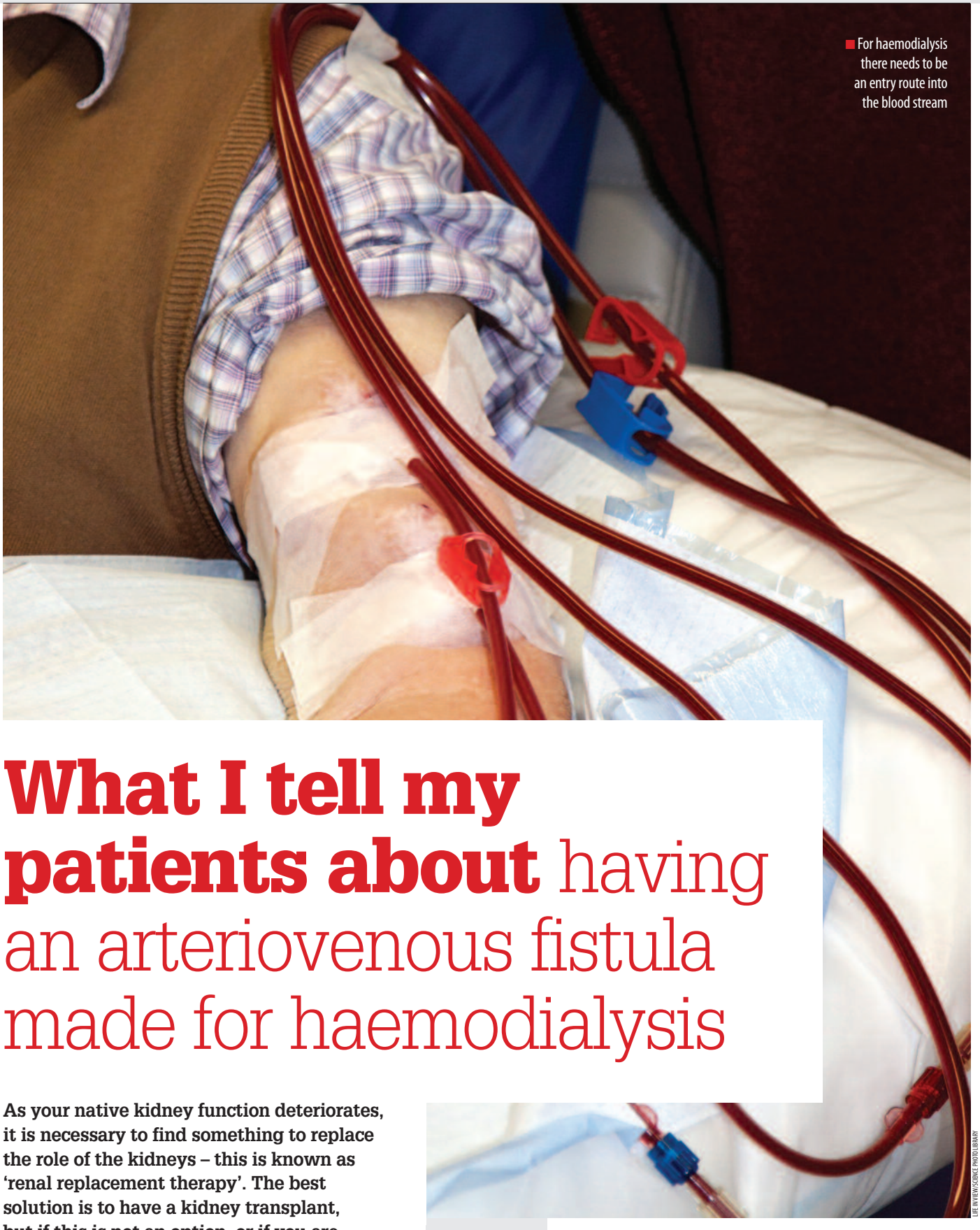

For haemodialysis there needs to be an entry route into the blood stream

LIFE IN VIEW/SCIENCE PHOTO LIBRARY

What I tell my patients about having an arteriovenous fistula made for haemodialysis

As your native kidney function deteriorates, it is necessary to find something to replace the role of the kidneys – this is known as 'renal replacement therapy'. The best solution is to have a kidney transplant, but if this is not an option, or if you are on the waiting list for a transplant, dialysis is necessary. This can be peritoneal dialysis or, more commonly, haemodialysis.

In haemodialysis, blood is removed from the bloodstream and passed through a dialysis machine. This acts like an artificial kidney, removing impurities that have built up and returning 'clean' blood back into the body. To do this, there needs to be one of three types of entry route, or 'vascular access', into the bloodstream: an arteriovenous fistula, a graft or a central venous catheter. A fistula is the preferred means of vascular access and the thrust of this article. However, patient preference is very important and has a large influence on the choice of access.

Jeremy S Crane
MB ChB MD FRCS
Consultant Transplant and Vascular Surgeon, West London Renal and Transplant Centre, Imperial College Healthcare NHS Trust, London

BRITISH JOURNAL OF RENAL MEDICINE 2013; Vol 18 No 3

■ One of the potential risks of a fistula is that it will clot

What is a fistula and how is it formed?

In dialysis, blood is pumped through the dialysis machine at reasonably high speeds so normal 'blood test veins' are simply not strong enough and would collapse under the pressure. The ideal is a 'stronger' blood vessel that is easily accessible, sitting just under the skin. This ideal is called a fistula. It is created by surgically connecting a vein to an artery, typically in the wrist or elbow area. This allows a proportion of fast-flowing blood from the artery to be diverted up the vein. The vein adapts to this faster volume of blood by slowly thickening up, enlarging and becoming strong enough to withstand the regular needling necessary for dialysis. Where possible, it is performed in the non-dominant arm (that is, left arm for right-handed patients, and vice versa).

Patient preference is very important and has a large influence on the choice of vascular access

Can all patients with renal failure have a fistula?

Not all renal patients can have a fistula; there must be appropriately sized blood vessels in the arm for it to be possible. Vessels are assessed by clinical examination to determine whether any are sufficient to place you on the operating list for fistula creation. However, if the vessels are not easily visible, 'duplex mapping' (an ultrasound scan to accurately measure arteries and veins) can be performed.

Sometimes the arm veins are not large enough, or they have been damaged by numerous blood tests or cannula insertions as part of previous medical treatment. This is why kidney patients are advised to protect their veins at forearm and elbow level in the non-dominant arm.

Are there other vascular access options?

As mentioned earlier, the best vascular access choice is a fistula. However, if the veins are unsuitable, there are two other options. The first is a graft – this is a prosthetic tube connecting an artery to a vein with blood flowing through, which can be needled like a fistula. The main problem with a graft is that because it is 'foreign' material it is prone to infection.

The other option is a central venous catheter. Plastic catheters are placed in the great veins leading to the heart. The exit site for these catheters is usually the chest wall. Again, this involves plastic material prone to infection but, in certain circumstances, such as short-term dialysis or in the case of frail or elderly patients, it is often a sensible option.

What does the fistula operation involve and what should I look out for after the surgery?

To create the fistula it is necessary to have a small operation done, as a day case procedure. It is typically performed under local anaesthetic – you are awake during the procedure, can chat with the surgeon throughout and even listen to music. In fact, in my theatre the patient always has first choice of the type of music! The operation lasts about an hour. Once the fistula is created, there will be a 'buzz' in the vein. The surgeon will show you how to feel this buzzing and this is your way of checking that the fistula is working.

Not all fistulas will work and this is important to bear in mind before having the procedure. However,

after the operation, there are things you can do to help the fistula develop and stop it clotting. Drinking plenty of water to keep well hydrated is essential – this prevents the blood becoming 'sticky' and therefore more likely to clot. Exercising the fingers and hands on the same arm as the fistula by, for example, squeezing a pair of socks or a rubber ball for five minutes, five times a day, encourages blood flow.

There are a few potential complications that can arise after fistula surgery (see Box 1). If the 'buzz' disappears, then it is important to alert your dialysis nurse or doctor. There are rescue procedures that can be performed to restore flow in the fistula. If the site of the fistula operation becomes red or swollen, this may be the sign of a wound infection and you should see your doctor. Occasionally too much blood flow is diverted to the fistula and the hand might become cooler. This is known as steal syndrome and also requires medical attention. Pins and needles in the hand after surgery can be due to bruising around the nerves and this usually settles within a few days.

There are a few potential complications that can arise after fistula surgery

For a few days after the operation it is a good idea to elevate the arm while relaxing at home, and not use your arm for lifting heavy bags or weights. Once the wound is fully healed, and the fistula is working well, there are no restrictions and you can use your arm as normal. Driving is usually fine after a couple of weeks. Once the fistula has been created, it is vital not to have blood tests or have blood pressure measured in the fistula arm; both of these could potentially damage or clot the fistula.

Key points

- There are three types of vascular access for haemodialysis: a fistula, graft or catheter.
- Each patient has a say in the best form of vascular access for them.
- When nearing dialysis, it is important to protect the veins in your arm from blood tests, particularly at the elbow crease.
- A fistula does not involve foreign material, therefore decreasing infection risk.
- Not all fistulas will be successful and it is important to bear in mind that there are a number of complications that can arise.

Box 1. Potential complications after fistula surgery

- Failure of fistula to mature
- Wound infection
- Steal syndrome
- Fistula becoming unsightly with time

When can my fistula be used for dialysis?

The fistula usually takes approximately six weeks to mature and at that point it is ready to be needled for dialysis. However, some mature much quicker and some take longer. Your surgeon or dialysis nurse can examine the fistula and give you an indication of its maturity.

When first used, the walls of the fistula will likely be soft and mobile, so inserting the needle for the first few dialysis sessions may be difficult and, occasionally, bleeding can occur at the puncture site. This is not uncommon, and while the bruising may be unsightly, it usually settles within a few days. The dialysis nurse is then able to make further attempts at inserting the needle. With time, the vessel becomes fixed in position and the vessel wall stronger, meaning few or no further problems when the needle is inserted.

Are there long-term problems with a fistula?

As the fistula matures and is needled, the vein still remains reasonably small and discreet. Sometimes though, the vein enlarges and becomes unsightly. This is usually due to either needling the same portion of vein too many times or a narrowing within the fistula somewhere 'upstream'. The fistula can be surgically repaired to make it cosmetically acceptable again. A narrowing can be opened up by a radiologist using minimally invasive techniques, and this is known as a fistuloplasty.

If the fistula becomes overly developed, it can 'steal' blood intended for the hand. Sometimes the hand is a little cooler, but this may not be a problem. However, this steal syndrome can cause pins and needles, or pain in the hand, and at that stage it needs to be fixed. Surgery can reduce the flow in the fistula, increasing the blood flow to the hand to relieve the symptoms ■

Declaration of interest
None declared.