

Hemodialysis Treatment

Patients with chronic renal failure need regular **Hemodialysis** that performs the kidney's job of ridding the body of toxic waste products, and to maintain fluid, electrolyte and acid-base balance. One of the greatest challenges facing patients and their doctors is keeping the vascular access graft open for dialysis. Most patients with chronic renal failure receive dialysis using synthetic bridge grafts made of polytetrafluoroethylene (PTFE). These tend to clot or malfunction, decreasing reliable access for life-sustaining dialysis and causing considerable morbidity, discomfort and inconvenience for dialysis patients.

Currently, there are about 250,000 Medicare patients undergoing hemodialysis in the United States, and half or more will have at least one episode of clotting (thrombosis) of the graft. Until recently, most thrombosed grafts had been managed by surgically removing the clot, but interventional radiologists are increasingly providing nonsurgical dialysis graft declotting. These interventions are safer, less costly, and often more effective, since the angiographic technique allows for correction of the underlying reason the graft failed. Ultimately, these techniques improve the quality of life for dialysis patients.

The problems with dialysis grafts, have led to an increasing number of patients receiving an arteriovenous fistula, which is a connection created surgically by joining a vein and an artery in the forearm that allows blood from the artery to flow into the vein, thus providing access for dialysis. Fistulas are considered the "gold standard" for maintaining access to a patient's circulatory system, to provide life-sustaining dialysis. They last longer, need less maintenance, and are associated with lower rates of infections, hospitalization and death than other types of access.

Interventional Techniques Used to Maintain Dialysis Access

- Angioplasty
- Stenting
- Combination of drugs and mechanical devices to break up the clot, i.e., a pulse spray with a clot-dissolving drug (lytic agent)
- Lyse and wait thrombolysis (drug therapy alone)
- Balloon thrombectomy (clot removal) techniques
- Use of mechanical thrombectomy devices

Angioplasty and Stenting

In this technique, the interventional radiologist inserts a very small balloon attached to a thin catheter into a blood vessel through a small nick in the skin. The catheter is threaded under fluoroscopy "real-time" guidance to the site of the blocked artery. The balloon is inflated to open the artery. Sometimes, a small metal scaffold, called a stent, is inserted to keep the blood vessel open.

Balloon angioplasty and stenting have generally replaced open surgery as the first-line treatment because randomized trials have shown interventional therapy to be as effective as surgery for many arterial occlusions. In the past seven to ten years, a very large clinical experience in centers around the world has shown that stenting and angioplasty are preferred as a first-line treatment for more and more processes throughout the body.

Thrombolysis (Lysis)

Catheter-directed thrombolysis is performed under imaging guidance by interventional radiologists. This procedure, performed in a hospital's interventional radiology suite, is designed to rapidly break up the clot, restore blood flow within the vein, and potentially preserves valve function to minimize the risk of post-thrombotic syndrome. Thrombolysis is often used with IVC filter placement, to ensure that none of the clot lodges in the lungs. The interventional radiologist inserts a catheter into the popliteal (located behind the knee) or other leg vein and threads it into the vein containing the clot using imaging guidance. The catheter tip is placed into the clot and a "clot busting" drug is infused directly to the thrombus (clot). The fresher the clot, the faster it dissolves ? one to two days. Any narrowing in the vein that might lead to future clot formation can be identified by venography, an imaging study of the veins, and treated by the interventional radiologist with a balloon angioplasty or stent placement.

Thrombectomy ? AngioJet Mechanical

Thrombectomy also targets the clot (thrombus) directly, but this procedure's purpose is to remove the clot from the body. Thrombectomy is also a catheter-directed procedure using fluoroscopy "real-time" guidance, which is performed in a hospital's interventional radiology suit. This technique utilizes a thin, flexible catheter which is inserted directly into the thrombus (clot). A high-speed water jet is then used to

create a vacuum effect and pull the thrombus into the catheter where it is broken into tiny pieces. The fragments are then propelled through the catheter and out of the body. This quickly restores blood flow, resolves symptoms and removes the clot from the body.

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