

of patients, present needing immediate dialysis and never having seen a nephrologist. Some patients have an unexpectedly rapid progression of their renal failure. Other patients have a fistula placed, but it does not mature quickly enough (or ever) to allow for its use at the initiation of dialysis.

We have had a national strategy to decrease catheter use, commonly referred to as "Fistula First" in place since January 2003. This initiative has been very successful in many ways, but has not solved this problem. An excessively large number of patients are still starting dialysis with a catheter. It is time that we give serious consideration to a national strategy with a slightly different focus, a national strategy to avoid catheters.

A careful examination of the problem will lead one to conclude that such a strategy is possible and would have a significant impact. At least two candidates for changes in patient management should be considered: 1) establishing a 30-20-10 rule for access placement and 2) the use of a peritoneal dialysis catheter as an alternative to a central venous catheter.

The renal function in most patients with chronic kidney disease who progress to end-stage follows a slowly declining curve. By monitoring this curve, key actions directed toward vascular access should be triggered by specific levels of renal function. When the glomerular function rate (GFR) reaches 30, a carefully structured plan of patient and family education should be initiated. This should be formal and organized. It should have a number of components related to dialysis, one of which should be dialysis access appropriate for the type of dialysis that is planned. When the GFR reaches 20, the patient should have vascular mapping immediately followed by fistula placement, if hemodialysis is to be the modality used. At a GFR of 10, the patient should be started on the dialysis that has been planned.

Except in cases with an unexpectedly rapid deterioration, this should give time for the creation and the maturation (including salvage procedures) of a useable fistula at the initiation of dialysis. There would undoubtedly be cases in whom a fistula may be created long before it is needed and some in whom an access is placed that is never used. However, an unused fistula is certainly a better alternative than a catheter.

Peritoneal dialysis (PD) is a modality that has been underutilized in the United States. The use of a temporary PD catheter to deliver short term PD as an alternative to the use of a central venous catheter is a novel idea that has not been realized on any wide spread basis. A PD catheter has several features that recommend it for this application. It can be easily placed as an out-patient; although not usually done, it can be used immediately and it is not associated with the dire complications that characterize central venous catheter use.

A PD catheter is an attractive alternative for use in those patients in whom a fistula cannot be developed (scheduled, placed, and matured) prior to the initiation of dialysis. In view of the complications associated with the usual approach to these cases, it should be considered. We have the ability to do better for our patients and they deserve it. The time for a new national strategy directed not at reducing catheters, but avoiding them has come.

## **Treat the Stenosis Before Surgery or Consider a Graft-catheter**

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In hemodialysis patients, critical central venous stenoses and obstructed central veins precipitate repeat interventions and access failures. In such cases, a decision must be made to attempt to treat the obstructive stenosis with established procedures and preserve the access, or to place a graft-catheter (HeRO device).

The traditional treatment for central vein occlusions has been angioplasty, or angioplasty with uncovered nitinol stent placement in cases of elastic recoil. Stents were generally sized to a diameter slightly larger than the vessel lumen (1). However, this technique has yielded a 3-month primary patency of 56-67% and in many instances have caused occlusion where only stenoses previously existed (2-4). In our outpatient vascular access center, we recognized the complications of treating central veins in this manner and have developed a new treatment protocol. Two concentric stents are placed, with a size equal to the lumen diameter expected following elastic recoil. The presence of an additional stent provides the radial force necessary to resist extrinsic compression and elastic recoil from the thick walls of central veins.

A retrospective study of hemodialysis patients with recurrent central venous stenosis was performed. Pa-

tients were included if they were treated for central venous stenosis treated with two concentric uncovered nitinol stents. Seven patients were found to have been treated in this way. Indications included arm swelling ( $n = 3$ ), breast swelling ( $n = 1$ ), access thrombosis ( $n = 2$ ), and new access evaluation ( $n = 1$ ). Three patients were female, the average patient age was 65, and accesses included 3 fistulas, 3 grafts and 1 catheter. All lesions were related to prior central venous catheter placement. Stenoses were treated at the subclavian vein ( $n = 6$ ), brachiocephalic vein ( $n = 6$ ), and superior vena cava ( $n = 3$ ); all stenoses were ipsilateral to the vascular access. All patients had patent central veins on follow-up (average = 5.2 months; range = 1–13.3 months). The arteriovenous accesses were preserved and the patient with a catheter had successful creation of a fistula.

By contrast, placement of a Hemodialysis Reliable Outflow (HeRO) device almost certainly precludes future ipsilateral access placement. The HeRO device is a combination of an inflow PTFE graft and an outflow catheter that is inserted into the right atrium, allowing for central venous occlusions to be bypassed. In the past 4 years, several clinical studies of the HeRO device have been conducted, yielding results that compare favorably to that of ordinary grafts. Although the primary patency of the HeRO graft-catheter is relatively low (33-36% at 12 months), its thrombosis, bacteremia rates, and 12-month secondary patency are comparable to that of arteriovenous grafts (70-78% vs. 48-88%, respectively) (5-8).

Although this is a relatively small patient cohort, the results of our approach are promising. Fistulas have a superior durability, lower infection rate, and lower rate of interventions than both HeRO devices and grafts (8). Therefore, if such central venous occlusions are amenable to endovascular techniques, attempts should be made to establish a patent access circuit and create a native vein fistula.

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## Place the AV Access and Worry About the Obstruction if it's a Problem

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The incidence of CVD amongst renal patients has been estimated between 25 and 40% in the literature. There is a strong association with the placement of central venous catheters reaching a very high 50% for those who have had a subclavian catheter inserted in their past medical history.

The risk factors are now well identified: multiple insertions of large catheters with long dwell times specifically on the left hand side and with a very high risk if inserted via the subclavian route rather than the internal jugular vein.

The vast majority of central venous obstruction (CVD) or stenoses are asymptomatic in patients who do not have a surgically created vascular access on the same side. It becomes symptomatic in only 50% of the patients once the access is up and running and in use. Although it is estimated that between 25 and 40% of patients who have had a centrally inserted catheter will develop CVD, it is very unlikely that any preemp-