Management of Venous Outflow Stenosis in Dialysis Patients

BY SAPAN S. DESAI, MD, PhD, MBA, FACS

The management of venous outflow stenosis in patients undergoing dialysis remains a challenge for practitioners. Flow-limiting disease that is uncorrected can lead to graft failure. Inappropriate management can lead to multiple secondary interventions, which in turn can lead to complications and graft thrombosis. We have refined the management of patients with arteriovenous grafts who develop flow-limiting venous outflow stenoses and have developed a surveillance program and protocol for management to reduce secondary interventions, improve overall graft patency, and reduce the cost of care.

PATIENT PRESENTATION

A 67-year-old man developed end-stage renal disease (ESRD) secondary to uncontrolled hypertension and diabetes. He required urgent-start dialysis and initiated hemodialysis via placement of a GORE® ACUSEAL Vascular Graft. We exclusively use the GORE ACUSEAL Vascular Graft in our practice due to its unique construction, ability to cannulate for dialysis within 24 hours of placement, and its favorable 1-year outcomes.1-5

The patient received a 4–7-mm tapered GORE ACUSEAL Vascular Graft placed in a forearm loop configuration. The brachial artery and vein were used as the inflow and outflow, respectively. We created a generous C-shaped loop when constructing the dialysis access to avoid kinking and subsequent graft stenosis (Figure 1). The patient was able to use this GORE ACUSEAL Vascular Graft within 1 hour of placement and subsequently had no issues with dialysis. He was discharged to home on postoperative day 1 and was seen in the clinic as part of our dialysis access surveillance program.5,6

The patient was followed in clinic at 1 month, then subsequently at 3-month intervals from the index procedure. At the time of the clinic visit, the patient had a review of his most current flow velocities during dialysis and a duplex ultrasound to identify any flow-related issues. At 1-year follow-up, duplex ultrasound revealed significantly elevated flow velocities and concern for a venous outflow stenosis located at the elbow joint.

TREATMENT OPTIONS

There are numerous options for treating a clinically significant venous outflow stenosis at the elbow joint. Options include:

- Continued monitoring and follow-up in 30 to 90 days with repeat imaging
- Perform either plain old balloon angioplasty or drug-coated balloon angioplasty
- Complete angioplasty with placement of a stent or stent graft
- Convert to a fistula or place a new graft

The first two options are commonly done, leading to a greater than expected rate of access failure in patients undergoing dialysis.1,5,7,8 The last option is unnecessary at this point, as minimally invasive interventional options have been shown to be more effective.5,7 We have recently shown that early, definitive intervention for venous outflow stenosis leads to improved long-term outcomes when treating these lesions with a GORE® VIABAHN® Endoprosthesis.5

The patient in this case was taken to the catheterization lab and underwent percutaneous access of the stent graft near the C-shaped loop; subsequent angiography revealed a high-grade venous outflow stenosis across the elbow.

Figure 1. Placement of a forearm loop 4–7-mm tapered GORE® ACUSEAL Vascular Graft (white arrowheads).
COURSE OF TREATMENT
We placed an 8-mm X 10-cm GORE VIABAHN Endoprosthesis across the elbow joint (Figure 2). The flow-limiting venous outflow stenosis is clearly seen in Figure 2. After dilating the stent graft, we completed additional angiography that revealed no further flow-limiting lesions and brisk flow into the central venous circulation. To confirm the highly flexible nature of the GORE VIABAHN Endoprosthesis, we completed additional imaging with the elbow joint flexed (Figure 3), revealing no kinking of the stent graft.

RESULTS
The patient had no postprocedural issues or complications. He was discharged shortly after his procedure and had routine follow-up with us in the clinic, resuming his normal postoperative surveillance program. We recommended follow-up at 1 month postprocedure, then regularly every 3 months. At each visit, a duplex ultrasound is performed and flow rates are reviewed. This patient’s flow velocities returned to normal, and he continued to use his GORE ACUSEAL Vascular Graft without any further interventions or issues at 2-year follow-up.

DISCUSSION
In our practice, patients who present with ESRD and require urgent-start dialysis are preferentially treated with placement of a GORE ACUSEAL Vascular Graft due to its lower rate of complications, secondary interventions, and cost of care compared with a central venous catheter (CVC) and arteriovenous fistula (AVF) combination. Routine follow-up should be initiated as part of an integrated surveillance program geared toward early identification of additional pathology.

Patients who develop venous outflow stenosis should be treated as soon as the stenosis is identified to avoid the development of further pathology along the circuit and potential thrombosis of the graft. We prefer to treat patients with placement of a GORE VIABAHN Endoprosthesis, thus reducing the number of additional secondary interventions and greatly improving overall patency of the GORE ACUSEAL Vascular Graft.

We have recently published our results with GORE ACUSEAL Vascular Grafts and this treatment paradigm. We found a survival advantage associated with GORE ACUSEAL Vascular Grafts compared with AVFs and CVCs when used for immediate dialysis access for ESRD patients (15% mortality vs 21.4% mortality at 1 year; P < .05). Fewer interventions and fewer hospitalizations were needed for patients who had GORE ACUSEAL Vascular Grafts compared with AVFs. This lower rate of complications leads to a significantly lower cost of care for GORE ACUSEAL Vascular Graft patients, contributing to $11,630 in cost savings associated with GORE ACUSEAL Vascular Grafts at 1 year ($5,894 vs $17,523; P < .01)."