Developed by: ANNA Specialty Practice Networks

Vascular Access Fact Sheet

Overview

Before beginning hemodialysis, a patient must have a vascular access in place. The vascular access provides entry into the patient's bloodstream. The access will allow the patient's blood to travel to the hemodialysis machine so toxins, wastes, and extra fluid may be removed before returning the blood back to the patient.

There are 3 types of vascular accesses: arteriovenous fistula (AVF); arteriovenous graft (AVG); and central venous catheter (CVC). Each access requires a surgical procedure. Depending on the type of vascular access, the access may be placed in the arms, legs, neck, or chest. A vascular access should be placed well in advance of beginning hemodialysis so the access will be ready for use. An AVF requires 4 to 12 weeks to mature prior to the first use. An AVF can be accessed earlier depending on rate of maturation, but it requires an order from the nephrologist or surgeon before accessing. An AVG requires 2 to 3 weeks to heal, incorporate into the surrounding skin, and for the edema to resolve. Several early stick (cannulation) grafts can be used anywhere from 24 to 72 hours after placement. A person who has sudden kidney failure that requires immediate hemodialysis will have a CVC placed for dialysis. The catheter is used until an AVF or AVG can be placed and is ready for use. The catheter should always be the last access option. In some cases, a catheter may be the patient's permanent access for dialysis.

Arteriovenous Fistula (AVF)

The ideal vascular access for patients on hemodialysis is the AVF. An AVF is created surgically by connecting an artery and a vein, and is usually placed in the arm. As the AVF matures (it takes 4 to 12 weeks to be ready for use), the vein will grow in diameter, and the walls will thicken from the blood flow of the artery. The AVF can provide good blood flow for many years of hemodialysis. Recent studies show that patients with AVFs have the least amount of complications, such as infections or clotting. However, some patients may not be candidates for an AVF due to small or damaged veins or arteries, or other medical conditions. The physician should have this discussion with the patient. The patient should ask for an AVF first.

Arteriovenous Graft

The AVG is similar to an AVF but has a manufactured, synthetic tubing material interposed between an artery and vein. Transplanted animal or human vessels may be used as AVGs as well. The arm is the preferred site for an AVG, but the leg can also be used. Compared to AVFs, AVGs have higher rates of clotting and stenosis.

Caring for a Fistula or Graft

Good AVF or AVG care will help maintain the patency of the vascular access. Measures can be taken to prevent clotting or infection to the access. Patency can be assessed by feeling the "thrill" or vibration of blood through the access, or using a stethoscope to listen to the "bruit" or "whoosh" of blood through the access.

The access should be kept clean and free of injury. The access should be assessed daily for signs of infection, including pain, tenderness, drainage, swelling, and redness to the area. Infections are treated with antibiotics. The access should be cleansed carefully before each dialysis session. The access site needs to be cleansed according to facility protocol to prevent an infection.

The access needs to be protected from injury or restriction to prevent clotting of the access. Patients should be instructed to:

- Avoid tight clothing, jewelry, or pressure on the access area.
- Not carry heavy objects across the access area.
- Avoid lying on the access site when sleeping.
- Not allow venipunctures or insertion of an IV in the access extremity.
- Not allow blood pressure to be taken in the access arm.

Good needle insertion technique keeps the access working well. Arterial and venous needle tips should be at least 2 inches apart. Needles should not be placed near surgical scars. Examine the access to determine the location of previous needle sticks; this prevents damage to the blood supply to the blood vessel wall. Puncture sites should be at least one-quarter inch from previous sites. Some facilities now use the buttonhole technique for access cannulation. This method uses the same site for each hemodialysis session. There is a specialized training program for the patient and healthcare provider before using this method. Direct pressure is applied to needle stick sites after each needle is removed.

ANNA Learning Leading Connecting
American Nephrology Nurses Association

Vascular Access Fact Sheet

Central Venous Catheter

A CVC is a narrow, flexible tube used to access the bloodstream. The CVC may be inserted into a large vein in the neck, chest, back, or groin. Two ports are at each end of the CVC exiting from the insertion site. One port allows blood to be removed from the body, and the other port allows blood to return into the bloodstream. CVCs are ready for immediate use after insertion. There are tunneled and non-tunneled catheters. It is recommended that tunneled, cuffed catheters are placed under fluoroscopy. This will confirm the catheter tip is in the right atrium of the heart. Non-cuffed catheters have a radio-opaque tip that when X-rayed, will show the position of the catheter tip at the junction of the superior vena cava and the right atrium of the heart. There must be documentation that the CVC is in the correct position before initiating hemodialysis. Some patients use permanent CVCs, but this is not the recommended access for long-term dialysis. While CVCs have the advantage of being able to be used immediately after placement, CVCs:

- Have a greater chance of becoming infected or clotted.
- Have a slower blood flow, thus not adequately cleaning the blood.
- Are the least-preferred choice of access for long-term dialysis.
- Are at greater risk for central vein thrombosis or stenosis.
- Cause high risk for sepsis, hemorrhage, or air embolism.

Central Venous Catheter Care

The CVC exit site must be kept clean and dry. The patient will need to keep dressing supplies, such as sterile gauze and tape, or large Band-Aids®, available in case the dressing becomes wet or soiled. The patient will not be able to swim, or take showers or soaking baths. The patient will need to take care when bathing to not get the exit site wet. CVC ports must be clamped at all times when not in use. The ends of the CVC must have caps securely in place after each dialysis session. These measures will help decrease the chance of infection and will prevent air from entering the vascular system. The exit site should be assessed at each dialysis session for signs of infection. The patient and healthcare provider should wear masks every time the CVC is accessed to prevent bacteria from the nose and/or mouth from contaminating the catheter or exit site. Always wash hands and wear clean gloves when caring for a CVC. Blood draws from the CVC should be performed by nephrology nurses only; non-dialysis personnel should not be allowed to access the CVC unless there is a life-threatening condition or training by dialysis staff and competency validation are documented. CVCs should be placed as a bridge access to dialysis while an AVF is maturing or an AVG is healing. Sites preferred for tunneled catheter insertion are the right internal jugular or the right external jugular. Non-tunneled catheters should be used only when the patient is hospitalized. Prior to hospital discharge, a non-tunneled catheter should be replaced with a tunneled, cuffed catheter for patient safety.

Be careful not to pull or tug on the CVC. Scissors or other sharp objects should never be used near the CVC. CVCs may be positional, which means the patient may need to change position to get a better blood flow rate. If the CVC becomes dislodged or gets pulled out, or bleeding occurs at the site, direct pressure should be applied to the site continuously for 20 minutes. If bleeding has not stopped, seek appropriate medical attention.

In addition to care of the vascular access, the registered nurse needs to collaborate with the nephrologist and/or other members of the healthcare team to formulate a vascular access team (advanced practice registered nurse [APRN], nephrologist, vascular surgeon, registered nurse, dialysis technician) to assist in evaluating the vascular access for optimal dialysis access.

In addition, the APRN needs to do the following:

- Monitor the patient's access by reviewing:
  - Dialysis laboratory values.
  - Dialysis adequacy.
  - Venous and arterial pressures.
  - Transonic flow rates or access flow rates.
  - Assessing vascular access complications (ischemia, infection, bleeding, thrombosis, inadequate flows, and aneurysm).
  - The need for further use of catheter access.
- Educate the patient about "saving the vein" or vein preservation for future access creation.
- Order diagnostic tests (fistulogram, duplex vascular scan of access) or laboratory values as appropriate. Consult the physician as warranted based on results.
- Have a plan of action for future dialysis access if the current access begins to fail or fails.

Resources

Centers for Disease Control and Prevention. (2011). *Guidelines for the prevention of intravascular catheter-related infections.* Retrieved from https://www.cdc.gov/infectioncontrol/pdf/guidelines/bsi-guidelines.pdf

Alleman, K., & Houle, K. (Eds.). (2015). *Core curriculum for nephrology nursing - Module 6: The APRN's approaches to care in nephrology.* In C. Counts (Ed.), *Core curriculum for nephrology nursing* (6th ed., pp. 1-212). Pitman, NJ: American Nephrology Nurse's Association.

Gilliland, M., Brown, J.S., & Pryor, L. (2017). Nursing care for patients with synthetic arteriovenous grafts. *Nephrology Nursing Journal*, *44*(5), 391-398.

National Kidney Foundation (NKF). (2012). *A clinical update on an alternative vascular access for the catheter-dependent hemodialysis patient*. Retrieved form http://www.kidney.org/sites/default/files/12-10-4487_KBB_ClinicalUpdateOnAlternateiveVA.pdf

NKF. (2017). *Hemodialysis catheters. How to keep yours working well.* Retrieved from https://www.kidney.org/atoz/content/hemocatheter

ANNA Mission Statement

ANNA improves members' lives through education, advocacy, networking, and science.

Additional Information:

American Nephrology Nurses Association
East Holly Avenue/Box 56
Pitman, NJ 08071-0056
(856) 256-2320
1(888) 600-2662

Copyright© 2018
American Nephrology Nurses Association
Pitman, NJ

This fact sheet may be photocopied for education purposes.