

ARTERIOVENOUS FISTULA

Information Booklet



Introduction

Renal failure is a condition where the kidneys have stopped working. It is the kidneys job is to rid the body of water and toxins that build up during daily life. If the kidneys fail totally, these toxins will build up rapidly to cause death within days or weeks.

There are many conditions that can cause kidneys to fail. This may occur slowly over many years or, in some cases the kidneys can go from completely normal to complete failure in a very short time. The only way to survive if you have total renal failure, is to have dialysis and the most common form of dialysis is **Haemodialysis**.



What is Haemodialysis?

Haemodialysis is a treatment for kidney failure that uses a machine to do the job of the kidneys. Blood is sucked out of a needle in a vein, sent into a machine with a filter in it which removes water and toxins, and then pumped back into another vein. About a pint of blood (a fifth of the total body's blood volume) flows through the machine every minute.

It is important that the veins are big enough to allow such a large amount of blood to be removed and replaced at high velocity. Unfortunately, veins are small, the blood flows slowly within them and they have thin walls which are easily damaged and will not support dialysis for more than a few days or weeks. They need to be modified to be used long term for dialysis.

What is a vascular access?

Vascular access can take several forms, but essentially, it is a surgical procedure where a vein is surgically modified to allow regular haemodialysis to occur. The most common way this is done, is by connecting an artery to a vein directly, to create an Arterio-Venous Fistula (AVF), or connecting a vein to an artery with a piece of plastic tubing, to create an Arterio-Venous Graft (AVG).

What is an arteriovenous fistula?

An **AV fistula** is a connection between a vein and artery. Arteries carry blood from the heart to the body, while veins carry blood from the body back to the heart. The surgeon usually places an AV fistula in the forearm or upper arm, but occasionally it can be in the legs.

An AV fistula causes extra pressure and extra blood to flow into the vein, making it grow large and strong. The larger vein provides easy, reliable access to blood vessels.

Without this kind of access, regular haemodialysis sessions would not be possible. Untreated veins cannot withstand repeated needle insertions. They would collapse the way a straw collapses under strong suction.

AV fistulas are recommended over the other types of access because it...

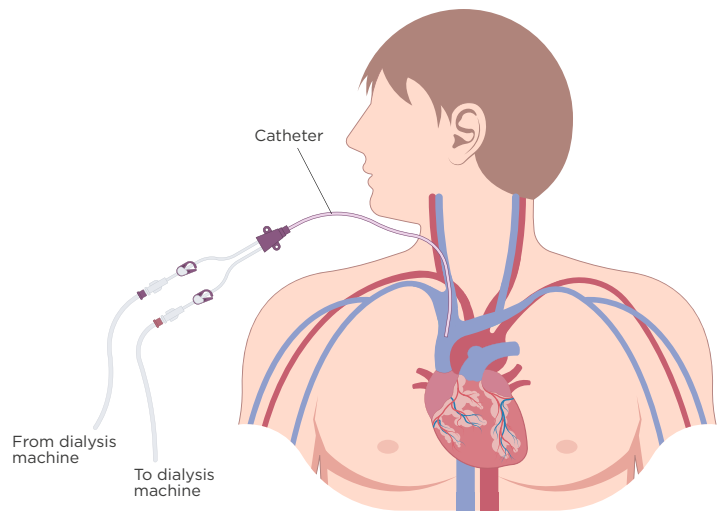
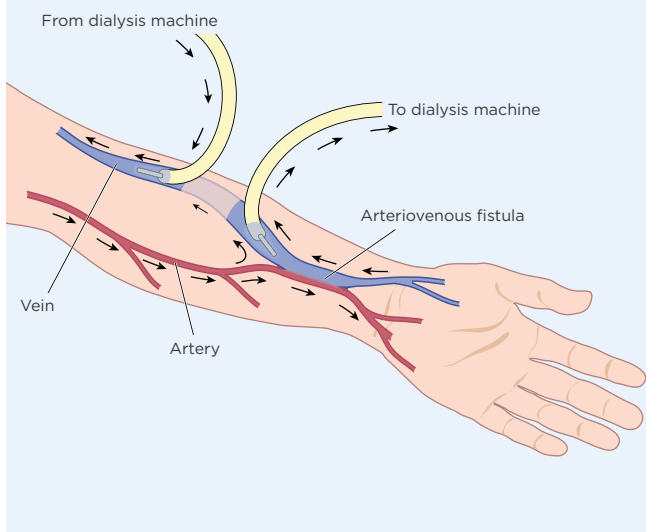
- Provides good blood flow for dialysis.
- Lasts longer than other types of access.
- Is less likely to get infected or cause blood clots than other types of access.

Haemodialysis session with an AV fistula

At the start of a haemodialysis session, a health care provider or the patient inserts two needles into the vascular access. One needle carries blood from the body to the dialyzer. The other carries filtered blood back to the body. To tell the needles apart, the needle that carries blood away from the body is called the arterial needle. The needle that carries blood back to the body is called the venous needle.

Some patients prefer to insert their own needles into the vascular access, which requires training to learn how to prevent infection and protect the vascular access. No matter who inserts the needles, the patient should know how to take care of the needle insertion area to prevent infection.

If an AV fistula does not mature, an AV graft is the second choice for a long-lasting vascular access.



What is a venous catheter (Hickman line, vas-cath)?

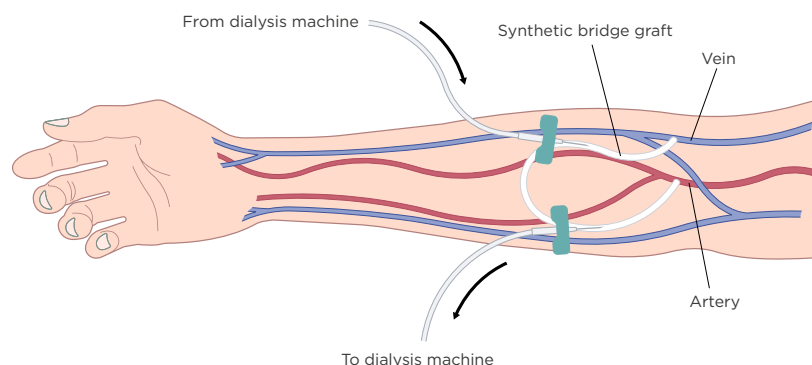
A venous catheter is a tube inserted into a vein in the neck, chest, or leg near the groin, usually only for short-term haemodialysis. The tube splits in two after the tube exits the body. The two tubes have caps designed to connect to the line that carries blood to the dialyzer and the line that carries blood from the dialyzer back to the body. If kidney disease has progressed quickly, a patient may not have time for placement of an AV fistula or AV graft before starting haemodialysis treatments and hence a venous catheter may be needed. Central venous catheters are inserted under local anesthesia and sedation to stay calm and relaxed during the procedure.


Venous catheters are not ideal for long-term use. With a venous catheter, a patient may develop a blood clot, an infection, or a scarred vein, causing the vein to narrow. However, if a patient needs to start haemodialysis right away, a venous catheter will work for several weeks or months until a surgeon can perform a long-term access surgery and the AV fistula or AV graft has time to mature.

If fistula or graft surgery is unsuccessful, then a patient will need a long-term venous catheter access. When a patient needs a venous catheter for more than 3 weeks, the surgeon will "tunnel" the catheter under the skin, rather than insert it directly into the vein. A tunneled catheter is more comfortable and has fewer problems. Even tunneled catheters, however, may become infected.

What is an arteriovenous graft?

An AV graft is a looped, plastic tube that connects an artery to a vein. A vascular surgeon performs AV graft surgery, much like AV fistula surgery. Unlike an AVF, the majority of patients will require a general anesthetic (i.e. go to sleep). A patient can usually use an AV graft 2 to 3 weeks after the surgery (quicker than for an AVF). An AV graft is more likely than an AV fistula to have problems with infection and clotting. Repeated blood clots can block the flow of blood through the graft. However, a well-cared-for graft can last several years. The AV graft is used in the same way as an AVF.





When will I need the Access procedure and which type is best for me?

AV fistulas (AVF) are recommended over the other types of access for the reasons mentioned previously and consequently, they will be recommended for you unless there is a reason they are not possible. However, AVFs take an average of three months to grow (mature) before they can be used. Therefore, it is important that patients should set up a vascular access well before starting haemodialysis.

Your Renal physician will aim to schedule an appointment with a vascular surgeon well before haemodialysis is required, giving a vascular access time to mature. The commonest reason either an AV graft (AVG) or Hickman line are used is because Kidney failure can happen suddenly and dialysis is required sooner than the three months an AVF takes to grow. The other reason an AV graft might be used is because a patient's veins are either too small or damaged to allow an AVF to be created.

After the surgery, you will have a wound either at the wrist or elbow crease. This would usually about 3-4 cm long. Sutures will hold the wound together but are usually dissolvable and will not need to be taken out. In some cases, non-dissolvable sutures are used and these will need to be taken out by your own GP in 5-7 days.

On the ward after the procedure, the nurses will check your arm regularly to look for a good blood supply, normal movement and sensation in your hand and also to confirm the fistula is working well. They do this by feeling the fistula for a vibrating pulse called a "THRILL" and listen with stethoscope for a roaring noise called a "BRUIT". You will be taught how to detect these signs yourself in order to monitor the fistula when you return home.

What to expect when you undergo an Access procedure at The VASC clinic

Dr Bond will see you in his clinic well before your surgery. He will undertake a painless test called a Doppler ultrasound to evaluate blood vessels that he may use to make the AV fistula. He will explain exactly what type of procedure he recommends and where on your body it will be. He will also explain the risks and benefits of the procedure. You will then schedule a date for the surgery.

AV fistula surgery is performed in hospital. The procedure may require an overnight stay in the hospital but many patients go home the same day. The procedure is usually done with local anaesthesia (awake) to numb the area where the surgeon creates the AV fistula. An anaesthetist is present during the procedure and can provide a medicine to relax you if needed and if you would prefer, he/she can also put you to sleep during the operation.

The procedure takes just over an hour and has minimal discomfort other than a few needle pricks at the beginning for the local anaesthetic.

Immediate Complications of AVF surgery

- **Bruising and tenderness** is common around the wound but will settle over a few days.
- **Bleeding** can occur at the wound which results in a swelling that takes days or a week to clear. Rarely, it might be bad enough to require a return to the operating theatre to be stopped. This is the main reason you have to stay in hospital for an absolute minimum of four hours after the procedure.
- **Immediate Failure of the fistula.** In some cases, the fistula never works properly from the start. This may occur in up to 5% of cases. The surgeon will normally know there has been some form of problem with the vein and will let you know what the next steps will be.
- **Nerve injury** is uncommon. If it occurs, it normally involves one of the nerves that controls sensation to the skin and results in an area of skin on the hand or forearm that is numb. This will usually improve over time and does not affect the way you use your hand. Extremely rarely, a nerve can be damaged that controls the way the hand moves. This is obviously a serious complication that, thankfully only occurs in very unusual circumstances.

Long term Complications of AVF surgery

- **Failure to mature.** An AV fistula requires 2 to 3 months to develop (“mature”) before the patient can use it for haemodialysis. About 10% of fistulas fail to mature and if this happens, the surgeon must repeat the procedure.
- **Failure of a previously working graft.** An average fistula will last 5 years before a new one is required. But this may be less or more. The graft will fail for the following reasons:
 - > **Narrowing of the vein or artery.** Results in reduced flow of blood in the fistula that makes dialysis less efficient or impossible. This can often be corrected by either Angioplasty (where a balloon on a wire is used to expand the narrowed area) or by surgical widening of the narrowed segment.
 - > **Infection.** Infection happens less frequently in AV fistulas than in AV grafts and venous catheters. Still, having an AV fistula does not guarantee the access will be infection-free. Infection will usually present with redness or tenderness but can also result in bleeding or failure of the fistula. Sometimes it can be treated with antibiotics and sometimes surgery is required to remove the fistula.
 - > **Clots (thrombosis).** Occasionally, clots will form in the fistula and cause it to stop working partially or completely. When this happens, an operation will be required to remove the clots. Clots can occur when you become dehydrated or as a result of slow flow in the fistula due to narrowing.
 - > **Aneurysms.** Many people have seen the bumpy appearance of a fistula that has been in place for many years. This is due to the vein bulging at certain points along its length. These bulges often occur when needles are put in the same place in the vein every time dialysis is performed. You will be taught how to “rotate” or vary the sites that needles are placed. These vein swellings can appear concerning as they might appear likely to burst. This is very rare however.
 - > **Bleeding.** Some bleeding is normal for a short time after dialysis needles are removed, and is controlled with local finger pressure and a band aid. However, sometimes the bleeding be prolonged and can indicate a problem with the fistula that needs to be surgically corrected.

How does a patient care for and protect a vascular access?

Generally speaking, the arm with a fistula looks and works normally and can be used for most daily activities. However, a patient can care for and protect a vascular access by...

- Ensuring that the health care provider checks the access for signs of infection or problems with blood flow before each haemodialysis treatment, even if the patient is inserting the needles.
- Keeping the access clean at all times.
- Using the access site only for dialysis.
- Being careful not to bump or cut the access.
- Checking the thrill in the access every day. The thrill is the rhythmic vibration a person can feel over the vascular access.
- Watching for and reporting signs of infection, including redness, tenderness, or pus.
- Not letting anyone put a blood pressure cuff on the access arm.
- Not wearing jewelry or tight clothes over the access site.
- Not sleeping with the access arm under the head or body.
- Not lifting heavy objects or putting pressure on the access arm.