Treatment of a Totally Occluded Superior Mesenteric Artery Facilitated by Retrograde Crossing Via Collaterals From the Celiac Artery

Jon Robken, MD; and Nicolas W. Shammas, MD, MS

Midwest Cardiovascular Research Foundation, Davenport, Iowa, USA.

**Purpose:** To present a new approach route for recanalization of a chronically occluded superior mesenteric artery (SMA).

**Technique:** Percutaneous treatment of an SMA occlusion can be accomplished in some cases via retrograde crossing through collaterals from the celiac artery. From a right common femoral artery (CFA) approach, an 8-F RDC guide catheter is advanced to the origin of the celiac artery via. Using a 5-F angled Glidecath, a long 0.035-inch stiff Glidewire, and a Choice PT wire, the glide catheter is advanced via the celiac artery into the superior pancreaticoduodenal artery. Using the angled Glidewire and the Choice PT wire, the occluded SMA is cannulated in a retrograde fashion. Through an 8-F sheath in the left CFA, an 8-F RDC guide catheter is advanced into the abdominal aorta. A goose neck snare is used to capture the Choice wire, which is withdrawn through the left catheter and sheath. The SMA occlusion is dilated, and the RDC guide is advanced into the SMA origin over the balloon. Another Choice PT wire and a 0.035-inch Wholey High Torque wire are placed in an antegrade fashion through the now open SMA. Angioplasty and stenting are then completed in the SMA over the Wholey wire.

**Conclusion:** Retrograde recanalization of the SMA via celiac collaterals offers a new endovascular approach to treating patients with chronic mesenteric ischemia and a chronically occluded SMA.

*J Endovasc Ther 2007;14:745–747*

**Key words:** total occlusion, superior mesenteric artery, angioplasty, stent, collaterals, celiac artery, technique

Abdominal angina is often a manifestation of severe vascular disease involving the superior mesenteric artery (SMA) and/or the celiac artery. Percutaneous treatment of these vessels is now commonly practiced, with acceptable angiographic and clinical results. Treatment of chronic total SMA occlusions has taken several forms: local catheter-directed thrombolytic therapy followed by balloon dilation and stent placement, direct recanalization and angioplasty, and retrograde recanalization via mini laparotomy or during surgical resection for mesenteric ischemia. A total chronic occlusion of the SMA is, however, a very challenging finding that makes the percutaneous approach very difficult for the endovascular specialist and quite often unsuccessful.

**TECHNIQUE**

In patients with mesenteric ischemia and an occluded SMA, percutaneous treatment of the occlusion can be accomplished in some cases...
cases via retrograde crossing through collaterals from the celiac artery. The right common femoral artery (CFA) is entered percutaneously using the Seldinger technique to place a 6-F sheath. Abdominal aortography (Figure, A) with retrograde filling of the occluded SMA. (B) Selective visualization of the celiac artery, with retrograde filling of the occluded SMA. (C) Retrograde selective engagement of the pancreaticoduodenal arcade via the celiac axis, which is filling the SMA retrogradely. (D) Retrograde recanalization of the SMA with the wire snared into a guide placed via the left common femoral artery. This was followed by dilation of the SMA origin and antegrade cannulation with a Wholey wire. (E) Stenting of the SMA, with no residual stenosis.

**Figure** ◆ (A) Abdominal aortogram in the 90° left anterior oblique projection showing the late filling of the occluded superior mesenteric artery (SMA). The straight line indicates the length of the occlusion of the SMA from its aortic origin. (B) Selective visualization of the celiac artery, with retrograde filling of the occluded SMA. (C) Retrograde selective engagement of the pancreaticoduodenal arcade via the celiac axis, which is filling the SMA retrogradely. (D) Retrograde recanalization of the SMA with the wire snared into a guide placed via the left common femoral artery. This was followed by dilation of the SMA origin and antegrade cannulation with a Wholey wire. (E) Stenting of the SMA, with no residual stenosis.
which is withdrawn through the left femoral catheter and sheath (Figure, D). In the case example shown, a 4-mm Sprinter balloon dilation catheter (Medtronic) is then advanced over the extracted wire across the SMA occlusion to dilate the lesion. The RDC guide is advanced into the SMA origin over the balloon. Another Choice PT wire and a 260-cm, 0.035-inch Wholey High Torque wire (Mallinckrodt, Hazelwood, MO, USA) are placed in an antegrade fashion through the now open SMA (Figure, D). Angioplasty is then completed in the SMA over the Wholey wire [using a 135-cm, 5-mm P3 balloon dilation catheter (Cordis, Miami Lakes, FL, USA) in this case]. A Premount Genesis balloon-expandable stent (Cordis; 6-×39-mm in this case) is deployed at 12 atmospheres, achieving excellent acute angiographic results with no residual narrowing (Figure, E). If there is disease in the celiac axis, that guiding catheter is withdrawn to the ostium, and another stent is deployed. The catheters are removed, and hemostasis is achieved using Perclose Proglide (Abbott Vascular, Abbott Park, IL, USA) devices.

DISCUSSION

Percutaneous treatment of the SMA and/or celiac axis in patients with mesenteric ischemia is now considered an acceptable, less invasive alternative to surgery. The occluded SMA can present a challenge to treat percutaneously, as the origin of this vessel cannot be identified from aortic root angiography. Typically, collaterals to the SMA are frequently seen from the celiac axis or the inferior mesenteric artery.

In the case illustrated here, collaterals from the celiac axis served as an excellent conduit to recanalize the SMA in a retrograde fashion. Dilation of the lesion prior to stenting was carried on with 4 and 5 mm balloons. Given the potential for embolization, we would recommend keeping predilation to the minimum necessary to advance the stent across the origin of the SMA. Because this particular patient’s symptoms were only 1 week old, it is possible that the occlusion was partly thrombotic on top of a severe chronic stenosis.

In the highlighted case, the patient’s symptoms resolved, suggesting that the SMA and celiac artery disease were at least partly responsible for the abdominal pain. It should be noted that another approach in this patient would have been to treat the celiac axis stenosis first and observe the patient for resolution of her symptoms. The celiac axis, however, was only moderately stenosed, and the SMA was thought to be the culprit.

Retrograde recanalization of the SMA via celiac collaterals is a new endovascular option to treat patients with chronic mesenteric ischemia and a chronically occluded SMA.

REFERENCES