

Overview of Radiologic Procedures for Maintenance of Hemodialysis Access

As chronic dialysis patients live longer, maximal preservation of each dialysis access site has assumed an increasingly important role. Over the past 10-15 years, in addition to the standard fistulogram/venogram, a repertoire of interventional radiologic procedures has evolved to assist with maintenance of permanent and establishment of temporary hemodialysis access.

For permanent dialysis access, these procedures include percutaneous clot lysis and mechanical thrombectomy, and angioplasty or intravascular stent placement for graft/outflow stenosis. With the recent diminished availability of Urokinase and concern for inducing a systemic lytic state with tissue plasminogen activator (TPA), emphasis has shifted from thrombolysis to mechanical declotting. Several new percutaneous techniques, ranging from percutaneous Fogarty catheter clot displacement to clot maceration and aspiration, are now well established. These offer the advantage of completing the procedure in a single session. To achieve optimal graft/fistula salvage, patients should be referred for evaluation at the earliest sign of access dysfunction (i.e., loss of graft thrill, flow rates less than 250 ml/min., increased venous pressure, elevated fractional recirculation).

Direct percutaneous or tunneled temporary central venous dialysis catheters can be placed under combined ultrasound and fluoroscopic guidance with lower complication rates (i.e., pneumothorax, arterial puncture, etc.). In the case of tunneled catheters, placement can be more timely and at lesser expense than in the operating room. Catheters are preferentially placed via either internal jugular vein to preserve subclavian vein patency for eventual permanent upper extremity access placement. In “desperate” situations, imaging guidance enables placement at less conventional sites such as transhepatic, translumbar, and intercostal. Of course, central venous catheters can be placed for alternate purposes such as TPN, long-term antibiotics, pheresis, etc. Percutaneous manipulation for malposition and clot/fibrin sheath stripping for salvage of existing central lines can also be performed.

An optimal approach for the chronic hemodialysis patient would appear to be surgical placement of a Cimino Fistula and simultaneous placement of a tunneled central venous catheter for use until the Cimino fistula matures.

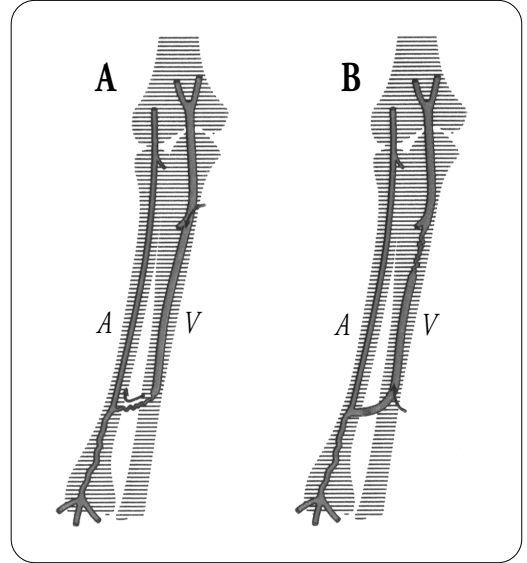


Figure 1. Schematic of sites for potential angioplasty of Cimino fistula (A) and venous outflow (B) stenosis.

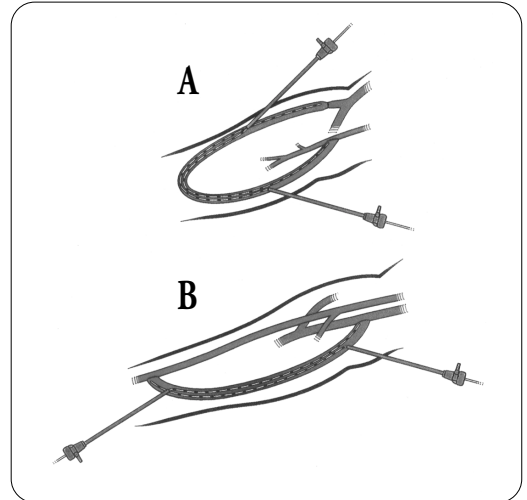


Figure 2. Schematic of catheter placement for percutaneous intervention of dialysis loop (A) and single limb (B) grafts.