

# Salvaging Vascular Access and Treatment of Severe Limb Edema: Case Reports on the Novel Use of the Hemodialysis Reliable Outflow (HeRO<sup>®</sup>) Vascular Access Device

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## OBJECTIVES

The objective of this report is to present a novel use of the HeRO<sup>®</sup> vascular access device to resolve morbid unilateral edema of the upper extremity and chest as well as salvage malfunctioning arteriovenous hemodialysis accesses in two patients.

## BACKGROUND

### Intended Patient Population:

The HeRO Vascular Access Device is intended as a long-term subcutaneous dialysis access for catheter-dependent patients and patients dialyzing with failing fistulas and grafts due to venous outflow obstruction.

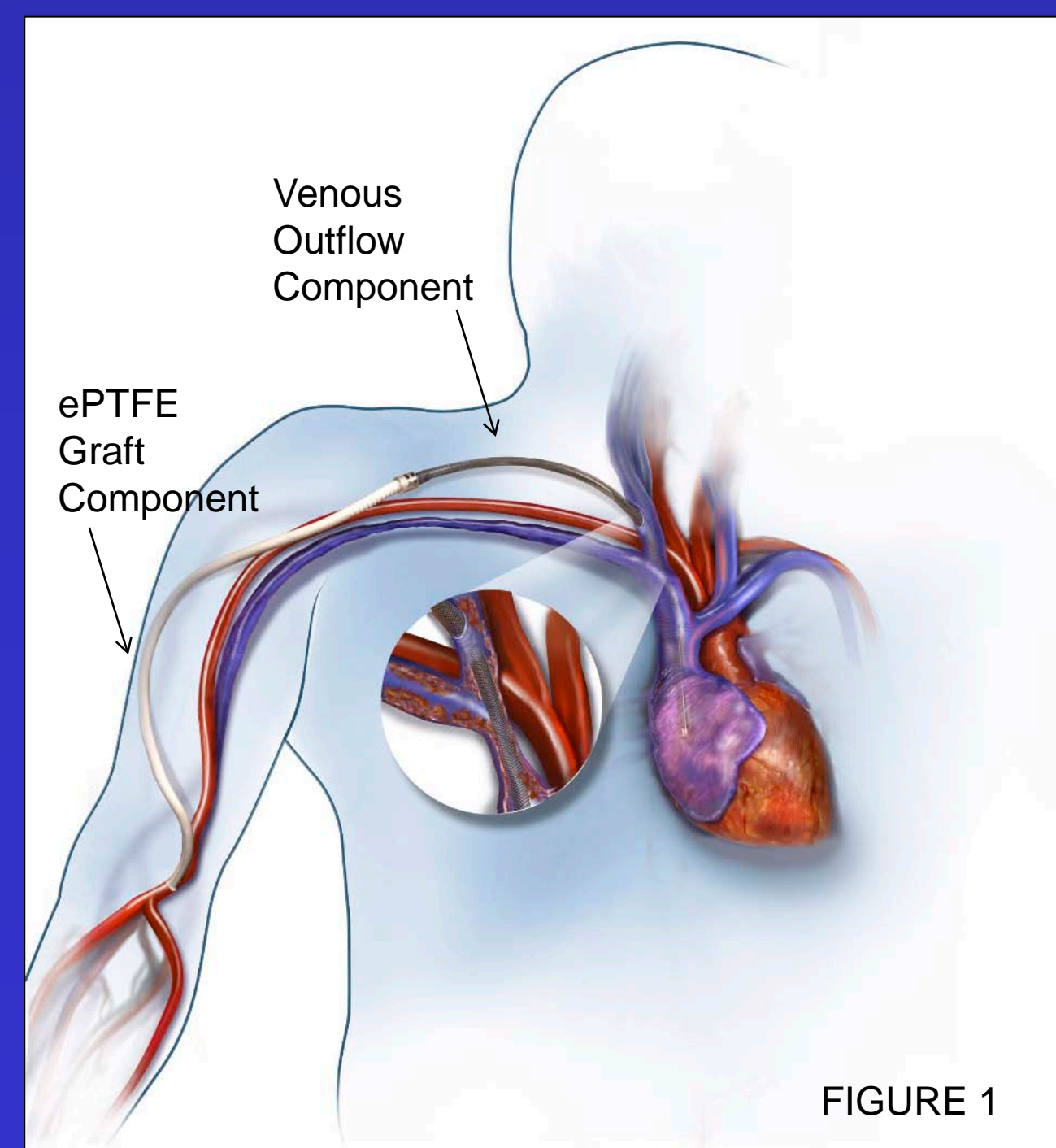


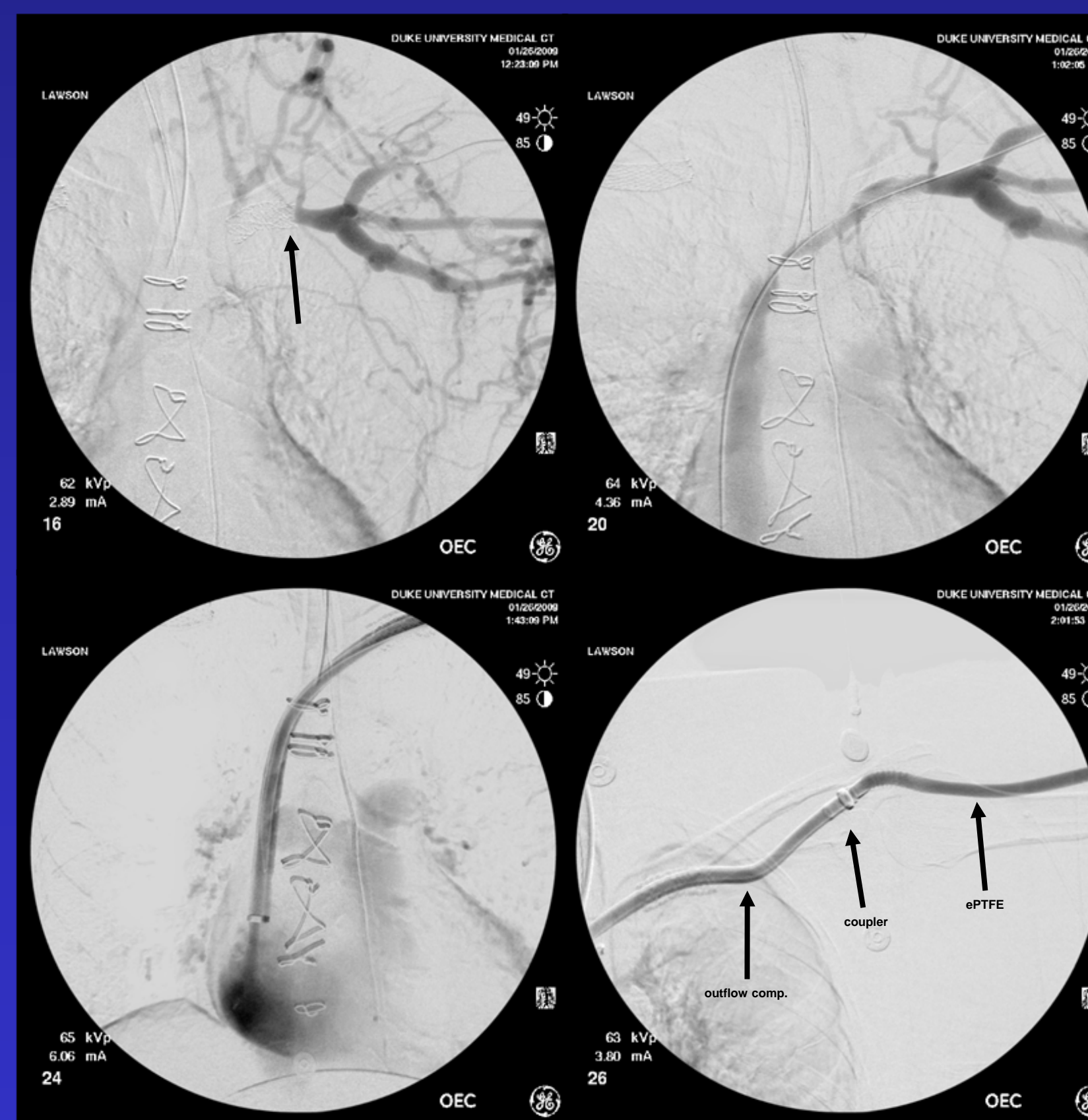
FIGURE 1

**Device Description:** The two components are surgically connected via a silicone encapsulated barbed titanium connector forming a subcutaneous arteriovenous access with central venous outflow, which can bypass central venous stenosis and/or occlusions and requires no venous anastomosis. (See Figure 1)

**Surgical Implant Procedure:** Depending on the venous anatomy and presence of outflow obstruction, the HeRO device can be placed in the right or left upper or lower extremity. The most common implantation procedure begins with the Venous Outflow Component introduced into the internal jugular vein via standard Seldinger technique. The radiopaque distal tip of the Venous Outflow Component is positioned in the right atrium under fluoroscopic guidance. The graft is subsequently tunneled in a “C” or teardrop configuration along the anteriolateral aspect of the upper arm from the inflow artery of choice to the deltopectoral groove. The Venous Outflow Component is then coupled to the graft via the connector. Lastly, a standard graft to artery anastomosis is created to complete the procedure. As with conventional grafts, the HeRO graft requires at least 3-4 weeks of tissue incorporation prior to cannulation.

## CASE REPORTS

Both patients had multiple attempts to create and maintain vascular access. Access had been established in both; one, in the form of an autologous brachial-cephalic AVF and the other by way of standard brachial artery to axillary vein AVG.



Neither access was functional for hemodialysis secondary to severe edema and poor venous outflow. Shuntography with central venous imaging demonstrated brachiocephalic vein (BCV) occlusion and a tandem subclavian/BCV stenosis respectively, resistant to angioplasty and stenting.



To address severe and disabling edema as well as salvage non-functional hemodialysis access as a result of the outflow lesions, a novel use of HeRO was planned. Once able to successfully traverse the central venous lesions and gain access to the SVC utilizing advanced endovascular techniques, attention was transitioned to the current dysfunctional access.

In lieu of the standard HeRO graft to artery anastomosis, the HeRO graft was successfully anastomosed to the failing brachiocephalic AVF and axillary artery to axillary vein AVG respectively, in an end to end fashion for inflow to the HeRO device. Both patients reported complete resolution of edema and discomfort within 4 weeks and continue to use their current revised hybrid HeRO device for dialysis free from complication or necessary intervention to date at 15 months.

## CONCLUSION

HeRO provides options for new access in patients with central venous stenosis/occlusion. We have also found the device to be a useful adjunct in access salvage and to provide relief from the above noted morbid conditions. The use of this device has been documented in complex vascular access patients, but no reports of use for purposes of limb salvage as a site for future access creation have been described. We believe that aggressive treatment of massive limb edema and morbidity due to chronic central vein stenosis with use of the HeRO device may result in prompt normalization of hemodialysis. Furthermore, these experiences demonstrate that this type of hybrid access salvage may prove beneficial by allowing for immediate cannulation of the previously dysfunctional access eliminating the need for a bridging catheter and its inherent risk of infection.