

CASE REPORT

Rare Cause of Delayed Upper Gastrointestinal Bleeding After Pancreaticoduodenectomy

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ABSTRACT

Context Luminal bleeding after pancreaticoduodenectomy can be present in various degrees of acuity in up to 30% of patients. **Case report** In this report, we describe a rare and uncommon cause of gastrointestinal bleeding after pancreaticoduodenectomy and review of the literature. **Conclusions** Multiple biliary procedures with common complications increase the difficulty making the correct diagnosis and therefore all possible etiologies of a complication must be evaluated.

INTRODUCTION

In today's multidisciplinary approach to medicine, complications can arise from multiple interventions in a patient's care. It is critical to understand the possible complications of each intervention a patient undergoes to determine the correct diagnosis and direct appropriate treatment.

Upper gastrointestinal bleeds are commonly encountered in the clinical setting. The following presentation is a patient with life threatening gastrointestinal bleeding after pancreaticoduodenectomy. It serves as a reminder to evaluate all possible complications of previous interventions as well as the role of angiography in diagnosis and treatment of hemobilia.

CASE REPORT

The patient is a 68-year-old man who presented with jaundice, weight loss, abdominal pain, and early satiety. He had a recent history of gallstone pancreatitis, post ERCP with sphincterotomy and common bile duct stent placement and cholecystectomy. He had been discharged home in good condition, but returned due to a severe gastric

outlet obstruction. He underwent repeat ERCP, but the procedure was aborted secondary to a duodenal stenosis. His biliary system was then drained with a percutaneous biliary drainage with a 8-Fr internal-external biliary drain (Flexima[®], Boston Scientific, Natick, MA, USA). Figure 1a demonstrates a lack of contrast filling the duodenum by percutaneous transhepatic cholangiography (PTC), and Figure 1b demonstrates the placement of the drain. An endosonography was then performed which confirmed a mass in the head of the pancreas. This was found by fine needle aspiration to be pancreatic adenocarcinoma with tumor invading into the duodenum. A staging helical abdominal CT with pancreatic protocol was performed, and one week later the patient underwent a classic pancreaticoduodenectomy with distal gastrectomy. At the end of surgery the percutaneous biliary drain was removed. The patient tolerated the procedure well. On post-operative day number three, the patient became acutely hypotensive and had a melanic stool with a drop in hemoglobin from 9.0 g/dL pre-operatively to 6.4 g/dL (reference range: 12.0-16.0 g/dL) requiring transfusion of 3 units of packed red blood cells. Endoscopy on two consecutive days identified the gastric anastomosis but found only clotted blood in the stomach with no source of bleeding. The patient's hematocrit later stabilized, and he was discharged home on postoperative day seven. The patient returned three weeks later with near-syncope symptoms, melena, and hematochezia. As the patient was exhibiting signs of intra-luminal bleeding, his first line diagnostic method was endoscopy which had to be repeated the following day due to clotted blood in the stomach. An additional 9 units of packed red blood cells were transfused. A tagged red-blood cell scan demonstrated bleeding localized to the

Received October 4th, 2011 - Accepted January 2nd, 2012

Key words Biliary Tract Surgical Procedures; Hemobilia; Hemorrhage; Jaundice; Pancreatic Neoplasms; Pancreaticoduodenectomy

Abbreviations ISGPS: International Study Group of Pancreatic Surgery

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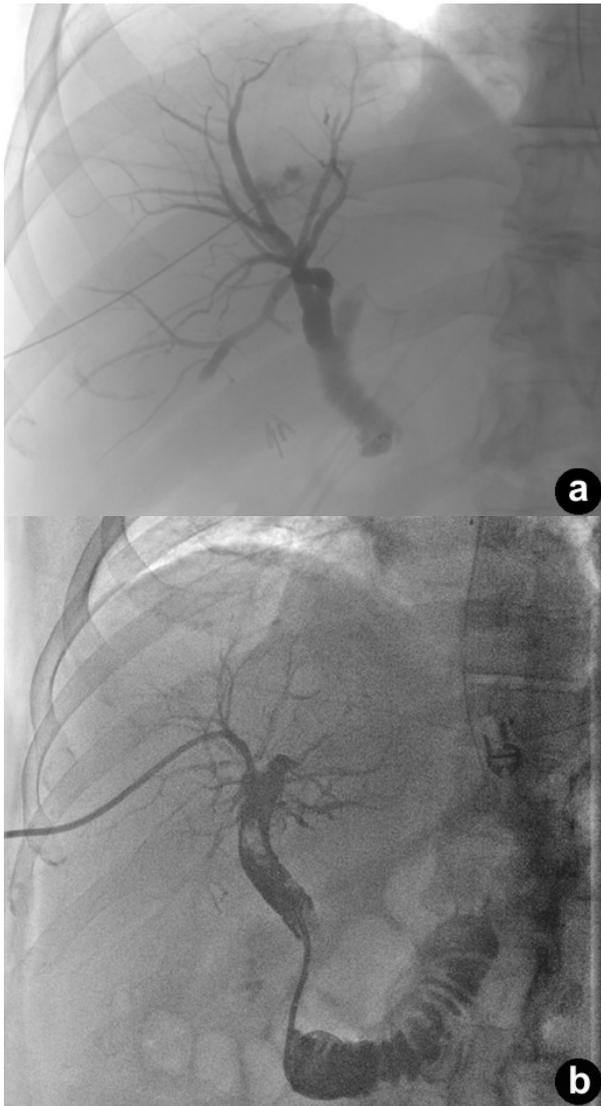


Figure 1. a. Percutaneous transhepatic cholangiography with filling defect of the duodenum. **b.** Percutaneous biliary drainage placement and filling of the duodenum.

proximal small bowel, and angiography demonstrated a right intra-hepatic artery pseudoaneurysm (Figure 2ab). The appearance of this pseudoaneurysm was small and intrahepatic and there was no extravasation of contrast or communication with the biliary tree. However, this was the likely source of bleeding and therefore we proceed to embolize it expeditiously. The patient had two straight 2 mm microcoils and two vortex microcoils of 3 ad 3.3 mm placed for selective embolization. After the procedure, the patient's hematocrit stabilized, and he had no further episodes of hypotension or gastrointestinal bleeding. He is currently doing well without any sequelae nine months after surgery.

DISCUSSION

Gastrointestinal bleeding is a widely known complication after pancreaticoduodenectomy with a reported incidence of 2-18% [1]. Etiologies of gastrointestinal bleeding range from technical failure at

the anastomotic site to marginal ulcer formation to visceral artery bleeding (Table 1) [2]. As there have been a wide range of published bleeding rates after pancreaticoduodenectomy, the International Study Group of Pancreatic Surgery (ISGPS) proposed a classification system of post-pancreatic hemorrhage based on time of onset, location of bleeding, and severity of hemorrhage. Onset is defined as early (less than 24 hours) versus delayed (more than 24 hours) to more accurately classify causes of bleeding [11]. The most common cause of early post-pancreatic hemorrhage is technical failure at the anastomotic site. Causes of delayed post-pancreatic hemorrhage are pancreatic leak leading to vessel disruption, intra-abdominal infection with peripancreatic involvement, and vascular injury during resection [11]. Location of bleeding is defined as intra-luminal *versus* extra-luminal. Finally, severity of hemorrhage is evaluated as mild *versus* severe. Mild hemorrhage consists of a drop in hemoglobin less than 3 g/dL without physiologic impairment and successful conservative management consisting of i.v. fluids and transfusion of less than 3 units of blood. Severe hemorrhage is defined as a

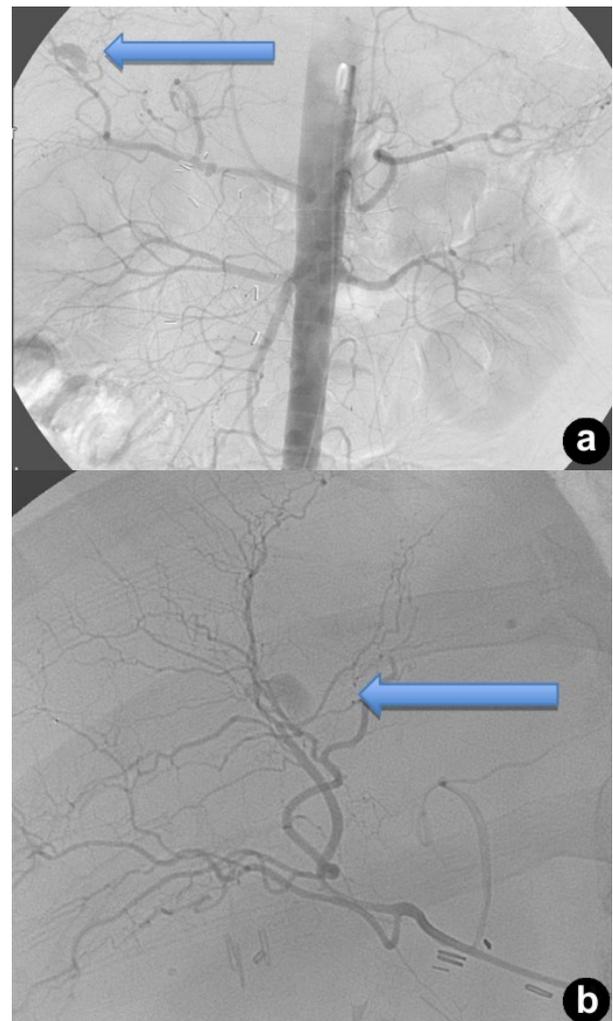


Figure 2. Right intra-hepatic artery pseudoaneurysm. Note the proximity of the percutaneous transhepatic cholangiography catheter (a.) to the location of the pseudoaneurysm (b.).

Table 1. Causes of gastrointestinal bleed after pancreaticoduodenectomy.

Study	Subjects	Total bleeds	Gastrointestinal bleeds	Causes (% of all patients)
Limongelli <i>et al.</i> [3] ^a	4,333	169 (3.9%)	62 (1.4%)	Pseudoaneurysm: 53 (1.2%)
Rumstadt <i>et al.</i> [4]	559	42 (7.5%)	22 (3.9%)	Pseudoaneurysm: 1 (0.2%)
Choi <i>et al.</i> [5]	500	22 (4.4%)	20 (4.0%)	Anastomotic sites: 3 (0.6%) Arterial: 14 (2.8%) Pseudoaneurysms: 9 (1.8%) Unknown: 5 (1.0%)
Rajarithinam <i>et al.</i> [6] ^a	458	14 (3.1%)	6 (1.3%)	Arterial bleeding in pancreas: 5 (1.1%) Anastomotic site: 2 (0.4%) Pseudoaneurysm: 7 (1.5%)
Yekebas <i>et al.</i> [7]	1,524	87 (5.7%)	36 (2.4%)	Vascular erosions: 13 (0.9%) Pseudoaneurysm: 4 (0.3%)
de Castro <i>et al.</i> [8] ^a	1,010	23 (2.3%)	14 (1.4%)	Sepsis/leak: 17 (1.7%) Arterial: 4 (0.4%) Anastomotic site: 2 (0.2%) Pseudoaneurysm: 1 (0.1%)
Fujii <i>et al.</i> [9]	357	13 (3.6%)	Not reported	Pseudoaneurysm: 7 (2.0%)
Treckmann <i>et al.</i> [10] ^a	189	11 (5.8%)	6 (3.2%)	Arterial: 9 (4.8%) Unknown: 2 (1.1%)

^a Measured only delayed hemorrhage

hemorrhage equal to, or greater than, 3 g/dL, causing clinical impairment, and requiring more than 3 units of blood and/or invasive operative or angiographic therapy. The ISGPS has combined the three factors above to classify hemorrhage as grade A, B, or C [11]. In our patient, the first episode of bleeding was a grade A hemorrhage (least severe), and the second episode was classified as a grade C (most severe) hemorrhage.

A meta-analysis evaluating delayed post-operative hemorrhage after pancreaticoduodenectomy demonstrated pseudoaneurysm to be involved in 31% of cases [4]. The mechanism of pseudoaneurysm is thought to be related to pancreatic leak causing irritation to the adventitia of the arterial wall. A common associated finding with bleeding from a visceral artery pseudoaneurysm is the sentinel bleed days to weeks before a large gastrointestinal hemorrhage [10]. A single center retrospective review of 35 cases of delayed post-pancreatic hemorrhage secondary to pseudoaneurysm demonstrated a sentinel bleed in 45% of patients [12].

Hemobilia is a known complication of percutaneous biliary instrumentation. Percutaneous liver interventions are the leading cause of iatrogenic hemobilia [13]. The quality improvement guidelines for PTC and biliary drainage published by the Journal of Vascular and Interventional Radiology recognize hemorrhage as a complication of these procedures and cite a 2.5% complication rate and suggest an acceptable hemorrhage rate of 5% [14]. A comparison of left sided versus right sided PTDB was performed on a series of 346 patients and showed an increased rate of hemobilia in left sided biliary drainage procedures; however, it was not shown to be a statistically significant increase over the right side [15].

Percutaneous biliary drainage can cause immediate bleeding by direct vascular injury or a delayed bleed secondary to pseudoaneurysm formation with communication to the biliary system [16]. A case of

intrahepatic pseudoaneurysm causing life-threatening upper gastrointestinal bleed immediately after removal of a biliary drainage catheter has been reported in the literature [17]. The suspected cause was the 18-Fr drainage catheter injuring the wall of the adjacent left hepatic artery, which tamponaded the site until the time of drain removal. In our case, there was a sentinel bleed which then subsided leading us to believe this was an enteric staple line bleed from the gastric anastomosis. When the patient represented with bleeding three weeks after the surgery, it was unclear about the pathogenesis given the timing. When repeated endoscopies are not conclusive, a four-phase CT scan or angiogram should be obtained.

When patients have percutaneous biliary drainage prior to pancreaticoduodenectomy, what is the optimal timing for removal of the drain? Many would consider 4-6 weeks the optimal timing to provide ample drainage for the biliary anastomosis. In the setting of cancer with the biliary tube in the duodenum, it was our approach to remove it at the time of surgery since there may have been potential for cancer seeding. Since this was a delayed bleed, the cause of bleeding would remain a diagnostic dilemma even after pulling the drain out six weeks later; conversely, the differential diagnosis of bleeding is significantly narrowed with the delayed removal since early causes of gastrointestinal bleeding have been ruled out.

SUMMARY

Gastrointestinal hemorrhage is a known complication of both pancreaticoduodenectomy and percutaneous biliary drainage. While bleeds within 24 hours are likely associated with anastomotic bleeding, causes for bleeding after the 24-hour time period are more variable [1]. Multiple procedures with common complications add difficulty to the diagnosis and therefore all possible etiologies of a complication must be evaluated.

Conflict of interest All authors have no disclosures or conflicts of interest to report

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