

Navigating the Vascular “SEAS”

Self Exam of Access ~ Simplified



A patient guide to assessing the dialysis vascular access produced as a collaboration between Kimberly F. Thompson, R.N., B.S.N., C.N.N. Patient Services Coordinator of ESRD Network #12, Scott O. Trerotola, M.D., F.S.I.R., F.A.C.R., Interventional Radiology, University of Pennsylvania Medical Center, & Gerald A. Beathard, M.D., PhD, F.A.C.P., F.C.A.P., Interventional Nephrology, University of Texas.

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GERALD A. BEATHARD, MD, PHD, FACP, FASN has been an interventional nephrologist since the early 1980s. He began his practice of clinical nephrology in 1968, first at the University of Texas medical Branch in Galveston, Texas, and then in private practice in Austin, Texas. He is currently the medical director of RMS Lifeline, a company that develops out-patient interventional suits for the management of dialysis vascular access problems. He has published extensively in the field of vascular access. Dr. Beathard was one of the original members of the National Kidney Foundation's Dialysis Outcomes Quality Initiative (NKF-K/DOQI) Vascular Access Workgroup.

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SARAH YELTON, RN, CNN has been the Quality Improvement Director of ESRD Network #12 since 1997. Her nephrology career began in 1982 and she has practiced many years at the bedside in all modalities of renal replacement therapy. She provides clinical quality management and oversight activities related to quality outcomes for more than 260 dialysis and transplant facilities located in Missouri, Iowa, Kansas, and Nebraska. She directs the Quality Improvement Department and is responsible for the development and oversight of quality improvement initiatives. Recent initiatives have included, Decreasing Vascular Access Infection; Vascular Access Stenosis Monitoring; and Promoting Dialysis Patient Safety In the current initiative: National Vascular Access Improvement Initiative also known as the "Fistula First" project she holds the position of Liaison-Elect for the National Beneficiary Education Task Force. She assists in coordinating collaborative activities between the Network and other quality improvement agencies. She enjoys being a resource to dialysis personnel and acts as a mentor to new quality improvement personnel in other ESRD Networks. Ms. Yelton is a registered nurse and is certified in nephrology nursing. She is a member of the American Nephrology Nurses' Association and the Vascular Access Society of the Americas.



CATHY LONG, BA, RHIT has been the Quality Improvement Specialist at ESRD Network #12 since 1998. She has extensive quality improvement experience in both acute and outpatient settings. At ESRD Network #12 she assists the QI Director in the development and oversight of quality improvement initiatives and activities for more than 260 dialysis and transplant facilities located in Missouri, Iowa, Kansas, and Nebraska. Recent quality improvement initiatives have included, Decreasing Vascular Access Infection; Vascular Access Stenosis Monitoring; Promoting Dialysis Patient Safety; and the National Vascular Access Improvement Initiative also known as the "Fistula First" project. She assists in coordinating collaborative activities between the Network and state survey agency personnel in each of the four states. She enjoys being a resource to dialysis personnel and researching difficult situations in nephrology. Ms. Long is a Registered Health Information Technician and a member of both the American Health Information Management Association and the Kansas Health Information Management Association.

Self Exam of Accesses - Simplified

Patients suffer more hospitalizations from access problems than any other difficulty. Your dialysis access is often called your “life-line” because without it, dialysis is not possible. Vascular, (pronounced vas-cue-lur), relates to your blood vessels (arteries and veins*). You may hear the medical staff call your access a “vascular access”. Through your fistula, graft, or catheter, the dialysis staff have “access” to your blood and can perform dialysis treatment, hence the term “vascular access”.

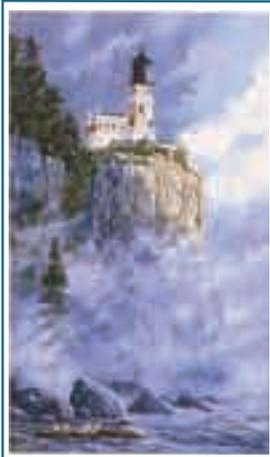
ANCHOR POINT



*Arteries, (pronounced are-ter-ee) carry blood away from the heart after it has received oxygen from the lungs. Veins, carry blood back to the heart after the oxygen has been used by the body's cells.

The purpose of this booklet is to inform you about what you can do to increase the time your life-line works and decrease the chances of having problems, which could lead to a hospitalization. The second purpose is to encourage you to examine your access through the information contained in this booklet. Learning to examine your access can help recognize problems and allow for early intervention by the surgeons, doctors, and renal treatment team.

The most important thing to remember is that you are a member of the treatment team, and you have a choice in the dialysis access that will be used for your treatment.



ENLIGHTENING

*Nephrologists are internal medicine doctors with specialized training in the care and treatment of the kidneys.

*Interventional Nephrologists are physicians who are trained in nephrology and in performing interventional procedures on dialysis vascular accesses.

There are three types of dialysis life-lines used. The preferred life-line is a fistula, pronounced (fis-chew-la), next is a graft, and least desired is a catheter. You may sometimes hear your access also called an arteriovenous fistula (AVF), or an arteriovenous graft (AVG). Arteriovenous, (pronounced are-tear-ee-oh vee-nus), refers to the connection of your artery and vein in your access. The surgeon, interventional radiologist, (pronounced in-ter-ven-shun-ul ray-dee-ah-low-gist*), interventional nephrologist, (pronounced in-ter-ven-shun-ul nef-raw-low-gist*) or nephrologist, (pronounced nef-raw-low-gist*) will discuss with you the best type of dialysis access for you.

ANCHOR POINT



*Interventional radiologists are doctors who specialize in performing procedures that are less invasive than typical surgery. They use images as a guide. They have fewer risks and less pain associated with their procedures.

Internal Access Types

There are major differences between the 3 types of access. The first difference is whether the access is internal or external. Grafts and fistulae are internal accesses, while a catheter is external. Internal accesses are made by the surgeon and lie below your skin. The access is usually in your lower or upper arm, but sometimes it may be located in your thigh or chest area. If a graft is located in the chest area, staff may call it a “necklace” graft because it lies similar to a necklace. Needles are placed in the access to take blood to the dialysis machine and return it to your body. An internal access provides better dialysis because a higher flow of blood can be achieved and they are less prone to infections.

Although grafts and fistulae are internal accesses, there are major differences between them that will be discussed further, later in this booklet.

The preferred type of dialysis access is internal because it is less likely to become infected or clot, however, they (both fistulas and grafts) need time to mature. Grafts are useable typically within a month, and fistulas may require as much as six months. A catheter can be used immediately, but is more likely to get infected or clot. Regardless of the type of access, there are benefits and drawbacks to each.



Healed Fistula



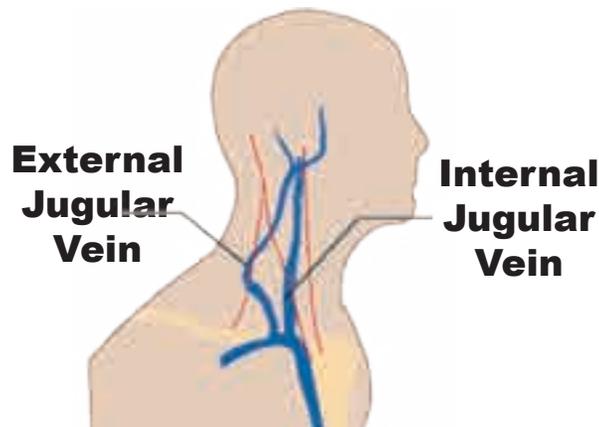
Healed Graft

A fistula by far is the best type of access because it lasts longer - some longer than 20 years, is less likely to become infected - resulting in fewer hospitalizations, and has a lesser chance of clotting. A fistula is made from your own vein and so it is compatible with your body.

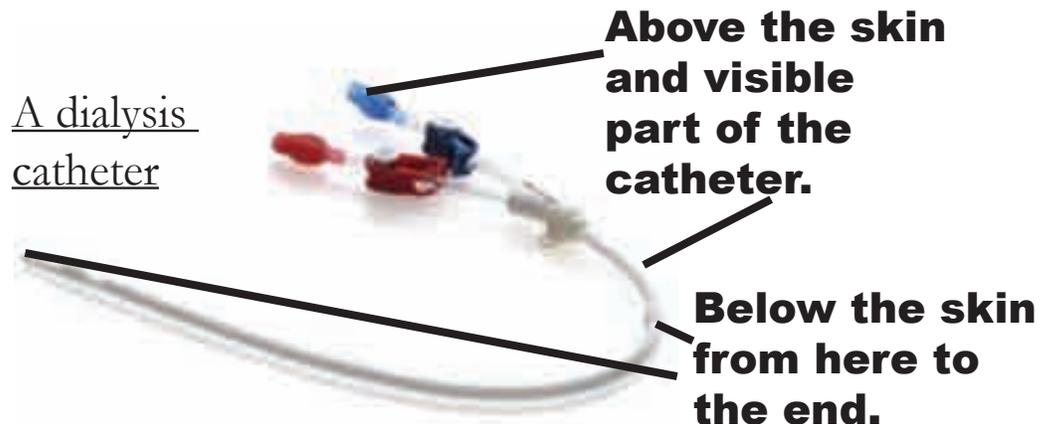
A graft is a synthetic tube that connects your vein to an artery through a surgical procedure. It is compatible with your body, however, patients with grafts have more difficulty with clotting and a higher chance of infection, all of which can lead to hospitalization.

External Access Types

The second type of access category is external accesses. These are catheters that are placed into a large vein, usually in your neck. Catheters have different names depending on which large vein the catheter is placed in - either IJ or EJ. IJ is your internal jugular, whereas EJ is the external jugular. The “external” and “internal” is associated with their location inside your body. Please do not confuse this with the “external” and “internal” types of dialysis accesses. These catheters are sometimes referred to as “tunneled” catheters because they are tunneled under your skin from your neck down to your chest. Staff may also call them “perm-caths” because they are designed to be long lasting.



Catheters are external accesses because the catheter lines extend outside the body. The lines or “lumens” as some medical staff may call them are connected to the dialysis tubing for your treatment. One line takes blood away from your body; the other brings blood back to you after it has been cleaned by the artificial kidney in a continuous cycle.



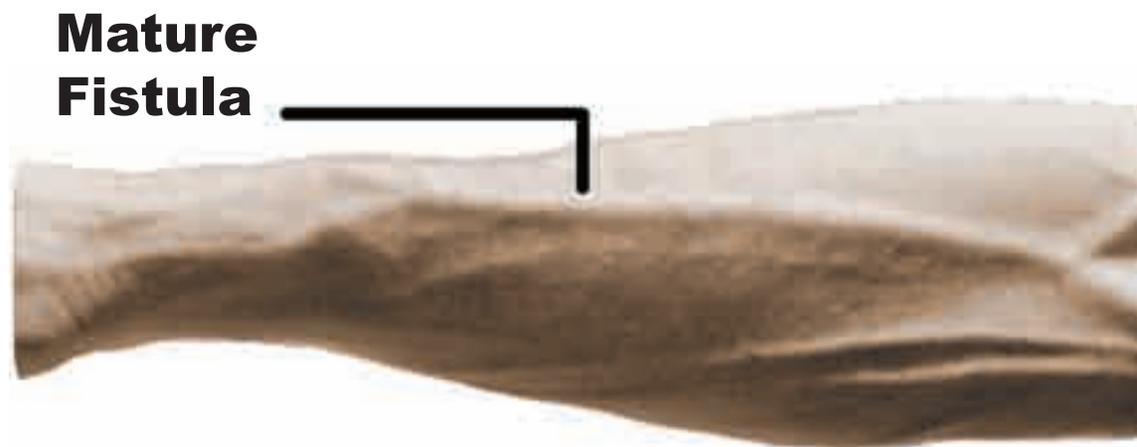
For more information on specific types of accesses, please see ESRD Network #12's newsletter “Maintaining Your Lifeline” at:

http://www.network12.org/pat_newsletter/maintaining_your_lifeline.PDF

Below the Surface - Internal Access Types

A fistula (also called “native fistula”, “AV fistula”, “arteriovenous fistula” or “AVF”) is created by a surgeon using a good quality vein and artery. The surgeon connects the artery and vein together. The point where the connection is made is called an anastomosis, (pronounced ah-nas-tah-mow-sis). Some of the blood from your artery flows through the anastomosis and into the vein used to create your fistula. The blood flowing through your artery and into the fistula is faster than the blood flow that the vein typically receives. The higher blood flow causes the vein to get bigger and the walls to toughen or “thicken”. The thickening of the walls and the larger size of the vein is called “maturing”. Your fistula must mature before the dialysis needles can be used for your treatment. Once mature, the fistula will be able to provide enough blood flow for a successful dialysis treatment. It usually takes 3 months for a fistula to mature, however, some may take longer.

The picture below is the right arm with a well developed or “mature” fistula. Surgeons usually want to place your internal access in your non-dominant arm. Typically, the hand you sign your name with is your dominant arm, so if you are right-handed, then your internal access would be placed in your left arm. This allows your dominant arm to be free during dialysis. In the picture below then, we could assume this patient is left-handed.



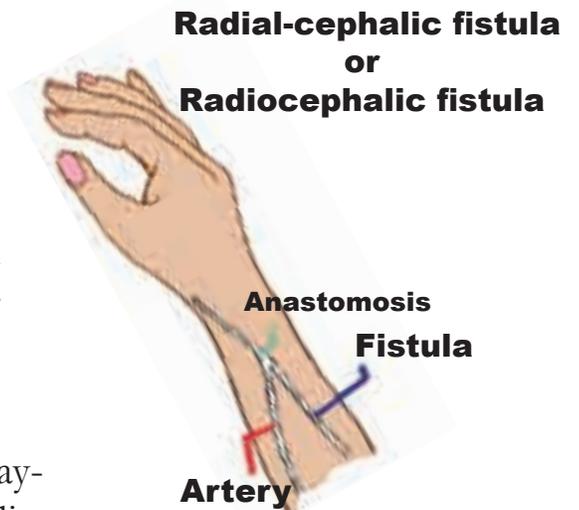
This fistula was placed in the patient’s forearm.

Below the Surface Continued - Fistula

Common places for a surgeon to create your fistula are:

Forearm

Called a radial-cephalic fistula, (pronounced ray-dee-ul seh-fal-ick) or also called radiocephalic, (pronounced ray-dee-oh-seh-fal-ick) and is created using an artery at your wrist (the radial artery) and a vein (the cephalic vein) from your forearm.

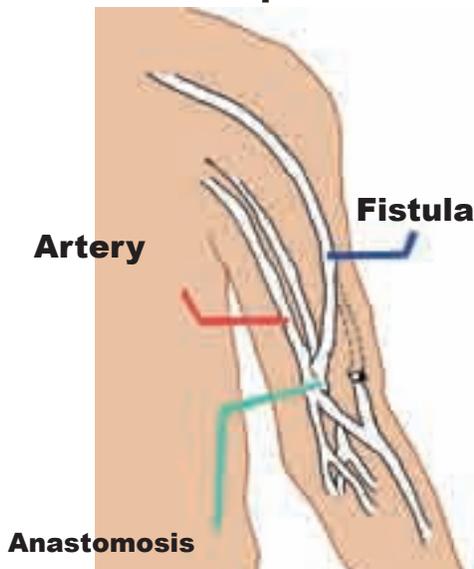


Upper Arm - 2 types

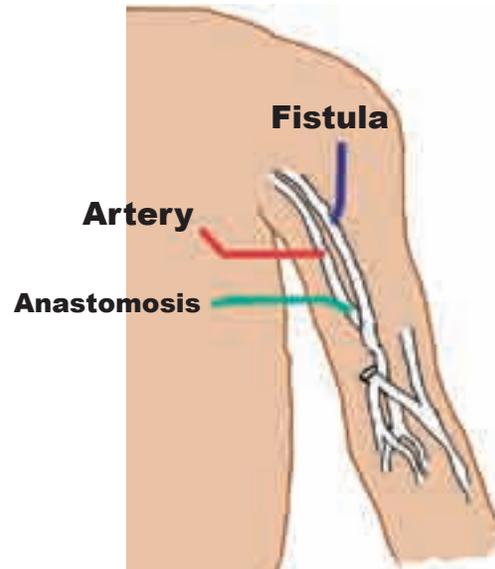
One is a brachial-cephalic fistula, (pronounced bray-key-ul seh-fal-ick) or also called brachiocephalic, (pronounced bray-key-oh-seh-fal-ick) and is created using an artery at your elbow (the brachial artery) and the cephalic vein. The cephalic vein starts at your wrist and goes all the way to your shoulder. It is usually a large vein and works well for fistulas.

The second type of upper arm fistula is a brachial-basilic fistula, (pronounced bray-key-ul ba-sill-ick) or also called brachiobasilic, (pronounced bray-key-oh-ba-sill-ick) and is created using the brachial artery at your elbow and your basilic vein. The basilic vein is located on the inside of your upper arm, whereas the cephalic vein is on the outside of your arm.

Brachial-cephalic fistula or Brachiocephalic fistula



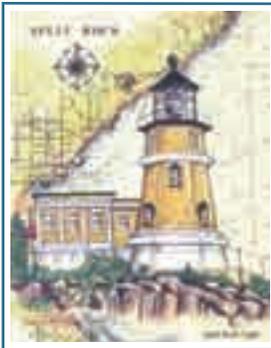
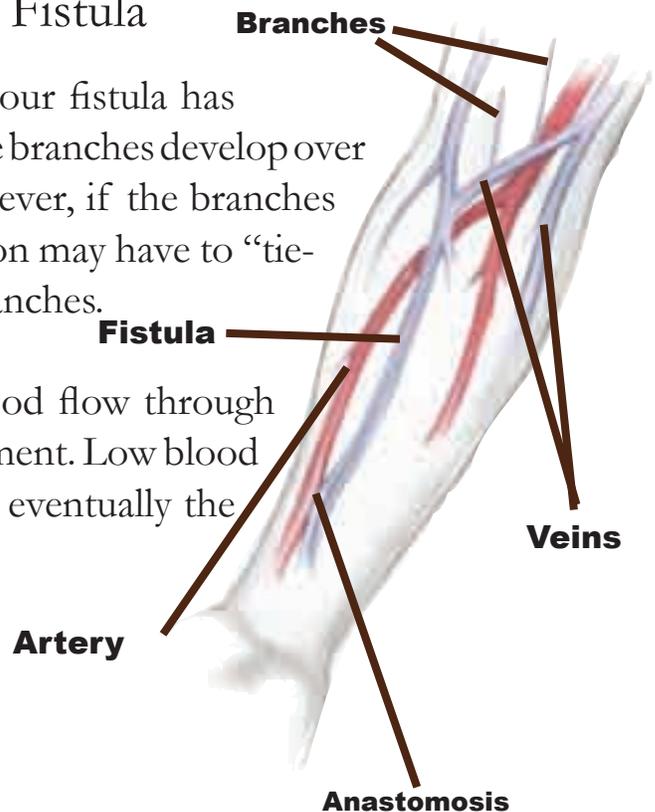
Brachial-basilic fistula or Brachiobasilic fistula



Below the Surface Continued - Fistula

Sometimes the vein that is used to create your fistula has branches, similar to a tree with branches. If the branches develop over time, they can also be used for dialysis, however, if the branches prevent the fistula from maturing, the surgeon may have to “tie-off” or ligate, pronounced (lie-gate), the branches.

Ideally, the artery will provide adequate blood flow through your access and its branches for dialysis treatment. Low blood flows can cause poor dialysis treatment and eventually the fistula will fail to work.

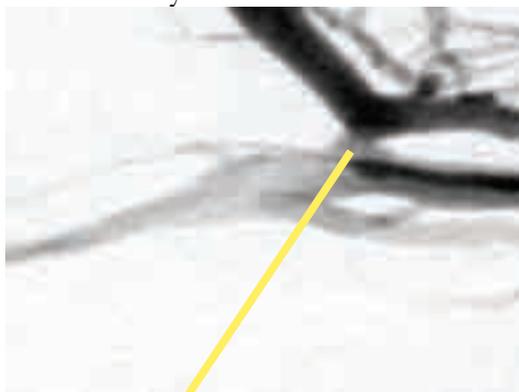


ENLIGHTENING

To prevent aneurysms from developing a technique called the “buttonhole” is being used.

The artery used to create your fistula is NEVER stuck with the dialysis needles, or as some medical staff say, “cannulated”, (pronounced can-you-late-ed). Usually 2 needles are used for dialysis, both in the vein or the branches of your fistula. You may hear the medical staff call one needle “arterial” and the other “venous”, this designates which needle is taking blood to the dialysis machine, (arterial) and which is bringing blood back to you, (venous) similar to the arteries in your body taking blood away from your heart and the veins bringing it back to the heart.

The use of your own blood vessels to create a fistula should always be the first choice for dialysis access. However, if your vessels are not in good condition, lie too deep, or are too crooked or too small a graft may be necessary.



Anastomosis Site

The picture to the left shows the anastomosis site internally.

ANCHOR POINT

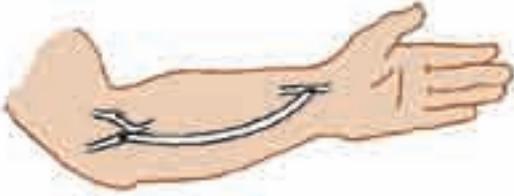


Stick Yourself?

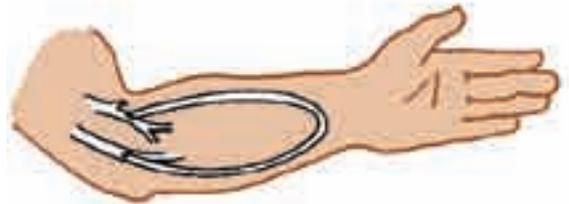
Yes, many patients put in their own needles. This allows you to have some control in your treatment and because you check your access daily, you know it better than anyone else!

Below the Surface - Grafts

Forearm Straight Graft

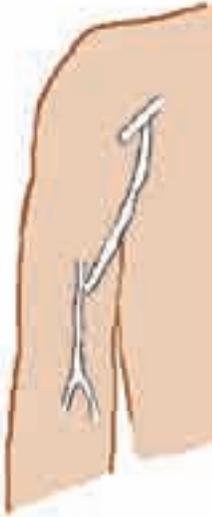


Grafts are the second choice in dialysis accesses. Usually when a patient's veins are not good enough for a fistula, a graft is created. A synthetic tube or artificial blood vessel is used as a substitute for your vein. Grafts may also be referred to by the renal treatment team as AVG's, or arteriovenous grafts. The blood flows from the artery, through the graft, then through your vein. Because the graft material is used, there are 2 anastomosis sites instead of the one in a fistula. One is between the artery and the graft, called the arterial anastomosis, the other is between the graft and the vein, called the venous anastomosis. Blood flows from your artery through the arterial anastomosis, through the graft, through the venous anastomosis, and finally through the vein. Needles are inserted into the graft for dialysis, and just like in



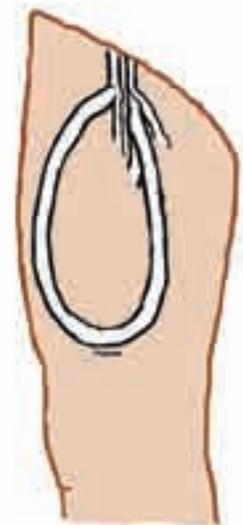
Forearm Looped Graft

a fistula, one needle is called arterial, the other needle is called venous. The arterial side and needle relate to where the artery attaches to the graft and the venous side and needle relate to the vein. When your dialysis staff put needles in your graft, they should stay 2 finger-widths away from the anastomosis sites to prevent the needle tip from damaging the anastomosis site.



Axillary Straight Graft

The most common place for a graft is in the forearm or upper arm; however this is not the case with every patient. If a patient has had other non-functioning grafts in their arms, the surgeon may have to place the graft in the patient's thigh, or even chest, called a "necklace" graft or an "axilloaxillary", (pronounced ax-ill-oh-ax-ill-airy) graft.

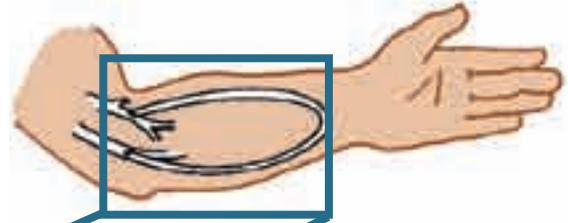


Thigh Looped Graft

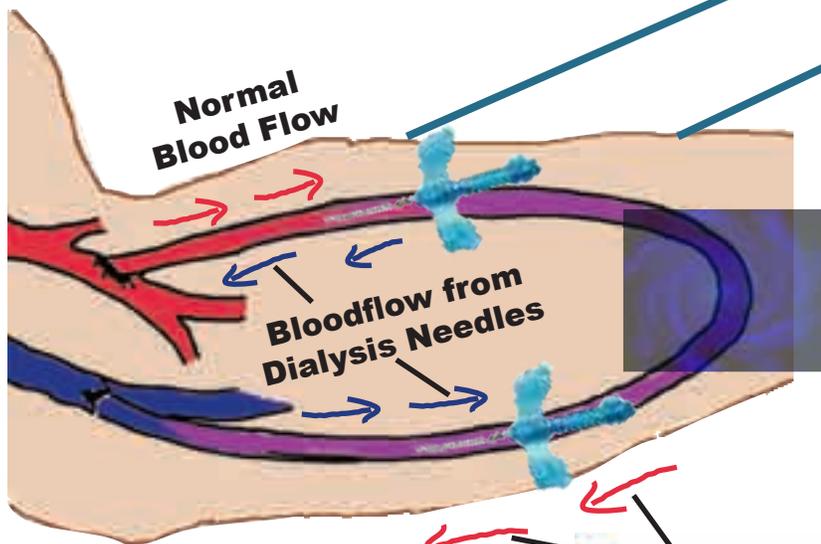
Below are the common locations for a graft. Grafts can be straight or "looped" (a horseshoe shape).

Below the Surface - Grafts Continued

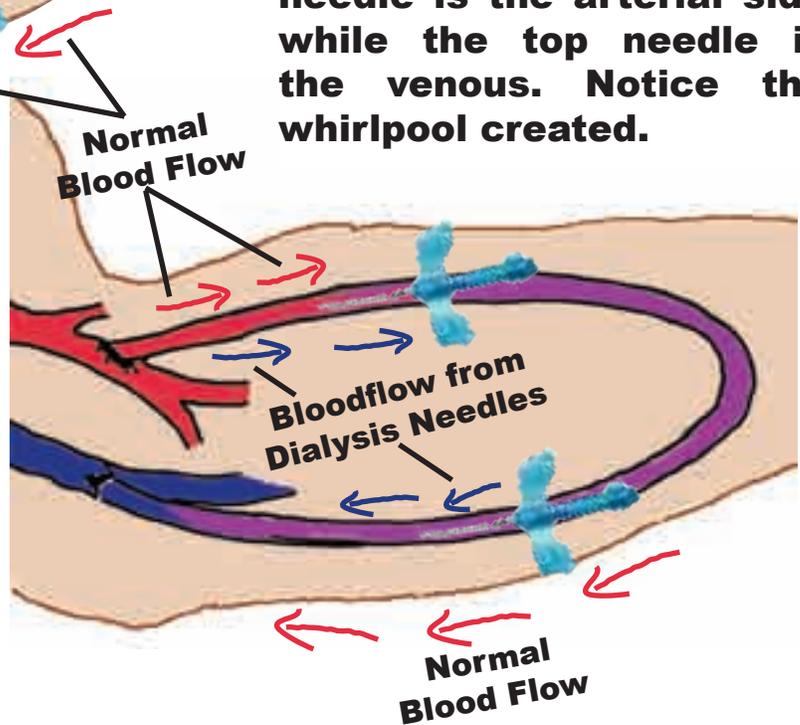
An important thing to remember if you have a graft for dialysis is which side is the arterial side and which is the venous side. Surgeons usually have a standard way of creating your graft, however, some patients' veins and arteries are different and the graft is reversed. If the dialysis staff is unsure which side is arterial and which is venous and the tubing is reversed when you are hooked to the dialysis machine, or if the needles are pointed towards each other, a whirlpool effect called "recirculation" occurs. This can lead to inadequate dialysis.



Due to the blood from the needles going against the blood from the body, a whirlpool of blood is created. The top needle is taking blood to the dialysis machine and the bottom needle is returning the blood to the patient. Unfortunately, the bottom needle is the arterial side while the top needle is the venous. Notice the whirlpool created.



Notice the blood from the body and the needles are flowing in the same direction. This eliminates recirculation. Some facilities will have the arterial needle positioned differently than is pictured, this is fine as long as venous remains venous and arterial remains arterial. Recirculation occurs when venous and arterial are reversed.

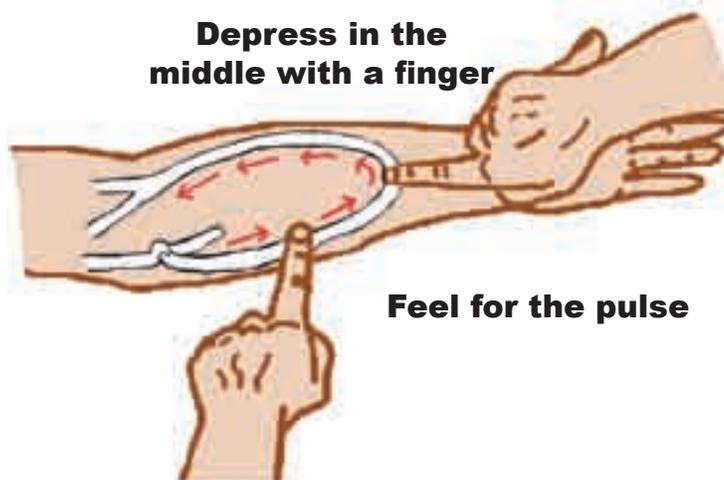


Below the Surface - Grafts Continued

Fortunately, there are a few simple ways that you can assist your staff in understanding which side is arterial and which is venous.

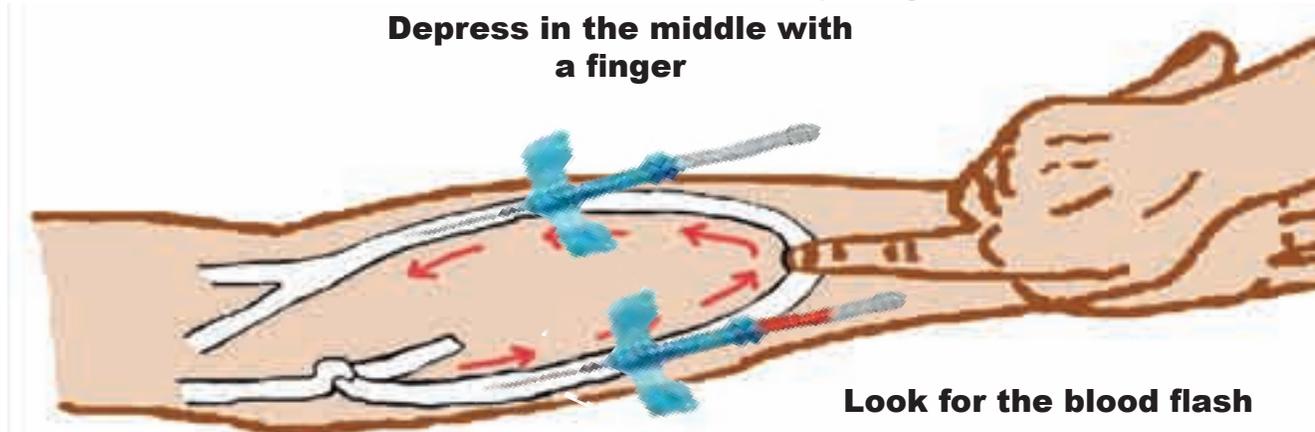
You can do the first way yourself, away from the dialysis unit, and it requires no special equipment. To check your access, ask a friend or a family member to firmly press on your graft in the center of the “U” shape or in the middle if you have a straight graft. Use a finger from your free hand to feel each side of your graft. The side that pulses the strongest is the arterial side. Don't be alarmed if you notice that the venous side barely pulses, just remember you don't want to do this for any length of time as you are slowing the blood flow through the access. See the diagram below:

Some dialysis nurses may ask if your thumb is “blue” or “red”. A blue thumb means the venous side of your graft is along side your thumb, a red thumb means your artery is along side your thumb.



This patient has a blue thumb. Can you tell by the arrows pointing in the direction of the blood flow?

Another way that the dialysis staff can determine the arterial and venous sides is using the same technique as above with a few minor changes. When preparing for dialysis, you or your nurse can put your dialysis needles into your access. Once taped and secure, lightly depress in the middle of your access as instructed above. Blood will flash with your heart beat on your arterial side and the blood will disappear from the needle on the venous side. This is an easy no-fail method your staff may use to tell the difference between arterial and venous sides of your graft. See the illustration:



Complications - Recognize the Signs

Complications can occur in grafts or fistulas, however they usually occur more often in grafts. Early recognition of a problem is very important. If problems are seen early, serious difficulties may be avoided. **YOU** are the best person to recognize the changes in your access. There are a few things you will need to know and learn in order to tell the dialysis staff and your physician if there may be a problem. The following information will help you learn what to look for when feeling and examining your access.

There are 4 main types of complications and multiple minor ones that can affect your access. This information will focus on the major complications of infection, stenosis, (pronounced sten-oh-sis), which is a narrowing of your access and can lead to thrombosis, (pronounced throm-bo-sis), or clotting, and finally, the development of an aneurysm, (pronounced an-yer-is-mm) and/or pseudoaneurysm, (pronounced sue-dough-an-yer-is-mm), which is a bulge in your access.

To examine your access and recognize if a problem is starting, you will need to do 4 things; look at the skin that covers your access to tell if it looks normal, look to see if you are developing a bulge anywhere along your access and feel the pulse and the thrill of your access.

1. Examine the skin



Feeling for the pulse and thrill require some practice, but the practice will make it easier as the days go by.

2. Look for a bulge



The first 2 steps are easy. The skin should not be shiny, feel warmer than your other skin, be red, or have any drainage.

3. Feel the pulse



4. Feel the thrill



Feeling Pulse and Thrill

The 2 things you may feel when you place your hand **SOFTLY** on your access are the thrill or the pulse. It is important that you do not confuse these. The thrill, (**which is NORMAL**) is a vibration or “buzzing” that can be felt throughout the fistula or graft as blood flows through it. The buzzing is similar to the hum made by the purring of a cat. At some points in your access, a slight beating may be felt. This is called a pulse. This is **NORMAL** *IF* the thrill is the main feeling. *A pulse that is stronger than the thrill is ABNORMAL - (not normal).* *An access that only has a pulse present is ABNORMAL - (not normal).* A pulse may be compared to a beating heart.

Feeling the Pulse



Feel the anastomosis site lightly for the pulse.



Move up the fistula feeling for changes in the pulse.



Continue to move up the fistula to the venous end.

Everyone’s access feels different. The thrill (**which is GOOD**) may little by little give way to a pulse - (**which is generally BAD**) over time. When you check your access every day, you can tell if a change has happened and inform your staff. Remember, early intervention is key. If a problem in your access develops, especially stenosis, changes occur.

Any changes in the pulse or thrill reflect a change in blood flow through the access.

If the “thrill is gone” and “no pulse is present”, the access may have no blood flowing through it and has become clotted.



With your palm, feel the anastomosis site.

Changes in the pulse or thrill can be found by doing this daily and may help save your access.



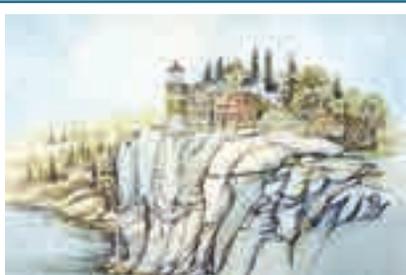
Move your palm to the venous end feeling for the thrill.

A normal access is soft and can be pressed down easily. The thrill is a gentle buzz. Place your hand **SOFTLY** when feeling for the pulse and thrill. The best way to feel for the thrill is with your palm, especially the part of your palm closest to your fingers. A pulse is best felt with your fingertips. Make sure you examine the **WHOLE** access and the rest of your arm as well.

Especially for fistulas, make sure you examine the area closest to the anastomosis, (where the scar is) for a pulse. Stenosis (narrowing) often occurs very close to the anastomosis and the thrill downstream from this stenosis may be mistakenly interpreted as a good sign, when in fact it is a sign of a problem. Pressing hard can create an abnormal blood flow and cause the pulse and thrill to feel abnormal as well.

STEP 1. SKIN -

Look at the skin over your fistula first. There should be no redness, swelling, pain, or drainage. Next, lightly feel your access. It should not feel warm, swollen or painful.

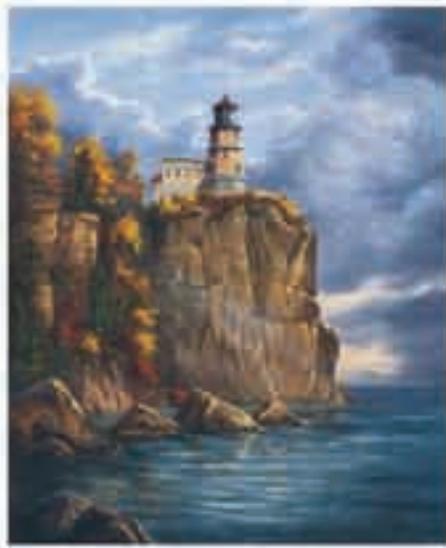


ENLIGHTENING
A strong pounding is a sign of a problem.

STEP 3. PULSE -

Lightly use your fingertips and feel your entire fistula. A faint beating may or may not be felt. A strong beating is the sign of a problem. Pay special attention to the where your vein and artery join - this is the most common place for problems.

STEP 2. BULGE - Look for bulges in your fistula. Bulges are sometimes seen when the dialysis needles are put in the same area every time. Bulges should not have shiny skin, ooze blood, or have skin that “peels” and does not heal. Bulges may need surgery.



ENLIGHTENING
A change in thrill, or no thrill is a problem.

STEP 4. THRILL -

Lightly use your fingers and feel your entire access, paying special attention to areas where the thrill is strong or weak. The thrill should feel like the purring of a cat.

Inspect the Skin - Daily

A break in your skin can allow germs (bacteria) that are normally on your skin to enter into your tissues or even your bloodstream. These bacteria are harmless when they stay on your skin's surface, but they can cause very serious problems if they enter your body. You could lose your dialysis access or even worse, develop a life-threatening infection if this occurs.

Inspect the skin over and around your access every day. The Band-Aids®, or other dressings that covered your old needle sites can usually be removed within 24 hours of your treatment. After removing the dressings, leave the sites uncovered. Any previous needle site should be healing well and scabs are part of the normal healing process. **DO NOT** pick the scabs. There are bacteria under your fingernails and this can cause it to get into your bloodstream or access and cause an infection. Scabs are **NORMAL** and will fall off when the needle site is healed. Other than the needle sites, your skin should be clean, have no rashes, scratches or drainage (pus).

Appearance of Skin Over Access

**Needle sites should
be healing - DO NOT
pick the scabs!**

Skin should be clean

No breaks in skin



Early Signs of Infection

Include draining, swelling, pain and tenderness, redness and warmth. If you notice any of these, notify your doctor or dialysis staff immediately.

Signs & Symptoms of Infection



Drainage can mean the beginning of an infection. If there is any drainage that looks like pus, or if there is bleeding, call your doctor immediately. Bleeding from an old needle site does not mean it's infected, but it does mean there is a break in your skin and bacteria could now enter and cause an infection. It is normal to see slight / scant blood on

the dressing, if more blood is seen than several drops, or if your arm is oozing, notify your doctor or dialysis nurse.

The picture above shows an infected access with ulcers.

Swelling is sometimes present after a new access is created. This is typical with surgery and should disappear over time. You can help decrease the swelling by propping your arm up above the level of your heart. For example, if you are sitting, imagine a line circling your body at the level of your heart. Your arm should be propped above this imaginary line. Elevating your arm helps with a body process called “venous return”, or the return of blood back to your heart. Swelling that continues or occurs later may be a sign there is a problem that your dialysis staff or doctor may need to investigate.

Swelling can be local - confined to one small area, or general- meaning your entire arm. Generalized swelling in your arm is usually a sign that there may be a problem with one of the large veins in your chest. Local swelling can be an early sign of an infection or of narrowing (stenosis) in your access. Either type of swelling should be discussed with the dialysis staff and your physician.

Pain and tenderness are common when a new access is placed, however they usually fade in a few days. Pain that lasts longer, or appears when there was none before suggests a problem. If the pain and tenderness are on one area of your access and there is some swelling or other signs of infection, notify your doctor or dialysis unit.



Inspect the Skin - Daily

Redness of your skin over your access indicates a problem. If you have a dark complexion or if you are a person of color, it may be a little harder to recognize early redness. It will be important for you to feel for warmth and heat if you notice swelling and pain. You may also notice that the color of your skin over your access becomes lighter after your access has been used a long time, this is normal and shouldn't cause alarm. If redness does occur, notify your dialysis staff or your physician.



It is normal for the skin over your access to feel slightly warmer because of the additional blood flowing through your access; however it should not feel hot. Heat can indicate that an infection has started. Notify your doctor or dialysis staff if you notice your access is hot.

In most patients, a single sign or symptom usually doesn't mean infection. Infections bring a combination of changes, such as a swollen, tender, red area on your access, or heat, drainage, and pus.

An early infection can look like a pimple on your access from an old needle stick. If you notice this on your access, notify your dialysis staff or your doctor. Early treatment can prevent this from becoming something dangerous to your health. **DO NOT** squeeze the "pimple" as this could spread the bacteria inside it.



Aneurysms & Pseudoaneurysms

Over time, a fistula may develop an aneurysm, (pronounced an-your-is-mmm). An aneurysm occurs when the fistula wall becomes weak. The weak wall may begin to bulge out over time. Usually aneurysms occur as a result of placing the dialysis needles in the same central location over and over again. Aneurysms only occur in real vessels. Placing the needles in the same area is not the same as the “buttonhole” technique.

If your graft is stuck in the same place repetitively, a hole can be created in the wall of the synthetic material, eventually causing a bulge. The bulge or ballooning in a graft is not called an aneurysm. Because the graft is synthetic material, the bulge is called a “pseudoaneurysm” (pronounced sue-do-an-your-is-mmm) - meaning “not a real aneurysm”. Pseudoaneurysms have the characteristics of a real aneurysm and are usually caused by the dialysis needle being placed in the same site over and over. This is also referred to in the dialysis community as “one-site-itis”. Pseudoaneurysms can be avoided by rotating your needle sites. The next page discusses graft degeneration further. The pictures below represent aneurysms and pseudoaneurysms.



Aneurysms and pseudoaneurysms should be examined everyday and concerns be discussed with the dialysis staff and physician. If you notice changes such as bright shiny skin over it, if it seems to be oozing blood, forming a sore, or it increases in size rapidly over a couple of days, call your doctor’s office IMMEDIATELY.



If your staff are using the buttonhole technique for dialysis, they are developing a “tunnel” for the needle to go into every treatment. Once the tunnel is created the staff use the same spot over and over leaving the surrounding skin and vessel intact. The “buttonhole” technique is encouraged



because it helps prevent the formation of aneurysms in fistulas and decreases the pain associated with the needles.

Graft Degeneration & Fistula Buttonhole Technique

Placing the needles in the same areas over and over again cause the wall of the fistula or graft to weaken. The wall is still there, but weak, hence the bulging. This is different than the buttonhole technique used for fistulas. Look at the picture of the inner tube. The inner tube has a weak spot which is bulging out, while the tube itself remains intact. This represents your access. What concerns would you have if you



wanted to take this tube to the pool or river? Eventually, the access will no longer function properly and have to be replaced. The pictures below show graft degeneration in a graft in a patient. The second picture shows the graft material after it was removed from another patient with graft degeneration from “one-site-itis”.



Photograph provided by courtesy and utilized with express written permission from WL Gore & Associates. Any use without their consent is prohibited.

Fistula Buttonhole Technique

Another way of putting your needles in your fistula is the “buttonhole” technique. The needles are put into the exact same spot each dialysis treatment. This is different from “one-site-itis”, in that needles are in the same general area versus the same spot. Placing needles in the same exact spot every treatment form a “track”. Because the track is like a tunnel going from the surface of your arm to the surface of your fistula, there is no pain with needle placement. When the track is established, blunt or non-pointed needles are used so no damage is done to the track. There is no chance of sticking yourself with blunt needles and many patients have chosen to put in their own needles.

ANCHOR POINT



What is a Track?

A track is like a small tunnel through your skin. If you have pierced ears, the hole is a track. Developing the track takes some time, but it is well worth the effort!



Infiltration

Blood that leaks out of your access from a “bad” needlestick or a poorly developed fistula is called an “infiltration”, pronounced (in-fill-tray-shun). If the dialysis needle punctures the wall of the fistula or graft after it was inserted, blood can leak into your surrounding tissues, leaving a bruise. The size of the bruise will depend on how long the bleeding occurred and the amount of blood that goes into the tissue. Due to the fast pump speeds used in dialysis (400 - 500 ml/min*) the bruise could be quite large and occur quickly. Unfortunately, infiltrations happen and even the most experienced and caring staff members have infiltrated an access. This does not necessarily reflect on their skills and patients are always encouraged to self-cannulate. If your access is infiltrated, you will feel pain, stinging and notice swelling. The next day it will look like a bad bruise and be painful. If the infiltration is severe, you may need to have a catheter temporarily to give your access time to heal. Apply ice packs to your access for the first day and then alternate with cold and heat packs over the next several days. Before taking any pain medicine, check with your doctor or dialysis staff. Some pain medicine can make the bleeding and bruising from an infiltration worse. Below is a picture of an infiltration.



ANCHOR POINT



***What is a ml/min?**

ml/min stands for how many milliliters are processed per minute. This is used for blood flows and dialysate flows during treatment. One cup of fluid is 240 milliliters.



ENLIGHTENING

*A pop can contains 355 milliliters of soda. The blood pump moves at least this amount of blood every minute!

Stenosis

Stenosis is the term that describes a narrowing that may occur in your access or veins connected to the access. What happens with stenosis is very much like what happens when you pinch a garden hose. The pinching (or stenosis) causes the FLOW of water (or blood) to decrease through the hose (or access). It also causes the PRESSURE in the part of the hose (or vessel) between where you are pinching and the faucet (the artery) to increase. Stenosis generally gets worse with time and can lead to clotting. It can also lead to access failure and eventual access loss. The arrow below shows the point of narrowing - or stenosis.

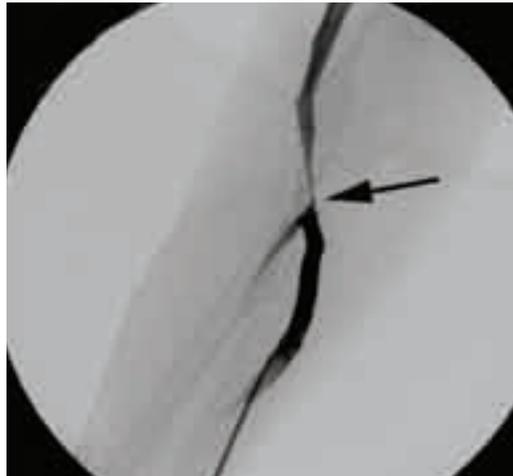


The vessel(s) of your dialysis access may develop stenosis over time as their opening becomes narrowed. The narrowing occurs because the inside wall or inner lining is thickening. This thickening is a type of scarring. Although the process is complicated, it occurs because veins are not designed to handle the high blood pressure and high blood flows created when a dialysis access is placed. As a result, venous stenosis develops. Graft stenosis and fistula stenosis are different. Stenosis is more common in grafts, but can occur in fistula as well. The pictures below show a normal access and what occurs inside your access when venous stenosis begins as narrowing until eventual clotting.



Graft Stenosis

Stenosis in your graft usually occurs where the graft material is attached to your vein - the venous anastomosis site; however, it can occur anywhere within your graft, or even higher up in the veins in your upper arm or chest. If you have had a dialysis catheter in the past, especially if you had it a long time, you are at risk for developing stenosis in the veins in your chest. The arrow shows the point of stenosis.



Stenosis in your graft should be detected early. If stenosis continues without your staff or doctor intervening, it will eventually cause your access to clot. The clotting can cause the entire access to be lost. Stenosis causes changes in the pulse and thrill that you can feel in your access, noticing these differences over time can assist you to alert your staff to the changes and help prevent the loss of your access.

When you feel your graft, the pulse should be faint. You never want to feel your graft with strong pressure because this changes the blood flow. The change in blood flow will make the pulse and thrill feel different.

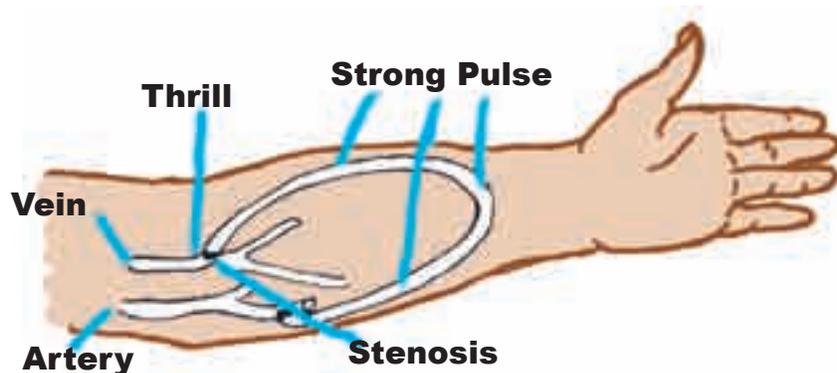


- 1. Is there a change in pulse?**
- 2. Is there a change in thrill?**
- 3. Have you had a catheter for a long period in the past?**

Feeling for Changes

Softly touching your access, place your ring finger on your access. The ring finger is suggested because it offers a lighter touch. When stenosis begins to occur, the thrill you are used to feeling will become weaker and the pulse will become stronger and pounding - the stronger the pounding, the more the stenosis. The increased pounding is always between the arterial anastomosis and where the stenosis is located. Past the stenosis, the access will be soft and have little or no pulse, and there may be a thrill at this point. It is important not to confuse this abnormal pulse-thrill combination with a normal thrill in your access. The change between the strong pulse and the weak pulse or thrill tells you where stenosis is occurring.

Stenosis can develop anywhere along your access - because of this, it is important to feel your entire arm for the thrill and pulse and notify the dialysis staff or physician if you feel changes. Change is important, any change that you notice should be mentioned to the dialysis staff and your doctor at **YOUR NEXT SCHEDULED APPOINTMENT!**



A strong pulse and change in thrill location are associated with stenosis at the venous anastomosis.

When you have a graft in your forearm, the veins in your upper arm will get bigger because of the high blood flow and high blood pressure. You may see or feel veins in your upper arm that you couldn't see before your access was placed. This is normal and is actually a good thing. These enlarged veins can eventually be made into a fistula if you need it. This is called a secondary fistula because it occurred as a result of the access in your lower arm. These veins should be soft and easy to compress. **Although the larger size of these veins makes them appealing for nurses if you need an IV, never allow a person to place any needles in your access arm other than the dialysis staff. Blood pressure cuffs should not be placed on this arm either.**

Feeling for Changes Continued

If stenosis occurs in the upper part of these veins, that vein will become larger and will develop a strong pulse. If you feel along the vein, you may feel a point where the pulse seems to disappear. You may feel a thrill at this point. This is another sign that stenosis has developed.

Stenosis may also develop in a vein in your chest. These veins are called your central veins. Patients that have had catheters for long periods of time or have a pacemaker on the same side as their access have a greater risk for developing stenosis. An early sign of central vein stenosis is swelling of your hand and arm. Veins may appear on your chest and upper arm that were not visible before. If you are thin, you may be able to feel a thrill in your upper chest just below your collar-bone. These veins are very close to the surface and most easily felt there.

Because stenosis can cause you to lose your dialysis access, it is important to know what to look for. The following pictures show step-by-step how to feel your graft.



Starting at the arterial anastomosis and going up the graft, use 2 fingers to feel the pulse. Pay close attention to any changes in the pulse.

Starting at the arterial anastomosis and moving up the graft, use your palm to feel the thrill. Pay close attention to a change in the thrill.

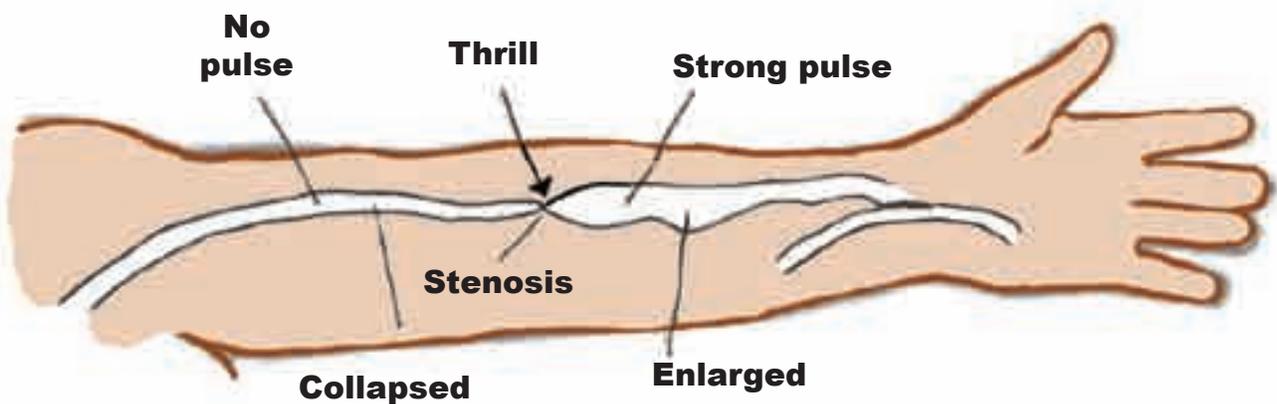
Report any changes to your dialysis team or your doctor.



Fistula Stenosis

Fistula stenosis is less common, but it still can lead to problems if it is not detected early and treated. The changes that occur with a fistula are in some ways easier to detect than in a graft.

Normally, your fistula should have a very soft pulse and possibly no real pulse at all - if you feel it softly. Your entire fistula should be easy to press down and the thrill (buzzing) should be strong at the anastomosis site. If you raise your arm over your head, you should notice the fistula partially collapses. This is normal.



If you develop stenosis, the part of your fistula between the anastomosis and the spot of the stenosis will become distended. (This can become very large if not caught early.) It will also develop a strong pulse. Additionally, some patients notice that the veins on the back of their hand enlarge. These enlarged veins may have a pulse or thrill as well. When you raise your arm, the part of your fistula between the anastomosis and the spot where the stenosis is occurring will remain enlarged, while the other portion of your fistula will collapse like normal.

In addition, the pulse suddenly will disappear as you pass the spot of stenosis and the size of the fistula will suddenly become smaller. When you feel the spot where these changes are occurring, you will feel a thrill.

Fistula Stenosis

The most common place for stenosis to develop in a fistula is just above the anastomosis. Feeling over the anastomosis will tell you that there is a problem because you will feel a strong pulse and the thrill has decreased. The thrill may even start and stop with the pulse, and in severe cases, it may be absent. It is important to remember that when you feel the anastomosis of your fistula, you remember, “pulse is bad, thrill is good.” The thrill means blood is flowing; the pulse means there is something trying to pinch off the blood flow (stenosis). Always use a light touch.



Starting at the arterial anastomosis and going up the fistula, use 2 fingers to feel the pulse. Pay close attention to any changes in the pulse.

Starting at the arterial anastomosis and moving up the fistula, use your palm to feel the thrill. Pay close attention to a change in the thrill.

Report any changes to your dialysis team or your doctor.



The goal and reason for self-examination is to allow YOU to discover a change in your access. If you practice self-examination, you will know your access better than anyone else, and thus will be the expert on how it should feel. It also means that you will detect changes more quickly and can alert the renal treatment team or your surgeon. Remember any change could be important – discuss it with your dialysis staff or doctor.