# Celiac Artery Stenting

A complex case is made easier by combining several novel catheter technologies.

BY PARAG DOSHI, MD, FACC, FSCAI

A 64-year-old woman presented with complaints of postprandial abdominal pain with ongoing weight loss. She had a long-standing history of smoking one to two packs of cigarettes per day. Other significant history included coronary artery disease and hypertension. A 64-slice CT angiogram of her abdominal vasculature showed severe stenosis of the proximal celiac trunk (Figure 1). The patient's superior mesenteric artery (SMA) had minor irregularities, while the inferior mesenteric artery (IMA) was very small and atretic. In view of the symptomatic mesenteric ischemia, the patient was given the option of endovascular revascularization of the celiac trunk.

Aortography was performed in anteroposterior and lateral projections (Figure 1), which was notable for severe angulation of the celiac trunk with severe stenosis just after its ostium. It was believed that positioning the stent would be difficult due to the combination of angulation and proximal calcification. It was decided that the best chance of accessing the site was to use a unique approach combining several recently available catheter technologies.

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To assist in accessing and positioning of the interventional equipment along the access of the conduit, an 8-F Morph universal deflectable guide catheter (BioCardia, South San Francisco, CA) with a 6.1-F lumen was used. This catheter provides the operator with the ability to deflect the distal end of the catheter during the proce-

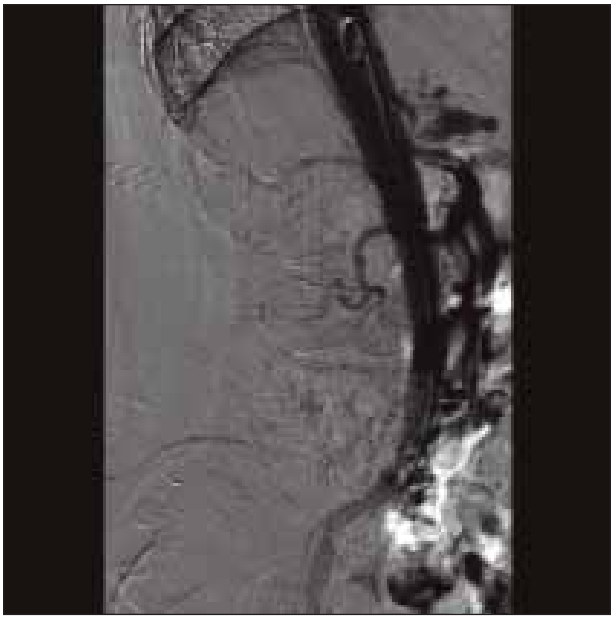

Figure 1. Aortogram of the celiac artery before the procedure.

Figure 2. Celiac artery accessed with a Morph deflectable catheter.

**Figure 3. Morph catheter with coaxial balloon inflated.**

**Figure 4. Postballoon angiogram using a Morph catheter.**

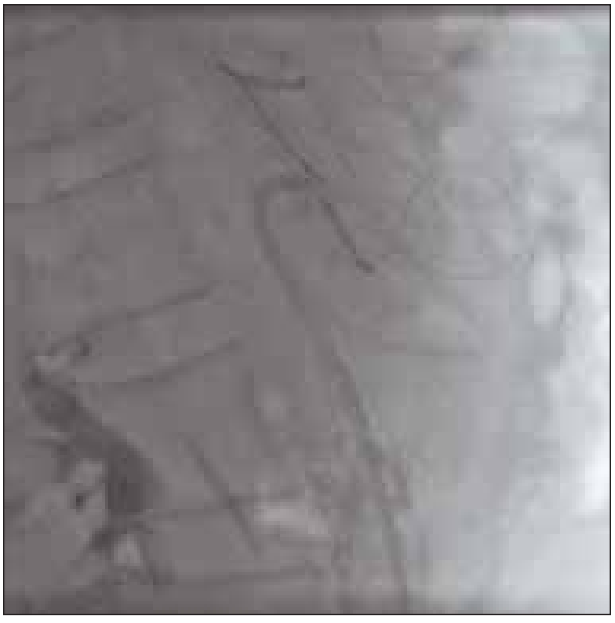

**Figure 5. Morph catheter with Ostial Pro device and stent in position.**

**Figure 6. Final result showing minimal residual stenosis in the celiac trunk after deployment of the stent.**

dure up to 180º and provides significant backup support. To assist in precise positioning of the stent at the aorto-ostial lesion presenting in the celiac trunk, we used the Ostial Pro Stent Positioning System (Ostial Solutions, Kalamazoo, MI). The Ostial Pro provides four arms that enable precise positioning of the stent at an ostial lesion without having the deployed stent protrude into the aortic lumen.

A 6-F sheath in the right femoral artery was exchanged for an 8-F sheath to accommodate the Morph catheter. Anticoagulation was started using bivalirudin. An 8-F, 110-cm Morph guide catheter was advanced near the ostium of the celiac trunk. After rotating in the anterior direction, the distal end of the Morph catheter was deflected to assume a near 180º angle similar to the configuration needed to access a left internal mammary artery. The catheter engaged the celiac ostium very easily (Figure 2). We tried to traverse the stenosis with

a .014-inch Hi-Torque Spartacore 14 guidewire (Abbott Vascular, Santa Clara, CA); however, this was unsuccessful due to suboptimal torque of the guidewire tip in the eccentric lesion. We then chose a BMW guidewire (Boston Scientific Corporation, Natick, MA) that was easily advanced across the lesion into the splenic artery. A 4-mm Maverick Over-the-Wire balloon catheter (Boston Scientific Corporation) was advanced to the tip of the guidewire. Because the BMW guidewire would not provide sufficient support for the stent, it was exchanged for a stiffer .014-inch Platinum Plus guidewire (Boston Scientific Corporation), which was then advanced through the balloon catheter. It was very difficult to advance the guidewire in the catheter and required an extreme degree of pushing, but the Morph catheter remained reliably in position and did not back out.

After placing the Platinum Plus guidewire in position, the balloon catheter was pulled back into the lesion and inflated to 12 atm to achieve complete expansion (Figure 3). The balloon was then removed (Figure 4), and the Ostial Pro was advanced through the Morph catheter and placed approximately 10 cm before the distal tip of the Morph. We then advanced a 6- X 18-mm Palmaz Blue balloon-expandable stent (Cordis Corporation, Warren, NJ) distal to the lesion in the celiac trunk. At this time, we straightened the tip of the Morph guide catheter and backed it out of the ostium. The Ostial Pro was advanced beyond the distal tip of the Morph until its four feet were seen on the angiogram to have expanded. The Morph was then advanced forward, positioning the Ostial Pro, so that its feet were observed to flatten against the ostium of the celiac trunk (Figure 5). At this point, the stent was pulled back to line up at the ostium and deployed with 16 atm. The stent delivery catheter and the Ostial Pro were then removed. Final angiograms (Figure 6) through the Morph showed excellent results with no residual stenosis. In view of the very small size of the common femoral artery, a closure device was not used, and the sheath was sutured in place.

## RESPONSE TO TREATMENT

This patient was transferred to the recovery area in stable condition. She experienced diffuse abdominal pain for 1 to 2 hours, which resolved spontaneously. Soon after the procedure, her appetite had improved; she was able to eat complete meals without any abdominal discomfort. She remained symptom free for 2 months. Her weight gain was remarkable.

## LONG-TERM FOLLOW-UP

We do not have long-term follow-up on this patient, but it is our practice to follow these patients carefully in an outpatient setting. Restenosis may manifest with reappearance of postprandial angina or weight loss. If clinically suspected, restenosis may be identified with noninvasive tests such as duplex sonography or CT angiography. Percutaneous transluminal angioplasty can be safely performed to treat restenosis. We have treated a very difficult case of restenosis with the assistance of the Morph catheter to provide correct angulation and obtain guidewire access in a restenosed stent that was deployed in a very tortuous celiac trunk.

## DISCUSSION

This case represents the successful merging of several new catheter technologies to navigate substantial challenges in the treatment of a complex vascular lesion. The celiac trunk usually arises from the aorta at an acute angle, and in this case, it was an especially difficult angle to engage. The Morph catheter simplified the engagement by allowing the tip to be deflected to point directly to the ostium of the celiac trunk. More importantly, it provided excellent backup support in pushing the stiff guidewire. In our experience, we have not seen this degree of backup support from any other existing guide catheters. The Morph also made it very easy to create a coaxial system with a custom angle that corresponded to the angle of the celiac artery, allowing excellent control over placement of the balloon catheter and stent. In addition, the Ostial Pro provided excellent definition of the celiac ostium, allowing precise positioning of the stent at the ostium.

## CONCLUSION

Endovascular procedures have improved as a result of the development of advanced interventional devices. In this case, the combination of the Morph deflectable tip catheter and the Ostial Pro stent positioning system resulted in an excellent outcome, and we believe it will save significant procedural time and provide for more precise intervention, particularly in cases with difficult anatomy. Combining improved interventional technologies in turn should translate into better outcomes for patients, reduced fluoroscopy for the physician, and reduced costs for both the hospital and the health care system. ■

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