

Case Report: Ruptured Gastroduodenal Artery Aneurysm Post Pancreaticoduodenectomy

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Abstract. Delayed arterial hemorrhage following pancreaticoduodenectomy is a rare complication, yet serious, that is associated with high mortality rate. Ruptured gastroduodenal aneurysm is one of the causes of upper gastrointestinal hemorrhage that requires quick identification and management to prevent further morbidities and mortality. Up-to-date, there is no consensus on the surgical management of ruptured visceral aneurysm. The surgical treatment of this condition varies according to the patient's clinical status and the health care center expertise. This report, presents our own experience of the management of ruptured gastroduodenal aneurysm with endovascular and surgical methods.

Keywords: Gastroduodenal aneurysm, Delayed arterial hemorrhage, Pancreaticoduodenectomy, Transcutaneous arterial embolization.

Introduction

The outcome of pancreaticoduodenectomy (PD) has significantly improved in recent years, specifically in terms of the improvements in

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surgical technique, post-operative care, surgical site infection control, and the role of Interventional Radiology in managing the complications following PD^[1-3].

Delayed arterial hemorrhage (DAH) following a PD is an uncommon entity representing 5.8% of all patients^[4,5]. Delayed arterial hemorrhage is defined as a massive arterial bleeding occurring two to five days after PD^[6] with a high mortality rate reaching up to third of affected patients^[7]. Many risk factors contribute to DAH, with pseudoaneurysm formation of nearby vasculature representing one of the most common factors^[8]. Due to the rare incidence of DAH, its management is still unclear, and consensus regarding the treatment is yet to be determined.

A case report is presented of an upper gastrointestinal hemorrhage, secondary to a ruptured gastroduodenal artery (GDA) pseudoaneurysm in a patient who underwent a PD and our experience with angiographic management of acute perforated GDA aneurysm.

Case Report

A forty-three-years-old gentleman presented with jaundice and epigastric pain of 2 months duration prior to admission. He was diagnosed with poorly differentiated adenocarcinoma of the ampulla of Vertebral, Anal, Tracheo-Esophageal and Renal anomalies (VATER) and underwent a pylorus-preserving PD procedure. On day 10 post op, he developed acute onset of hematemesis, melena, a drop of his hemoglobin level, tachycardia of 110 and blood pressure of 105/60. Upper gastrointestinal (GI) endoscopy following resuscitation measures revealed a large blood clot at the gastro-jejunal anastomosis site. A computerized tomography (CT) scan was done that was negative for any active bleeding. Afterwards, he was shifted to the angiogram suite in which selective angiography of celiac trunk, splenic artery, common hepatic artery, and left gastric artery showed neither bleeder site nor morphologically abnormal vessels. Patient was treated conservatively with pantoprazole infusion. The bleeding stopped and patient was discharged home in a good condition.

Two months later, he was presented to our Emergency Department with massive hematemesis of one day duration. On examination, he was severely pale, blood pressure was 71/53 and heart rate was 117 with a drop of hemoglobin level from 14 mg/dL to 6.1 mg/dL. Resuscitation with Ringer's solution and blood transfusion was done and once stabilized; the patient was transferred to the angiogram suite for urgent visceral angiography. The study showed a pseudoaneurysm of the GDA bleeding through erosion in the jejunum (Fig. 1A). Embolization with coil was done (Fig. 1B); however, due to the technical difficulty in deploying the coil in the (GDA). The distal end of the coil was left behind in the hepatic artery. Bleeding was stopped and the patient was shifted to the intensive care unit in a stable condition.

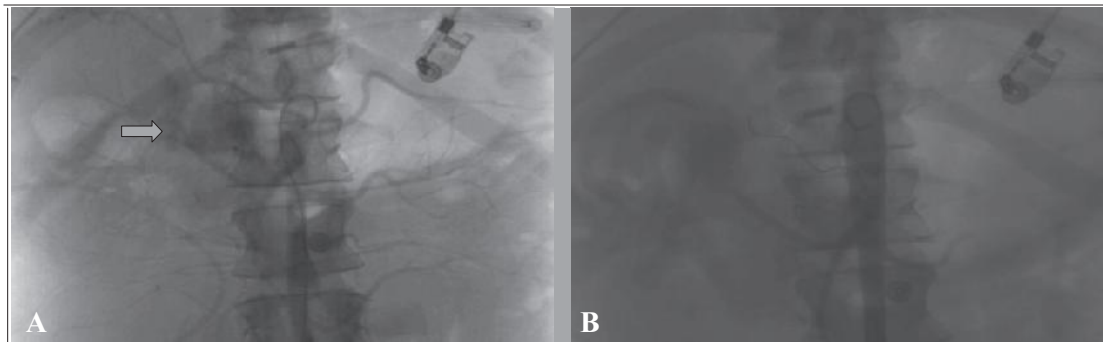


Fig. 1. A) Angiography revealed a pseudoaneurysm arising from the GDA (arrow); B) Post TAE with coil insertion with complete resolution of the pseudoaneurysm.

Four hours later, the patient started to have another attack of severe hematemesis and became hemodynamically unstable. The decision was made to go for an urgent laparotomy in an attempt to stop the bleeding surgically. In the operating room, the stomach was found full of clotted blood, a ruptured GDA aneurysm of a 5 x 6 cm size was found to be actively bleeding inside the jejunal loop 20 cm proximal to the gastrojejunal anastomosis. Gastrectomy of the anterior wall was done to evacuate clotted blood, ligation of the aneurysm was performed and bleeding was controlled. The patient was transferred to the ICU later on in a stable condition. However, seven hours later, abdominal drains revealed blood, and he started to

become hemodynamically unstable due to massive hemorrhagic shock and coagulopathy with sudden cardiac arrest. Cardio-pulmonary resuscitation started for twenty minutes, however, patient did not respond and death was declared.

Discussion

Hemorrhagic complications post PD can be classified according to the timing of occurrence into early and late. Early arterial bleeding following PD which usually occurs within 48 hours of the procedure and is mainly secondary to technical failure which requires urgent operation. Any bleeding related to PD after that time-frame is considered DAH^[1-3]. Its mortality ranges from 11%-54%^[4]. Multiple factors play a role in the development of DAH post PD. Regional lymphadenopathy and skeletonization of the vasculature, pancreatic fistula, anastomotic leak, and abscess formation were among the most common^[8]. In a recent metanalysis about DAH post PD, it was found that the most common causes for the development of DAH was attributed to the presence of intra-abdominal abscess or anastomotic leak (65.5%)^[9].

A pseudoaneurysm is a serious complication following PD that has been found to be involved in approximately one-third of the cases. It originates from a major vasculature that has been exposed to regional lymphadenectomy or gastroduodenal arterial stump^[9,10]. In pseudoaneurysm cases, the most common bleeding sites are the GDA and right hepatic artery^[11]. Yet, it is considered a rare incidence following PD^[4,5,11,12]. Gastroduodenal artery aneurysm is very rare, accounting for 1.5% of all visceral aneurysms^[13,14]. GDA aneurysm was found to occur mainly in the age group of 50-58 years old with a male to female ratio of 4.5:1 and a mean size of 3.6 cm^[15,16]. The clinical presentation of GDA aneurysm varies from abdominal pain, hypotension, gastric outlet obstruction, pulsatile abdominal mass to other nonspecific symptoms as vomiting, diarrhea and jaundice^[17,18]. The most serious complication is ruptured GDA aneurysm which presents with upper GI bleeding, most commonly. It renders as high as 75% risk of rupture with a mortality of 20%^[15]. Therefore, early recognition and proper management is important to prevent

unfavorable consequences. In cases of massive DAH post PD, and especially with the presence of sepsis or bile leak, ruptured pseudoaneurysm should be suspected. In these cases, computed tomography studies and angiography should be implemented to reach a diagnosis. The gold standard diagnostic test for visceral aneurysm is Angiography which also considered a therapeutic tool^[19,20]. Endoscopy, which is usually used as a first diagnostic tool when upper gastrointestinal tract bleeding is suspected, may fail to pinpoint the site of hemorrhage. Therefore, positive findings such as erosive gastritis on endoscopy can be dangerously misleading and result in a delayed intervention or, in the worst cases, death^[9].

There is no consensus about the management of DAH other than resuscitation. Treatment modalities can involve exploratory surgery or endovascular procedures. Historically, surgery was the only option for aneurysm treatment. However, it may lead to hazardous complications due to the fragility of the tissues, especially post PD and the difficulties to identify the bleeding site^[21]. In massive DAH post PD, operative management can be associated with a mortality rate of 90%, therefore, it should be restricted in patients whom endovascular management failed or for hemodynamically unstable patients^[22,23]. The standard therapeutic and first-line management is transcatheter arterial embolization (TAE) with micro-coils which precisely enables the site of the aneurysm and allows for selective embolization^[10,12,22,24]. In the previously mentioned meta-analysis, it was found that there was no significant difference in arresting the bleeding in DAH between exploratory surgery and TAE. Transcatheter arterial embolization (TAE) resulted in less morbidity and mortality in comparison to exploratory laparotomy^[9]. However, re-bleeding is not uncommon with TAE and may require further angiographies. Incomplete embolization, coil migration and recanalization of the bleeding artery are possible factors^[24,25]. Also, covered stents were found to suit GDA pseudoaneurysms, with their advantage of preserving hepatic inflow. It was found to be a successful procedure in many cases of DAH caused by GDA, and many authors favored the use of covered stents for the treatment of GDA over TAE^[7,21,24,26,27].

In this present case, TAE did not succeed to stop the bleeding during the longer period and the patient became hemodynamically unstable. It may be attributed to the above mentioned re-bleeding risks. Thus, exploratory surgery was the last resort to save the patient's life. The choice for ligation or excision of the pseudoaneurysm depends on the anatomical position, hemodynamic stability, risk of re-bleeding, previous surgery and procedure related mortality^[28,29]. Although re-bleeding recurred shortly in this case after the operation, going for angiography or re-operation may be an alternative choice.

In conclusion, visceral aneurysm is a rare, yet serious complication following PD in which early recognition and management is essential to prevent further complications. Transcutaneous arterial embolization (TAE) is considered the treatment of choice for visceral aneurysm. Because re-bleeding risk may still occur after TAE, repeating angiogram or exploratory surgery may be necessary to control bleeding.

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تمزق كيس دموي في الشريان المعدي بعد عملية استئصال جزء من البنكرياس والاثني عشر

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المستخلص. حدوث النزيف الشرياني المتأخر والذي يحدث بعد عمليات استئصال البنكرياس والاثني عشر نادر ولكنه من المضاعفات الخطيرة التي تقترن بنسبة عالية من الوفيات. تمزق الشرايين يعتبر واحداً من أسباب نزيف الجهاز الهضمي العلوي الذي يتطلب سرعة التشخيص والمعالجة لتوخي حدوث المزيد من المضاعفات والوفيات. حتى الآن، لا توجد أي أساليب علاجية جراحية متفقة لمعالجة هذه الحالة والعلاج يختلف على حسب الحالة المرضية وخبرة المركز الطبي وتقدمه من حيث توفر العلاجات الجراحية والعلاجات بالمنظير. نتقدم بطرح حالة مرضية تم علاجها في مستشفى جامعي بالعلاج المنظري والجراحة.