Arterio-Venous Fistula or Arterio-Venous Graft for Haemodialysis

Haemodialysis access
In haemodialysis, blood is taken from your blood vessels, cleaned in a dialysis machine and returned into your veins. Veins have very low blood flow, insufficient to sustain haemodialysis. A surgically created connection between an artery and a vein however increases blood flow sufficiently to allow vascular access for haemodialysis. There are two types of long-term vascular access: native arterio-venous fistulae (AVF) or arterio-venous grafts (AVG).

What is an arterio-venous (A-V) fistula?
Making a direct connection for blood flow between a vein and an artery creates an A-V fistula (AVF). Arteries are blood vessels that take blood from the heart at high pressure and veins take blood back to the heart. Arteries have strong walls to handle fast blood flow. When an artery is joined to a vein, the fast blood flow from the artery enters the vein. This increased flow of blood to the vein makes it enlarge. The wall of the vein then becomes stronger to handle the faster flow of blood. The connection between artery and vein is made during a small operation usually near the wrist or elbow.
What is arterio-venous (A-V) graft?

An A-V graft is used if one’s veins are too small or too diseased to develop as a fistula. The graft is most often a soft synthetic tube that is connected at one end to an artery and the other end to a vein. A graft can be placed in an arm or a leg.

![Diagram of A-V graft](image)

What happens before the operation?

- Ultrasound (Doppler) scan of the veins in your upper arms (usually)
- Pre-operative visit with the Vascular Surgeon, who will decide where and what type of access will be created. The type of anaesthesia will also be discussed.
- Visit the Pre-anaesthetic clinic if having a general anaesthetic, although more commonly the operation is done under local anaesthesia.
- You may be asked by your team to exercise your hand muscles by squeezing a rubber ball. This can help to strengthen and widen your veins.

The operation

Most operations are performed under local anaesthesia and constitute minor surgery. At surgery, the skin of the arm will be cleaned with antiseptic once you have had the general anaesthetic or before the local anaesthetic is injected. A small cut is made into the skin and once the artery and vein have been found they are sewn together, or a graft is inserted to connect them. Lastly, the skin is sewn back together again.

The operation takes place in an operating theatre and is performed by a vascular surgeon. Surgery is usually done as a day case procedure and takes 40-60 minutes. There is some additional time spent in the waiting area, anaesthetic room and the recovery room. Only occasionally is an overnight stay required.

After the operation

Your fistula will be checked by a nurse or a doctor for a buzzing sensation known as a "thrill" which can be detected by feeling the area. The nurse or a doctor will also listen for a "bruit" around the operation site, which is a whooshing sound heard through a stethoscope. "Thrill" and "bruit" are caused by high flow of blood through the vein or a graft and are good indicators that the fistula or graft is working.
Care after the operation
Three days after surgery, you will be seen on PCU-ward 20 for the review of fistula and for the removal of dressing. If you develop bleeding, discharge or severe pain in the wound you should seek medical help. (Vascular access nurse can be contacted during office hours, A&E during out of hours). Keep the operation site clean and dry until the wound edges have healed. You need a clinical check 2 - 4 weeks post surgery by Vascular Access Nurse and this will be arranged by the surgical team on discharge. A series of Doppler ultrasound will be done as post-operative follow up.

Long term care of your fistula/graft
There are a few measures which you can take to help maintain your fistula:

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<th>Do Not</th>
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<td>Exercise your hand regularly.</td>
<td>Do not wear tight fitting clothes or bracelets or watches on your AVF arm</td>
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<td>Squeezing a soft ball for five minutes twice or three times a day increases blood flow through the AVF</td>
<td>Do not use your AVF arm for carrying/lifting heavy objects</td>
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<td>Check your fistula daily. If it becomes red or tender, contact the hospital. If the thrill has changed or disappeared, contact the hospital immediately.</td>
<td>Never let any body take blood pressure, insert drip &amp; measure blood pressure on your AVF arm</td>
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<tr>
<td>Check your hand. If it becomes very swollen or very painful or blue, contact the hospital</td>
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When can the fistula or graft be used?
Fistulas formed at the elbow usually take approximately 8 weeks to mature (i.e. the period necessary for vein to enlarge and strengthen so that we can use it for haemodialysis). However, fistula formed at the wrist usually takes longer and can take anything up to 12 weeks to mature depending on the individual’s veins. Rarely, it will be used earlier, but only if examination by a doctor or nurse confirms a useable fistula.

Grafts are often usable soon after the operation, owing to the fact that we do not need to wait for the vein to enlarge and strengthen. However, this period varies from patient to patient.

What are some possible complications of my fistula/graft?
- **Clotting** - there is a risk that your fistula/graft can clot off and stop working. This can occur immediately after theatre or at any time later. Surgeons or radiologists are sometimes able to de-clot or refashion the fistula/graft to start it working again. However, in some cases it will be necessary to create a new fistula.

- **Infection** - occasionally infections can occur in fistulas and grafts although grafts are at a higher risk of infection because they are made of foreign material. Infection can usually be treated with antibiotics but in some cases, especially with grafts, the graft may need to be removed and a new access formed.
• **Steal Syndrome** - this condition occurs when the fistula takes away some of the blood supply from your hand. It can result in a painful or cold hand. A glove can be worn to relieve this but if it becomes troublesome, surgery may be required.

• **Neuropathy** - a fistula / graft can also divert blood away from the nerves in the arm, which may cause a tingling sensation in the hand. In some cases it may cause sufficient pain to require the reversal of the fistula / graft.

• **Bleeding** – This is very uncommon. If it occurs, immediate compression on the bleeding area, maintained by pressure provided by a thumb or a single finger on the bleeding site is necessary. Pressure anywhere else will only serve to increase bleeding from the fistula site. Always contact the dialysis unit if you think there is abnormal swelling or sensation at the site of the fistula. Sudden bleeding can be life-threatening and must therefore not be neglected, get medical attention straight away.

• **Swelling** – Mild swelling is expected after surgery and should settle within days. Raising your arm while in bed may speed up recovery. Severe or continuous swelling of the whole arm may be due to narrowing of one of the veins taking blood back to the heart. If you develop this, you should contact the hospital. The vein used for access will “grow” over time to allow the increased blood flow, therefore there will be swelling along the course of the vein; this is expected, and rarely a problem.

• **Aneurysm** - Aneurysms in AV fistulas at the cannulation site are not unusual occurrences. This means a formation of pouch like swelling over the fistula vessel. Fortunately, most of these aneurysms are easy to deal with if needed. It is important to avoid any trauma or friction over the site. Please ask your dialysis nurse or the consultant if there are any concerns.

If you are worried about any of these risks, please speak to your consultant or to the dialysis nursing staff.

**What are the alternatives to having a fistula operation?**

It is possible to use a dialysis line in the long term to be connected to the dialysis machine but this is more likely to cause complications such as infection and clotting.

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“**Remember a fistula / graft is your lifeline - Please take care of it**”

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**Useful websites:**
http://www.renal.org/Libraries/Procedures_for_Patients/Formation_of_an_arteriovenous_fistula_AVF.sflb.ashx

http://www.kidneypatientguide.org.uk/site/fistulaAnim.php
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