

CASE REPORTS

Embolization in a Patient with Ruptured Anterior Inferior Pancreaticoduodenal Arterial Aneurysm with Median Arcuate Ligament Syndrome

Hiroyuki Ogino, Yoza Sato, Tatsuo Banno, Toshinao Arakawa, Masaki Hara

Department of Radiology, Nagoya City University School of Medicine 1, Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya, Japan

Abstract

In median arcuate ligament syndrome, the root of the celiac artery is compressed and narrowed by the median arcuate ligament of the diaphragm during expiration, causing abdominal angina. Aneurysm may be formed in arteries of the pancreas and duodenum due to a chronic increase in blood flow from the superior mesenteric artery into the celiac arterial region. We report a patient saved by embolization with coils of ruptured aneurysm that developed with markedly dilated anterior inferior pancreaticoduodenal artery due to median arcuate ligament syndrome.

Key words: Medial arcuate ligament syndrome—Aneurysm—Embolization

Case Report

The patient was a 54-year-old man who lost consciousness and was brought to a near hospital by ambulance. Systolic blood pressure was 70 mmHg and hemoglobin was 4.9 g/dl at the time of admission. Since abdominal CT showed a large volume hematoma around the pancreas head, the patient was transferred to our hospital for therapy.

On superior mesenteric arterial angiography under a slight expiration, the gastroduodenal artery, anterior pancreaticoduodenal artery (PDA), and posterior PDA were markedly dilated, and an irregularly shaped cystic aneurysm measuring 2 cm was observed in the anterior inferior pancreaticoduodenal artery (AIPD) (Fig. 1). A Tracker 18 (Boston Scientific, Wauertown, MA, USA) was passed through a 4 Fr hook-type catheter, and the microcatheter was able to pass the neck of the aneurysm distally, then six microcoils (3 Interlocking detachable coils and 3 Voltx coils, Boston Scientific) were placed in the AIPD artery from the distal to the proximal portion of the neck of the aneurysm not filled with blood (Fig. 2). Lateral aortography was performed under inhalation and expiration. While the aortography showed a slightly stenosed root of the celiac artery during inhalation, it showed severe stenosis of the root during expiration. Blood supply from the superior mesentery artery to the celiac arterial region was observed. Therefore, the patient was diagnosed with median arcuate ligament syndrome (Fig. 3). The patient underwent yearly angiography for follow-up, and, as of 3 years after embolization, there was no recurrence of aneurysm.

Discussion

In median arcuate ligament syndrome, also called celiac trunk compression syndrome, the root of the celiac artery is compressed

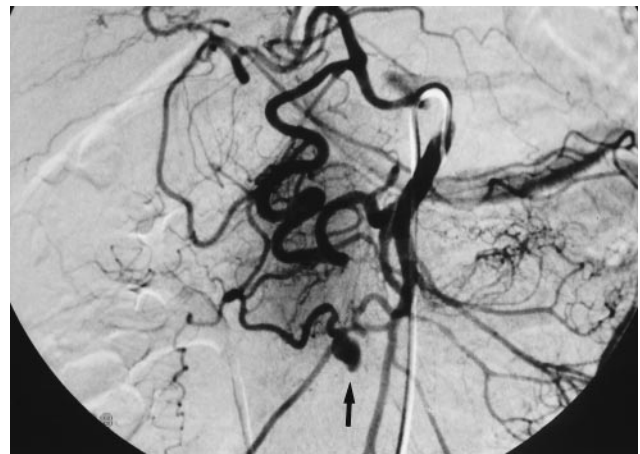


Fig. 1. Superior mesenteric arterial angiography shows the gastroduodenal artery, anterior and posterior PDA (arrows) were markedly dilated, and an irregularly shaped aneurysm (arrowhead).

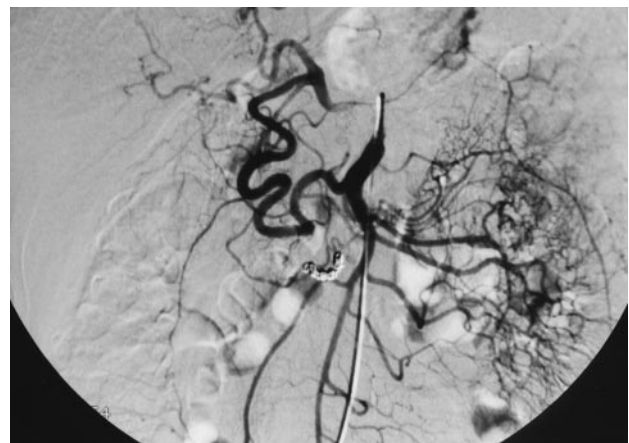


Fig. 2. The anterior PDA is embolized, and the aneurysm is not depicted.

and narrowed by the median arcuate ligament of the diaphragm during expiration. It is considered that obstruction of the celiac artery root increases the blood flow from the superior mesenteric artery to the celiac arterial region via the posterior PDA, causing

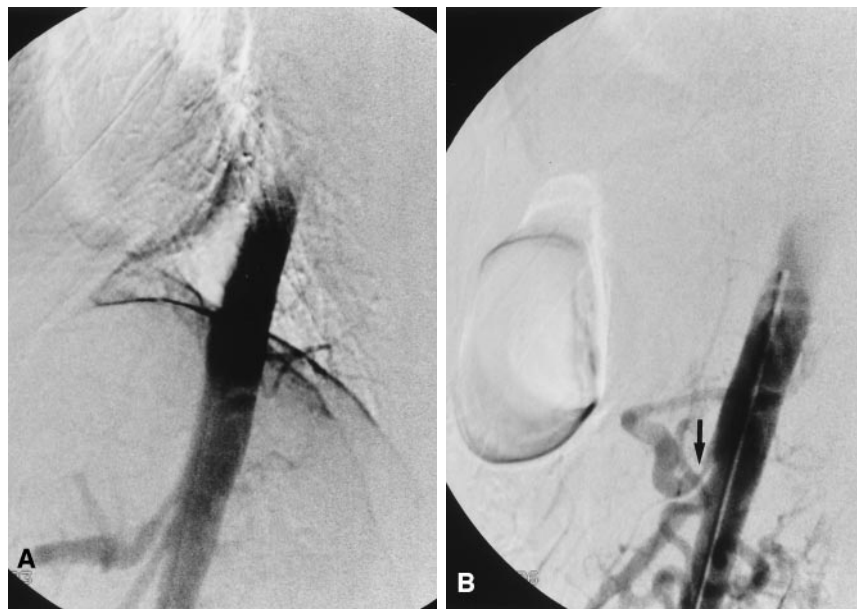


Fig. 3. **A** Aortography during inhalation shows both the celiac artery and superior mesenteric artery. **B** Aortography during expiration shows severe stenosis of the celiac artery (arrows).

abdominal angina [1, 2]. Definite diagnosis of median arcuate ligament syndrome is made by angiography, however, Kopecky et al. [3] reported the usefulness of spiral CT scanning of compression of the celiac artery by the arcuate ligament.

Arteriosclerosis, pancreatitis, trauma, and fibromuscular dysplasia have been reported to be the causes of pancreaticoduodenal artery aneurysm [4], and aneurysm formation due to narrowing and obstruction of celiac arterial root has also been reported [1]. Suzuki et al. [2] investigated 42 patients with pancreaticoduodenal arterial aneurysm, and the median arcuate ligament compressed the root of the celiac artery in seven patients [2]. In our case, aneurysm was developed in the anterior PDA which was not as dilated as in the posterior PDA. We think this appearance was caused by a pressure gradient of a different caliber between the anterior and posterior PDA. We suggest that the aneurysm developed at a weak portion of the PDA due to increased blood flow. Since the frequency of aneurysm rupture in the splanchnic artery is high, except for the splenic artery, and the mortality from rupture is high, therapy mainly consisting of embolization is necessary for cases discovered before rupture [5]. For ruptured cases such as this patient, embolization is the first choice and packing of the aneurysm or embolization of the distal and proximal side of the parent artery is necessary. Only the proximal side may be embolized due to vascular spasms in ruptured cases [7], however, most cases can be treated by embolization using a microcatheter. Since aneurysm may recur due to persistent narrowing of the root of the celiac artery, it

is necessary to improve the blood flow with aortohepatic bypass or division of the arcuate ligament [8]. In this patient, we are following the course yearly and planning to improve the blood flow by embolization and surgery when aneurysm formation recurs.

References

1. Sutton D, Lawton G (1973) Celiac stenosis or occlusion with aneurysm of the collateral supply. *Clin Radiol* 24:49–53
2. Suzuki K, Kashimura H, Sato M, Hassan M, Yokota H, Nakahara A, Muto H, Yuzawa K, Fukao K, Tanaka N (1998) Pancreaticoduodenal artery aneurysms associated with celiac axis stenosis due to compression by median arcuate ligament and celiac plexus. *J Gastroenterol* 33:434–438
3. Kopecky KK, Stine SB, Dalsing MC, Gottlieb K (1997) Median arcuate ligament syndrome with multivessel involvement: Diagnosis with spiral CT angiography. *Abdom Imaging* 22:318–320
4. Verta MJ, Dean RH, Yao JST, Conn J Jr, Mehn WH, Bergan JJ (1977) Pancreaticoduodenal artery aneurysms. *Ann Surg* 186:111–114
5. de Perrot M, Berney T, Deleaval J, Buhler L, Mentha G, Morel P (1999) Management of true aneurysms of the pancreaticoduodenal arteries. *Ann Surg* 229:416–420
6. Compression of the celiac trunk by the median arcuate ligament (2000) *Radiology* 214(2):604–606, *Radiology* 211(2):405–410
7. Baker KS, Tisando J, Cho SR, Beachley MC (1987) Splanchnic artery aneurysms and pseudoaneurysm: Transcatheter embolization. *Radiology* 163:135–139
8. Quandalle P, Chanbon JP, Marache P, Saudemont A, Maes B (1990) Pancreaticoduodenal artery aneurysms associated with celiac axis stenosis: Report of two cases and review of the literature. *Ann Vasc Surg* 4:540–545