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Rupture of traumatic gastroduodenal artery pseudoaneurysm: case report

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Splanchnic artery aneurysms account for 0.1-0.2% of all vascular aneurysms. Gastroduodenal artery aneurysms represent 1.5% of them and usually occur secondary to inflammatory disorder of surrounding tissues such as pancreatitis. In this report, a patient with abdominal pain of sudden onset 15 days following blunt abdominal trauma was presented. He was referred to our hospital with the presumed diagnosis of ruptured pseudoaneurysm. Since pseudoaneurysm could not be detected during the abdominal angiography, no endovascular intervention was performed and a laparotomy was decided. At the exploration of pseudoaneurysm which ruptured within the abdomen following retroperitoneum, gastroduodenal artery was found as the source of pseudoaneurysm and bleeding was controled by vascular clips. Owing to the high rupture rate of gastroduodenal artery pseudoaneurysms, they should be immediately treated *via* endovascular or surgical means.

KEY WORDS: Aneurysm, false - Arteries - Aneurysm.

Pseudoaneurysm occurs as a result of laseration of an artery wall for various results, during which leaking blood is initially thrombosed and then being tamponated by the surrounding tissues and covered by a fibrous capsule. The differences between a pseudoaneurysm and true aneurysm lie in their etiology and histologic structure. The true aneurysms include all layers of the arterial wall, whereas pseudoaneurysm has only the fibrous tissue. The leading causes of true and pseudoaneurysms of gastroduodenal artery are arteriosclerosis and an inflammatory disorder of surrounding tissues such as pancreatitis.[1,2] Other etiologies of pseudoaneurysms are surgical interventions performed around the peripancreatic area, infection, vasculitis, trauma and medial degeneration of the artery. Gastroduodenal artery is a rare site of splanchnic aneurismal disease. This is generally presented by rupture, with a significant mortality rates.[3]

Case report

A 41-year old male patient with the complaint of abdominal pain has admitted to the emergency unit of an other hospital. His blood pressure was 110/80 mmHg, pulse 84/min, hematocrit 32% and hemoglobin 10 g/dL. His physical examination revealed tenderness and voluntary guarding in the epigastrium and right upper abdomen. The intravenous contrast enhanced abdominal CT showed perihepatic free fluid and a pseudoaneurysm 2.5 cm in size within the hemorrhagic collection area which showed contrast extravasation. The hemorrhagic collection located in the mesentery displaced the superior mesenteric artery laterally and could not be demarcated from the duodenum and pancreatic head (Figures 1, 2). The patient with pre-diagnosed as ruptured pseudoaneurysm was transferred to our hospital in which there was an interventional radiology unit. According to the patient's past medical history, the patient underwent a percutaneous drainage from the liver abscess one year ago. And also 15 days ago, during skiing he had a blunt abdominal trauma when he fell down. At our evaluation, his blood pressure was 90/60 mmHg, pulse 108/min, Hct 23%, Hb 8 g/dL, PT 13 s and PTT 33 s. On his physical examination severe tenderness and rigidity in the epigastrium and right upper abdomen was detected. His hematocrit level was increased to 31% after 3 units of blood transfusion. The subsequent abdominal CT demonstrated enlargement on the hemorrhagic collection area observed in the previous CT and increased perihepatic fluid, but no active contrast material extravasation. The patient underwent abdominal angiography after CT scanning. Celiac and superior mesenteric arterial chateterization was performed during the angiography, which revealed that the proximal segment of the gastroduodenal artery was intact; however its branches could not be visualized. There was also spasm in the middle colic artery. Because an endovascular intervention could not be performed, a laparotomy was decided. At the onset of exploration, 500 mL blood was aspirated from the abdomen and retroperitoneal hematoma of 20x25cm in size involving the mesentery was identified. Bleeding branches of the middle colic artery were ligatured during the exploration of the hematoma. In order to reach the origin of pseudoaneurysm, the dissection advanced through behind the neck of the pan-

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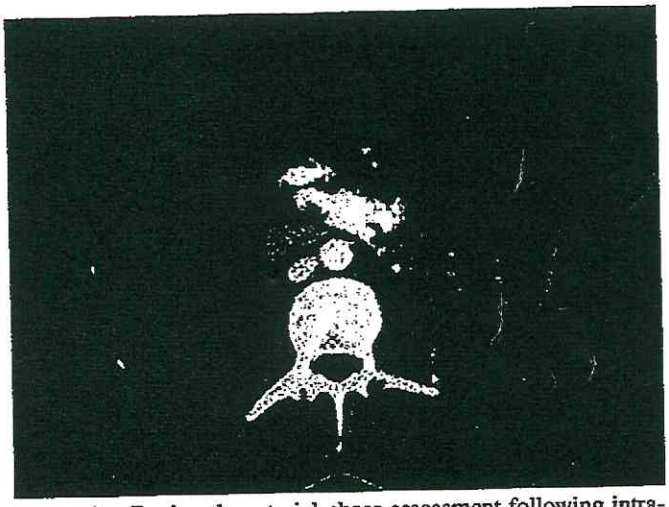

Figure 1.—During the arterial phase assessment following intravenous contrast injection, the abdominal CT scan reveals contrast material extravasation arising from ruptured pseudoaneurysm within the large hematoma located in the mesentery.

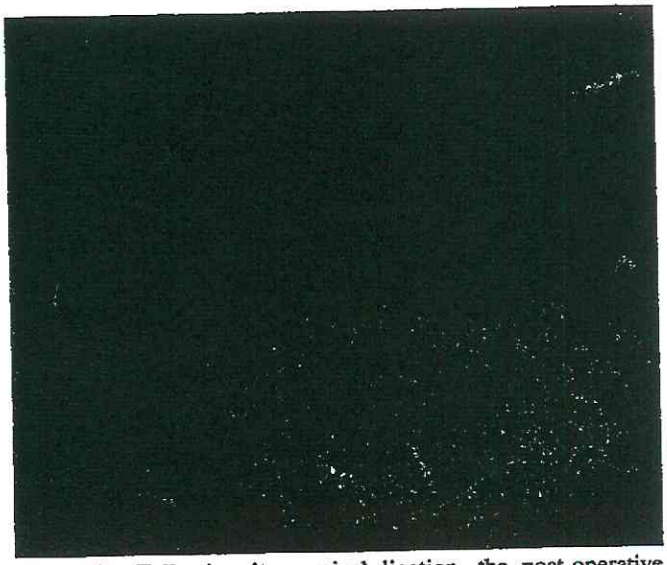

Figure 3.—Following its surgical ligation, the post-operative control angiography shows that the gastroduodenal artery arising from the hepatic artery terminates 0.5 cm after its origin.

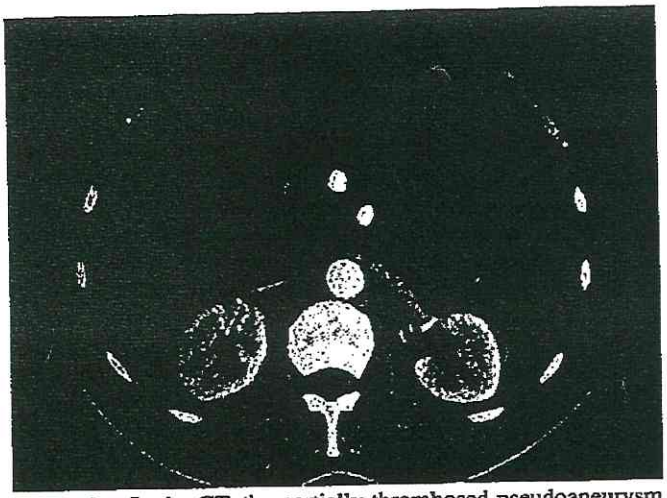

Figure 2.—In the CT, the partially thrombosed pseudoaneurysm of 2.5 cm in size with intensive contrast fixation observed at the gastroduodenal artery causes shifting of the superior mesenteric artery laterally.

creas and bleeding pancreatic branches were ligurated. Portal confluence was found and afterwards massive bleeding from the thrombosed gastroduodenal artery started. Bleeding was controled by vascular clips. No sign of arteriosclerotic changes was noted at the intra-operative assessment. The patient received 3 units of blood transfusion peri-operatively. In the control angiography performed on the third postoperative day, the gastroduodenal artery arising from the hepatic artery was seen to terminate 0.5 cm after its origin (Figure 3). The patient was discharged 15 days after the operation. He is currently doing well at the second year of follow-up.

Discussion

Among splanchnic artery aneurysms, 60% are splenic artery aneurysms and 20% hepatic artery aneurysms.[1] Gastroduodenal artery aneurysms constitute solely 1.5% of them.[1] Pseudoaneurysms of gastroduodenal artery are more common than true ones and usually are encountered in males and older than 45 years of age.

Most gastroduodenal artery aneurysms develop due to inflammatory events such as pancreatitis.[1, 2] Blunt trauma is a rare cause of gastroduodenal artery pseudoaneurysm. Pseudoaneurysm may occur as a result of rapid deceleration, falling down and traffic accident. In present case, the patient stated that he fell down directly on his abdomen while skiing 15 days ago. There was no systemic disease in his background and no complaint until he admitted to hospital. Neither the physical nor radiological examinations or operative findings revealed any pancreatitis or systemic vascular disease. Since the patient had experienced sport accident, the pseudoaneurysm was considered to arise from previous trauma. However, segmental arterial mediolysis could not be excluded in the etiology due to the lack of histopathological examination. Segmental arterial mediolysis first described by Slavin [4] in 1976 is a vasculopathy which involves particularly visceral arteries and leads to intramural dissection, thrombosis or aneurysmal rupture. It is characterized by lytic degeneration on the media layer of vessels without arteriosclerosis or inflammation. Inada *et al.*[5] reassessed the microscopic cross-sections of ruptured visceral artery aneurysms of unknown origin reported in the Japanese literature and diagnosed "segmental arterial mediolysis" in 27 cases. By means of a histopathological evaluation, differential diagnosis of true aneurysms from pseudoaneurysms can be made, a previous arterial disease established and even approximate time of the rupture recognized according to microscopic characteristics of organized hematoma. Hence, pathologic analysis

of aneurysmectomy material composed of hematoma should be performed.

The clinical presentation of patients with gastroduodenal artery pseudoaneurysms is quite variable spectrum ranging from incidental finding to abdominal catastrophe. Its manifestations could be abdominal pain, upper gastrointestinal hemorrhage, obstructive jaundice or a pulsatile abdominal mass. However, it has reported that more than 50% of gastroduodenal artery pseudoaneurysms are diagnosed following rupture which generally occur within the gastrointestinal system and 15% in the peritoneum.[1] It is difficult to define which aneurysm will rupture. There is no correlation between the size of the aneurysm and the rupture. A study by Neschis *et al.*[6] have concluded that only 17.6% of the ruptured aneurysms and 9% of non-ruptured aneurysms are less than 1 cm in size. Therefore, all gastroduodenal artery aneurysms should be treated.

Patients with gastroduodenal artery aneurysms are treated via endovascular or surgical means. The appropriate treatment is confirmed according to patient's clinical presentation, general condition, accompanying disease and risk factors. Surgical intervention is indicated for emergency patients of unstable hemodynamic status or cases whose transarterial catheterization could not be performed. The ligation of gastroduodenal artery without any reconstruction is generally adequate due to the collateral circulation in emergency circumstances. Endovascular route is preferred in cases of high operative risk secondary to accompanying diseases and ruptured aneurysms in hemodynamically stable patients. Since the surgical access is difficult due to its localization and the existence of multiple communicating vessels, transarterial embolization is proposed as the initial treatment of choise in the gastroduodenal artery pseudoaneurysms.[3, 7] In present case, endovascular intervention was attempted in the first-line management. However, neither the CT scan revealed contrast material extravasation nor the angiography visualized an aneurysm, a laparotomy became inevitable. During the operation, the gastroduodenal artery could not be safely ligatured behind the pancreas and bleeding was successfully controled *via* vascular clips.

There is no randomized controlled trial which compares endovascular interventions to surgical ones in the treatment of splanchnic artery aneurysms. In the retrospective analyses including a limited number of case series, both true aneurysms and pseudoaneurysms have generally evaluated together. Chiesa *et al.*[8] treated 27 patients with visceral artery aneurysm surgically and 7 by endovascular means. In their study, the mortality and morbidity rates in the surgical group were 3.6% and 7.1%, respectively. No mortality was observed in the endovascular group; however the morbidity rate was reported as 14.3%. In another trial of 28 cases consisting of surgically treated patients, the mortality and morbidity rates were determined to be 11% and 40%, respectively.[9] On the other hand, Tulsyan *et al.*[10] applied embolization in the treatment of 48 patients with visceral artery aneurysm, with mortality of 8.3%. The most significant drawbacks of the endovascular interventions are rebleeding of an aneurysm due to its recanalization and the development of visceral ischemia following occlusion of aneurysmal collaterals. As independent of the treatment process, mortality and morbidity rates are high in both emergency circumstances and ruptured aneurysms.[3, 10] The mortality rate was reported as 25% in the ruptures of gastroduodenal artery aneurysm.[1]

In conclusion, although they are extremely rare, splanchnic artery aneurysms should be considered in the differantial diagnosis of patients who experienced abdominal pain or intraabdominal bleeding following a blunt abdominal trauma. Gastroduodenal artery pseudoaneurysms frequently present as a consequence of rupture within the gastrointestinal system or peritoneum. Endovascular techniques are used as a primary treatment of patients with gastroduodenal artery pseudoaneurysm if their clinical conditions allow. Unless an endovascular treatment is applied, surgical ligation or clipping of the gastroduodenal artery is warranted.

Riassunto

Rottura di pseudoaneurima post-traumatico dell'arteria gastroduodenale: caso clinico

Gli aneurismi delle arterie splancniche rendono conto dello 0,1-0,2% di tutti gli aneurismi vascolari. Gli aneurismi dell'arteria gastroduodenale rappresentano il 1,5% di questi e solitamente sono secondari a patologie infiammatorie dei tessuti circostanti come la pancreatite. In questo articolo, viene presentato il caso di un paziente con dolore addominale ad insorgenza improvvisa 15 giorni dopo un trauma addominale chiuso. Il sospetto diagnostico è stato di rottura di pseudoaneurisma. Poichè lo pseudoaneurisma non potè essere evidenziato all'angiografia addominale, il paziente non è stato sottoposto a procedura interventistica endovascolare ed è stata posta indicazione a laparotomia esplorativa. All'esplorazione, è stato riscontrato uno pseudoaneursma dell'aorta gastroduodenale con sanguinamento nel retroperitoneo, che è stato controllato con clips vascolari. A causa dell'elevato tasso di rottura degli pseudoaneurimis dell'arteria gastroduodenale, essi dovrebbero esserev immediatamente trattati per via endovascolare o chirurgicamente.

PAROLE CHIAVE: Aneurisma, falso - Arterie - Aneurisma.

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