

Recanalization of a Central Venous Occlusion

After failed conventional guidewire crossing, RF guidewire passage is attempted in a dialysis patient.

BY JAMES F. MCGUCKIN, MD

Failed central venous occlusion (CVO) recanalization leads to several unpalatable treatment options: surgical banding or take down of the ipsilateral dialysis access, surgical reconstruction with possible rip resection/thoracotomy, or the need for the patient to tolerate underlying symptoms secondary to the obstruction and possibly poor quality of hemodialysis related to recirculation.

CASE STUDY

The patient was a 66-year-old right-hand-dominant man who presented to our institution with a swollen right upper extremity. He had increasing pain during the previous 2 months. The swelling began after the creation of a right brachio basilic fistula. The new fistula had never been used. He had a palpable but pulsatile thrill, detectable through the marked edema of his right arm (Figure 1). The patient had been undergoing dialysis through a right internal jugular tunneled dialysis catheter (TDC).

After informed consent, the patient's right upper arm was prepped and draped, and access was obtained to the fistula. A fistulagram and venogram were obtained. A stenosis was noted in the fistula where it was superficialized, and marked collaterals were noted in the right shoulder region consistent with occlusion of the right brachiocephalic vein (BCV) at the level of the right internal jugular TDC (Figure 2). A 7-F 25-cm sheath (Terumo Interventional Systems, Somerset, NJ) was placed, but it

was occlusive at the basilic stenosis. This area was treated successfully with an 8-mm percutaneous transluminal angioplasty (PTA) balloon to prevent thrombosis. A 65-cm 5-F angled, tapered catheter (Terumo Interventional Systems) and a 180-cm Stiff Shaft Glidewire (Terumo Interventional Systems) were used to attempt to pass the right BCV occlusion with the angled soft tip with the



Figure 1. Marked edema of the patient's right hand.

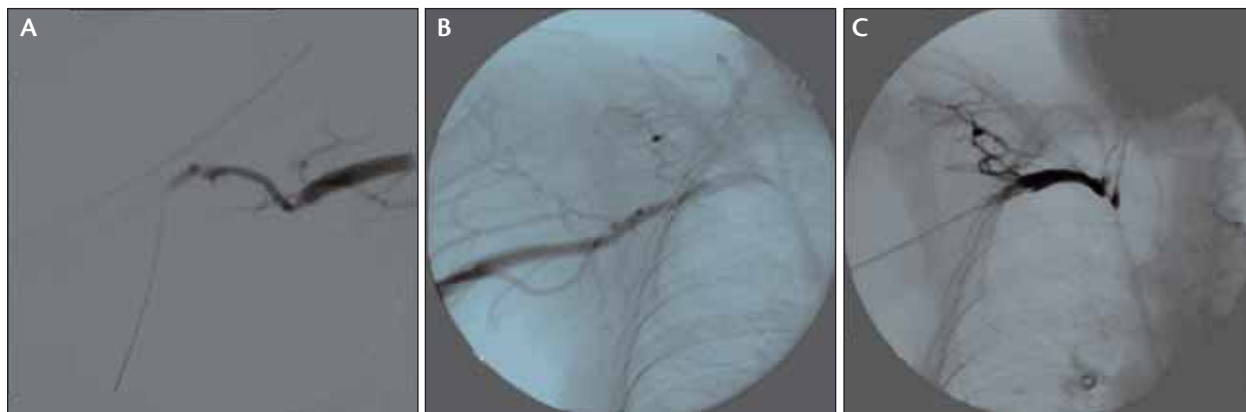


Figure 2. Fistulagram and venogram demonstrating intrafistula stenosis as well as right BCV occlusion with collaterals.

TDC in place. The back end of the Terumo Glidewire was then used with the added support of a 7-F Brite Tip guide catheter (Cordis Corporation, Warren, NJ), but this was unsuccessful. It was believed that the indwelling TDC was the critical element preventing central passage of the Glidewire, so it was partially withdrawn into the tract over a second 180-cm Glidewire.

During withdrawal of the catheter, a superior vena cava (SVC)-gram was obtained demonstrating a fibrin sheath (Figure 3). The fibrin sheath appeared to be contiguous with the right subclavian vein seen on road map angiography, and once again, the wire passage was attempted with the TDC above the occlusion. This technique again failed, and we performed simultaneous venography using the catheter in the right subclavian vein and the partially

withdrawn TDC in the right anterior oblique (RAO) projection (Figure 4). The RAO venogram revealed a 1.5- to 2-cm gap between the two contrast columns, and even with a known target using the road map technique, the passage of the wire into the right BCV was again unsuccessful. The TDC was then removed completely, and a 10-F sheath was placed to maintain hemostasis of the tract. Through the sheath, a 10-mm, 4-F snare (ev3 Inc., Plymouth, MN) was placed juxtaposed to the terminus of the subclavian vein contrast column but within the fibrin sheath of the right BCV.

Through the existing 5-F catheter and 7-F guide catheter system within the right subclavian vein, the Baylis PowerWire radiofrequency (RF) guidewire (0.35, Baylis Medical Company, Inc., Montreal, Canada) was

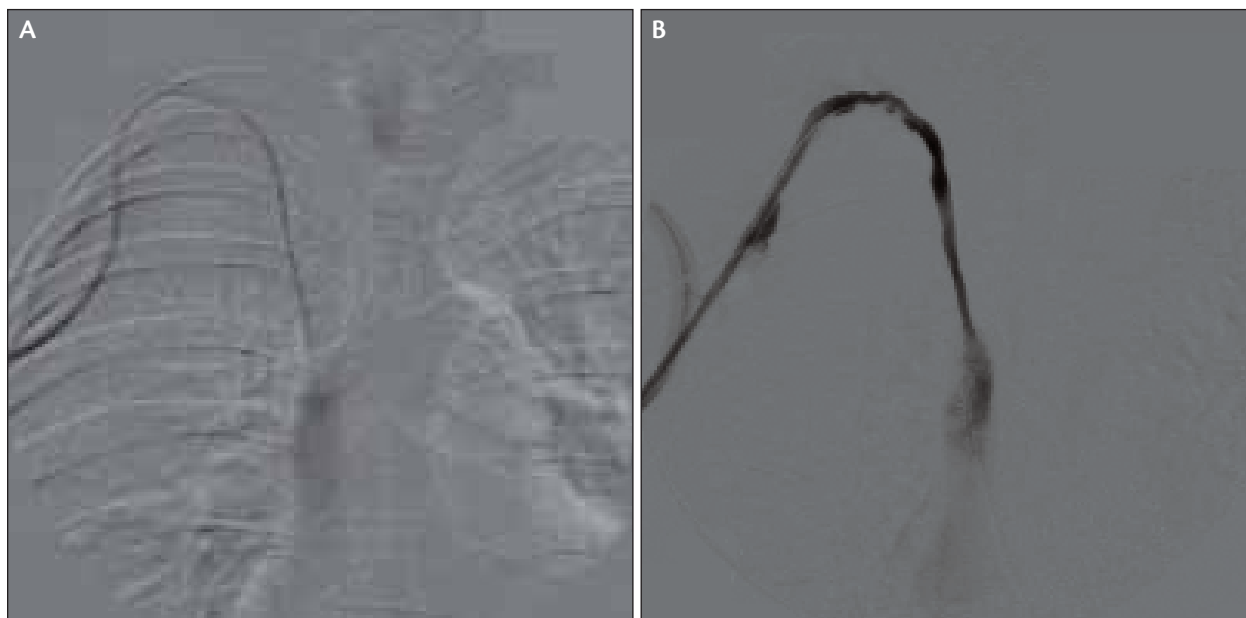


Figure 3. Catheter study showing a widely patent SVC central to the obstruction (A) and fibrin sheath from previous right internal jugular TDC (B).



Figure 4. RAO venogram demonstrating the obstruction.

used at 25 W with 2-second pulse duration to cut through the obstruction from the subclavian vein into the target snare within the fibrin sheath with the right BCV. Three passes were required to direct the PowerWire through the snare. Using orthogonal imaging, the gunsight technique was utilized, and the PowerWire was successfully passed through the obstruction and captured.

The RF PowerWire was retrieved out of the previous TDC tract through a 10-F sheath (Figure 5). This wire

passage through the obstruction was then serially dilated by angioplasty from 7 to 10 mm (Figure 6A). A McGuckin 4-F catheter (AngioDynamics, Queensbury, NY) was then advanced through the obstruction. The through-and-through wire was released from the 10-F sheath and withdrawn onto the McGuckin catheter and flipped 180° within the fibrin sheath and into the SVC. The wire was then advanced into the IVC, and the right BCV tract was dilated to 12 mm (Figure 6B). A 14- X 60-mm Zilver stent (Cook Medical, Bloomington, IN) was deployed at the right BCV, and repeat 12-mm PTA of the right BCV was performed followed by repeat fistulagram and venogram, which demonstrated resolution of all collaterals, and inline continuous flow was noted to the heart (Figure 7).

The thrill was markedly improved by palpation and no longer pulsatile. No central dialysis catheter was placed. The patient went to dialysis the next day, and the fistula was successfully used for hemodialysis access with 16-gauge needles. Marked resolution of the right arm swelling was noted 2 days after the recanalization, and the fistula has been used successfully thereafter.

DISCUSSION

Several techniques have evolved over the decades in efforts to recanalize CVOs. Typically, hydrophilic guidewires are successful in up to 90% of recanalization attempts. In failed attempts, the back end of the hydrophilic-wire Colapinto or Cope skinny needles (Cook Medical) can be used to either create a tract or to pass a wire through a needle using the gunsight tech-

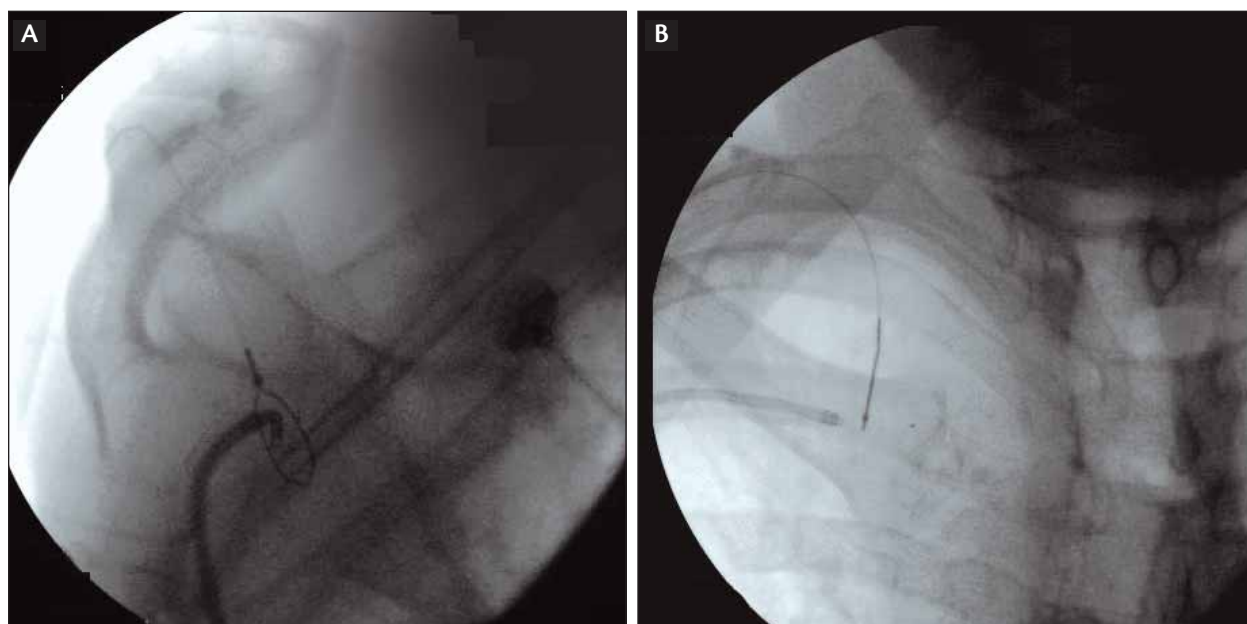


Figure 5. Steep RAO and anterior-posterior views showing the RF PowerWire and the gunsight technique.

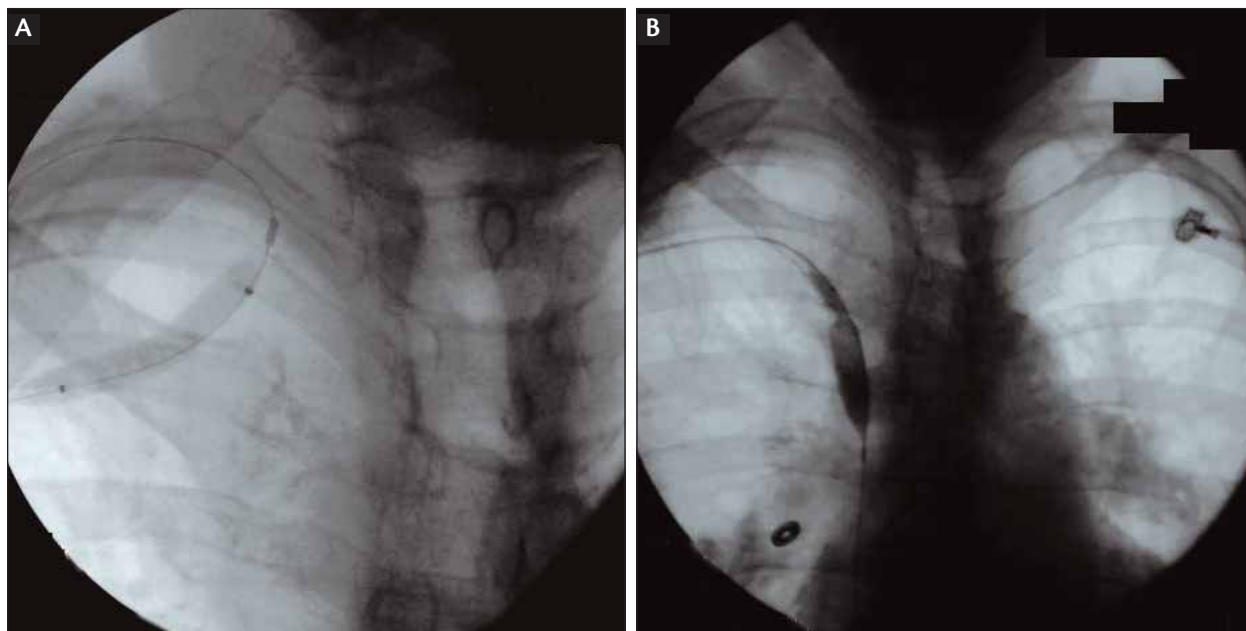


Figure 6. PTA of the tract after the RF PowerWire was passed cephalad and then caudally after the wire was flipped into the IVC.

nique. If the traverse of the obstruction is successful, the advantage is that it provides a through-and-through wire that, with countertraction on the wire from the opposite direction, provides a firm rail upon which to pass balloon catheters through the obstruction to aid the recanalization. In my experience, the 4- and 5-mm

PowerFlex balloon catheters (Cordis Corporation) provide the best profile to allow passage through the obstruction. Recanalization and dilation, although technically successful, are typically not sufficient to maintain patency without primary stenting.

SUMMARY

The Baylis RF PowerWire can be a useful tool to safely cross CVOs when classical hydrophilic guidewire techniques are not successful. Care should be taken to place TDC on the opposite side of the proposed arteriovenous fistula. Ipsilateral swelling in an end-stage renal disease patient with a fistula and existing or previous TDC suggests a central stenosis or occlusion, and intervention and possible catheter repositioning or removal may be indicated. ■

For more on recanalization with a radiofrequency energy guidewire, see Dr. McGuckin's article in the July 2009 issue of Endovascular Today.

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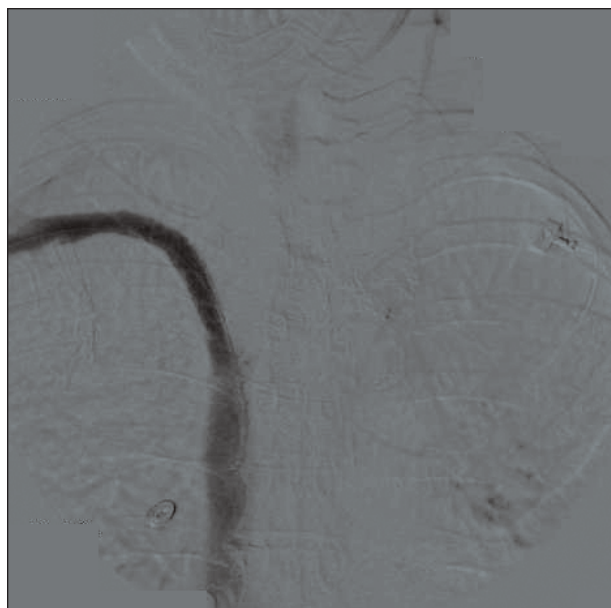


Figure 7. Final SVC image demonstrating collateral resolution and continuous flow to the right atrium. The patient had successful dialysis from the fistula the next day.