

Celiac Artery Aneurysm: Report of Two Surgical Cases

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Abstract: Celiac artery aneurysms are uncommon and only 21 cases have been reported in Japan. We present herein two cases of celiac artery aneurysm treated by aneurysmectomy and vascular reconstruction, and review the Japanese literature documented between 1969 and 1997. Our two patients were asymptomatic, and their aneurysms were detected incidentally by abdominal computed tomography (CT) and ultrasonography during investigations of other disorders. The celiac trunk was imaged well by three-dimensional CT angiography, which proved very effective for determining the best surgical approach and type of operation. Aneurysmectomy and reconstruction of the common hepatic and splenic arteries with direct end-to-end anastomosis was performed successfully in both patients. Pathological examination revealed medial degeneration with loss of elastic fibers and atherosclerotic changes that were probably secondary. In Japan, 13 patients (61.9%) have been surgically treated and several methods of vascular reconstruction with grafting have been reported; however, there have been no previous reports of an end-to-end anastomosis without grafting as described herein.

Key Words: celiac artery aneurysm, 3-dimensional CT angiography, vascular reconstruction, end-to-end anastomosis

Introduction

Celiac artery aneurysms are relatively rare, and only 21 cases have been reported in Japan including the first report by Yamada et al. in 1969. As this type of aneurysm is generally asymptomatic, establishing a diagnosis before rupture is very difficult; however, with recent

advances in noninvasive imaging techniques, more cases are being detected before rupture.¹ We encountered two asymptomatic aneurysms in patients undergoing investigations of other disorders. Aneurysmectomy with vascular reconstruction was successfully performed in both these patients.

Case Reports

Case 1

A 49-year-old man was transferred to our surgical unit from the department of internal medicine after a celiac artery aneurysm was detected by abdominal computed tomography (CT) and ultrasonography during examinations for hepatitis C. At the age of 11 years, he had undergone surgery for tuberculous arthritis but his family history was noncontributory. Mild liver dysfunction was shown by the laboratory tests. No abnormalities were detected on plain abdominal X-ray films. Digital subtraction angiography (DSA) revealed a spindle-shaped celiac artery aneurysm, 42mm in diameter, associated with a splenic artery aneurysm, 10mm in diameter, and three-dimensional CT angiography (3D-CT) revealed that the common hepatic and splenic arteries originated from the celiac aneurysm. The normal-sized portion of the celiac artery extended 20mm from the origin at the celiac trunk (Fig. 1). Echocardiography and a history revealed no evidence of endocarditis. After clamping of the celiac, common hepatic, and splenic arteries, the aneurysm was resected with ligation of the left gastric artery. There was no thrombus, but small deposits of atheromatous plaque were found in the luminal wall. Following complete aneurysmectomy, the normal-sized common hepatic and splenic arteries were approximated to the celiac trunk, and a direct end-to-end anastomosis was performed without grafting (Fig. 2). The small splenic

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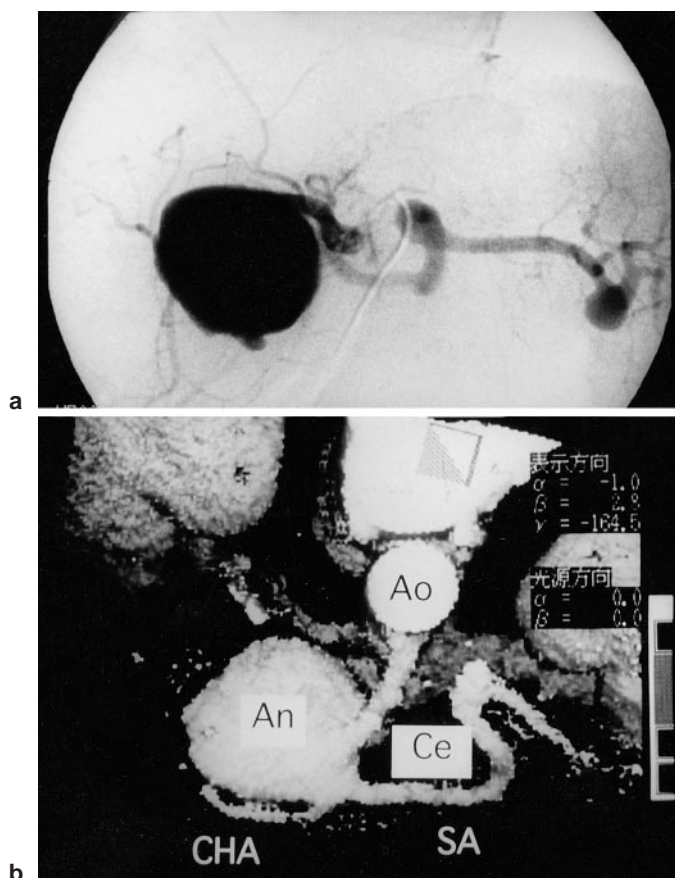


Fig. 1. **a** Digital subtraction angiography revealed a spindle-shaped celiac artery aneurysm associated with a splenic artery aneurysm (case 1). **b** Three-dimensional computed tomographic (CT) angiography revealed that the common hepatic and splenic arteries originated from the distal end of the celiac artery aneurysm (case 1). *Ao*, aorta; *CHA*, common hepatic artery; *SA*, splenic artery; *An*, aneurysm; *Ce*, celiac artery

artery aneurysm was resected together with the spleen. After vascular reconstruction, blood flow in the hepatic and splenic arteries was 350ml/min and 120ml/min, respectively. Pathological examination of the aneurysm demonstrated medial degeneration with loss of elastic fibers and atherosclerotic changes that were probably secondary. The postoperative course was unremarkable, except for a collection of serous fluid in the left subphrenic space that was drained under ultrasonic guidance. A DSA performed 3 months postoperatively revealed a patent celiac axis without stenosis or dilatation around the anastomosis.

Case 2

A 58-year-old man was admitted to our department for evaluation and treatment of a celiac artery aneurysm detected by CT during a follow-up examination after

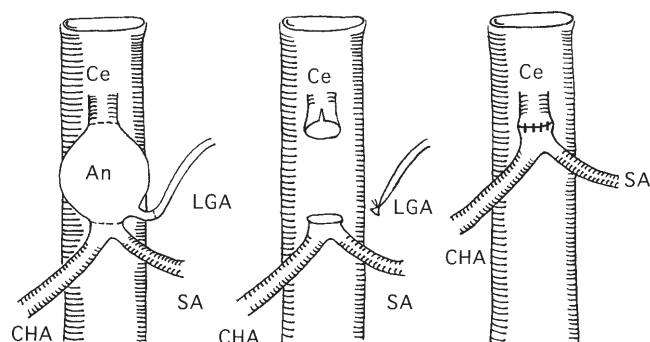


Fig. 2. Schematic representation of the procedure. *CHA*, common hepatic artery; *SA*, splenic artery; *An*, aneurysm; *Ce*, celiac artery; *LGA*, left gastric artery

colon cancer surgery performed 5 years earlier, at which time he had also undergone wrapping of an iliac artery aneurysm. There were no abnormal findings on plain abdominal X-ray films or blood tests, and marked dilatation of the aneurysm was shown by follow-up CT (Fig. 3). DSA revealed a spindle-shaped aneurysm, 16mm in diameter, in the distal portion of the celiac artery and a 3D-CT revealed that the left gastric, common hepatic, and splenic arteries originated from the distal end of the aneurysm, and that the length of the normal proximal portion of the celiac artery was about 10mm (Fig. 4). The normal portion of the celiac trunk was exposed with ligation of the left gastric artery. After clamping, the aneurysm was resected and the distal celiac artery was anastomosed to the proximal celiac trunk in an end-to-end fashion, as described in case 1. Pathological examination revealed medial degeneration and adventitial fibrosis. The postoperative course was uneventful.

Discussion

A report by Graham et al. in 1985 reviewed 108 cases of celiac artery aneurysm reported in the United States and Europe;¹ however, in Japan, only 21 cases have been reported to date (Table 1).¹¹⁻²⁵ The mean age at onset of the Japanese patients was 51.1 years and the male to female ratio was 12:9. The etiology of the aneurysm included atherosclerosis in 10 patients, trauma in 2, inflammation in 2, iatrogenic disease in 3, and Marfan's syndrome in 1, although atherosclerosis may actually have been a secondary change. The symptoms noted were epigastralgia, abdominal pain, and abdominal discomfort in 23.8% of the patients. An increase in the number of asymptomatic cases detected during investigations of other disorders has recently been reported.^{1,2} DSA is the most important procedure for diagnosis and also gives some information about the existence of other visceral aneurysms. The incidence of

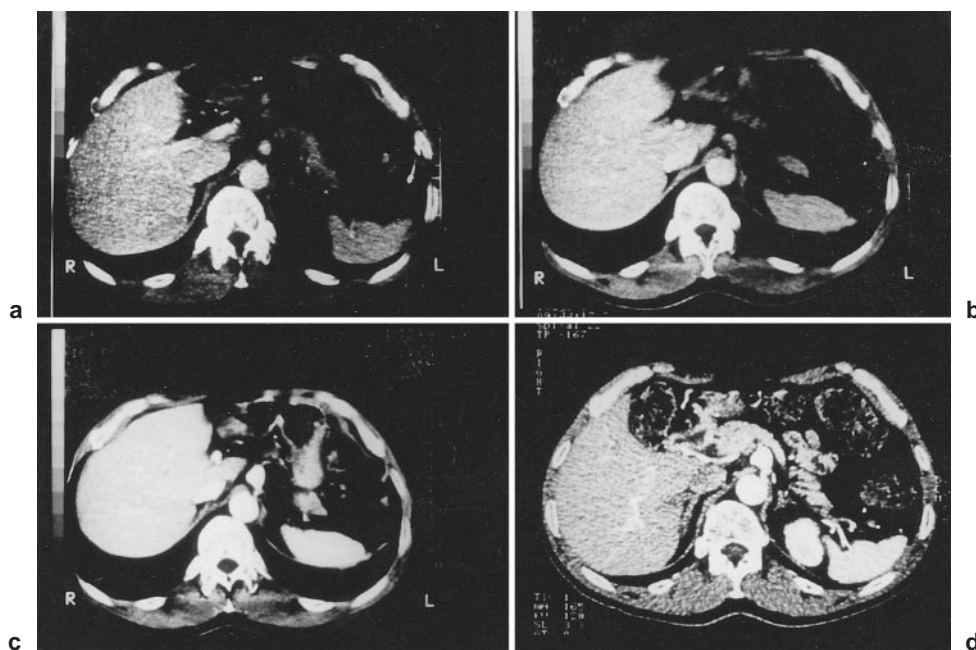
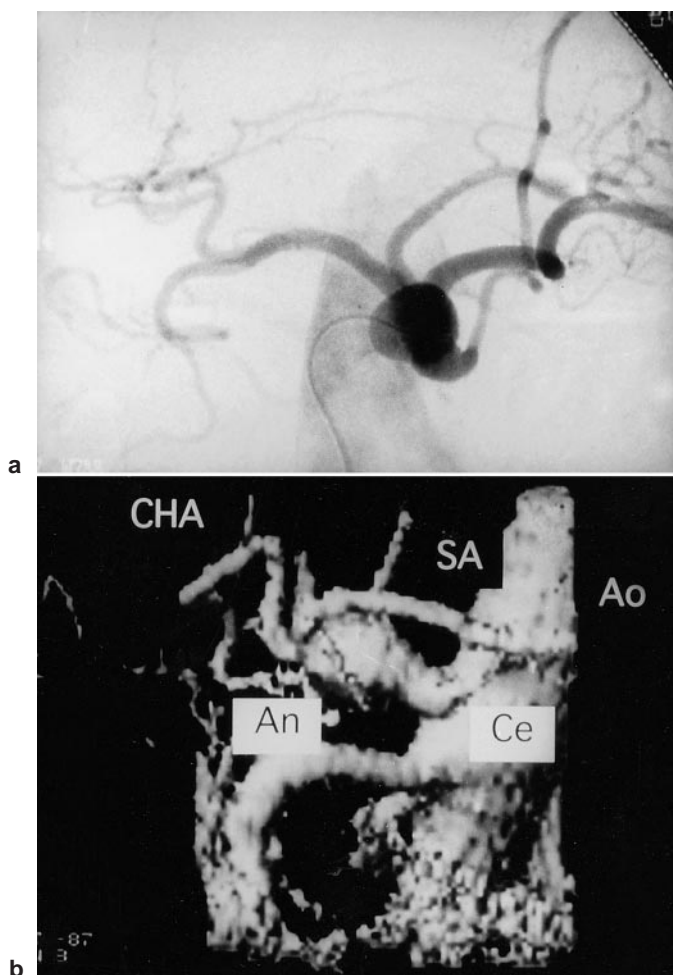


Fig. 3a-d. Follow-up CT scans in case 2. **a** July 1992; **b** December 1992; **c** August 1993; **d** January 1994



rupture of celiac aneurysms was reported as 13% by Graham et al.¹ Due to the high morbidity and mortality after rupture (40%),¹ treatment is needed for large spindle-shaped aneurysms and all saccular ones. Aneurysmectomy and vascular reconstruction is the treatment of choice, but simple arterial ligation with aneurysmectomy may be effective in some cases.³ If the collateral circulation is sufficient, vascular reconstruction is not needed in these patients; however, the hepatic circulation cannot be evaluated definitely by any procedure, so it is safer to perform reconstruction of the hepatic artery whenever possible. Although one case of a mycotic aneurysm of the celiac trunk being managed by vascular reconstruction has been reported,⁴ aneurysmectomy with simple ligation is usually recommended for inflammatory or infectious disease.⁵ Objective and precise evaluation of the collateral circulation via the superior mesenteric artery is needed in such cases. The celiac trunk can be ligated safely in Appleby's operation⁶ for advanced gastric cancer if the gastroduodenal artery provides sufficient collateral

Fig. 4. **a** DSA revealed a spindle-shaped celiac aneurysm in case 2. **b** Three-dimensional CT angiography revealed that the length of the normal proximal portion of the celiac artery was about 10mm in case 2. Ao, aorta; CHA, common hepatic artery; SA, splenic artery; An, aneurysm; Ce, celiac artery

Table 1. Documented Japanese cases of celiac artery aneurysm

Case	Reference	Age	Sex	Presentation	Investigation	Procedure	Pathology
1	Yamada et al. ¹¹	35	M	Epigastric pain	AG	Aneurysmectomy, end-to-end anastomosis between HA and MCA	Trauma
2	Tanabe et al. ¹²	43	F	Abdominal pain	AG	Aneurysmectomy, SMA reconstruction with SA	Inflammation
3	Sawada et al. ¹³	31	M	Back pain	AG	Percutaneous embolization with metallic coil	Trauma
4	Hirose et al. ¹⁴	34	F	Bleeding from drain	US, CT	Percutaneous embolization with balloon catheter	Inflammation
5	Miki et al. ¹⁵	67	M	Epigastric pain	US	Follow up	
6	Kubo et al. ¹⁶	60	M	Asymptomatic	AG, US, CT	Follow up	
7	Baba et al. ¹⁷	50	M	Asymptomatic	AG, US, CT	Aneurysmectomy, CHA and SA reconstruction with SV	
8	Mochida et al. ¹⁸	74	F	Asymptomatic	AG, US, CT	Aneurysmectomy, patch angioplasty of CHA and SA	Atherosclerosis
9	Matsumoto et al. ¹⁹	62	M	Asymptomatic	AG, US, CT	Aneurysmectomy, CHA and SA reconstruction with SV	Atherosclerosis
10	Ishikawa et al. ²⁰	63	M	Intestinal bleeding	AG, US, CT	Aneurysmectomy, CHA and SA reconstruction with prosthesis	Atherosclerosis
11	Kimura et al. ²¹	46	F	Asymptomatic	AG, US, CT	Aneurysmectomy, CHA and SA reconstruction with SV	Atherosclerosis
12	Kimura et al. ²¹	50	M	Asymptomatic	AG, US, CT	Aneurysmectomy	Atherosclerosis
13	Morita et al. ²²	55	F	Asymptomatic	AG, US, CT		Introgenic
14	Morita et al. ²²	52	F	Asymptomatic	AG, US, CT	Aneurysmectomy, autogenous vein patch angioplasty	Introgenic
15	Morita et al. ²²	62	M	Asymptomatic	AG, US, CT		Atherosclerosis
16	Morita et al. ²²	60	F	Asymptomatic	AG, US, CT	Follow up	Introgenic
17	Kikuchi et al. ²³	21	M	Epigastric pain	AG, US, CT	Autopsy	Marfan's syndrome
18	Tanabe et al. ²⁴	49	F	Asymptomatic	AG, US, CT	Aneurysmectomy, patch angioplasty of CHA and SA with SV	Atherosclerosis
19	Mori et al. ²⁵	53	F	Abdominal pain	AG, US, CT	Aneurysmectomy, CHA and SA reconstruction with SV	Atherosclerosis
20	Present case 1	49	M	Asymptomatic	AG, US, 3D-CT	Aneurysmectomy, end-to-end anastomosis between CHA, SA and CA	Atherosclerosis
21	Present case 2	58	M	Asymptomatic	AG, US, 3D-CT	Aneurysmectomy, end-to-end anastomosis between CHA, SA and CA	Atherosclerosis

AG, angiography; US, ultrasonography; CT, computed tomography; 3D-CT, three-dimensional CT; CA, celiac artery; HA, hepatic artery; MCA, middle colic artery; SMA, superior mesenteric artery; SA, splenic artery; SV, saphenous vein

flow, which demonstrates that ligation of the celiac trunk should not pose a problem, provided there is sufficient collateral circulation.

The etiology of our two patients was medial degeneration with secondary atherosclerotic changes; therefore, aneurysmectomy and vascular reconstruction were performed. In Japan, several methods of vascular reconstruction have been described, including hepatic and splenic artery reconstruction with grafting in five cases, autogenous vein patch angioplasty of the hepatic and splenic arteries in one case, anastomosis between the common hepatic and middle colic arteries in one case, reconstruction of the superior mesenteric artery with the splenic artery in one case, and reconstruction of the hepatic and splenic arteries with autogenous vein patch angioplasty in one case (Table 1). However, there have been no reports of direct end-to-end anastomosis without grafting, as performed for the two patients described herein. In our two patients, preoperative 3D-CT revealed that the celiac trunk could be clamped safely, but if aneurysmectomy and direct anastomosis had not been feasible, we would have prepared autogenous venous or arterial grafts, using the saphenous vein or the internal iliac artery, respectively, for vascular reconstruction. When performing direct end-to-end anastomosis, it is extremely important to mobilize the common hepatic and splenic arteries sufficiently and keep as much length as possible. If the residual celiac trunk is 30–40 mm in length, there is no problem with performing direct end-to-end anastomosis. We usually cut into the celiac trunk to enlarge the anastomotic area (Fig. 2), and perform color Doppler scanning for follow-up in the outpatient clinic.

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