

## Alteplase Use in Hemodialysis Central Venous Catheters

### Purpose

To use a fibrinolytic agent to restore and maintain patency of occluded hemodialysis (HD) central venous catheters (CVCs). This may involve 1 or both lumens of the CVC.

### Policy

1. This procedure may be done on tunneled or nontunneled CVCs, but only with a physician's order.
2. Strict aseptic technique is to be used when performing this procedure.
3. The reconstituted product must be carefully inspected for particulate matter and not administered if it is present. To minimize risk, a 5- $\mu$ m filter needle must be used to withdraw the reconstituted product from the vial prior to patient administration.
4. Before alteplase use, the CVC should be thoroughly evaluated to determine other causes of occlusion and/or inability to sustain required flows.
5. Indications of CVC malfunction include:
  - ◆ Difficulty aspirating and/or infusing
  - ◆ Inability to maintain a sustained blood flow rate (QB) > 250 mL/min for 2 consecutive HD sessions
  - ◆ Inability to initiate a QB > 200 mL/min for 1 HD session
  - ◆ Arterial pressure of  $\leq$  -250 mm Hg and/or venous pressures of  $\geq$  250 mm Hg
  - ◆ Line reversal to achieve QB > 250 mL/min
6. All efforts should be made to limit a maximum of 2 doses of alteplase within a 2-week time period and/or a maximum allotment of 4 mg per dialysis session. If this has occurred, the patient's primary nephrologist should be notified and CVC viability should be assessed.
  - ◆ Note: Alteplase should not be ordered for CVCs that have been placed within 1 week, as problems related to occlusion of CVCs during this period are likely a result of mechanical problem; therefore, line exchange should be considered
7. All patients whose lumens are routinely locked with alteplase (indication for this is rare)
  - ◆ Will receive 1 mg per lumen of alteplase lock solution
  - ◆ Will be assessed by the vascular access team and primary nephrologist for other potential alternatives

### Points of Emphasis

1. Alteplase contains no antibacterial preservatives and should be reconstituted immediately before use. Reconstituted solution may be used within 24 hours after reconstitution if stored in the refrigerator
2. Relative contraindications to alteplase include:
  - ◆ Recent (within 2 months) central nervous system surgery or severe trauma
  - ◆ Known active internal bleeding
3. Lyophilized (not reconstituted) alteplase should be stored at refrigerated temperature
4. No other medications should be added to solutions containing alteplase

## Alteplase Use in Hemodialysis Central Venous Catheters (cont'd)

### Procedure

1. Evaluate and troubleshoot the patency of the catheter as instructed in the Appendix "Alteplase Algorithm".
2. If indicated, obtain physician's order for alteplase administration, verifying the method of administration.
  - ◆ 30-minute dwell (for lumen occlusion)
  - ◆ Intravenous infusion (for sluggish flow)
  - ◆ Lock
3. Obtain alteplase and reconstitute as follows:
  - A. Reconstitute the 2-mg vial of alteplase with 2.2 mL sterile water for injection (result is 1 mg/mL alteplase)
  - B. Inject the sterile water into the 2-mg alteplase vial, directing the diluent stream into the powder. Slight foaming may occur; allow the vial to stand undisturbed until large bubbles have dissipated
  - C. Mix by gently swirling the vial until the contents are completely dissolved. DO NOT SHAKE
  - D. Inspect the product for foreign matter and discoloration. The reconstituted 2 mg alteplase preparation should appear as a colorless to pale yellow transparent solution
4. Explain the procedure to the patient. Obtain baseline vital sign measurements and document them in the patient chart.

### Equipment

- On/off supplies
- 3-mL syringes
- 10-mL prefilled normal saline (0.9%) syringes
- Blunt fill needles
- Gauze (4 × 4)
- Two 5- $\mu$ m filter needles
- Alteplase 2-mg vial
- Sterile water for injection
- Labels for syringes

## Alteplase Use in Hemodialysis Central Venous Catheters (cont'd)

5. Instill the alteplase solution as follows:

### 30-minute dwell

- A. Note: If resistance is felt at any time, use a gentle push/pull motion to instill the lumen. Never use excessive force
- B. Using a 5- $\mu$ m filter needle, withdraw 1 mL reconstituted alteplase (1 mg) into 2 separate 3-mL syringes. Apply alteplase labels to the syringes
- C. Using 2 additional 3-mL syringes, withdraw normal saline solution equal to the remaining volume of each lumen plus 0.9 mL (used to advance alteplase)
- D. Instill 1-mL alteplase solution (1 mg) into each lumen
- E. Instill normal saline equal to the volume of each lumen, then advance alteplase by 0.3 mL (0.6 mL will be left in each syringe)
- F. Clamp lumens, leaving syringes attached. Wait 10 minutes
- G. Advance alteplase by 0.3 mL using saline solution (0.3 mL will be left in each syringe)
- H. Clamp lumens and leave syringes attached. Wait 10 minutes
- I. Advance alteplase using the last 0.3 mL of saline. Clamp lumen. Wait 10 minutes
- J. Use prefilled 10-mL normal saline syringes to briskly flush and aspirate each lumen to assess function
- K. If unable to flush or withdraw alteplase, attempt to reposition the patient and ensure the catheter is not kinked. Attempt again to flush with 10 mL normal saline

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## Alteplase Use in Hemodialysis Central Venous Catheters (cont'd)

### Intravenous infusion

- A. Use a 5- $\mu$ m needle to withdraw 2 mL reconstituted alteplase (2 mg) into a 3-mL syringe
- B. Add 2 mg alteplase to a 50-mL minibag of 0.9% normal saline solution
- C. Attach minibag to the infusion pump, and then to the venous chamber of the blood line
- D. Infuse alteplase over 1 hour (rate of 50 mL/h) as follows:
  - With the CVC lumens in the “reverse” position for the first 30 minutes
  - With the CVC lumens in the “normal” position for the last 30 minutes. If unable to infuse in the “normal” position, administer the last 30 minutes in the “reverse” position

### Alteplase lock

- A. Use a 5- $\mu$ m needle to withdraw 1 mL reconstituted alteplase (1 mg) into 2 separate 3-mL syringes
  - B. Using 2 additional 3-mL syringes, withdraw normal saline equal to the remaining volume of the lumen plus 0.2 mL each (used to advance alteplase)
  - C. Instill alteplase 1 mL (1 mg) into each lumen
  - D. Instill normal saline equal to the remaining volume of each lumen, then advance alteplase by 0.2 mL
  - E. Clamp lumen, apply injection clamps, and apply alteplase labels to the lumens
  - F. Allow alteplase to dwell in the lumens until the next HD treatment
6. If catheter is patent, commence dialysis and administer heparin as prescribed.
  7. If catheter is patent and the heparin lock solution has been flushed through the catheter, commence dialysis but do not administer heparin bolus as prescribed.
  8. If the alteplase procedure (30-minute dwell or infusion) was performed at the end of dialysis or on a nondialysis day, flush the lumens with 10 mL 0.9% saline and lock with anticoagulant.

### Bibliography (cont'd)

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Protocol adapted with permission from Southern Alberta Renal Program, Alberta, Canada.

## Alteplase Algorithm

