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Treating Disadvantaged Venous Anatomy With the GORE® Hybrid Vascular Graft

How the stent-driven venous anastomosis can be used to create and maintain vascular access in challenging dialysis patients.

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The GORE® Hybrid Vascular Graft (GHVG) was cleared for use in the United States in 2010.[1] Over the last 5 years, the GHVG has allowed for percutaneous and sutureless* venous anastomosis and has provided many novel ways to maintain vascular access in some of the most challenging patients.[2,3] The specific types of patients in which the GHVG can be used is invaluable. In this article, we use a series of short case vignettes to highlight how the stent-driven venous anastomosis can be used to treat disadvantaged venous anatomy. Case examples include the morbidly obese patient, the patient with stented outflow from a graft that needs to be replaced, a patient with axillary veins that are too small to create a standard sutured anastomosis, and a patient with a previous upper arm arteriovenous graft that has failed but with a patent axillary vein above the old graft's anastomosis.

CASE VIGNETTE 1: PLACING A STENT-GRAFT IN A MORBIDLY OBESE PATIENT

Creating vascular access in a morbidly obese patient can be extremely challenging. We have had several patients with a body mass index greater than 50 kg/m^2. Technically, suturing the venous anastomosis is difficult because the vein can be located more than 8 to 10 cm below the skin and large amounts of subcutaneous adipose tissue. In these cases, the incision required to expose the axillary vein is very large. Comorbid conditions, such as diabetes mellitus, combined with the large amount of subcutaneous adipose tissue create a significant risk for postoperative wound infections and seroma formation. The GHVG allows for the creation of a technically less difficult venous anastomosis through a 1- to 2-cm incision in the axilla, which is far less susceptible to complications. Consideration should be given to placing a GHVG as the first choice in all patients

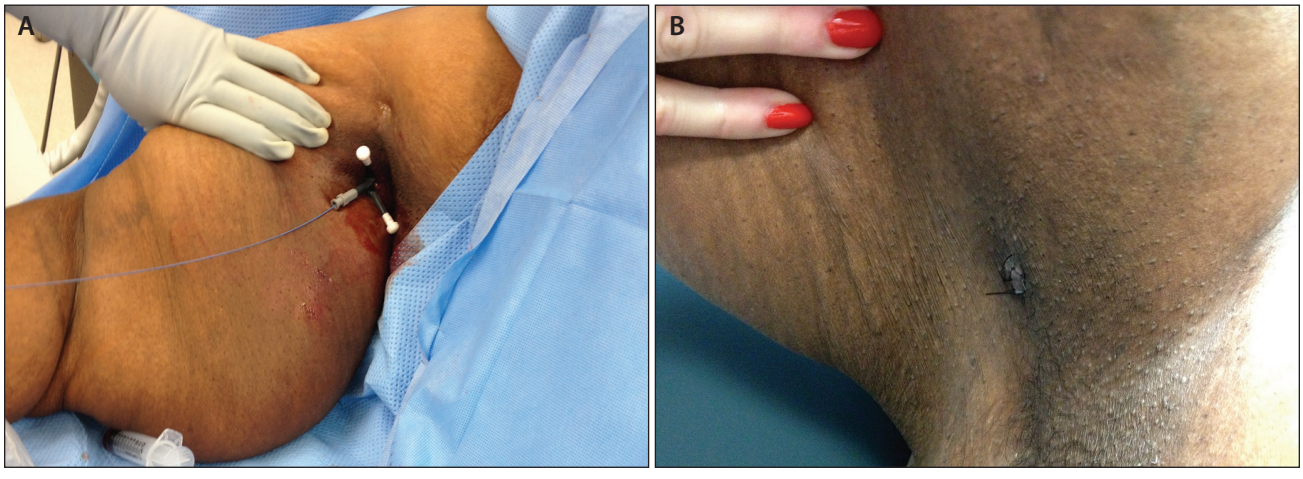

Figure 1. A morbidly obese patient with a percutaneous sheath in place (A) and a healed venous anastomosis incision in the axilla (B).

*Two stay sutures located through the nitinol reinforced section and the vessel wall are required per the Instructions for Use.

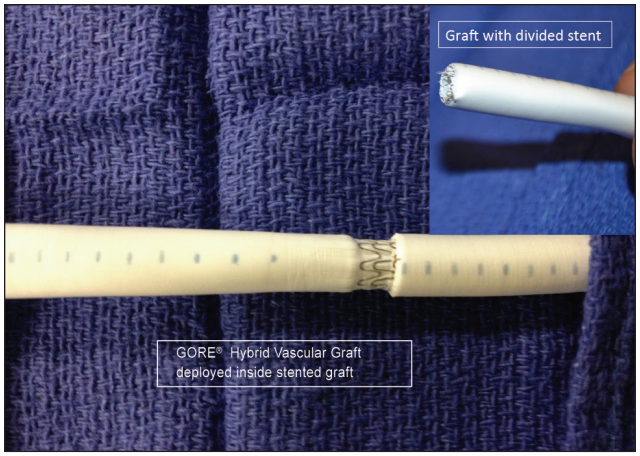

Figure 2. Graft with stent divided and with the GORE® Hybrid Vascular Graft deployed inside the stented graft.

with body mass index ≥ 35 kg/m^2. The minimally invasive nature of the GHVG allows for the avoidance of significant morbidity in these patients and is technically easier for the well-trained vascular access surgeon (Figures 1A and B).

CASE VIGNETTE 2: A PATIENT WITH STENTED OUTFLOW AND INFECTION REQUIRING GRAFT REPLACEMENT

In a second case example, a patient presented with an infected needle stick site in a graft that had been in place for several years.[2] Stents had previously been placed from the distal aspect of the graft through the venous anastomosis and into the subclavian vein. A new graft could not be sutured in because there was no area that could be transected without transecting the wires belonging to the stents. We decided to replace the old graft by dividing the old graft through the stented portion and deploying the stent portion of the GHVG inside the lumen of the divided stent, thus excluding the divided ends of the wires from the stent from the circulation within the graft (Figures 2 and 3). The patient was able to continue dialysis access in her upper extremity.

CASE VIGNETTE 3: A PATIENT WITH SMALL-CALIBER AXILLARY VEINS

The GHVG can create a viable access in a small or friable axillary vein, where a standard graft may fail. In these cases, either via an open or percutaneous approach, the covered stent portion of the GHVG can be placed through a smaller vein in which a standard sutured anastomosis would stenose the outflow. With the GHVG, the landing zone is more centrally located in a larger vein so that the flow through the graft is not compromised by the small caliber of the axillary vein. The instructions for use for the GHVG recommend sizing the stent section 5% to 20% larger than the healthy vessel diameter. In cases in which there is a

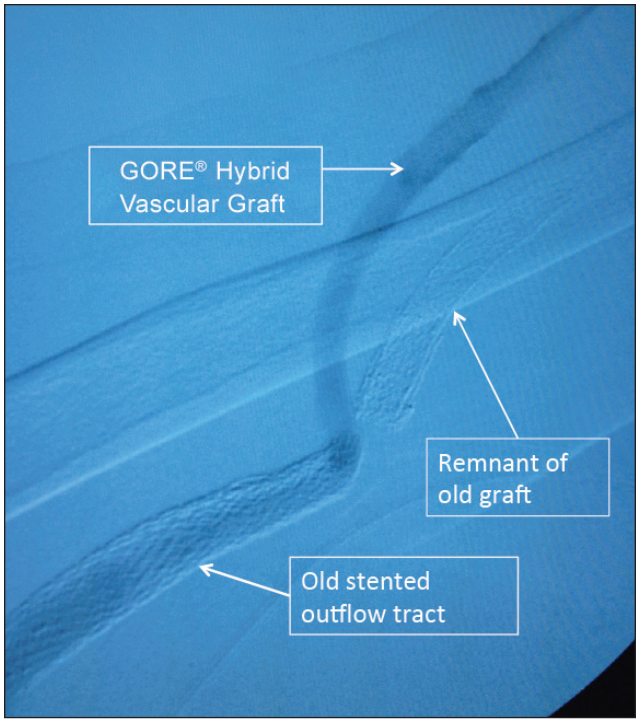

Figure 3. Graftogram of the GORE® Hybrid Vascular Graft deployed into the stented outflow.

long segment of vein that is compromised, a GHVG with a 10-cm stent section can be used to extend the graft vein interface more proximally. If the stent portion of the GHVG terminates in an area of the vein that is not ideal, then a covered stent of the same size as the outflow stent portion of the GHVG can be used to extend the graft to a suitable site within the vein. The adequacy of the outflow should be confirmed by performing a graftogram with visualization of the outflow before tunneling after deployment within the venous system to confirm adequate outflow. In addition, a graftogram should be completed after tunneling of the graft to ensure that there is no kinking at the junction of the stented and nonstented portion of the graft.

CASE VIGNETTE 4: MAINTAINING ACCESS IN A PATIENT WITH A FAILED ARTERIOVENOUS GRAFT IN THE UPPER ARM

The GHVG can be used to maintain access in a patient with a failed upper arm polytetrafluoroethylene graft that was placed using a standard open technique. In these cases, a preoperative ultrasound should be performed to visualize the axillary vein to confirm patency as well as determine that the vein can be cannulated to allow for percutaneous access to the axillary vein above the failed graft. Once these conditions are confirmed, the patient is scheduled for the operating room. The axillary vein can be cannulated with a micropuncture set, and a venogram

is performed through the microsheath to confirm that the vein is of adequate caliber and quality for placement of the GHVG. In addition, the outflow through the central circulation to the right atrium should be confirmed. After confirmation of the outflow, the GHVG is placed in the standard percutaneous fashion. In these cases, the venous outflow of the graft can be at or just beyond the chest wall. This technique can allow a patient to maintain access in their upper extremity and delay or avoid placement of an arteriovenous graft in the lower extremity.

SUMMARY

The GHVG is an important tool for all vascular access specialists to have in their access toolbox. As our case vignettes show, the GHVG can allow for the preservation of upper arm access in patients with failing or failed upper arm grafts. The GHVG can avoid morbidity in obese patients who present difficult access challenges, with a secondary patency of over 60% at 1 year.[4] The GHVG allows for the creation of a sutureless* anastomosis in cases in which a standard graft could not be successfully deployed. Surgeons who develop the required skills to create access options using the GHVG will become essential members of the access team and provide life-preserving care for patients with end-stage renal disease. As we know, the first access placed is not the most important—it's the fourth, fifth, sixth, seventh, and beyond that maintain a patient's life line. The GHVG has an important role in the ongoing efforts to achieve and maintain dialysis access in this challenging patient population. ■

***Two stay sutures located through the nitinol reinforced section and the vessel wall are required per the Instructions for Use.**

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