CASE REPORT

Creating a Sutureless Anastomosis at the Venous Outflow

BY JOHN R. ROSS, MD

A properly functioning dialysis access requires three things: (1) good arterial inflow, (2) a patent conduit (eg, native venous fistula, synthetic graft, in-dwelling central venous catheter), and (3) unobstructed outflow. Patients with chronic end-stage renal disease (ESRD) and a history of various accesses often suffer from venous occlusion and stenosis somewhere within the entire circuit. The introduction of arterial flow into the venous system often results in the formation of stenotic lesions. This is the primary failure mechanism of arteriovenous fistulas and grafts.

Because of this, adequate outflow veins (appropriately sized, accessible, free of stenosis, and not having valves) are often difficult to locate and often force accesses to be placed in dominant arms, thighs, or elsewhere. A patient with challenging veins who requires placement of a new access is often challenged with compromised, inaccessible veins, veins with valves present making anastomosis placement a challenge, or preexisting stents or stenoses. ESRD patients also often present with obese arms, making surgical dissection to adequate veins challenging.

The GORE® Hybrid Vascular Graft (HVG) allows percutaneous creation of an endoluminal, end-to-side anastomosis. The HVG is a single-lumen surgical graft composed of two structural components, an expanded polytetrafluoroethylene (ePTFE) vascular graft, and a constrained ePTFE section supported with nitinol, known as the Nitinol Reinforced Section (NRS). The NRS is designed to be inserted into the outflow vessel, allowing the creation of an end-to-end anastomosis deep into a vein that may not be otherwise accessible to allow performance of conventional anastomosis. In the following case, a patient with multiple failed accesses benefited from the placement of a HVG, which allowed percutaneous placement of the venous outflow of the graft deep in the axilla.

CASE REPORT

A 62-year-old elderly man with ESRD presented with complications associated with a violated axilla concomitant with multiple failed accesses, including basilic vein transposition and one upper arm graft placement. The patient was currently dialyzing through a catheter placed on the left side, suggesting that there was a problem in the central venous system on the right side. Preoperative ultrasound vessel mapping showed adequate brachial and radial arterial flows and pressures, but inadequate veins in the upper arm.

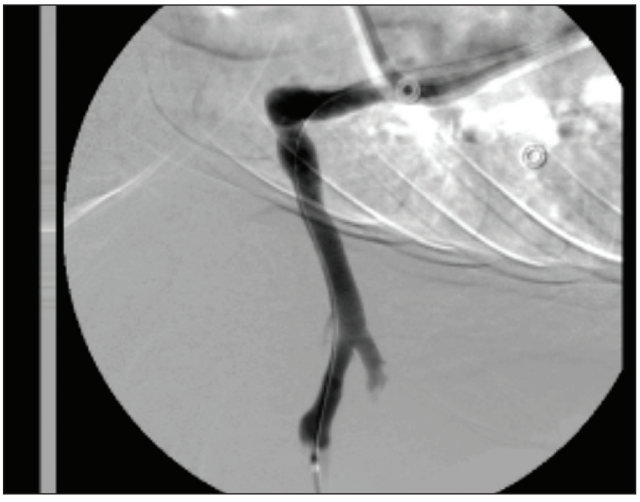

Figure 1. Initial angiogram.

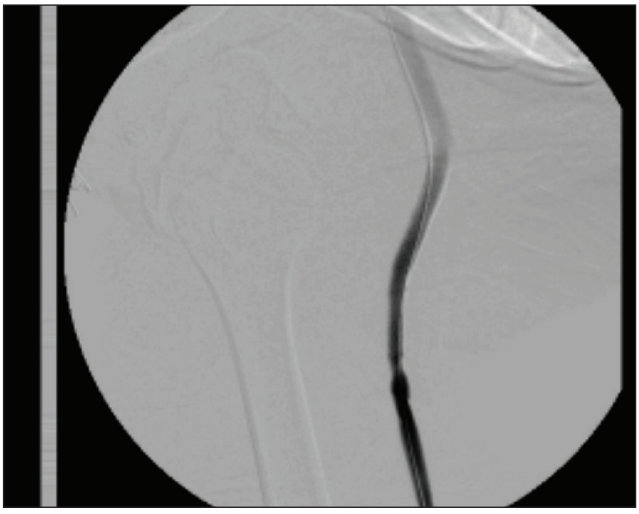

Figure 2. Deployed GORE® Hybrid Vascular Graft prior to balloon angioplasty.

Needle access was gained, and an 8 Fr introducer (Merit Medical Systems, Inc.) was placed in the proximal basilic vein without difficulty using sonographic guidance. A 0.035-inch Roadrunner® PC guidewire (Cook Medical) was introduced all the way into the superior vena cava. Venography showed

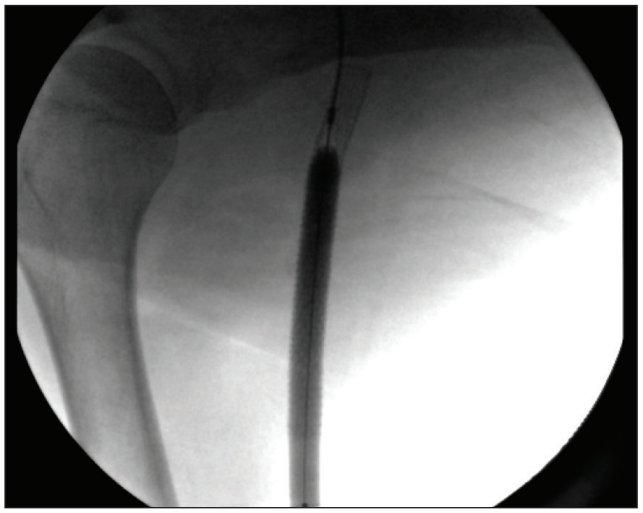

Figure 3. Balloon angioplasty of the NRS.

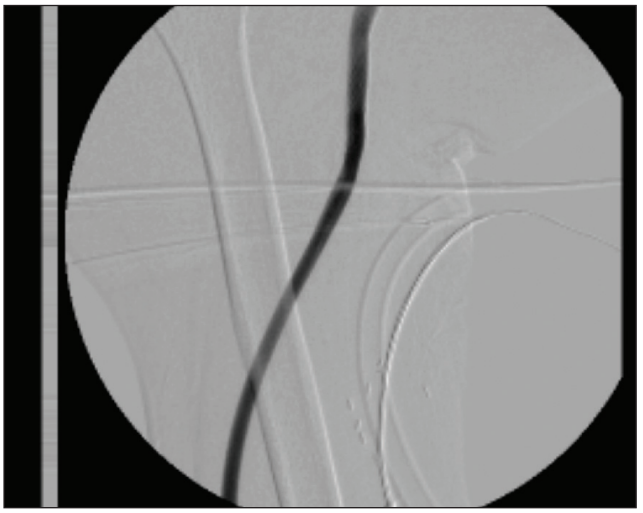

Figure 4. Final angiogram.

that there was no evidence of high-grade central stenosis, and the location of valves was noted, as is paramount to determine the landing zone of the tip of the NRS (Figure 1). The optimal landing zone of the NRS should be at least 2 cm lateral to (or beyond) the valve.

After obtaining initial fluoroscopic imaging and deciding that there was an adequate venous landing zone for the NRS, a surgical cutdown was performed on the supra-antecubital brachial artery. A HVG with an 8 mm x 10 cm NRS was selected and was passed through a 14 Fr COOK® PEEL-AWAY® Sheath Introducer fluoroscopically and deployed per the instructions for use. There is always a stricture at the entrance of the NRS into the vein (Figure 2), and this is immediately remedied when ballooning the entire NRS with an 8 mm x 8 cm BARD® CONQUEST® PTA Dilatation Catheter (Figure 3).

After the NRS is deployed in the outflow vein, a tissue tunnel is created for the vascular graft component using a BARD® IMPRA® Kelly-Wick Tunneler followed by retrograde pullback of the graft through the tunnel. Special attention is given to ensure that there is no pleating, twisting, or kinking of the graft, especially at the transition zone (where the NRS meets the vascular graft component). A final angiographic run is performed by introducing contrast directly into the distal end of the HVG (Figure 4). The arterial anastomosis is conducted, and a simple end-to-side anastomosis in the usual fashion is accomplished.

CONCLUSIONS

There are many applications of the HVG in patients with complex anatomies. The NRS allows for the creation of outflow deep into the axilla and through obese arms. The NRS also allows placement through preexisting stents, stenotic lesions, and valves. By going percutaneously, the procedure is very efficient and can take approximately 20 to 30 minutes to complete. More importantly, the precision is far greater than surgically cutting down high in the axilla. In this case, we present the utility and extraordinary usefulness of the HVG in a violated axilla, where conventional venous anastomotic techniques would have been extremely challenging, if not impossible.

The instructions for use for the HVG suggest oversizing the distal section of the NRS to the vein by 5% to 20%, which is consistent with other stents and stent grafts. In our experience, improved clinical outcomes have been obtained if the distal end of the NRS is undersized. Also, per the manufacturer's instructions for use, the placement of two stay sutures through the NRS is recommended to further anchor the NRS into the vein to avoid displacement of the NRS. Our experience has been that proper sizing of the NRS within the vein, with subsequent percutaneous transluminal angioplasty using a balloon to seat the NRS, obviates the need for these stay sutures. We have not experienced any migration or pulling out of the NRS.

Based on our historical results of the expectation of patency of the deployed HVG, the violated axilla is comparable, if not superior to conventional dialysis access vascular grafts. The HVG allows for the creation of dialysis access in patients with complicated anatomies and is a worthy alternative procedure to central venous catheter dependency. ■

Learn more about this case and the value of the GORE® Hybrid Vascular Graft in complex dialysis cases by visiting **goremedical.com/hybridcase**

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