Successful endovascular treatment of chronic mesenteric ischemia in a patient with variant celiacomesenteric trunk anatomy

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ABSTRACT

The celiacomesenteric trunk (CMT) is a rare anatomical variant where the celiac axis and superior mesenteric artery share a common origin. Despite its rarity, CMT has significant implications across various medical fields, particularly in surgical planning and interventional procedures. We report a case of chronic mesenteric ischemia owing to atherosclerotic stenosis at the CMT bifurcation, necessitating a complex interventional approach. Kissing covered stent angioplasty was successfully performed, resulting in revascularization, symptom resolution, and no restenosis at 1-year follow-up. This report highlights the feasibility and effectiveness of the kissing stent technique in managing complex CMT bifurcation obstructions in patients with chronic mesenteric ischemia. (J Vasc Surg Cases Innov Tech 2024;10:101604.)

Keywords: Celiacomesenteric trunk; Mesenteric ischemia; Endovascular repair

The celiacomesenteric (or celiomesenteric) trunk (CMT) represents a rare anatomical variant in which the celiac axis (CA) and the superior mesenteric artery (SMA) have a common origin from the abdominal aorta as a single trunk. Recent computed tomography angiogram reviews report the prevalence of CMT to be between 1.1% and 3.4%.[1,2] Notwithstanding its rarity, the CMT variant has important implications across various medical specialties. Knowledge of CMT anatomy can be crucial in the preoperative planning and performance of pancreatectomy, hepatectomy, and liver transplantation, as well as radioembolization of hepatic tumors.[3-5]

In vascular surgery, patients with CMT have been reported requiring both open vascular surgery and endovascular treatment for thoracoabdominal aneurysm, aortic dissection, visceral artery aneurysm, as well as for acute and chronic mesenteric ischemia (CMI).[6-9]

We present a case of CMI secondary to atherosclerotic stenosis of a CMT bifurcation complicating interventional treatment which necessitated dual-access sites and kissing stent angioplasty for repair. Written consent was provided for the publication of this case.

CASE REPORT

An 82-year-old man with a past medical history of smoking, hyperlipidemia, hypertension, benign prostatic hyperplasia, and coronary artery disease presented with a 4-month history of postprandial abdominal pain and a 14-kg weight loss. Past medical history was negative for previous myocardial infarction and stroke. Patient medications included hydrochlorothiazide, pravastatin, terazosin, and tramadol. Computed tomography arteriogram revealed diffuse aortic atherosclerosis, a high-grade stenosis of a CMT involving the common trunk and SMA-CA bifurcation, and a moderate stenosis of the inferior mesenteric artery (Fig 1), consistent with CMI.

Technique. The procedure was performed in a hybrid operating room under moderate, conscious sedation. The CA and SMA branched from the common truck at acute angles in cephalad and caudad directions, respectively. For this reason, dual-access sites were planned. The right femoral artery was chosen to cross the lesion into the CA and the left brachial artery was to be used to cross the SMA stenosis.

The initial aortogram confirmed a high-grade stenosis of the CA and occlusion of the SMA, which was perfused by the inferior mesenteric artery via a large arc of Riolan. From the left brachial artery percutaneous access, a 7F, 70-cm sheath was advanced to the CMT orifice. The SMA occlusion was crossed using a 0.014-inch guide wire (Fig 2) and crossing catheter. The lesion required pre-dilation with a 3 mm balloon to exchange for a 0.035 catheter and finally a 0.035-inch guidewire. Next, the 5F right femoral sheath was exchanged for a 7F $\times$ 45-cm steerable sheath and the celiac artery stenosis crossed without difficulty (Fig 3).

Kissing predilatation with 4-mm balloons was followed by the deployment of two kissing balloon-expandable covered stents (6 $\times$ 22 mm in the CA branch) (iCast, Atrium Medical Corp, Merrimack, NH) post dilated to 7 mm, 7 $\times$ 38 mm in the SMA branch (iCast, Atrium Medical Corp). The femoral access site was closed with a closure device (Perclose ProGlide, Abbott, Abbott Park, IL), and the brachial access site was managed by manual compression. Completion arteriogram revealed an excellent result (Fig 4). The patient tolerated the procedure well and was discharged later that day.

Postprocedural clopidogrel 75 mg/d orally was prescribed for stent occlusion prophylaxis. Follow-up visits and duplex

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Fig 1. Sagittal reconstruction of computed tomography arteriogram demonstrating stenosis of the celiacomesenteric trunk (CMT) bifurcation (celiac axis [CA], thin arrow; superior mesenteric artery [SMA], thick arrow).

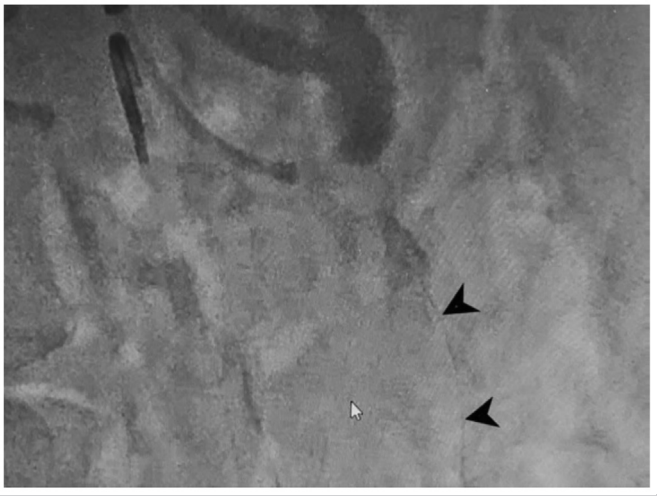

Fig 2. Angiography showing high-grade celiac axis (CA) stenosis and superior mesenteric artery (SMA) occlusion. The occlusion was successfully crossed using an 0.014-inch guide wire (black arrows).

scanning were performed every 3 months for 1 year, during which time the patient remained symptom free and with no evidence of restenosis.

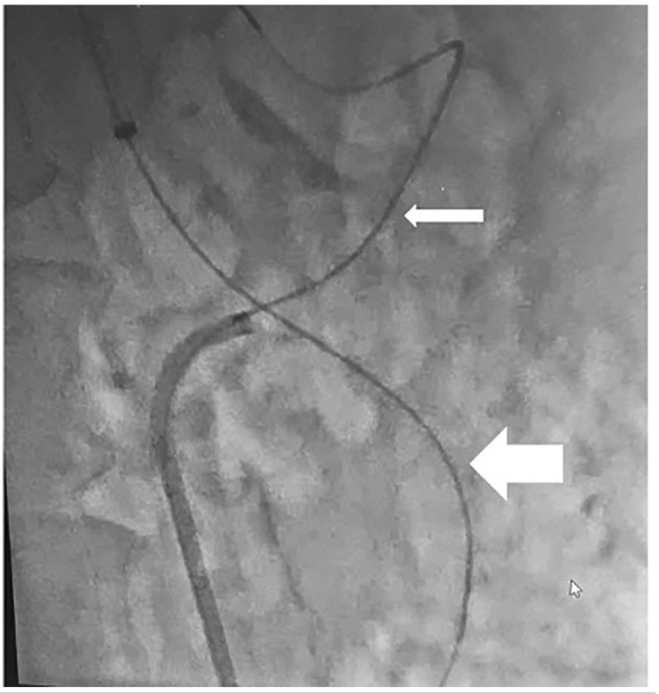

Fig 3. Fluoroscopic image demonstrating successful wire crossing into celiac axis (CA) via right femoral sheath (thin arrow) and into superior mesenteric artery (SMA) via left brachial sheath (thick arrow).

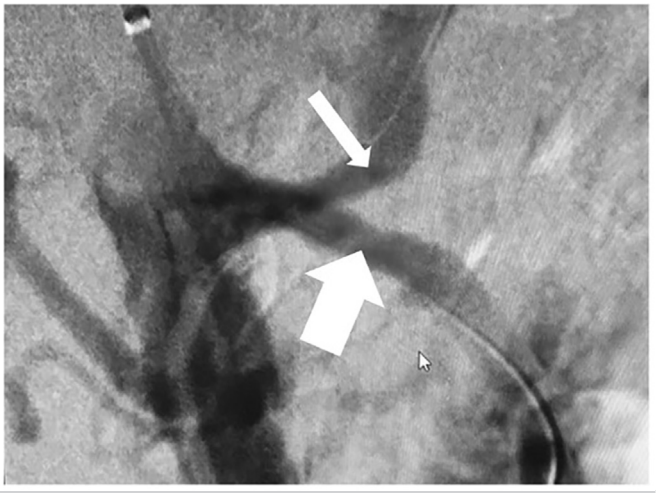

Fig 4. Completion arteriogram demonstrating widely patent celiacomesenteric trunk (CMT) "kissing" covered stents (celiac axis [CA], thin arrow; superior mesenteric artery [SMA], thick arrow).

DISCUSSION

In CMT anatomy, the common trunk diameter ranges between 8.7 and 13.4 mm, and the length between 21.8 and 4.25 mm. It originates from the aorta between the level of the lower body of the L1 and the L1-L2 intervertebral disk, more aligned with the typical level of the SMA.[10] CMTs can be classified as short (common

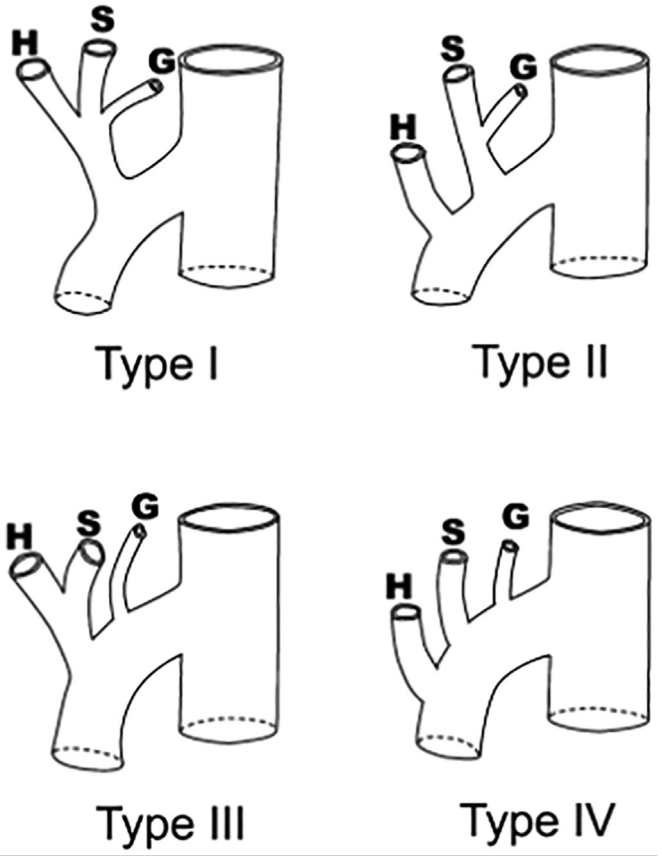

Fig 5. Classification of the celiacomesenteric trunk (CMT). Schematic drawing of the four branching patterns in the CMT from Higashi[12](1983): (i) the left gastric, splenic and common hepatic arteries arise from the CMT in common (type I); (ii) the left gastric and splenic arteries arise in common and the common hepatic artery arises independently (type II); (iii) the common hepatic and the splenic arteries arise in common and the left gastric artery arises independently (type III); or (iv) all three arteries arise independently (type IV). *G*, left gastric artery; *H*, common hepatic artery; *S*, splenic artery (with permission from Katagiri et al, 2007).

trunk <20 mm) vs long (>20 mm)[11] or based on the celiac branch vessel anatomy as originally proposed by Higashi (Fig 5).[12,13]

Because the mesenteric circulation in individuals with a CMT is supplied by two branches of the aorta instead of the usual three, iatrogenic disruption of the circulation of the CMT or inferior mesenteric artery can be catastrophic.[9,11,14] It is also possible that the more limited source of collateral circulation makes individuals with a CMT anatomy more prone to mesenteric ischemia, both acute and chronic, and/or worsens the prognosis of both conditions.

Several cases of fatal acute mesenteric ischemia in patients with a CMT have been reported in the literature, including in a patient in whom the inferior mesenteric artery was not reimplanted after aortobifemoral bypass.[8,9,15] More favorable outcomes have been published for patients with CMT anatomy and CMI. Successful surgical treatment of CMI in patients with CMT has been reported with both bypass grafts and patch angioplasty.[7,16,17] More recent publications highlight the endovascular treatment of CMI from CMT obstructions with angioplasty and stenting of the common trunk with both uncovered and covered stents.[18-21]

We chose a brachial approach to treat the SMA branch and a femoral approach to the celiac branch to maximize the pushability of wires and the trackability of catheters, balloons, and stents. Polytetrafluoroethylene-covered stents were used owing to their excellent patency and decreased incidence of restenosis.[22]

CONCLUSIONS

The presence of a CMT in cases of CMI does not preclude a catheter-guided intervention, and a kissing stent technique can be an effective approach for treating obstructions involving the CMT bifurcation.

DISCLOSURES

None.

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