quadrant pain and jaundice. The classic Quincke triad is observed in only a minority of cases, reported in approximately 20% of patients [2] [3].

Over the past decades, the etiology of hemobilia has shifted from predominantly traumatic causes to mainly iatrogenic origins, particularly following hepatobiliary surgery or interventional procedures [2] [4] [5]. Post-cholecystectomy hemobilia, although rare, is increasingly recognized and is often associated with delayed diagnosis [6] [7]. Through this series of six cases managed in our department, we aim to describe the clinical, diagnostic, and therapeutic aspects of hemobilia, highlighting the diversity of etiologies, clinical presentations, and management strategies.

2. Materials and Methods

This was a retrospective, single-center study conducted in the Department of Hepato-Gastroenterology at Hassan II University Hospital in Fez. Medical records were reviewed for patients diagnosed with hemobilia between March 2022 and December 2025. Data collection was completed in January 2026.

3. Study Population and Case Definition

Patients were included if they presented with clinical features suggestive of hemobilia (gastrointestinal bleeding with or without jaundice or biliary pain) and had objective confirmation of bleeding originating from the biliary tree.

Confirmed hemobilia was defined by at least one of the following criteria:

- 1) Visualization of blood or clots emerging from the major papilla during upper gastrointestinal endoscopy;
- 2) Evidence of blood within the bile ducts on endoscopic retrograde cholangiopancreatography (ERCP);
- 3) Identification of arterial extravasation or pseudoaneurysm on computed tomography angiography or selective arteriography.

Patients with upper gastrointestinal bleeding of non-biliary origin or incomplete medical records were excluded.

Collected data included clinical, biological, endoscopic, and radiological characteristics, therapeutic modalities, and patient outcomes.

4. Ethical Considerations

This retrospective study was conducted in accordance with the principles of the Declaration of Helsinki. Given its retrospective design and the use of fully anon-

ymized clinical data, formal ethical committee approval was not required. Patient confidentiality was strictly maintained.

5. Results

Clinical and Diagnostic Presentation

The series included six patients, predominantly male, with a mean age in the sixth decade of life. Gastrointestinal bleeding was the primary presenting feature in all cases, manifesting as hematemesis, melena, or profuse hematochezia. In several patients, bleeding was associated with cholestatic jaundice and right upper quadrant pain.

All patients underwent upper gastrointestinal endoscopy as the initial diagnostic investigation. Although endoscopy was frequently non-contributory or failed to identify a clear gastroduodenal source of bleeding, it allowed visualization of active bleeding or blood clots emerging from the major papilla in several cases, strongly suggesting the diagnosis of hemobilia.

Abdominal computed tomography angiography, followed by selective arteriography when indicated, enabled identification of the vascular source of bleeding. The most common etiology was postoperative pseudoaneurysm related to hepatobiliary surgery, while tumoral vascular involvement was identified in two cases.

6. Case Descriptions

Case 1

A 61-year-old man with a history of laparoscopic cholecystectomy performed one year earlier for gallstone disease presented with massive hematemesis and melena associated with tachycardia and hemodynamic instability.

At admission, his hemoglobin level was 7 g/dL (baseline: 10 g/dL), consistent with severe acute anemia. Laboratory investigations demonstrated mild hepatocellular injury with aspartate aminotransferase (AST) at 2 times the upper limit of normal (ULN), alkaline phosphatase at $1.1 \times$ ULN, and markedly elevated gamma-glutamyl transferase (GGT) at $11 \times$ ULN. Total bilirubin was 35 mg/L, with direct bilirubin at 28 mg/L, suggesting associated biliary obstruction.

Upper gastrointestinal endoscopy revealed active bleeding originating from the major papilla (**Figure 1**). Computed tomography angiography followed by selective arteriography demonstrated a pseudoaneurysm of the cystic artery stump with contrast extravasation into the common bile duct.

Selective transcatheter arterial embolization using coils was performed, targeting the pseudoaneurysm as well as the proximal arterial branch supplying hepatic segment V, resulting in immediate control of bleeding (**Figure 2**).

The clinical course was subsequently complicated by migration of coils into the common bile duct, without clinical or biochemical deterioration. The overall outcome was favorable under close clinical and laboratory monitoring.

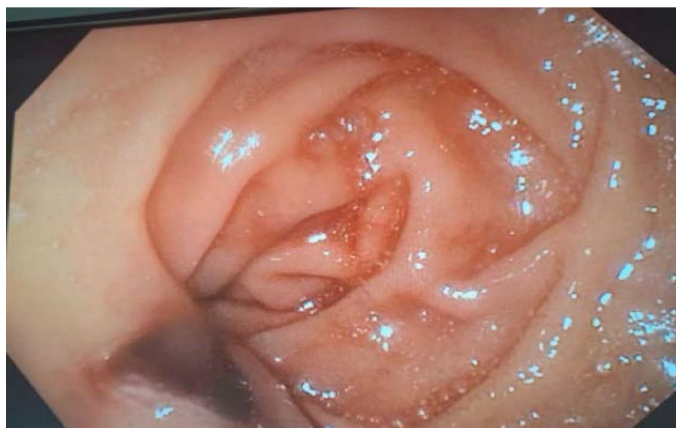


Figure 1. Active bleeding emerging from the papilla of Vater observed during upper gastrointestinal endoscopy.



Figure 2. Pseudoaneurysm of the cystic artery stump with contrast extravasation into the common bile duct, treated by coil embolization.

Case 2

A 31-year-old woman with a history of laparoscopic cholecystectomy performed two years earlier presented to the emergency department with upper gastrointestinal bleeding associated with tachycardia and severe anemia (hemoglobin level: 7.5 g/dL).

Laboratory investigations revealed hepatocellular injury with alanine aminotransferase (ALT) at 4.4 times the upper limit of normal (ULN) and aspartate aminotransferase (AST) at $2 \times$ ULN, along with mild cholestasis (alkaline phosphatase at $1.3 \times$ ULN and gamma-glutamyl transferase [GGT] at $4 \times$ ULN). Total bilirubin was 12 mg/L.

Initial upper gastrointestinal endoscopy did not reveal any gastroduodenal lesion explaining the bleeding. Endoscopic retrograde cholangiopancreatography (ERCP) demonstrated the presence of blood within the common bile duct, confirming the diagnosis of hemobilia.

Vascular imaging subsequently identified a pseudoaneurysm of the right hepatic artery (**Figure 3**), which was successfully treated with selective transcatheter arterial embolization (**Figure 4**).

The clinical and biochemical outcomes were favorable following the procedure.

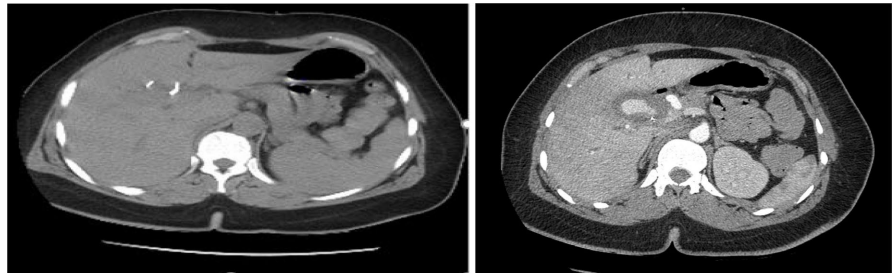


Figure 3. Abdominal computed tomography angiography showing postoperative surgical clips following cholecystectomy; in the arterial phase, a pseudoaneurysm of the right hepatic artery surrounded by a hypodense area is visualized.



Figure 4. Selective arteriography demonstrating a pseudoaneurysm of the right hepatic artery.

Case 3

A 60-year-old man with a history of pancreaticoduodenectomy performed for cholangiocarcinoma presented with melena associated with clinical jaundice.

At admission, his hemoglobin level was 6 g/dL, consistent with severe acute anemia. He was hemodynamically unstable and required transfusion of two units of packed red blood cells.

Laboratory investigations demonstrated a cholestatic pattern of liver function abnormalities, consistent with biliary obstruction.

Duodenoscopy revealed active bleeding at the biliodigestive anastomosis (**Figure 5**). Selective arteriography identified a pseudoaneurysm of the common hepatic artery.

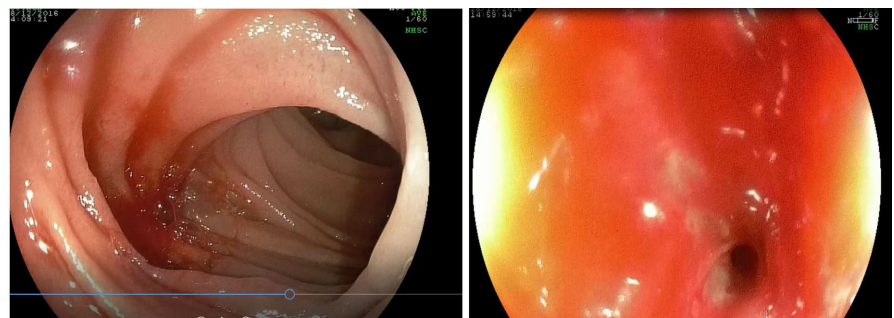


Figure 5. Active bleeding at the hepaticojejunostomy observed during ERCP, consistent with hemobilia secondary to a pseudoaneurysm of the common hepatic artery following pancreaticoduodenectomy for cholangiocarcinoma.

Transcatheter arterial embolization was successfully performed (**Figure 6**), resulting in immediate control of bleeding.

The presence of jaundice was likely related to transient biliary obstruction secondary to intraductal clot formation, a well-recognized mechanism in hemobilia.

The subsequent clinical course was favorable.

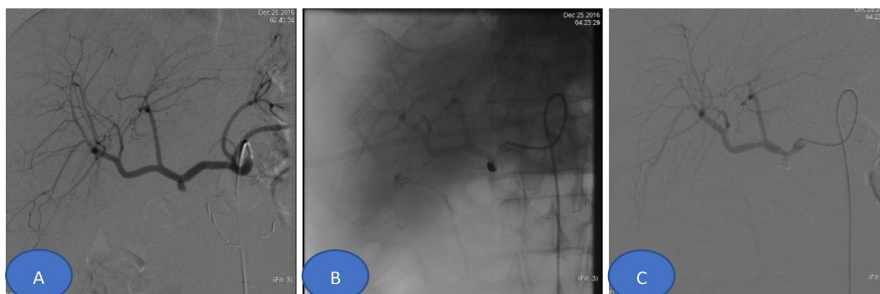


Figure 6. Selective arteriography showing a pseudoaneurysm of the posterior wall of the common hepatic artery without biliary extravasation (A), coil embolization of the pseudoaneurysmal sac (B), and satisfactory angiographic control after embolization (C).

Case 4

An 85-year-old man with no prior surgical history was admitted for biliary colic associated with jaundice and melena.

At presentation, his hemoglobin level was 10.2 g/dL, without evidence of hemodynamic instability. Laboratory investigations demonstrated a mild hepatocellular injury (AST: $1.5 \times$ ULN; ALT: $1.2 \times$ ULN) associated with a marked cholestatic pattern (GGT: $4.5 \times$ ULN). Total bilirubin was 130 mg/L, with direct bilirubin at 66 mg/L, consistent with significant biliary obstruction.

Upper gastrointestinal endoscopy did not reveal any gastroduodenal source of bleeding.

Abdominal computed tomography angiography demonstrated a gallbladder tumor complicated by hemobilia. Endoscopic retrograde cholangiopancreatography (ERCP) revealed a normal-caliber common bile duct with dilation of the intrahepatic bile ducts. A biliary stent was placed, with active blood drainage observed through the stent.

Given the absence of hemodynamic instability and the presumed tumoral origin of bleeding, conservative management was adopted. The clinical course was marked by spontaneous hemostasis and favorable evolution.

Case 5

A 49-year-old man presented with profuse hematochezia associated with tachycardia and hemodynamic instability.

At presentation, his hemoglobin level was 6 g/dL (baseline: 12 g/dL), consistent with severe acute blood loss anemia. He required transfusion of packed red blood cells as part of initial resuscitative management.

Laboratory investigations demonstrated marked hepatocellular injury, with alanine aminotransferase (ALT) at 11 times the upper limit of normal (ULN) and

aspartate aminotransferase (AST) at $16 \times$ ULN, associated with cholestasis (gamma-glutamyl transferase [GGT] at $6 \times$ ULN). Total bilirubin was 40 mg/L, including 23 mg/L of direct bilirubin.

Initial endoscopic evaluation, including both upper gastrointestinal endoscopy and colonoscopy, failed to identify the source of bleeding.

Abdominal imaging revealed dilation of the common bile duct without evidence of lithiasis or tumoral obstruction. In the setting of persistent unexplained gastrointestinal bleeding associated with biliary abnormalities and abnormal liver function tests, endoscopic retrograde cholangiopancreatography (ERCP) was performed.

ERCP enabled extraction of an intraductal blood clot from the common bile duct, thereby confirming the diagnosis of hemobilia.

Subsequent etiological investigations identified a vascular source of bleeding, which was successfully treated by selective transcatheter arterial embolization. The clinical outcome was favorable.

Case 6

A 56-year-old man was referred for melena evolving over several weeks, associated with severe anemia. On admission, he was tachycardic (heart rate: 105 bpm) but without clinical jaundice.

His hemoglobin level at presentation was 6.3 g/dL, consistent with significant acute blood loss. During the course of bleeding, the nadir hemoglobin reached 4 g/dL. He required transfusion of eight units of packed red blood cells, resulting in stabilization of hemoglobin at 11 g/dL.

Liver function tests demonstrated a cholestatic pattern, with total bilirubin at 26 mg/L (direct bilirubin: 19 mg/L), gamma-glutamyl transferase (GGT) at $7.7 \times$ the upper limit of normal (ULN), alkaline phosphatase (ALP) at $4.6 \times$ ULN, and mild hepatocellular injury (AST: $1.9 \times$ ULN; ALT: $2 \times$ ULN).

Upper gastrointestinal endoscopy revealed a submucosal lesion on the lesser curvature of the stomach (**Figure 7**), associated with active bleeding emerging from the major papilla.

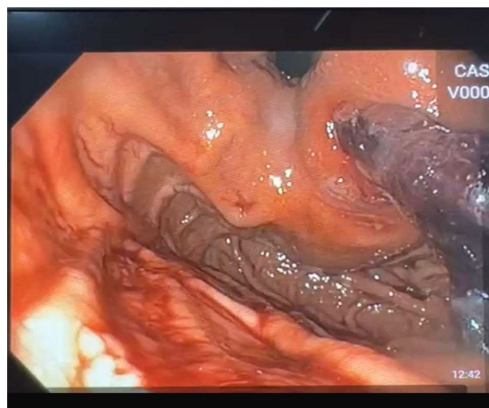


Figure 7. Endoscopic image showing a large submucosal lesion of the lesser curvature of the stomach, suggestive of a gastrointestinal stromal tumor (GIST), partially covered by an adherent blood clot.

Abdominal computed tomography angiography demonstrated a mass suggestive of a gastrointestinal stromal tumor (GIST) with extension to the left hepatic lobe. Imaging also showed dilation of the intrahepatic bile ducts and the common bile duct. Further evaluation identified hemobilia secondary to a pseudoaneurysm of the right hepatic artery, with contrast extravasation into the biliary tree.

Emergency transcatheter arterial embolization was performed (**Figure 8**), achieving effective control of bleeding.

The subsequent clinical and biochemical course was favorable under medical management and close monitoring.

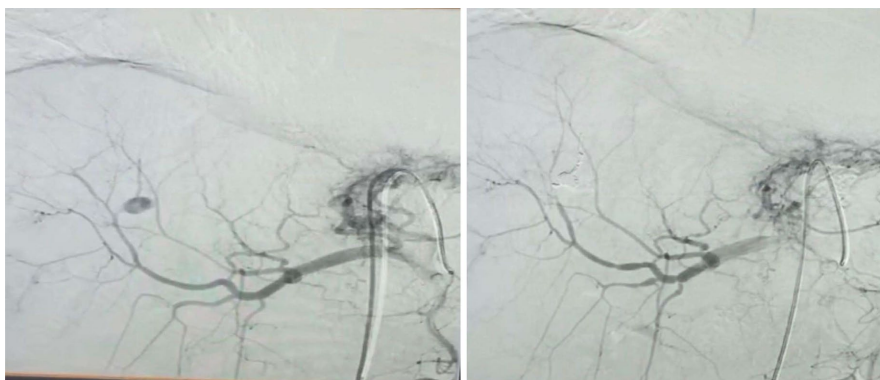


Figure 8. Pseudoaneurysm of the right hepatic artery treated by selective coil embolization.

7. Discussion

Hemobilia is a rare cause of gastrointestinal bleeding, resulting from an abnormal communication between a vessel of the splanchnic circulation and the biliary tree [1] [2]. Since its first description by Sandblom in 1948 in the setting of abdominal trauma [1], its epidemiology has significantly evolved. While traumatic causes historically predominated, iatrogenic etiologies now account for the majority of cases, paralleling the increasing use of hepatobiliary surgery and diagnostic and therapeutic interventional procedures [2] [4] [5].

Through this series of six cases, we highlight the diversity of etiological contexts, clinical presentations, and management strategies of hemobilia. Three cases occurred secondary to hepatobiliary surgery, mainly laparoscopic cholecystectomy; one followed major surgery in the form of pancreaticoduodenectomy; and two were related to tumoral processes. This heterogeneity is consistent with the literature, in which postoperative pseudoaneurysms—particularly those involving the cystic artery or branches of the hepatic artery—represent one of the most frequently reported causes of delayed hemobilia [6]-[9].

From a pathophysiological perspective, post-surgical hemobilia most often results from progressive arterial wall injury induced by various mechanisms, including direct needle puncture, erosion by vascular clips, thermal injury related to electrocautery, or local inflammation. These factors may lead, sometimes long after the initial procedure, to the formation of a pseudoaneurysm whose subsequent rupture into the biliary tree causes bleeding [6]-[8]. In our series, the interval between

surgery and symptom onset ranged from several weeks to several years, underscoring the potentially delayed nature of this complication and the importance of maintaining clinical suspicion even after procedures considered routine, such as cholecystectomy.

The clinical presentation of hemobilia is classically described by Quincke's triad, consisting of upper gastrointestinal bleeding, right upper quadrant pain, and jaundice. However, this triad is observed in only 20% - 30% of cases [2] [5], contributing to diagnostic challenges. In our series, all patients presented with gastrointestinal bleeding, whereas jaundice and biliary pain were inconsistently observed. Some patients exhibited atypical manifestations, such as isolated hematochezia or prolonged melena, illustrating the broad clinical spectrum of hemobilia and explaining the diagnostic delays frequently reported in the literature.

Upper gastrointestinal endoscopy remains the first-line investigation in patients presenting with gastrointestinal bleeding. Although often non-contributory, it may suggest the diagnosis when active bleeding or blood clots are observed emerging from the papilla of Vater [2] [5]. In our series, endoscopy raised suspicion in several cases but was insufficient to determine the underlying etiology. ERCP played a complementary role by demonstrating intraductal blood or clots and, in selected cases, enabling biliary drainage.

Vascular imaging is central to the diagnostic workup. Computed tomography angiography often allows initial localization of the vascular lesion, whereas selective arteriography remains the reference standard [1] [2] [5] [9]. In addition to confirming the diagnosis through visualization of a pseudoaneurysm or contrast extravasation into the biliary tree, arteriography enables immediate endovascular treatment. In our experience, it accurately identified the bleeding source in all cases with suspected vascular origin.

Regarding therapeutic management, transcatheter arterial embolization (TAE) has become the treatment of choice for hemodynamically significant hemobilia. Robert *et al.* [9] reported success rates exceeding 80% with a low rate of major complications, and Berry *et al.* [5] confirmed the efficacy and safety of selective embolization as first-line therapy. When superselective catheterization is feasible, this approach ensures durable bleeding control while preserving hepatic perfusion [5] [7] [9]. In our series, embolization achieved effective hemostasis in the majority of patients, without the need for surgical reintervention, with outcomes comparable to those reported in these reference series.

More recent literature has further reinforced the central role of TAE in hemobilia management. A contemporary review published in 2024 emphasizes that angiography with embolization should be considered the first-line therapeutic approach in clinically significant cases, reporting high technical success rates and favorable clinical outcomes [10]. In our cohort, embolization successfully controlled bleeding in all patients with a documented vascular source, without the need for emergency surgery. These findings align with contemporary data and further support interventional radiology as the cornerstone of modern hemobilia management.

Complications related to embolization are generally uncommon but should be recognized. They include transient hepatic cytolysis, hepatic or gallbladder ischemia, and, more rarely, hepatic infarction or ischemic biliary injury, particularly when non-selective embolization is required [5] [7] [9]. In our series, one case of coil migration into the common bile duct was observed, a rare complication sporadically described in the literature. Such events may result in biliary obstruction or cholangitis and warrant prolonged clinical, biochemical, and radiological follow-up.

The limitations of our study include its retrospective, single-center design and the small sample size, inherent to the rarity of hemobilia. Nevertheless, this series contributes meaningful clinical insight by illustrating the diversity of etiologies, variable time to onset, and heterogeneous presentations, while reaffirming the pivotal role of interventional angiography in contemporary management.

8. Conclusion

In conclusion, hemobilia remains a rare but potentially life-threatening cause of gastrointestinal bleeding. The diagnosis should be considered in cases of unexplained gastrointestinal bleeding associated with biliary manifestations, particularly in patients with a history of hepatobiliary surgery or malignancy. Selective arteriography with transcatheter embolization represents an effective and safe therapeutic strategy, allowing avoidance of major surgical intervention in the majority of cases.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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