

Percutaneous Transarterial Embolization of Pseudoaneurysm Secondary to Pancreatitis: a case report

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Ruptured pseudoaneurysm with gastrointestinal bleeding is a rare but frequently fatal complication in patients with pancreatitis. Arteriographic embolization of visceral artery pseudoaneurysms is a safe and highly effective technique for the identification and treatment of hemorrhage even in critically ill patients. We report a case of massive hematemesis caused by rupture of a pseudoaneurysm successfully treated by transcatheter embolization.

Key words: Chronic pancreatitis; Embolization; Interventional procedure; Pseudoaneurysm

Bleeding pseudoaneurysm is a rare, but potentially life-threatening complication of acute or chronic pancreatitis. Computed tomography (CT) is accurate in the diagnosis of pseudoaneurysms and complicating pseudocysts. Surgical removal of pseudoaneurysm frequently requires simultaneous pancreatic resection. Transcatheter arterial embolization is a less invasive, safe and effective management. We describe a case of successfully treated ruptured pseudoaneurysm associated with pseudocyst formation by transcatheter embolization.

CASE REPORT

A 37-year-old man with a history of chronic pancreatitis (Fig.1a) and pseudocyst formation (Fig.1b) secondary to alcohol abuse was admitted because of sudden onset of epigastric pain and massive fresh blood vomiting for one day. He was then sent to our department for further evaluation and treatment.

On admission, serum amylase was 232 U/L and lipase was 237 U/L. The patient was hemodynamically unstable with hypotension (BP: 86/43 mmHg). The upper gastrointestinal endoscopy revealed a mass-like lesion with erosions at the posterior wall of the duodenal bulb. The abdominal CT was then performed and revealed an oval-shaped strongly enhanced lesion with local fluid accumulation around the pancreatic head region. Chronic pancreatitis with acute exacerbation and pseudoaneurysm formation secondary to pancreatitis was impressed (Fig. 2a & 2b). Emergency angiography was performed and demonstrated abnormal contrast agent accumulation along the gastroduodenal artery. Diagnosis of pseudoaneurysm was confirmed (Fig. 3).

After superselective catheterization of gastroduodenal artery, embolization of the pseudoaneurysm was performed immediately with five pieces of coils. The gastroduodenal artery was successfully occluded with metal coils placed both proximally and distally to the

source of bleeding. Angiography after embolization revealed complete embolization of the pseudoaneurysm (Fig. 4). CT one month later showed complete resolution of the pseudoaneurysm (Fig. 5). The patient recovered uneventfully and had no further episodes of bleeding or signs of mesenteric ischemia during a 3-month follow-up after the embolization.

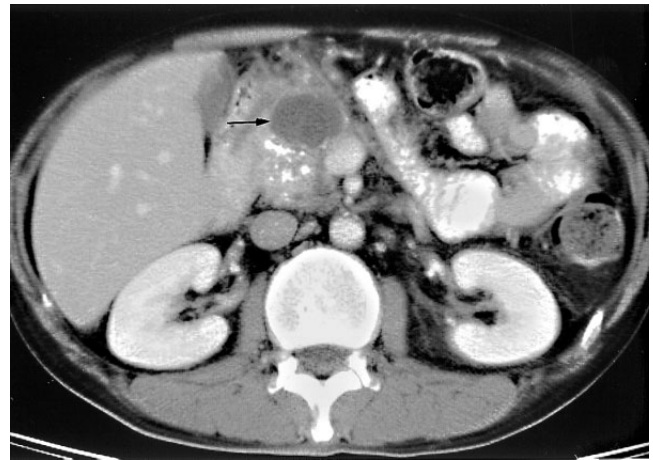
DISCUSSION

Pseudoaneurysm of the peripancreatic arteries is a cause of gastrointestinal bleeding in patient with

chronic pancreatitis. Pseudocysts occur in approximately 25% of patients with chronic pancreatitis, in which about pseudocysts are associated with pseudoaneurysm in approximately 10% of the cases [1]. The incidence of the pseudoaneurysms, secondary to pancreatitis, is as high as 10% on the basis of angiographic findings. The resultant hemorrhage is the most serious and fatal complication of pancreatitis. Rupture of a pseudoaneurysm can manifest as melena, hematemesis, intraperitoneal and/or retroperitoneal bleeding [2,3]. The arteries most commonly involved in decreasing order are splenic, gastroduodenal, pan-



1a

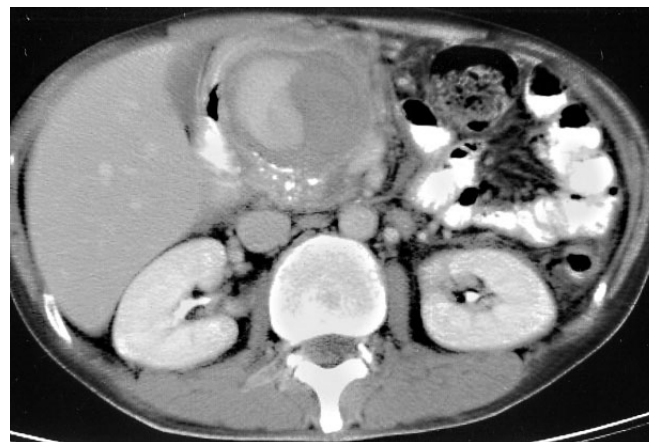


1b

Figure 1. a. Postcontrast CT scan of the abdomen shows atrophy of the body and tail of the pancreas, dilatation of the pancreatic duct and diffuse pancreatic calcifications. Diffuse chronic calcific pancreatitis is considered. **b.** Postcontrast CT scan of the abdomen shows a pseudocyst (→) with well-defined wall at the pancreatic head in a patient with chronic pancreatitis.



2a



2b

Figure 2. a. and b. Precontrast and postcontrast CT scan of the abdomen at the level of the head of the pancreas shows a rounded fluid collection with strongly oval-shaped enhanced content in the peri-pancreatic head region, indicating a pseudoaneurysm secondary to pancreatitis. The pseudoaneurysm can be clearly identified as a vascular structure surrounded by a low-attenuation blood clot.

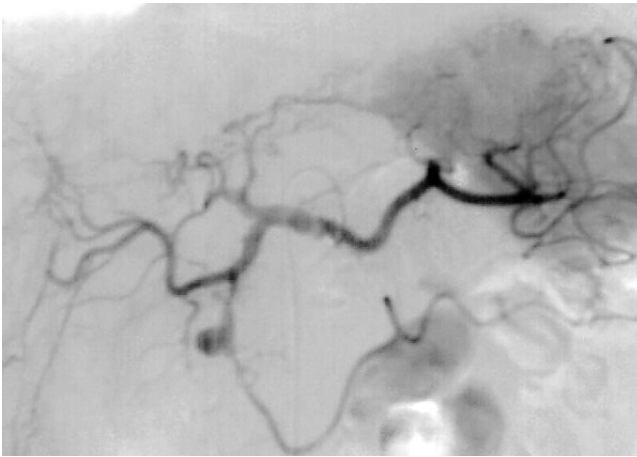


Figure 3. Superselective angiography demonstrates abnormal outpouching contrast accumulation in the gastroduodenal artery. Pseudoaneurysm arising from the gastroduodenal artery is confirmed.

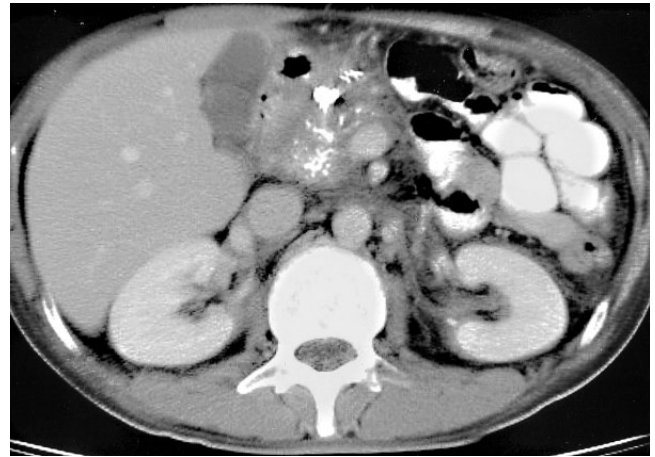


Figure 5. Followed CT at one month later shows complete resolution of the pseudoaneurysm and confirmed that the coils were in situ.



Figure 4. Followed angiography after embolization reveals complete embolization of the pseudoaneurysm. The artery was successfully occluded with metal coils placed both proximally and distally to the pseudoaneurysm.

creatic-duodenal, and hepatic arteries [1]. In our case, the pseudoaneurysm was anterior to the pancreatic head, a location near the gastroduodenal artery that runs along the groove between the head of pancreas and the C loop of the duodenum. Some fluid accumulation between pancreatic head and duodenum as well as mildly enlarged pancreatic head are seen, indicating pancreatitis in acute stage. Therefore, if acute pancreatitis was accompanied by a pseudocyst located near peri-pancreatic arteries, the potential development of pseudoaneurysm should be kept in mind.

Pathogenesis of pseudoaneurysm formation of arteries adjacent to the pancreas is digestion of the wall of the artery by pancreatic enzymes [4]. Several mechanisms have been hypothesized, including (a) autodigestion of the wall of the artery by elastase and other pancreatic enzymes that are released as a result of the inflammatory process; (b) formation of enzyme-rich pseudocysts due to ductal rupture in chronic pancreatitis, which incorporates an adjacent artery; (c) expanding pseudocyst eroding into an adjacent artery [1,2,4]. Because pseudoaneurysms are prone to rupture and will lead to life-threatening hemorrhage, rupture of a pseudoaneurysm should be suspected, if a patient with pancreatitis develops upper GI bleeding without definitely detectable source [2].

The choice of diagnostic test depends on the stability of the patient. In a hemodynamically unstable patient with massive bleeding, angiography is the procedure of choice. However, in a more stable patient and particularly one with obvious gastrointestinal bleeding, upper gastrointestinal endoscopy should be performed at first [1]. The upper GI endoscopy is often non-diagnostic for the massive bleeder because intraluminal blood cannot be adequately cleared. It is also difficult to diagnose the small bowel bleeding beyond the ligament of Treitz, albeit uncommon, by using endoscopy [5]. The RBC labelled G-I bleeding scans and angiography often can localize the site and determine the cause of bleeding when diagnostic endoscopy is unsuccessful.

Both CT and angiography study are accurate in the diagnosis of pseudoaneurysm complicated with pseudocyst [6,7]. Preoperative angiographic diagnosis of gastrointestinal bleeding resulting from pseudo-

aneurysm greatly reduces the morbidity and mortality of surgery [5,6]. It was reported that extravasation of contrast medium was frequently seen if the rate of bleeding exceeds 0.5 mL/min. [2]. In our case, extravasation was evident on angiography and facilitated identification of the bleeding site. Angiography should be performed if pseudoaneurysm rupture is suspected [2,5].

Mortality rate among patients with treated pseudoaneurysm is in the range of 10% to 40%. Without treatment, the mortality may be as high as 90% [1,7,8]. In addition, mortality caused by the rupture of pseudoaneurysms was reported to be approximately 50%; therefore, early diagnosis and treatment are essential [2,7,8]. Once a pseudoaneurysm has been identified, it should be treated, even if there is not active bleeding [1]. The application of transcatheter arterial embolization of bleeding vessels and pseudoaneurysms has tripled the survival rate of patients with bleeding in acute pancreatitis [8]. The choice of initial treatment includes either transcatheter arterial embolization (TAE) or surgical intervention. In recent years, TAE has replaced surgery as the most effective initial treatment for pseudoaneurysms associated with pancreatitis [2]. Primary resection of the pseudoaneurysm, which frequently requires pancreatic resection; but arteriographic embolization of visceral artery pseudoaneurysm is a safe and highly successful technique for the effective identification and treatment of hemorrhage even in critically ill patients.

Therapeutic angiography is primarily indicated in the frail or severely ill patient who is a poor surgical candidate and is increasingly popular in all acute GI bleeders after unsuccessful therapeutic endoscopy [5]. Selective intra-arterial vasopressin therapy had been considered to be a standard angiographic therapy, but embolotherapy is becoming increasingly popular since microvascular technology has become available [5]. Various embolic materials, such as steel coils or detachable balloons, can be used for TAE, either alone or in combination with sponge. Permanent steel coils are the most frequently used because there is no need for recanalization [2]. In the 1990s, transcatheter embolization has become much safer because of more experience and significant improvements in catheters and guidewires, including development of highly radiopaque coaxial catheter systems as small as 2.2F and open-ended guidewires [5]. Currently, microcoils, either alone or with gelatin sponge pledgets or polyvinyl alcohol particles (diameter, 355 to 500 μm), are considered the safest, most efficacious embolic materials. Gelfoam or alcohol particles are less accurately deployed than microcoils because of occasional

reflux into adjacent nontargeted vessels [5]. Superselective angiographic catheterization and microcoil embolization are now frequently used to diagnose and treat acute upper and lower GI bleeding [5].

Although arterial embolization is generally safe in the upper GI tract hemorrhage because of its rich arterial collateral supply, there are still some complications associated with TAE including hemorrhage, infarction of normal tissue, abscess formation, and misplacement of embolized material, despite that such adverse events are relatively rare. No complications were encountered in the current case [2,5].

In conclusion, since the surgical therapy for pseudoaneurysm in association with high mortality rate, we consider diagnostic angiography followed by transcatheter embolization is a safe and highly successful treatment of choice for pseudoaneurysm caused by chronic pancreatitis, even in critically ill patients because of the high surgical risk. ◆

REFERENCES

1. Peter A. Banks M.D. Acute and Chronic Pancreatitis. In: Mark Feldman, Bruce F. Scharschmidt, Marvin Sleisenger, ed. Sleisenger & Fordtran's Gastrointestinal and Liver Disease. 6th ed., United States of America: W. B. Saunders Company, 1998; 854-855
2. Kiminori Kubo MD, Hayato Nakamura MD, Yoshihide Hirohata MD. Ruptured aneurysm and gastric perforation associated with acute pancreatitis: A rare cause of hematemesis. *Gastrointest Endosc* 2001; 53: 658-660
3. Maleux G, van Steenberghe W, Stockx L. Multiple small pseudoaneurysms complicating pancreatitis: angiographic diagnosis and transcatheter embolization. *Eur Radiol* 2000; 10: 1127-1129
4. Eliathamby Kuganeswaran MD, Owen J. Smith MD, Martin L. Goldman MD. Hemosuccus pancreaticus: rare complication of chronic pancreatitis. *Gastrointest Endosc* 2000; 51: 464-465
5. Lefkovitz Z, Cappell MS, Kaplan M, Mitty H, Gerard P. Radiology in the diagnosis and therapy of gastrointestinal bleeding. *Gastroenterol Clin North Am* 2000; 29: 489-512
6. de Perrot M; Berney T; Bühler L; Delgadillo X; Mentha G; Morel P. Management of bleeding pseudoaneurysms in patients with pancreatitis. *Br J Surg* 1999; 86: 29-32
7. Hama Y, Kaji T, Iwasaki Y. Transcatheter embolization of a superior mesenteric artery pseudoaneurysm. *Acta Radiol* 1999; 40: 649-651
8. Richard Neff MD. The pancreas revisited I: diagnosis, chronic pancreatitis. *Surg Clin North Am* 2001; 81: 359-361
9. Schoder M; Cejna M; Längle F; Hittmaier K; Lammer J. Glue embolization of a ruptured celiac trunk pseudoaneurysm via the gastroduodenal artery. *Eur Radiol* 2000; 10: 1335-1337

栓塞治療胰臟炎引起之假性動脈瘤：病例報告

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假性動脈瘤破裂引起腸胃道出血是少見，卻是致命的胰臟炎併發症。在治療上，即使是病情危及的病人，血管攝影加上動脈栓塞仍是最安全、且最有效的治療方法。我們報告一個經由動脈栓塞，成功治療的假性動脈瘤破裂引起大量吐血的病例，並討論胰臟炎引起之假性動脈瘤的機轉、診斷及治療。

關鍵詞：慢性胰臟炎，動脈栓塞，介入性處理，假性動脈瘤