

## Case Report

### Transarterial Embolization of a Hepatic Pseudoaneurysm with Hemobilia

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#### Abstract

We report a case of severe hemobilia due to a Right Hepatic Artery Pseudoaneurysm (RHAP) occurring 4 months after a laparoscopic converted to open cholecystectomy. The abdominal CT, ultrasound and an endoscopic retrograde cholangio pancreatography strongly suggested a RHAP. Our patient underwent a new open laparotomy; however, active bleeding recurred. The patient became hemodynamically unstable and received several globular units to avoid hypovolemic shock. A celiac trunk angiography confirmed a RHAP. Using a coaxial technique, geometry guided microcatheter reached a stable position in close proximity to the RHAP and an embolic mixture of n-butyl cyanoacrylate dissolved in lipiodol was injected achieving a successful deconstructive obliteration of both RHAP and RHA. Our patient made an uneventful and rapid recovery.

**Keywords:** Embolization; Hemobilia; Hepatic artery; Pseudoaneurysm

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#### Abbreviations

RHA: Right Hepatic Artery

RHAP: Right Hepatic Artery Pseudoaneurysm

#### Introduction

Hepatic and Cystic artery pseudoaneurysm with hemobilia represents rare and life-threatening complications from laparoscopic cholecystectomy. A few cases have been reported in the literature. We report a patient with acute severe upper digestive bleeding from a Right Hepatic Artery Pseudoaneurysm (RHAP) following a laparoscopic cholecystectomy that was successfully treated with endovascular embolization.

#### Case Presentation

A 52-year-old woman presented to the emergency department 4 months after laparoscopic converted to open cholecystectomy. The patient presented with abdominal pain, hematemesis and melena. She was pale with mild jaundice, her blood pressure was 80/40 mmHg and heart rate was 140 bpm. Right upper quadrant tenderness was noted. Her hemoglobin was 3.7 g/dl, white cell count 4,410 pcmm, platelet count 269,000 pcmm, with INR 1,15, prolonged coagulation times, total bilirubin 4.8 mg/dl, direct bilirubin 2.8 mg/dl, Gamma-glutamyltransferase 333 IU/L (normal range: 10-42 IU/L), and alkaline phosphatase 253 IU/L (38-126 IU/L) (Table 1). Ultrasound showed dilatation of the biliary tree and a pulsatile vessel next to the hepatic duct. The choledochus duct was dilated up to 17 mm with an intraluminal clot. An upper gastrointestinal endoscopy revealed blood clots in the duodenum with an active bleeding through the ampulla of Vater (Figure 1). A contrast enhanced CT scan showed fresh blood on the surface of the liver, adjacent to the surgical clips in the previous cholecystectomy surgical bed, as well as high-density material along the lower digestive tract, suggesting recent intraluminal bleeding. The arterial phase of dynamic CT imaging revealed a contrast enhanced 13 mm nodular lesion besides the main trunk of the right hepatic artery with extravasation of contrast to the liver hilum area, suggesting a RHAP (Figure 2). The patient underwent an emergency exploratory laparotomy revealing adhesences; the choledocus diameter was 2 cm with intraluminal blood. An allegedly right hepatic artery was ligated and a biliary Kehr and a Jackson-Pratt drain were placed. After surgery, significant digestive bleeding and hypotension recurred, and the patient was sent to the radiological interventional unit.

A celiac trunk angiogram with a 5F Cobra II catheter showed a RHAP adjacent to the surgical clips. The catheter was exchanged by a Chaperon 5 F guiding catheter and a Rebar 18 microcatheter with a Silverspeed 14 micro guidewire and was navigated distally towards the right hepatic artery. A position of embolization was selected 2 cm before the RHAP where 1.8 cc of n-butyl cyanoacrylate diluted in lipiodol at a 50% concentration was injected obliterating both the right hepatic artery and the pseudoaneurysm as demonstrated by means of a postembolization celiac artery angiogram. A post embolization superior mesenteric angiogram showed patency of gastroduodenal and left hepatic artery retrogradely through its anastomoses with the gastroduodenal artery, branch of the common hepatic artery (Figure 3). The patient was sent to the ICU where continued receiving globular

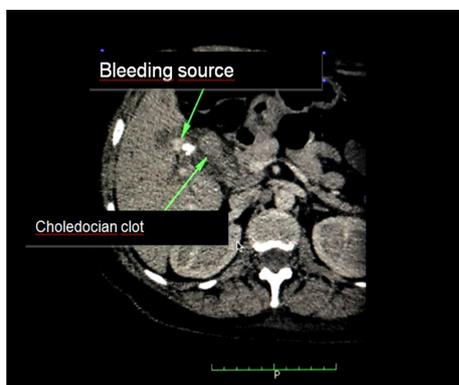
packages (to a total amount of 14 and 7 units of frozen plasma) and antibiotics. Few days later our patient recovered uneventfully with normalization of laboratory tests. Four months after embolization, the patient is well and free of complaint.

Date	15/08	18/08	25/08
Hemoglobin (g/dL)	3.7	10.4	10.0
MCV / mch (fl / pg)	83/26	85/29	92/30
Leucocytes (cél/ul)	4.41	11.09	9.6
RODS	0		0
Segmented	54		67
Platelets x 10 <sup>3</sup> (cél/ul)	269	190	312
Inr	1.15	1.08	
TTPa (sec)		30.9	
Urea / creatinine (mg/dl)	45/0.6	25.9/	
Proteins / albumin (g/dl)	5.3/2.7	4.8/2.3	6.6
Bilirubin tot / dir (mg/dl)	2.1/1.5	5.0/3.9	0.8/0.7
got / pggt (ui/l)	218/124	49/72	32/34
Alkaline Phosphatase / ggtp (ui/l)	467/440	215/224	252/162

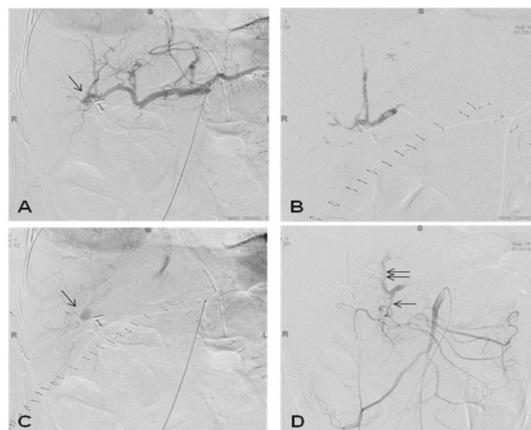
**Table 1:** Values from laboratory before and after the Transarterial Embolization of a Hepatic Pseudoaneurysm.



**Figure 1:** Upper digestive tract endoscopy showing a massive fresh clot coming out the ampulla of Vater.



**Figure 2:** Non contrast CT scan showing the bleeding focus close to the surgical clips and liver hilum region (punto de sangrado) and a large clot in the choledocian lumen (coagulo coledociano).



**Figure 3:** A) Celiac trunk angiography showing a RHAP adjacent to the surgical clips (arrow). B) Microcatheter injection of 50% n-bca + lipiodol occluding both right hepatic artery and the pseudoaneurysm in a deconstructive fashion. C) Late phase shows contrast stagnation inside the RHAP (arrow). D) Post-embolization superior mesenteric artery angiography showing patency of the left hepatic artery (double arrow) through its anastomosis with the gastroduodenal artery (arrow).

## Discussion

Laparoscopic cholecystectomy has replaced open surgery for cholelithiasis because it has lesser complications and shorter recovery time; however, iatrogenic biliary and vascular injuries still occur in 0.3 to 1.0 % of the patients [1-3]. A symptomatic pseudoaneurysm may arise in the early postoperative period or as late as 120 days after surgery [4].

The pathogenesis of a pseudoaneurysm of the hepatic and cystic arteries probably relates to disruption of the arterial wall related to mechanical and/or thermal vascular injury due to electrocautery and/or to bile leakage with chemical injury related to surgical dissection at the infundibulum of the gallbladder [4-11]. If the pseudoaneurysm communicates with the biliary tree, the patient will present with hemobilia.

Hemobilia presents the triad of Quinke; gastrointestinal bleeding, abdominal pain and jaundice. The intensity of the symptoms may vary from mild pain, anemia with or without slight jaundice to massive, life threatening gastrointestinal bleeding [12-14]. The probability and severity of the bleeding correlates directly with the size of the pseudoaneurysm [9,12-15].

A recent surgical history and the clinical picture of hemobilia should prompt to endoscopy with retrograde endoscopic cholangiography, however it is often inconclusive [6,16]. Imaging studies such as Spiral CT and or ultrasound may reveal signs of the aneurysm [10,17-21]. The gold standard for the diagnosis is a visceral angiography [1,13,14,22].

Transarterial embolization is the first therapeutic option in case of a severe or recurrent bleeding and has a success rate of 80 to 100% with a few complications [1,14,22,23]. In case of compression of the bile duct or a fistula or failure from embolization, open surgery should be performed to ligate the affected artery [17]. In our patient, surgical ligation of the right hepatic artery was presumably performed,

probably a branch, without occluding the main trunk of the RHA that harbored the pseudoaneurysm which led to recurrent bleeding that prompted embolization. Among the limitations of embolization are anatomical variations of the hepatic artery and recanalization of the aneurysm [24]. Hepatic artery embolization risks are hepatobiliary necrosis, bleeding, abscess formation and gallbladder fibrosis [24]. In case of embolization failure, open surgery for hemobilia is indicated [24,25].

In the scenario of hemobilia after laparoscopic cholecystectomy, a hepatic artery aneurysm must be strongly suspected, angiographically confirmed and embolized. If embolization fails, surgical intervention should be performed. This report aims to contribute to the awareness of the surgical community on the diagnosis and treatment of this infrequent situation and to highlight the relevance of endovascular embolization.

Among the therapeutic alternatives to occlude an aneurysmal sac, we have the reconstructive technique which uses metal coils or coated stents, and the deconstructive technique in which it is embolized by injecting occluding substances.

We decided for the second option before the difficult geometry of the celiac trunk that prevented the advance of our microcatheter guide towards the RHA and we used n-butyl cyanoacrylate plus lipiodol for its wide availability and lower cost in our environment as well as for our experience with this mixture in thousands of brain and systemic injuries. Particulate materials such as PVA, gel foam and others can only occlude the distal arteriolo-capillary bed, but not large arteries, such as the RAE, which can increase the pressure of the stump and induce new hemorrhages.

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