

Massive Gastrointestinal Hemorrhage One Month after Pancreaticoduodenectomy: Case Report and Review of Literature

Nathaniel J. Labio^{1,2}, Rodney B. Dofitas³ and Apolinario A' Ericson B. Berberabe⁴

¹Section of Hepatobiliary Surgery, Department of Surgery, College of Medicine- Philippine General Hospital, University of the Philippines Manila;

²Senior Lecturer, Department of Physiology, College of Medicine, University of the Philippines Manila;

³Associate Professor, Section of Head and Neck Surgery, College of Medicine- Philippine General Hospital, University of the Philippines Manila;

⁴Associate Professor, Section of Hepatobiliary Surgery, Department of Surgery, College of Medicine- Philippine General Hospital, University of the Philippines Manila

ABSTRACT

The operative mortality of pancreaticoduodenectomy (PD) has decreased considerably in recent years even in low-volume centers such as the Philippine General Hospital. However, morbidity rates remain high worldwide. Massive gastrointestinal hemorrhage is an uncommon but potentially fatal complication after pancreaticoduodenectomy with significant mortality and morbidity. This paper illustrates the clinical course of a patient presenting with late-onset gastrointestinal hemorrhage occurring one month after PD and provides an update on the diagnostic and therapeutic approach to this rare but fatal condition.

Key Words: *gastrointestinal hemorrhage, pancreaticoduodenectomy, angiography, coil embolization*

Introduction

Pancreaticoduodenectomy (PD) is the standard of care for selected patients with malignant disorders of the pancreas and the periampullary region. Refinements in surgical technique and proper selection of patients have reduced mortality rates to approximately less than 5% in high volume centers. However, morbidity rates remain high at 40 to 50%.^{1,2,3} Delayed gastric emptying (19-23%), disruption of the pancreatic anastomosis with subsequent pancreatic fistula (PF) (14%) and intra-abdominal abscess formation (5-10%), wound infection (10%) and hemorrhage (8%) are the most common complications resulting in significant morbidity.^{1,3} Early diagnosis and appropriate management of these complications are essential in improving outcomes after PD.

Early and late-onset gastrointestinal hemorrhage after PD remains a significant cause of post-operative morbidity and mortality even in highly experienced centers.^{4,6} There is increasing interest in post PD hemorrhage in recent literature because it poses a serious diagnostic and therapeutic challenge.^{4,6} Locally, there have been several papers describing complications after PD but detailed accounts of the clinical course on post PD hemorrhage are non-existent. Furthermore, all documented cases of post-PD hemorrhage occurred within the 1st week post PD.⁷⁻⁹ This is the first reported case describing a Filipino patient with late onset massive upper gastrointestinal bleeding presenting 30 days after PD.

Case Report

A 43-year old gentleman was admitted to the hospital due to obstructive jaundice secondary to an ampullary adenocarcinoma. A pylorus-preserving pancreaticoduodenectomy (Figure 1) with Childs' reconstruction (Figure 2) was performed. Pancreatico-enteric continuity was accomplished through a stented duct-to-mucosa end to side pancreatico-jejunosomy. The immediate perioperative course was unremarkable. On day 4 post-operatively, the patient developed a transient pancreatic fistula (Grade B)⁶ which resolved ten days later with conservative measures. The patient was then discharged improved after ten days. Thirty days post-operatively, the patient was subsequently readmitted for sudden onset hematemesis. Upon hospital admission, he was hemodynamically unstable, requiring transfusion of 6 units of packed red blood cells. An emergent upper gastrointestinal (GI) endoscopy failed to reveal a bleeding source within the stomach and duodenum. The duodeno-jejunal suture line was intact and unremarkable. However, fresh bleeding was seen at the afferent and efferent jejunal limbs distal to the duodeno-jejunal anastomosis. Mesenteric angiography was then performed revealing a pseudo-aneurysm at the level of the ligated stump of the gastroduodenal artery (GDA)(Figure 3). Successful control of bleeding was achieved with coil embolization of the common hepatic artery and the GDA stump (Figure 4). After embolization, the patient developed clinical evidence of transient hepatic ischemia but was discharged well after 7 days with no recurrence of bleeding.

Discussion

Post-PD hemorrhage occurs in 2 to 18% of patients (Table 1) after a pancreaticoduodenectomy and is associated with significant mortality rates ranging from 14 to 38 %^(10,11) and high rates of surgical re-exploration. Early and accurate localization of the bleeding source is needed to allow institution of appropriate and timely intervention. Knowledge and awareness of the potential sources of bleeding that may occur after a pancreaticoduodenectomy is crucial in dictating the most effective treatment modality for control of bleeding.

Bleeding after PD is often categorized into early and delayed post-PD hemorrhage. Early onset bleeding episodes occur within the first 7 days after surgery. It is commonly associated with undetected coagulation disorders or from technical failure of hemostasis⁽¹¹⁻¹³⁾. Surgical failure of hemostasis results from a non-secure intra-abdominal blood vessel or a bleeder along the anastomotic suture line.. This can present clinically as overt upper gastrointestinal bleeding per orem, bleeding through the nasogastric tube or as hemoperitoneum or bloody discharge from indwelling abdominal drains. It can also present insidiously as occult gastrointestinal bleeding with accompanying circulatory compromise and a falling hemoglobin.¹⁰⁻¹² Blanc et al reported¹³ that 90% of early-onset post PD hemorrhage results from failure of surgical hemostasis. The most common locations in decreasing order of frequency are the retro-portal pancreatic lamina (22%), the stump of the gastroduodenal artery (3.7%) and gastric submucosal blood vessels (3.7%).

Initial management should include adequate fluid resuscitation, blood volume replacement and urgent upper endoscopy to rule out sources of bleeding unrelated to the operation such as peptic or stress-induced gastric ulcers. These lesions are best treated endoscopically with adequate control of bleeding. Failure to find a bleeding source after a thorough endoscopic examination of the upper gastrointestinal tract necessitates a more aggressive approach that includes urgent surgical re-exploration to localize and ligate the offending blood vessel.¹¹⁻¹³ The decision for surgical intervention particularly in patients presenting with early onset post-PD hemorrhage should be made promptly. Urgent surgical re-exploration was successful in 90% of cases resulting in adequate control of bleeding and increased survival.^{12,13} A delay in surgical intervention in this subset of patients with early-onset hemorrhage can be fatal.

Delayed hemorrhage after PD is caused by localized sepsis resulting from bile leaks, pancreatic fistula or abscess formation. Infections activate pancreatic enzymes and inflammatory cytokines that act on previously ligated blood vessels, denuded areas of surgical dissection and lymphadenectomy which may lead to formation of pseudoaneurysms. These pseudoaneurysms have the potential to rupture and bleed into the peritoneal cavity or gastrointestinal tract manifesting as hematemesis, melena or hematochezia, accounting for 30 to 43 % of delayed-onset hemorrhages.¹³⁻¹⁹ The most common sites for

Table 1 Prevpst-PDHGE(2)

Author	Total # PD	%Bleed
Blanc,et.al.(2007) ¹⁰	411	7%
Wente, et.al,(2006) ⁹	458	1.70%
Koukoutsis,et.al.(2006) ⁸	362	8.80%
Tien, et.al.(2005) ¹²	402	18%
Choi, et.al.(2004) ¹¹	500	4.40%
Rumstadt,et.al.(1998) ⁵	559	7.50%
Reber,et.al.(1998) ¹⁴	138	2.20%
Miedema, et.al,(1992) ³	279	7.89%
Trede,et.al.(1987) ¹⁵	285	5.61%

Table 2 Delayed Hge Analysis

Author	Total # PD	Delayed (N)	Non-Surgical	Surgical
Blanc,et.al.(2007) ¹⁰	411	16	4	12
Koukoutsis,et.al.(2006) ⁸	362	14	5	9
Tien,et.al.(2005) ¹²	402	10	3	7
Choi,et.al.(2004) ¹¹	500	22	10	12
Reber,et.al.(1998) ¹⁴	138	3	3	0
Brodsky,et.al.(1991) ¹⁶	5	5	0	5

pseudoaneurysm formation are the gastroduodenal artery, the hepatic artery and the splenic artery.¹³⁻²⁰ In contrast to early-onset post PD hemorrhage where prompt surgical exploration is often needed, accurate localization and control of the site of bleeding through endoscopic or angiographic methods may be sufficient in achieving hemostasis in those with delayed onset post PD hemorrhage.

A significant risk factor for post-PD hemorrhage in this case was the occurrence of a transient pancreatic fistula resulting in pseudoaneurysm formation of the gastroduodenal artery stump. Rupture of this pseudoaneurysm into the jejunal loop draining the pancreatic remnant resulted in massive upper gastrointestinal bleeding. Hemodynamic stability after adequate fluid and volume replacement allowed for angiographic localization of the bleeding site and embolization of the feeding artery. Due to surgical ligation of the gastroduodenal artery from its origin at the common hepatic artery, a super-selective embolization of the gastroduodenal artery stump was not feasible. A super-selective embolization would have been ideal to preserve antegrade blood flow to the hepatic parenchyma reducing the risk for post-embolization hepatic ischemia. The risk for hepatic ischemia and infarction after embolization of the

hepatic artery is particularly increased in post-PD patients due to surgical obliteration of vascular collaterals within the gastroduodenal and pancreaticoduodenal arcades.¹³⁻²⁰ This patient developed clinical evidence of hepatic ischemia after embolization that resolved prior to hospital discharge.

The use of covered endovascular stents to occlude bleeding sites resulting from pseudoaneurysms developing on surgically-ligated short arterial stumps have reduced the risk for hepatic ischemia and infarction through preservation of antegrade blood flow to the liver.²²

Although non-surgical or angiographic control of late-onset hemorrhage post PD remains a desirable noninvasive option to surgical re-exploration, it is not always successful. Several studies have demonstrated that angiographic localization of the bleeding source was successful in only 48% of patients.^{4,20-22}

Hemodynamic instability in spite of ongoing volume resuscitation and failure of endoscopic or angiographic modalities are indications for surgical re-exploration and control of bleeding. Several studies have shown that in approximately 50% of patients with delayed post-PD

hemorrhage surgical intervention is required to achieve control of bleeding (Table 2).

Conclusion and recommendations

This paper illustrates the role of angiography and coil embolization as noninvasive diagnostic and therapeutic options in delayed onset post PD hemorrhage due to pseudoaneurysm formation. Early recognition of this uncommon and potentially fatal complication after pancreaticoduodenectomy poses a serious diagnostic and therapeutic challenge but is crucial for timely and appropriate intervention. Early onset hemorrhage occurring within 7 days after pancreaticoduodenectomy is best managed with surgical re-exploration. In contrast, angiographic embolization may be beneficial in a subset of patients with delayed onset hemorrhage. However, the decision for surgical re-exploration should be made promptly after failure of initial management. Adequate control of infection from anastomotic leaks, drainage of abscesses and fistulas is likewise warranted for successful hemostasis.

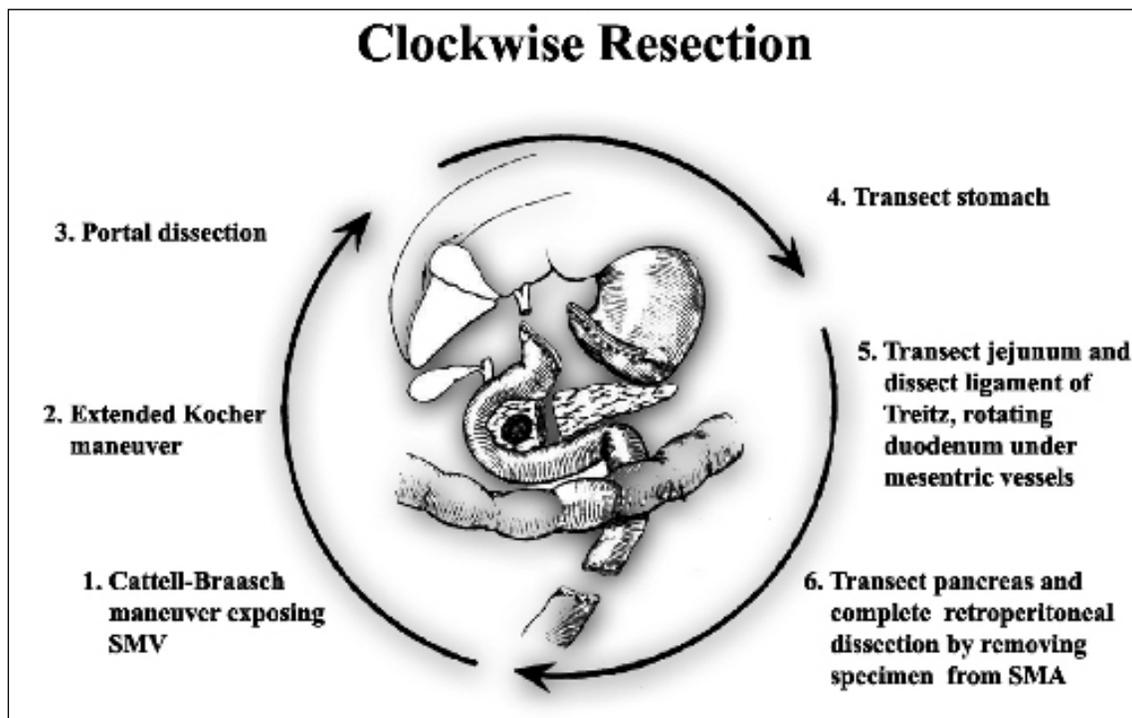


Figure 1. Technique of Pancreaticoduodenectomy

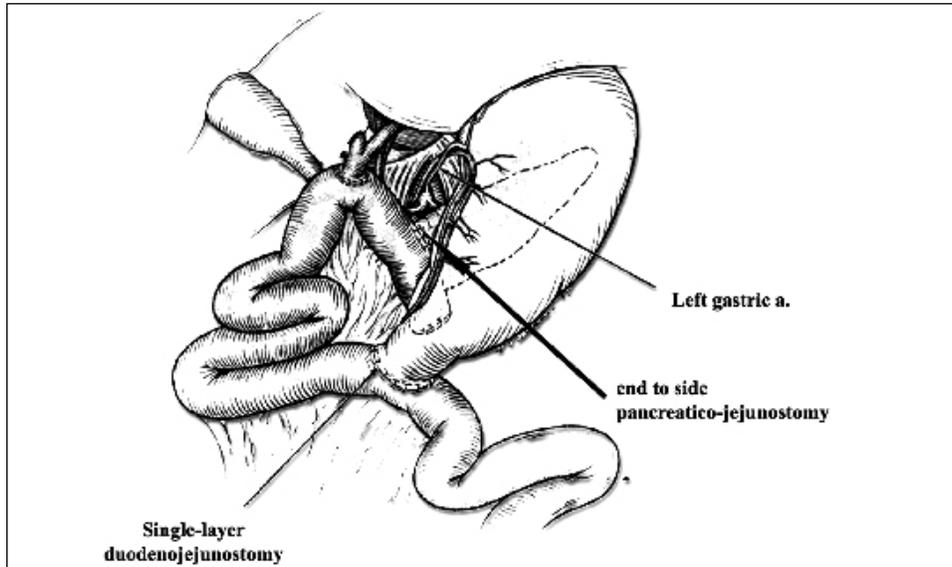


Figure 2. Technique of Childs' Reconstruction featuring end to side pancreatico- jejunostomy.

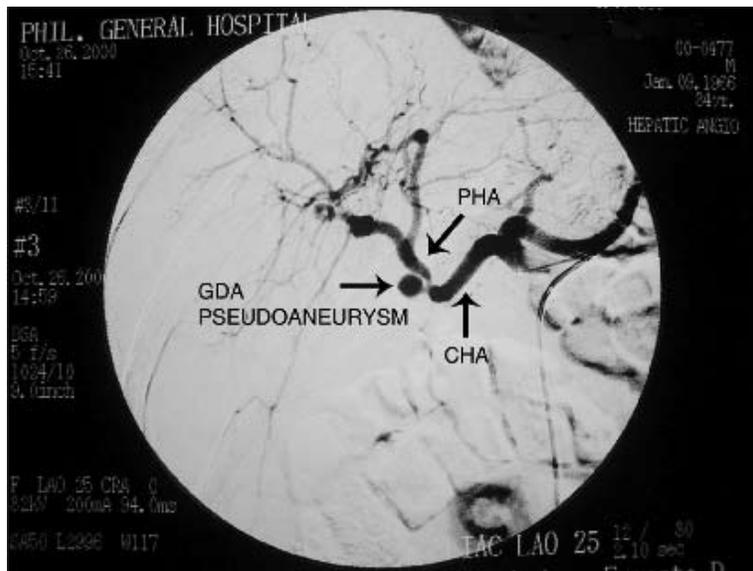


Figure 3. Angiogram demonstrating gastro-duodenal artery (GDA) stump Pseudoaneurysm.

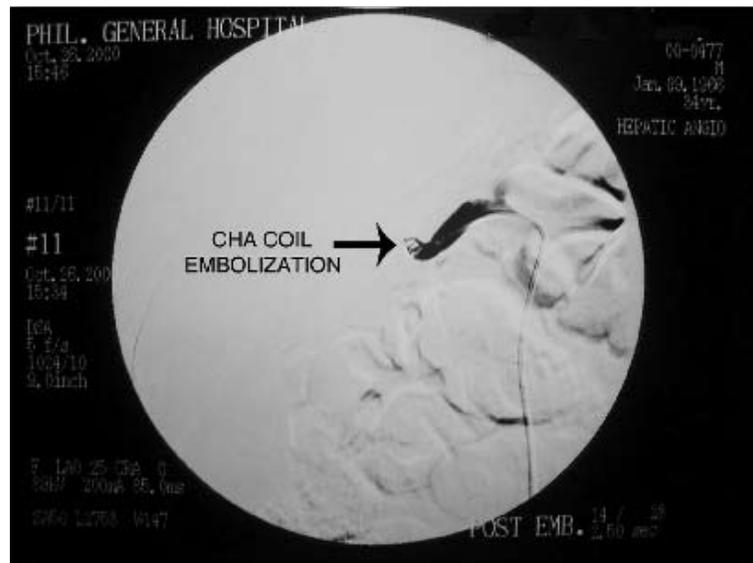


Figure 4. Successful occlusion of pseudoaneurysm with coil embolization of the common hepatic artery (CHA).

References

1. Yeo CJ, Cameron JL, Sohn TA, et al. Six hundred fifty consecutive pancreaticoduodenectomies in the 1990's: pathology, complications, and outcomes. *Ann Surg.* 1997; 226: 248-257.
2. Gouma DJ, Geene RC, Gulik TM, et al. Rates of complications and death after pancreaticoduodenectomy: risk factors and the impact of the hospital volume. *Ann Surg.* 2000; 232: 786-795.
3. Miedema BW, Sarr MG, van Heerden JA, et al. Complications following pancreaticoduodenectomy. Current management. *Arch Surg.* 1992;127:945-49.
4. De Castro SMM, Kuhlmann KFD, Bush ORC, et al. Delayed massive hemorrhage after pancreatic and biliary surgery: embolization or surgery? *Ann Surg.* 2005;241:85-91.
5. Rumstadt B, Schwab M, Korth P, et al. Hemorrhage after pancreaticoduodenectomy. *Ann Surg.* 1998;227:236 - 41.
6. Bassi C, Dervenis C, Butturini G, et al. Postoperative pancreatic fistula: an international study group (ISGPF) definition. *Surgery.* 2005; 138: 8-13.
7. Yap DG, Cuasay AB, et al. 61 Consecutive Pancreaticoduodenectomies in a University Hospital. *Philippine Journal of Surgical specialties.*1998; 53(3):109-112.
8. Bagasao M, dela Pena AS, et al. A 7 Year Experience with Pancreaticoduodenectomy. *Philippine Journal of surgical Specialties.*1984;39(1):68-72.
9. Dela Pena AS, Herbosa TJ, et al. Factors affecting Morbidity and Mortality in Pancreaticoduodenectomy for Periapillary Malignancies.1992;47(3):113-116.
10. Yeo CJ. Management of Complications following Pancreaticoduodenectomy. *Surgical Clinics of North America.* 1995;75(5): 913-23.
11. Koukoutsis, I, Bellagamba R, Morris-Stiff G, et al. Haemorrhage following Pancreaticoduodenectomy: Risk Factors and the Importance of Sentinel Bleed. *Dig Surg.* 2006;23:224-228.
12. Wente MN, Shrikhande SV, Kleef J, et. al. Management of Early Hemorrhage from Pancreatic Anastomoses after Pancreaticoduodenectomy. *Digestive Surgery.* 2006;23: 203-208.
13. Blanc T, Cortes A, Goere D, et al. Hemorrhage after pancreaticoduodenectomy: when is surgery still indicated? *American Journal of Surgery.* 2007; 194:3-9.
14. Choi SH, Moon HJ, Heo JS, et al. Delayed hemorrhage after pancreaticoduodenectomy. *J Am Coll Surg.* 2004;199:186 -91.
15. Tien YW, Lee PH, Yang CY, et al. Risk Factors of Massive Bleeding Related to Pancreatic Leak after Pancreaticoduodenectomy. *J Am Coll Surgeons.* 2005; 210: 554-559.
16. Ellison CE. Evidence-based management of hemorrhage after pancreaticoduodenectomy. *Am J Surgery.* 2007; 194:10-12.
17. Reber PU, Baer HU, Patel AG, et al. Life-threatening upper gastrointestinal tract bleeding caused by ruptured extrahepatic pseudoaneurysm after pancreaticoduodenectomy. *Surgery.* 1998: 124; 114-115.
18. Trede M, Schwall G. The Complications of Pancreatectomy. *Ann Surgery.* 1988; 207: 39-47.
19. Brodsky, JT and Turnbull AD. Arterial Hemorrhage after Pancreatoduodenectomy. *Arch Surg.* 1991; 126: 1037-1041.
20. Otah E, Cushin BJ, Rozenblit GN, Neff R, Otah KE, Cooperman AM: Visceral artery pseudoaneurysms following pancreatoduodenectomy. *Arch Surg.* 2002;137:55-59.
21. Sato N, Yamaguchi K, Shimizu S, et al. Coil Embolization of Bleeding Visceral Pseudoaneurysms following Pancreatectomy. *Arch Surg.* 1998; 133:1099 -1102.
22. Harvey J, Dardik H, Impeduglia T, et al. Endovascular Management of Hepatic Artery Pseudoaneurysm Hemorrhage complicating Pancreaticoduodenectomy. *Journal of Vascular Surgery.* 2006;43(3) : 613-614.

The ACTA MEDICA PHILIPPINA is now accepting original scientific papers, review articles and case reports for its upcoming issues. Please follow the format for submission as indicated in the "Instructions to Authors" elsewhere in the journal. All papers received shall be properly acknowledged. For inquiries and submission of proposals, please e-mail us at actamedicaphilippina@yahoo.com

Volume 42
Number 1 2008
ISSN 0001-6071