

CASE REPORT

Management of Delayed Arterial Hemorrhage After Pancreato-Duodenectomy. A Case Report Study

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ABSTRACT

Context Delayed arterial hemorrhage after pancreatoduodenectomy is defined as bleeding 5 or more days postoperatively. **Objective** We present the management of delayed hemorrhage after PD, due to gastro-duodenal arterial stump aneurysm. **Case report** A sixty-nine-year-old man suffering from pancreatic head carcinoma underwent pancreatoduodenectomy. On the 12th postoperative day he developed melena. Endoscopic evaluation revealed occult bleeding coming from the afferent limb of the gastro-jejunal anastomosis. The patient was treated conservatively. On the 15th postoperative day the patient presented a new episode of melena and hematemesis. Upper abdominal series control by computer tomography, selective angiography of the celiac trunk and superior mesenteric artery set the diagnosis of a pseudoaneurysm of the gastro-duodenal arterial stump. The patient was managed by trans-catheter arterial embolization and complete hemostasis was achieved. **Conclusion** Delayed intraluminal hemorrhage after pancreatoduodenectomy may be caused after pseudoaneurysm due to some visceral arterial stem erosion. Initial management, both diagnostic and therapeutic, should be the angiographic control and trans-catheter embolization of the bleeding vessel. In case of hemodynamic instability or when angiographic embolism is unsuccessful reoperation is the proper treatment.

INTRODUCTION

Even though, post-pancreatectomy hemorrhage (PPH) is a rare condition; it is one of the most life-threatening complications. The reports of the incidence and mortality rates of PPH vary from study to study. These differences seem to be, due to the fact that researchers define PPH in a different way. More specifically, the time of onset, the location and the severity of hemorrhage play an important role in the choice of the optimal therapeutic option. A risk stratification of PPH was attempted by several authors. Different authors define early onset PPH at different time intervals like at ≤ 24 hours, at 48 hours or at first to fifth postoperative day of the index operation. The location can be intraluminal or extraluminal and the severity of the bleeding may be mild or severe. Other complications such as coincident pancreatic fistulas and vascular pathologies (erosions, aneurysms) modify the therapeutic approach. Otherwise, early bleeding is usually appeared after technical failures. More discrete lines exist in the case of delayed PPH, where angiography could be the proper procedure. Anyhow, we can define a bleeding after PD as delayed when hemorrhage occurs 5 or more days postoperatively.

CASE REPORT

A sixty-nine-years-old male patient underwent a pancreatectomy (Whipple) procedure due to pancreatic head adenocarcinoma. Patient never had an EGD, melenas or hematemesis in the past. At his admission, physical findings showed Courvoisier sign and blood tests showed HCT: 41%, HGB: 13.7 g/dL, PLT: 221 K/ μ l, INR: 0.87. On the 12th postoperative day appeared an episode of melena. He was hemodynamically stable but drop in hemoglobin necessitated two units of blood transfusion. Abdominal drains were removed on the 7th postoperative day, since we had noted minimal postoperative drainage by the 5th postoperative day. Upper GI endoscopy revealed blood coming from the afferent limb of the gastro-jejunal anastomosis (**Figure 1**). The femoral artery was used for access under local anesthesia. Embolization with platinum microcoils was used for aneurysm ablation and complete hemostasis was succeeded. Upper endoscopy confirmed no further hemorrhage from the gastrointestinal tract before the patient was discharge. The gastro-jejunal anastomosis was intact. The patient remained stable with conservative treatment such as transfusions with Red Blood Cells and Fresh Frozen Plasma. We also changed the gastric protection from ranitidine to proton pump inhibitors (pantoprazole) during the next 48 hours.

On the 15th postoperative day the patient had a new episode of melena followed by hematemesis. As the patient was hemodynamically stable, CT-scan of the upper abdomen was performed with intravenous radiocontrast. Suspicion

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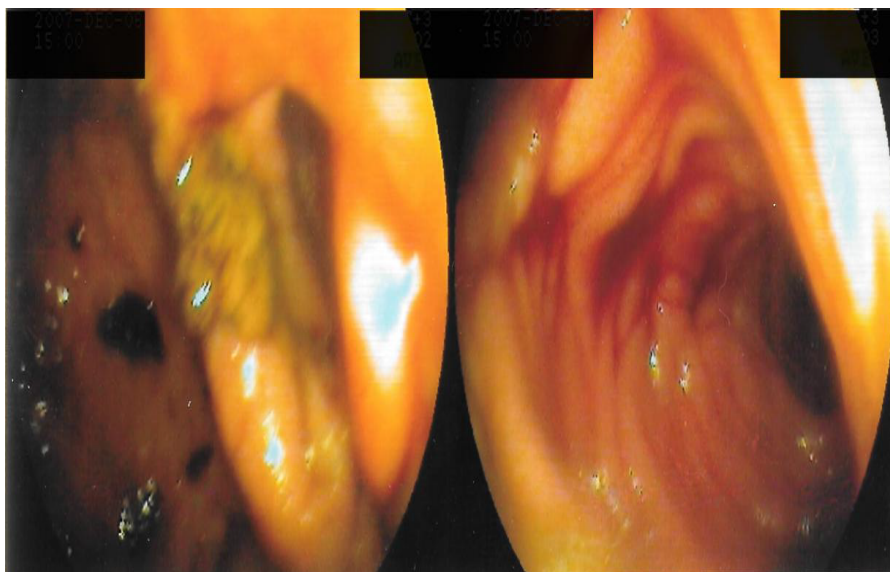


Figure 1. EGD showing bleeding from the site of anastomosis.

of a pseudoaneurysm was put by the latest examination and the pseudoaneurysm was detected by the CT scan with i.v. contrast fluid (**Figure 2**). The diagnosis and treatment (embolization) were performed with angiography by interventional radiologists. Indeed, there are reports which propose that aggressive treatment may contribute to post operative bleeding. That happens because of the interaction of pancreatic fluids post-operationally with the vessels. This interaction makes their wall vulnerable to aneurysms. So, the aggressiveness of the procedure increases the chances of a post operational bleeding.

A visceral angiogram of the celiac trunk and superior mesenteric artery was performed and a 2 cm pseudoaneurysm arising from the stump of the gastroduodenal artery was found. The celiac trunk was selectively catheterized and through the hepatic artery the gastroduodenal stump was embolized with platinum microcoils (**Figure 3**). The patient had an uneventful course and before his discharge we repeated an upper endoscopy, which confirmed the absence of bleeding from the gastro-jejunal anastomosis and its afferent and efferent limbs. The patient was discharged on the 22nd postoperative day and had no further bleeding episodes during a 6-month follow up period.

DISCUSSION

Delayed bleeding after PD is relatively rare (1%-4%) but carries a high mortality rate up to 50% [1, 2]. Late bleeding may originate from the gastrointestinal tract (peptic ulceration or from the anastomosis). Also in the case of delayed PPH characteristics such as the severity of bleeding, the intraluminal or extraluminal presentation and the relative septic complications with or without pancreatic fistula must also be considered. At this study we report a case of delayed PPH after PD caused by gastroduodenal arterial stump pseudoaneurysm presented as intraluminal gastrointestinal bleeding.

Generally, delayed PPH presents as a sudden intermittent intraluminal or intra-abdominal bleeding [3]. To evaluate

and manage delayed PPH after PD due to cancer, we reported the case of a patient with gastro-duodenal arterial stump aneurysm, where an intra-abdominal (extraluminal) lesion was presented as an intraluminal bleeding episode.

Factors that have been suggested to contribute or predispose to the development of delayed arterial hemorrhage after PD are regional lymphadenectomy and local vasculature. In such conditions the vessels become vulnerable to erosion by a pancreatic fistula or damage by local sepsis due to anastomotic leakage and abscess formation [4].

Another factor is the exocrine competency of the pancreatic remnant. It is likely that patients with pancreatic carcinoma reveals competent pancreatic remnant as to its excretory function produced more pancreatic juice with higher erosive potential comparing with chronic pancreatitis patients of exocrine insufficiency [5].

One of the most common and difficult complication after PD is pancreatic leakage with an incidence of 8% to 25% [6]. These patients can usually be managed conservatively by peri-pancreatic drains, use of antibiotics such as octreotide in order to avoid an intra-abdominal abscess formation, which can cause an arterial hemorrhage due to regional sepsis. Many studies confirmed the crucial impact of pancreatic parenchymal texture as a predisposing factor for fistula formation. A soft-textured pancreatic remnant was associated with a 20-fold increased possibility of fistula formation [7-9].

Sentinel bleeding has been described by many authors as a minor preliminary bleed, which precedes a major hemorrhage by 6 hours to 10 days. This bleeding can be presented as a prelude to arterial hemorrhage either as a minor bleeding from the abdominal drains or the gastrointestinal tract and must be considered as an indicator of imminent arterial hemorrhage [10].

Endoscopy is usually employed as the first diagnostic procedure, when gastrointestinal bleeding is suspected



Figure 2. CT scan analysis detecting pseudoaneurysm.



Figure 3. Angiography after embolization of the bleeding vessel.

after pancreatic resection. Our current policy revealed no specific localization of the bleeding source from the gastrointestinal tract by endoscopy, even though a small quantity of blood was coming from the afferent limb of the gastro-jejunal anastomosis. Bleeding after surgery of the pancreas should be attributed to bleeding pseudoaneurysm of main visceral artery. Recurrent minor bleeding episodes may precede a major fatal hemorrhagic episode and therefore should be considered an alarming sign for a risk of hemorrhagic shock [11, 12]. Endoscopy can be a useful diagnostic method to exclude intraluminal bleeding caused by ulcers and wound opening [13]. If the presence of pseudoaneurysm formation suspected, monitoring should be done by CT scans analysis [13]. Clinical examination and ultrasound are more appropriate methods detecting post-operational bleeding and do not harm the patient in contraction to CT scans (radiation). But the ultrasound may determine bleeding sources due to possible bleeding in the abdomen. In our case the bleeding happened in the small intestine lumen and the ultrasound analysis wouldn't be helpful of bleeding determination.

Sato *et al.* described the efficacy of early angiography in the diagnosis and management of delayed arterial hemorrhage after pancreatectomy [14]. In their cases of sentinel bleed angiographic control was also preceded by gastrointestinal endoscopy. Transcatheter arterial embolization, when indicated, can achieve temporary control of hemorrhage, hemodynamic stabilization and even permanent hemostasis. The difficulty with endoscopy may be related to the fact that arterial hemorrhage occurs near the pancreatojejunal anastomosis and passes through the gastrointestinal tract. Moreover, positive endoscopic findings such as erosive gastritis can be misleading and may delay treatment of patients with a precarious hemodynamic state. On the other hand, angiography may be the first diagnostic method in order to elucidate the exact site of bleeding. Although it has been reported that major bleeding sometimes could not be identified during angiography, probably due to the intermittent nature of the hemorrhage [10, 15]. However, precise identification of the bleeding artery is essential for accurate treatment. During previous years when endoscopy failed, the traditional approach to treatment for patients with delayed arterial bleeding after pancreatectomy due to pseudoaneurysms had been surgical. The surgical approach included aneurysm resection and revascularization, aneurysm ligation end organ resection (ie, splenectomy) leading to high mortality rate [16]. Nowadays, radiological approaches in the hemodynamically stable patient with embolization and exclusion of the pseudoaneurysm may achieve hemostasis in 60-80% of cases [17, 18] as in our case treated the bleeding by interventional angiography.

Despite the large advances in operative methods and surgical experience, mortality after PPH remains high. The surgical treated bleeding leads to better results in comparison with endoscopy. The identification of risk factors and postoperative monitoring may lead to early diagnosis [19, 20].

Conclusion

Visceral arterial stem pseudoaneurysm may be the cause of delayed PPH is presented by intra-luminal bleeding signs. Emergent treatment of these lesions by open and minimally invasive endovascular techniques are associated with elevated rates of post-procedural morbidity. Surgical repair in this hostile environment is difficult and potentially elevates the associated morbidity of the repair. Significant comorbid conditions may increase the risk of a major operative vascular reconstruction. Our study confirms that delayed PPH due to gastroduodenal arterial stump pseudoaneurysm can be managed successfully by endovascular embolization with coils, when patient is hemodynamically stable. Finally laparotomy may be avoided in cases with hemodynamic instability and successful endovascular reconstruction.

Conflicting Interest

The authors had no conflicts of interest

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