Endovascular Treatment of Celiac Artery Aneurysm Using Detachable Vascular Plugs

Arun Gupta, Ajit Kumar Yadav, Hirenkumar Kamleshkumar Panwala[1], Abhishek Agarwal[1], Buxi TBS[1], Saxena KK[1]

Departments of Interventional Radiology and [1]Radiodiagnosis, Sir Ganga Ram Hospital, New Delhi, India

Correspondence: Dr. Ajit Kumar Yadav, Department of Interventional Radiology, Sir Ganga Ram Hospital, New Delhi - 110 060, India. E-mail: yadavajitdr@gmail.com

ABSTRACT

Aneurysm of the celiac trunk is one of the rarest forms of splanchnic artery aneurysm. Untreated lesions enlarge progressively and may rupture spontaneously. Treatment of the celiac artery aneurysm is usually done by surgery or percutaneously by coil embolization. Presented is a case of 85-year-old man who sought care for a celiac trunk aneurysm detected on Doppler examination and confirmed by computed tomographic angiography. Patient underwent successful embolization using detachable vascular plugs.

Key words: Aneurysm; celiac trunk; vascular plug

Introduction

Aneurysm of the celiac trunk is one of the rarest forms of the splanchnic artery aneurysm, comprising less than 4% of all visceral aneurysms.[1] In most cases, these aneurysms are usually asymptomatic and their detection is occasional. The reported incidence of rupture of celiac aneurysms is approximately 15-20%.[2] Early intervention is recommended as the mortality of a ruptured aneurysm is approximately 80%.[2] Due to the risk of rupture, elective treatment should be considered in patients with aneurysms greater than 2 cm.[3] Variety of treatments had been recommended such as surgical repair, graft and stent placement, endovascular embolization by coils, vascular plugs or glue. Surgical treatment represents the traditional therapy, though it carries high post-operative morbidity and mortality.[4] Endovascular procedures are increasingly replacing surgery in the treatment of such aneurysms. We present a patient with bleeding celiac trunk aneurysm in whom Amplatzer vascular plugs were used for percutaneous embolization.

Access this article online	
Quick Response Code:	Website: www.wajradiology.org
	DOI: 10.4103/1115-1474.121105

Case Report

An 85-year-old male presented with a pain in the right hypochondriac and epigastric region with multiple episodes of hematemesis for about 3 years which had increased in frequency in the last 3 months. There was no history of trauma, fever, altered bowel habits, abdominal or chest infections. Patient is a chronic smoker for last 50 years. His upper gastrointestinal (GI) endoscopy was normal. The cardiovascular system was within normal limits. Ultrasound showed dilated celiac axis with extension to the common hepatic artery. Computed tomographic (CT) angiography reveals aneurysmal dilatation of the celiac trunk extending into the common hepatic artery with thrombosis of a portion of the lumen of the aneurysm, which also shows calcification within. The combined diameter of the aneurysm including the thrombosed portion is approximately 5.5 cm in size. The patent lumen of aneurysm other than thrombosed portion measures approximately 2.2 cm. The splenic artery and left gastric artery arising from the aneurysmally dilated celiac trunk shows mild irregularity, however, no evidence of aneurysmal dilatation of these arteries are noted. The aneurysm extends up to the origin of the gastroduodenal artery, however, hepatic artery proper is not dilated and is noted to divide into the left hepatic artery and right hepatic artery in a normal fashion [Figure 1]. Superior mesenteric artery (SMA) and its branches show adequate opacification.

Considering the patient's age, he was planned for endovascular repair of the celiac artery aneurysm (CAA). In angiography

suite under deep sedation through left brachial route, celiac artery angiogram confirmed the aneurysm with a nipple like protrusion from dilated part of common hepatic artery suggestive of probable repeated bleeding site [Figure 2a]. We decided to occlude the aneurysm with Amplatzer vascular plug instead of endovascular coil embolization in an attempt to reduce the cost and time of the procedure.

The aneurysm was traversed with a guide wire (0.035", Terumo, Japan) into the hepatic artery proper. The wire was exchanged for a stiff wire (Amplatez super stiff, Cordis, USA) and a 7 Fr sheath was inserted through the aneurysm. Two detachable vascular plugs (AGA Medical corp.UK) of 22 mm and 18 mm diameter respectively were placed just proximal to the origin of Gastroduodenal artery and up to splenic artery origin. Vascular plugs completely occluded the bleeding site. Post embolization celiac angiogram showed no flow from CHA with near complete occlusion of aneurysm. SMA angiogram showed perfusion of hepatic artery through gastroduodenal arcade and filling of splenic artery through collaterals [Figure 2b]. The liver functions remained unchanged after the procedure and during the hospital stay. Patient's post procedure hospital stay was uneventful and he was discharged after 4 days. After 6 months of procedure, the patient is doing well with no abdominal symptoms and ultrasound Doppler examination shows no flow in the aneurysm.

Discussion

CAA is one of the rarest forms of splanchnic artery aneurysm. It comprises only 4% of total visceral circulation aneurysm. The true incidence remains unknown, however, the estimated incidence ranges from 0.005% to 0.2%.[2,5,6] The usual age of presentation of CAA is in the sixth decade of life. It is seen more commonly in males. In a study by Veraldi *et al*. 1999, 70% of patients undergoing surgeries for CAA were males.[2]

The most common cause for CAA is atherosclerosis.[4,7] Other causes are trauma, surgery, infection, arteritis (Polyarteritis nodosa, Fibromuscular dysplasia), collagen vascular disease and congenital anomalies.[8,9] However in 40% of cases cause is unknown.[4]

The clinical presentation varies and patient can be asymptomatic at time of diagnosis. However epigastric pain and emesis are the common clinical presentations. On physical examination, abdominal bruit and palpable mass can be detected. Some rare presentations of CAA include hematemesis due to gastric varices as a result of splenic vein and portal vien obstruction secondary to external compression.

Base line evaluation of the patient was by Doppler examination and confirmed with CT angiography. Pre procedure work-up

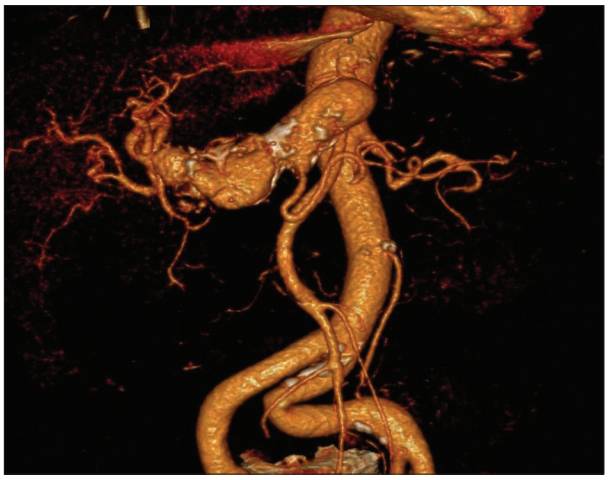

Figure 1: Computed tomography angiography of the celiac aneurysm with three-dimensional reconstruction

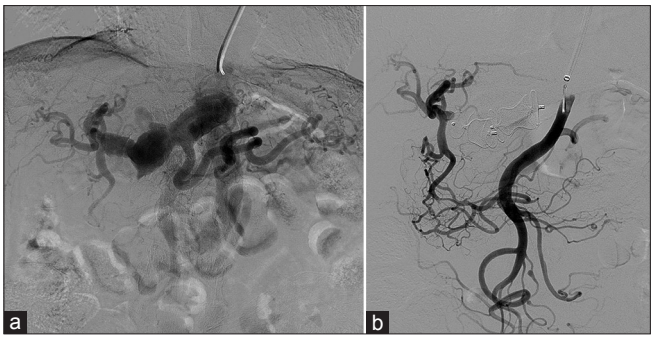

Figure 2: (a) Selective arteriography shows celiac artery aneurysm, with normal caliber splenic artery and nipple-like projection from aneurysm suggestive of bleeding site, (b) Selective arteriography shows the superior mesenteric artery with opacification of the hepatic artery via the gastroduodenal arcade and vascular plugs in celiac artery aneurysm

is necessary to evaluate the size of aneurysm, branch involvement and proximal and distal circulation.

In a study by Graham *et al*. the incidence of rupture of CAA was 13%.[4] The mortality and morbidity associated with rupture is very high (80-100%).[4] Rupture usually occurs into the peritoneum or rarely in to retroperitoneum and thoracic cavity.[6,10] Peritoneal bleed starts with bleeding in to lesser sac cavity than free spillage to peritoneal cavity, producing the classic "double rupture" phenomenon.[6] Sometimes, aneurysm directly erodes the bowel wall acting as sporadic GI bleeding known as the "herald bleed."[8] Therefore, immediate intervention is required in cases of ruptured CAA. Other indications for treatment of CAA are size more than 3 times the diameter of native vessel, symptomatic CAA causing erosion, external compression of adjacent structures and radiological evidence of progressive increase in size of the aneurysm.[11]

Until few years back the treatment of choice was surgical repair. However, the mortality and morbidity associated

with open surgery ranges from 20% to 36%. Therefore, the management techniques in the last decade have shifted towards the endovascular approach. The usual endovascular treatment is coil embolization and stent grafting. Other percutaneous techniques described in the literature are temporary balloon occlusion of the parent vessel, instillation of absolute alcohol and detachable coils into aneurysm sac.[12,13]

Terrinoni *et al*. reported the first successful embolization of a true aneurysm of the celiac artery with immediate occlusion of all afferent vessels of the celiac axis and suggested that this is a safe alternative to surgical intervention in high-risk patients.[14]

In our patient, the aneurysm was large in size and was extending close to the origin of gastroduodenal artery but not involving it. In view of the large size, endovascular plug embolization was preferred over conventional coil embolization to reduce the risk of inadvertent embolization of hepatic circulation. Vascular plug also reduces the cost and time of procedure as it can be repositioned before final deployment. We used brachial route to deploy vascular plugs, as the celiac trunk was more easily catheterized antegrade through this route and avoided the curve of the celiac trunk origin if a femoral approach had been used.

Hence vascular plug can be used for management of the celiac trunk aneurysms, if the vascular anatomy is favorable.

References

1. Messina LM, Shanley CJ. Visceral artery aneurysms. Surg Clin North Am 1997;77:425-42.
2. Veraldi GF, Dorrucci V, de Manzoni G, Guglielmi A, Laterza E, Rombola G, *et al*. Aneurysm of the celiac trunk: Diagnosis with US-color-Doppler. Presentation of a new case and review of the literature. Hepatogastroenterology 1999;46:781-3.
3. Carr SC, Mahvi DM, Hoch JR, Archer CW, Turnipseed WD. Visceral artery aneurysm rupture. J Vasc Surg 2001;33:806-11.
4. Graham LM, Stanley JC, Whitehouse WM Jr, Zelenock GB, Wakefield TW, Cronenwett JL, *et al*. Celiac artery aneurysms: Historic (1745-1949) versus contemporary (1950-1984) differences in etiology and clinical importance. J Vasc Surg 1985;2:757-64.
5. Syed M, Shaikh A, Neravetla S. Celiac artery aneurysm embolization by coil occlusion. Ann Vasc Surg 2005;19:113-9.
6. McMullan DM, McBride M, Livesay JJ, Dougherty KG, Krajcer Z. Celiac artery aneurysm: A case report. Tex Heart Inst J 2006;33:235-40.
7. Knox R, Steinthorsson G, Sumpio B. Celiac artery aneurysms: A case report and review of the literature. Int J Angiol 2000;9:99-102.
8. Pasha SF, Gloviczki P, Stanson AW, Kamath PS. Splanchnic artery aneurysms. Mayo Clin Proc 2007;82:472-9.
9. Parfitt J, Chalmers RT, Wolfe JH. Visceral aneurysms in Ehlers-Danlos syndrome: Case report and review of the literature. J Vasc Surg 2000;31:1248-51.
10. Risher WH, Hollier LH, Bolton JS, Ochsner JL. Celiac artery aneurysm. Ann Vasc Surg 1991;5:392-5.
11. Brown OW, Hollier LH, Pairolero PC, McCready RA. Uncommon visceral artery aneurysms. South Med J 1983;76:1000-1.
12. Yamamoto N, Ishihara S, Yoshimura S, Ueda T, Takeuchi T, Kawada Y. Endovascular embolization of a renal artery aneurysm using interlocking detachable coils. Scand J Urol Nephrol 1998;32:143-5.
13. Centenera LV, Hirsch JA, Choi IS, Beckmann CF, Gillard CS, Libertino J. Wide-necked saccular renal artery aneurysm: Endovascular embolization with the Guglielmi detachable coil and temporary balloon occlusion of the aneurysm neck. J Vasc Interv Radiol 1998;9:513-6.
14. Terrinoni V, Rengo M, Bianchi G, Lamazza A, Cosimati A, Antognoli MG, *et al*. Aneurysm of the celiac trunk: Review of the literature and report of a clinical case. G Chir 1995;16:191-4.

How to cite this article: Gupta A, Yadav AK, Panwala HK, Agarwal A, TBS B, Saxena KK. Endovascular Treatment of Celiac Artery Aneurysm Using Detachable Vascular Plugs. West Afr J Radiol 2013;20:110-2.

Source of Support: Nil, **Conflict of Interest:** None declared.