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Alteplase Use for Clotted Catheters

How exactly is alteplase used and handled for dialysis catheter thrombosis?

Tissue plasminogen activator has been used to declot accesses in hemodialysis patients for almost 10 years. Prior to 1998 the thrombolytic agent of choice for thrombosed hemodialysis catheters was urokinase. In 1998 the U.S. Food and Drug Administration (FDA) prohibited the distribution of this agent because of an associated risk for infection. Since that time streptokinase and alteplase have been the only agents available. The allergenic nature of streptokinase prevents repeated use of this agent, therefore alteplase has become the agent of choice.

Alteplase has two major problems in comparison to urokinase—it is more expensive and is unstable. Alteplase retains maximum thrombolytic activity when stored for no more than 48 hours at 2 °C. The cost of alteplase in our institution is approximately $48.00 per 1 mg dose. Alteplase (Activase; Genentech) is prepared in the pharmacy in 1 ml aliquots in a concentration of 1 mg/ml from 50 mg alteplase vials and stored in a constant temperature freezer at minus 20 °C. The product is removed from the freezer immediately prior to use and is completely thawed within a few minutes prior to administration.

Reports in the literature have documented the use of alteplase in doses from 2 to 45 mg with dwell times varying from 30 minutes to 4 days. Successful restoration of catheter patency ranged from 67 to 87.5% (1–4). Haire et al. (5) conducted the first randomized double-blind study to compare the efficiency of alteplase 2 mg/ml to urokinase 10,000 U/2 ml in oncology patients. Catheter function was restored in 89% with alteplase and in 59% with urokinase.

We have just completed a retrospective study comparing alteplase with urokinase (6). Our protocol was 1 ml of alteplase at a concentration of 1 mg/ml or 1 ml of 5000 U/ml of urokinase instilled into each catheter port. The catheter lumen was then filled to total volume with normal saline. At 20-minute intervals, 0.2 ml of normal saline was added to each port. The thrombolytic agent was allowed to dwell in the catheter for a total of 60 minutes before being aspirated. Hemodialysis was then reattempted. In our experience 70% of the patients receiving alteplase achieved posttreatment blood flow rates greater than 300 cc/min compared to 35% in the urokinase group. We have experienced no adverse events during the use of alteplase.

Patients with a fibrin sheath surrounding the catheter do not usually respond to this treatment. When urokinase was available we had good results with high-dose infusions of urokinase during dialysis producing dissolution of fibrin sheaths. We have not utilized high-dose continuing infusions of alteplase primarily because of the expense. Our current practice is to use alteplase only in tunneled catheters. We have replaced thrombosed temporary catheters over a wire in order to avoid the delay required for the use of the thrombolytic agent and the expense of the agent.

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