Hemodialysis: Alteplase (t-PA) Infusion for CVC during Hemodialysis

Site Applicability

PHC Renal Program

Practice Level

Nurses who have completed the required education and who provide care in a PHC Renal Program hemodialysis specialty perform this procedure.

Requirements

1. Thrombolytics are initiated only after all other possibilities for poor blood flow have been explored and attempts to resolve the problem (i.e. repositioning patient, flushing catheter, etc.) have been made.
2. A physician's order is required for alteplase infusion.
3. Obtain Prescriber's Orders – alteplase (t-PA, CATHFLO) for Occluded Hemodialysis Catheter from Cerner PowerPlans

Need to Know

1. PDTM (Parenteral Drug Therapy Manual): "Low-dose Alteplase Infusions for Treatment of Central Venous Dialysis Catheter-related Thrombi":
    - Low-dose IV alteplase infusions are approved for use to clear hemocaths with proven central venous thrombi affecting the catheter functions.
    - Low-dose IV infusions of alteplase may be given in critical care areas, 6B, Hemodialysis (in-center and community), Emergency, and MSSU at St. Paul's Hospital.
2. This procedure is performed during dialysis using a central venous catheter. Follow B-00-12-10152 to initiate hemodialysis using a central venous catheter with and without TEGO connectors.
3. Blocked or dysfunctional central venous catheters are identified by difficulty instilling or aspirating catheter lumens and/or a decrease in blood flow of less than 300 mL/min during hemodialysis.
4. In treating catheter-related thrombi, alteplase is infused near the thrombus to attain local high-level concentrations with relatively low total doses.
5. If a minimal blood pump speed can be achieved on the initiation of hemodialysis (200 mL/min) alteplase infusion can be initiated to restore catheter function.
6. Alteplase is a thrombolytic agent that works by binding to fibrin in a thrombus, then converting the entrapped plasminogen to plasmin resulting in local fibrinolysis (i.e. digests fibrin and dissolves blood clot).
7. Alteplase vials need to be protected from light and kept in their original box until needed. Alteplase vials do not contain antibacterial preservatives and should be stored in a refrigerator at a

temperature between 2 and 8 degrees C and reconstituted immediately before use. The solution must be used within 8 hours following reconstitution when stored between 2 and 30 degrees C.
8. Alteplase must be reconstituted with Sterile Water for injection. Mix gently by swirling the vial. Do not shake vial to dissolve.
9. Alteplase should not be administered to patients with known hypersensitivity to alteplase
10. Locking solution must always be aspirated from the catheter lumens prior to alteplase infusion.
11. Common sites of thrombus formation: catheter lumen, site where catheter enters the vein, catheter tip and along the external surface of the catheter

Equipment and Supplies

The following list of equipment and supplies are in addition to those required to initiate hemodialysis using a central venous catheter with and without TEGO connectors

Alteplase Infusion During Hemodialysis

1. Minibag containing 0.9% NS (50 mL x 2)
2. 3 mL Luer lock syringes (2 to 3)
3. Alteplase 2 mg/vial (1 to 2)
4. Alcohol /CHG swabs
5. Alaris® CareFusion System with Guardrail and PC Modules (2)
6. CareFusion Smartsite Infusion Sets (2)
7. CardioMed “Y” adapter w/male luer lock
8. Sterile water for injection
9. 18 g needles

Simultaneous Infusion of Alteplase into the Arterial and Venous Lumens prior to initiating hemodialysis

1. Minibags containing 0.9% NS (50 mL x 2)
2. 3 mL Luer lock syringes (2 to 3)
3. Alteplase 2 mg/vial (1 to 2)
4. Alcohol/CHG swabs
5. Alaris CareFusion System with Guardrail and pump modules (2)
6. CareFusion Smartsite infusion sets (2)
7. Sterile water for injection
8. Medication labels (2)
9. 18 g needles

Procedure

A. Alteplase Infusion during Hemodialysis

- One catheter lumen provides a minimum blood flow of 200 mL/min
- One catheter lumen does not provide adequate blood flow, however, instillation can be achieved with this lumen

Preparation:

1. Reconstitute alteplase according to manufacturer's instructions and physician's order.
2. Add alteplase in the amount ordered by the physician to minibag for infusion and label minibag.
3. Connect infusion tubing to one limb of "Y" adapter.
4. Prime Smartsite infusion set and "Y" adapter.
5. Attach a 3 mL syringe to open limb of the "Y" adapter.

STEPS	RATIONALE
1. Following the procedure for initiating hemodialysis using a central venous catheter with and without TEGO Connectors. Forcefully flush with "Push/Pause" technique each lumen with 20 mL of NS using aseptic technique.	To ensure catheter is thoroughly cleared of blood and heparin/citrate Push/pause" flush technique increases the turbulence within the catheter lumen during the flush, thereby making the flush more effective
2. If flush successful, attempt aspiration of blood and perform 2 to 3 additional forceful flushes with "Push/Pause" technique	
3. If flush unsuccessful repeat step 1. If successful, proceed to Step 5.	
4. If still unsuccessful contact physician.	
5. Connect arterial bloodline to catheter lumen that provides adequate blood flow	
6. Prime circuit with blood as per initiating hemodialysis procedure.	
7. Disconnect 3 mL syringe from "Y" adapter. Discard syringe.	
8. Replace syringe on "Y" adapter with venous bloodline.	

9. Attach male end of "Y" adapter to problematic lumen of catheter.	
10. Attach male end of "Y" adapter to problematic lumen of catheter	
11. Commence alteplase infusion to run over 1 hour.	
12. Monitor and document Q15 min: vital signs, and signs and symptoms of adverse complications (bleeding, allergic reaction).	
13. After 30 minutes of alteplase infusion, stop blood pump and infusion pump. Using aseptic technique, disconnect and switch arterial bloodline and "Y" adapter connections on catheter.	
14. Restart blood pump and infusion pump.	
15. Observe and document blood pump speed and arterial and venous pressures. Continue dialysis treatment.	A blood pump speed of 300 mL or more per minute with corresponding arterial and venous pressures is an indication of successful fibrinolysis.
16. In the event pump speeds are not attainable (more than 300 mL per minute), stop blood pump and infusion pump. Repeat step 12 and resume alteplase infusion through problematic lumen. Continue dialysis treatment.	Successful fibrinolysis has not occurred. Continue alteplase infusion through problematic lumen.

B. Simultaneous Infusion of alteplase into the Arterial and Venous Lumens prior to initiating hemodialysis

- One catheter lumen provides a blood flow of less than 200mL/min
- Unable to initiate hemodialysis due to inadequate blood flow
- Unable to aspirate from either lumen, however, instillation can be achieved with both lumens

Preparation:

1. Reconstitute alteplase according to product monograph and Physician's Order.
2. Using 2 to 3 mL syringes, divide the reconstituted dose of alteplase in half. Inject contents of syringes into the two minibags and label.
3. Prime both Alaris infusion pump tubing sets and load onto pumps

STEPS	RATIONALE
1. Prepare alteplase (see above)	
2. Connect infusion tubing directly to arterial & venous ports on central line. Open clamps on arterial & venous ports	
3. Commence alteplase infusions to run over 30 minutes	Simultaneously infuse alteplase into both ports
4. . Monitor and document q 15 min: vital signs, and signs and symptoms of adverse complications (bleeding, allergic reaction).	
5. After completion of alteplase infusion, repeat the procedure for initiating hemodialysis using a central venous catheter with and without TEGO connectors.	
6. Observe and document blood pump speed and arterial and venous pressures. Continue dialysis treatment.	
7. If unable to aspirate blood from lumens, notify physician.	
8. If unable to aspirate blood from lumens, notify physician.	If unable to aspirate blood from lumens, notify physician.

Documentation

1. Pre, intra, and post assessments of patient and catheter function at CST Cerner Nursing Narrative Notes and at iView Dialysis management Intra-procedure of Central Line
2. Dialysis management, Central Line iView – volume of locking agent instilled
3. Situation & Awareness/Action/Planning (Team communication-Discoverable)
4. Interventions: MD notification, additional monitoring and procedures performed.
5. Alteplase dose instilled on the Cerner medication administration record/HD monthly medication record
6. Document Alteplase dose on the TPA record binder for tracking.

Patient and Family Education

1. Instruct patient to observe and report any signs of bleeding, bruising, urticaria after alteplase infusion.

2. Instruct patient to inform hemodialysis nurse at beginning of next hemodialysis treatment that they have received alteplase during the previous hemodialysis treatment.

Related Documents

1. B-00-12-10152 - Hemodialysis: Accessing a Central Venous Catheter (CVC) with and without TEGO connectors
2. B-00-12-10043 – Hemodialysis: Central Venous Access Dressing
3. B-00-12-10144 – Hemodialysis: Flushing and Capping Central Venous Catheters
4. B-00-12-10058 – Hemodialysis: Alteplase (t-PA) Instillation into Blocked Central Venous Catheter
5. B-00-07-13045 – Standard Infection Control Precautions
6. B-00-07-13033 – Gowns and Protective Apparel
7. B-00-07-13027 - Face Protection: Masks, Goggles and Face Shields – Infection Control
8. B-00-07-13026 - Gloves – Infection Control
9. PDTM – Parenteral Drug Therapy Manual

References

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3. BC Provincial Renal Agency– Health Professionals - Vascular Access - Resources (2017). Vascular Access Guideline: Central Venous Catheter (CVC) Flushing & Locking. Accessed at www.bcrenalagency.ca
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6. Yuo, T. (Author), Davidson, I., Berns, J. & Collins, K. (Editors). (2020). UpToDate© Literature review: *Central catheters for acute and chronic hemodialysis access and their management*. Wolters Kluwer Health. Retrieved on September 20, 2022 from https://www.uptpdate.com

Appendices

- Appendix A: Steps for slow Dose Infusion during hemodialysis

Appendix A: Steps for Slow Dose Infusion during Hemodialysis

Steps for Low-dose Alteplase Infusion during Hemodialysis

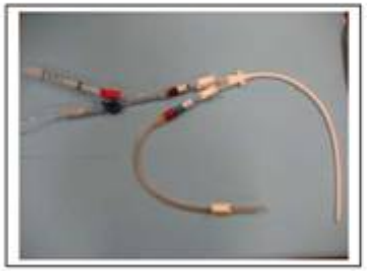
1. Obtain order from physician.
2. Reconstitute alteplase according to manufacturer's instructions and physician's order.
3. Add alteplase in the amount ordered by physician to minibag for infusion and label.

4. Connect infusion tubing to one limb of "Y" adapter.

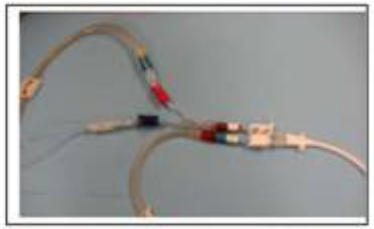
5. Prime Alaris infusion pump tubing and "Y" adapter and attach a 3 mL syringe to open limb of the "Y adapter.

6. Forcefully flush each lumen with 20 ml of NS using aseptic technique.
7. If flush successful, attempt aspiration of blood and perform 2 to 3 additional forceful flushes with aspirated blood.
8. If flush unsuccessful, repeat step 6, if successful proceed to Step 9.

9. Connect arterial bloodline to venous lumen of the catheter. Prime circuit with blood as per initiating



10. Attach the male end of "Y" adapter to arterial lumen of catheter.



11. Disconnect 3 mL syringe from "Y" adapter. Discard syringe.
12. Replace syringe on "Y adapter with venous bloodline.
13. Initiate dialysis as per routine.
14. Commence alteplase infusion to run over 1 hour.

15. Monitor and document Q15 min: vital signs, and signs and symptoms of adverse complications.
16. After 30 minutes of alteplase infusion, stop infusion. Disconnect and switch arterial bloodline and "Y" adapter connection on catheter.
17. Restart. If unable to achieve adequate BPS, stop blood pump and Alaris pump.
18. Resume alteplase infusion through arterial lumen. Continue dialysis treatment.

Persons/Groups Consulted:

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