

Image Quiz for Surgeons

Chirurgia (2013) 108: 910-914
No. 6, November - December
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Emergency Pancreaticoduodenectomy for Bleeding Pancreatic Pseudoaneurysm in Patient with Common Mesentery and Replaced Right Hepatic Artery

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Rezumat

Duodenopancreatectomie în urgență pentru pseudoanevrism pancreatic hemoragic la un pacient cu mezenter comun și arteră hepatică dreaptă complet înlocuită

Duodenopancreatectomia este rareori realizată în urgență, cu atât mai puțin în condiții netraumatice. Complicație vasculară rară a pseudochistului pancreatic, pseudoanevrismul se prezintă ca o malformație arterială pulsatilă care poate duce la hemoragii fatale dacă nu este tratată. Tratamentul său optim rămâne controversat. Majoritatea autorilor sunt de părere că embolizarea arterială este primul pas pentru stabilizarea pacientului, cu intervenție chirurgicală ulterioară dacă este necesar. Prezentăm un caz neobișnuit de pseudochist cefalopancreatic complicat cu un pseudoanevrism hemoragic cu originea în artera pancreatico-duodenală inferioară, la un pacient cu multiple comorbidități, mezenter comun, variantă de arteră hepatică dreaptă și instabilitate hemodinamică. Am realizat o duodenopancreatectomie în urgență, cu abord retropancreatic precoce, evoluția postoperatorie imediată și la distanță fiind simplă. Subliniem faptul că intervenția în urgență a permis atât controlul rapid al hemoragiei, cât și îndepărtarea pseudochistului – importante mai ales la pacienții cu risc înalt la care embolizarea arterială nu este o opțiune.

Cuvinte cheie: pancreatită, pseudoanevrism pancreatic, chirurgie

Abstract

Pancreaticoduodenectomy is infrequently performed in emergency, so much the less in lack of traumatic evidence. A rare vascular complication of the pancreatic pseudocyst, the pseudoaneurysm, presents as a pulsating malformation which may lead to life-threatening bleeding if left untreated. Its optimal treatment remains controversial. Most authors agree that angioembolization is the first step to stabilize the patient's condition, with further surgery if such be the case. We herein report an unusual case of pancreatic head pseudocyst complicated with a bleeding pseudoaneurysm arising from the inferior pancreaticoduodenal artery, in a patient with multiple comorbid conditions, common mesentery, hepatic artery variant and hemodynamic instability. An emergency early retropancreatic approach pancreaticoduodenectomy was performed with uneventful immediate and long-term outcome. We highlight that emergency surgery allowed both rapid control over the bleeding with hemostasis and removal of the pseudocyst. This is particularly relevant in high-risk patients in whom selective angioembolization is no more of choice.

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Key words: pancreatitis, pancreatic pseudoaneurysm, surgery

Introduction

Pancreaticoduodenectomy (PD) is a complex operation, being routinely performed as an elective procedure. Emergency PD represents less than 2 % of indications, but it implies an added challenge for the surgeon (1).

A rare vascular complication of chronic pancreatitis (<10%) is the pancreatic pseudoaneurysm (PPA), resulting from erosion of the pancreatic or peripancreatic arteries into a pseudocyst (PPC). It differs from a true aneurysm in that its wall does not contain the components of a vessel but consists of fibrous tissue which usually continues to enlarge, creating a pulsating malformation, an extravascular hematoma, communicating with the intravascular space (2,3). Accordingly, a communication between the vasculature and the PPC is formed. PPA forms when enzyme-rich peripancreatic fluid, often within a PPC leads to autodigestion and weakening of the walls of the adjacent arteries (2,3,4). The most commonly involved arteries are the splenic artery, up to 50 % cases, and less frequently the gastroduodenal artery (GDA), the pancreaticoduodenal artery (PDA), the superior mesenteric artery (SMA), the left gastric artery and the hepatic artery (HA) (2,3,4,5). Though rather uncommon, PPA is accompanied by life-threatening complications, mainly rupture and bleeding, with a mortality rate as high as 12.5% even in treated patients and >90 % if patients are left untreated (3- 9). Selective transcatheter arterial embolization (TAE) is the standard tool for the diagnosis of PPA, but Multi-Detector Computed Tomography (MDCT) is routinely performed for treatment planning, with sensitivity and specificity up to 95 and 90 % respectively (10). No evidence based guidelines exist regarding the optimal treatment modality as limited data is available (5-9). The current major controversy is whether selective TAE should be the conclusive treatment or whether it should be only a preceding approach for further elective surgery (7,8, 11,12).

We report the case of a sudden PPA rupture in a patient with multiple comorbid conditions, common mesentery and replaced right hepatic artery (rRHA). Whereas the patient has suddenly become hemodynamically unstable, an emergency PD had to be performed as single and final therapeutic management. To our knowledge, related reported cases are scarce (15).

Case report

A 65 year-old man, former miner, occasionally drinker, with a medical record of pulmonary silicosis, CPOD, myocardial infarcts, angor pectoris and recent aorto-coronary by-pass under antiplatelet therapy with clopidogrel, presented at the emergency room with mild dyspnea, asthenia, low grade fever, moderate to intense epigastric pain, anorexia and intermittent melena in the past 3 weeks. The pain had not been decreased by usual analgesics and had even worsened in the past 4 days. Physical examination revealed a thin, oriented, pale, low grade feverish (37,6° C) patient with normal heart sounds (88/min) and arterial pressure (135/85 mmHg). The abdomen was

tender in the right part of the lower epigastric area, where a deep, irregularly shaped and painful mass was discovered by palpation. Chest auscultation showed normal breathing sounds. Rectal examination showed traces of melena. Laboratory tests indicated values as follows: leucocytosis ($11\,400/\text{mm}^3$), low hemoglobin level (9.4 g/dl), normal platelet count ($36.4 \times 10^4/\text{mm}^3$), normal serum creatinine level, glucose 136 mg/dl, lipase 325 IU/l, amylase 171 IU/l, LDH 285 IU/l, aspartate aminotransferase 44 IU/l, total bilirubin levels 0.8 mg/dl. A chest X-ray film disclosed little amount of right pleural effusion. Abdominal ultrasound showed a hydropic gallbladder, a 9.6 mm common bile duct, and a 49/48 mm hypoechoic structure in the pancreatic head in conjunction with an enlarged main pancreatic duct above. MDCT described a common mesentery and a 5 cm-sized mass of the pancreatic head, including a well delimited cystic structure, with the content enhancing similarly to the aorta and suggesting a PPC complicated with PPA (Fig. 1). An enlarged Wirsung duct (9.5 mm) was noticed upstream of this structure, with a suspected communication in between. No overt biliary tree dilatation was seen. The angio-MDCT ascertained the PPA inside the PPC, as a vascular structure related to the inferior PDA (Fig. 2). A rRHA originating from the right-sided SMA (consistent with common mesentery) was described as well, in a retroportal position (Fig. 2).

Upper endoscopy examination was also undertaken and it revealed a small amount of blood in the 2nd duodenum, but with no overt transpapillar bleeding.

The conclusive diagnosis was chronic pancreatitis with cephalic PPC and PPA formation, common mesentery, replaced RHA arising from the SMA, right pleural effusion, recent aorto-coronary by-pass, angor pectoris, CPOD, and pulmonary silicosis. Since the patient has showed an acceptable clinical course he was scheduled for TAE. On the 3rd day of hospitalization, the patient presented a sudden, sharp epigastric pain



Figure 1. MDCT – pancreatic head pseudoaneurysm (black arrowhead), right-sided superior mesenteric artery and duodenojejunal angle (suggestive for common mesentery)



Figure 2. MDCT - pancreatic head pseudoaneurysm related to the inferior pancreaticoduodenal artery (open arrow-head) and replaced right hepatic artery arising from the superior mesenteric artery (arrow)

associated with general pallor, sweating, tachycardia, abdominal tenderness and systolic arterial pressure dropped at 80 mmHg. Hemoglobin level and hematocrit dropped to 6.2 g/dl and 17 % respectively. Color Doppler imaging showed turbulent blood flow inside the PPC structure. Emergent endoscopy revealed transpapillar hemorrhage, so a sudden rupture of the PPA with active bleeding inside the PPC was highly suspected. Since interventional TAE was no more of choice in this poor-risk and rapidly deteriorating patient, hemodynamically unstable, emergency surgery was necessary as single life-salvage treatment. The laparotomy confirmed the pancreatic head tumor of about 5 cm diameter, well delimited, with no sign of bleeding into the peritoneal cavity. According to these intraoperative findings a PD was decided for, with both hemostasis and curative intent. Taking into account the PPA vascular source and HA variant, a backwards Whipple was performed with mesopancreas first dissection, allowing rapid exposure of the right side of the SMA (ever more readily in case of common mesentery) with the rRHA (Fig. 3). Early control over PPA bleeding was achieved by exposure and ligation of the inferior PDA and GDA outside the PPC, before any digestive or pancreatic transection and removal of the specimen. The operative time was 260 min. with a blood loss of 385 ml. Early postoperative outcome was uneventful and the patient was discharged on the 11th postoperative day. Three months after PD, the patient presented a normal clinical and imaging status.

The pathological examination of the operative specimen confirmed the diagnosis of PPC and PPA (Fig. 4, 5)

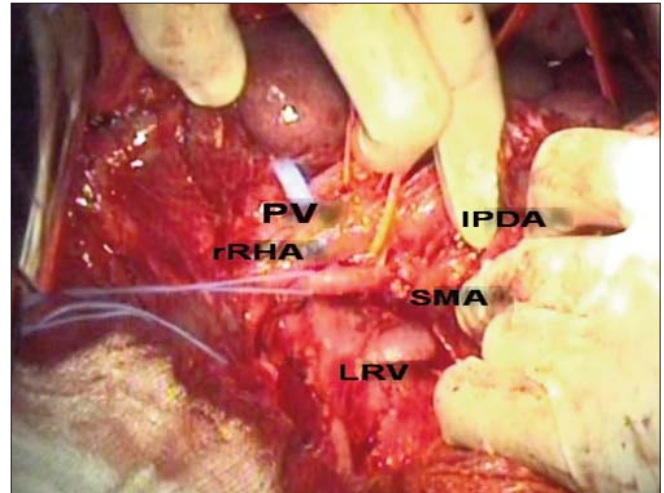


Figure 3. Early backwards exposure of the mesopancreas with isolation of the SMA and rRHA (IPDA - inferior pancreaticoduodenal artery, LRV - left renal vein, PV - portal vein, rRHA - replaced right hepatic artery, SMA - superior mesenteric artery)

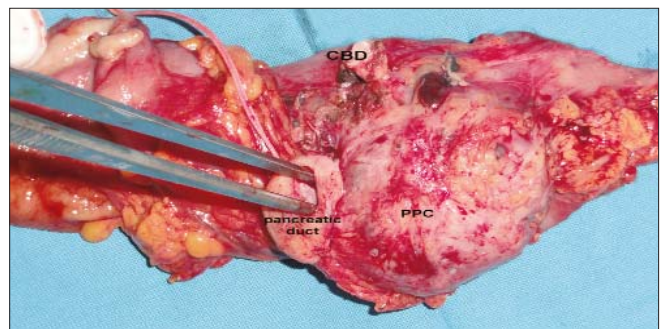


Figure 4. Pancreaticoduodenal resection specimen with pseudocyst (PPC) communicating with an enlarged upstream pancreatic duct (CBD - common bile duct)

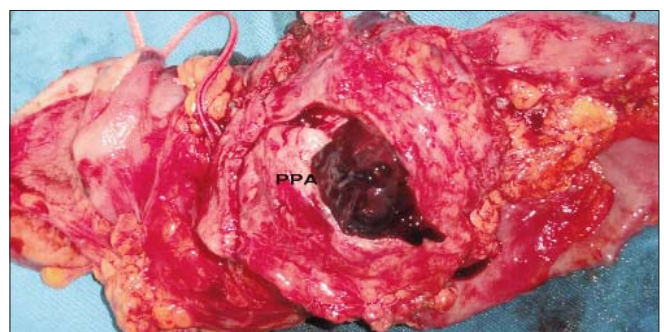


Figure 5. Figure 5 Pancreaticoduodenal resection specimen with pancreatic pseudoaneurysm (PPA) inside the pseudocyst

Discussion

The cases of PD performed in emergency are quite exceptional (less than 2%), being reported mainly for trauma (1,13,16). The most commonly reported cases of non-trauma emergency PD are: severe complication after therapeutic endoscopies (perforation or bleeding), intractable duodenal or ampullary bleedings (ulcer or tumors) (13,18). Other exceptional causes for an emergency PD are: acute abdomen due to mucinous cystic neoplasm, bleeding from varices of the duodenum due to pancreatic arterio-venous malformation and spontaneous hemorrhage from a metastatic tumor of the pancreatic head involving the duodenum (15- 20). The indications for an emergency PD should take into account mainly clinical aspects, rather than imaging features (13). Surgery-related complications after emergent PD are reported to be quite similar to those after elective PD, although the overall morbidity is higher due to the altered general status of the patient with emergency indications (13,16,18,19).

PPA formation is a rare yet lethal complication of chronic pancreatitis, with a prevalence less than 10 %, which may carry a severe outcome with a mortality rate >90 % in untreated patients. It has been reported to spontaneously form thrombi but this is a very rare event (2- 5). It may rupture and bleed into the biliary tree (hemobilia), pancreatic duct ("hemosuccus pancreaticus" - as in our reported case), gastrointestinal tract, peritoneal cavity and retroperitoneum with 12.5 % mortality rate even in treated patients (2,3,4,15). The hemorrhage is usually associated with a very poor prognostic (2,3,4,5,6). Clinically, a bleeding PPA manifests as silent anemia with melena or as intermittent massive bleeding into the gastrointestinal tract or abdominal cavity, both requiring emergency laparotomy (4,5,6,7,8). Localization of PPA via imaging studies is crucial to further treatment. Ultrasound is of little diagnostic value. Doppler ultrasound and contrast-enhanced MDCT are widely used as non-invasive techniques for detecting bleeding PPA (2,3,4,10) and associated PPC as it has been proved in our case, precluding the use of angiography. However, angiography remains the definitive modality to diagnose, locate and evaluate the presence of a PPA with a sensitivity rate of 100 %. Its advantage is that it can be used both to diagnose acute rupture with bleeding and to treat the lesion as well (2-9).

Therapy provided for PPA includes thrombin injection, stent graft placement, TAE and surgical repair (2-8). A few cases describing percutaneous ultrasound-guided thrombin injection have been reported and it seems to be the treatment of choice mainly for postcatheterization of femoral pseudoaneurysms (2,3, 21). When organ infarction is of concern, stent graft can be used to maintain the patency of the affected vessel (2-5). TAE is more reliable and a widely used method of treatment for large PPA with a success rate of 70 to 100 % and a reported rate of mortality of 12-33% (3,4,5,7,8,9). Most authors agree that TAE is appropriate when bleeding is diffuse or emanating from the pancreatic head, for unsuccessful surgery or postoperative bleeding. Its use is however quite limited in case of patient hemodynamic instability (2,3,6,7,8,9).

Other authors consider surgery as the best option for bleeding PPA complicating chronic pancreatitis (2-9,11,12). Nevertheless, selection of the best surgical procedure is still a matter of debate. The major controversy surrounding the operative management of bleeding PPA is whether to perform arterial ligation or pancreatic resection. It has been suggested that proximal and transcystic ligation of the bleeding vessel with internal or external drainage of the cyst is superior to pancreatic resection (4-9,11,12,14). Conversely, other authors have suggested that pancreatic resection should be employed as it is the only certain way to prevent the very common problem of rebleeding (2- 9,11,12,14). Location of the PPA is a major issue when selecting the surgical procedure. Patient outcome is better for lesions in the pancreatic body and tail (mortality, 16 %) than for those with lesions in the pancreatic head (mortality, 43 %) (4-8). In our case, a bleeding PPA complicating a pancreatic head PPC required emergent surgery due to patient hemodynamic instability. We estimate that even in this high operative risk patient, an emergency Whipple was the procedure of choice as far as it provided both an early control over the bleeding vessel and the complete removal of the pancreatic head lesion. A retropancreatic approach (22) was preferred because it allowed mesopancreas first dissection (23) with early isolation of the right-sided SMA and rRHA (22) (close to the SMA origin) alongside early isolation and ligation of the GDA and inferior PDA outside the PPC, as vascular source of the PPA. Handled thusly, the rRHA could be spared and steady hemostasis of the bleeding PPA was provided before any digestive or pancreatic transection and removal of the specimen.

In conclusion, we estimate that in bleeding PPA, even in high surgical risk patients, once the patient is hemodynamically unstable, the surgery, particularly the pancreatic resection, is the only certain way to ensure both definitive hemostasis and removal of the lesion. Backwards Whipple is a good tool to manage a bleeding pancreatic head pseudoaneurysm as it allows early control over peripancreatic vasculature and sparing HA variants within an early mesopancreas approach.

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