

# What I tell my patients about reflux nephropathy

The flow of urine from the kidney down to the bladder is an important part of maintaining correct kidney function. Although this is normally a straightforward process, when an abnormality does occur it can lead to problems with kidney function, such as reflux nephropathy.

## What is reflux nephropathy?

'Reflux' describes the process whereby urine passes back up the wrong way from the bladder to the kidney while the bladder is trying to empty (Figure 1). As a result, scarring can occur within the kidney, leading to kidney damage or 'nephropathy'.

## How does reflux occur?

Normally, the ureters enter the bladder through a long tunnel of bladder muscle, so that when the bladder contracts this tunnel closes tightly, preventing the passage of urine back up to the kidneys (Figure 1). In up to 2% of otherwise healthy children, this tunnel does not prevent urine passing back up to the kidneys. Reflux tends to improve with time, and disappears by the age of two years in about 50% of affected children. In the remainder it improves more slowly, but it has often disappeared completely in adults who have

signs of reflux nephropathy, such as scars in the kidney.

There is a tendency for reflux to run in families, although the details are not yet fully known. Other, less common, abnormalities within the kidneys themselves (such as poor development) or the urinary system may be associated with reflux. Reflux can also result from a blockage to the normal flow of urine – for example, as a result of urethral valves (the abnormal presence of a valve within the urethra which prevents the flow of urine out of the bladder) in childhood, or nerve damage to the bladder due to spina bifida (where the spinal cord has not formed correctly).

## What causes the scarring?

Although it is not known exactly how the scars form, they tend to occur in those with the most severe reflux. It is likely that the reflux of urine into the kidneys causes local inflammation, which then leads to scars. Urinary infections may hasten the scarring process, although their importance is not certain in every patient. However, simply correcting the reflux does not seem to solve the

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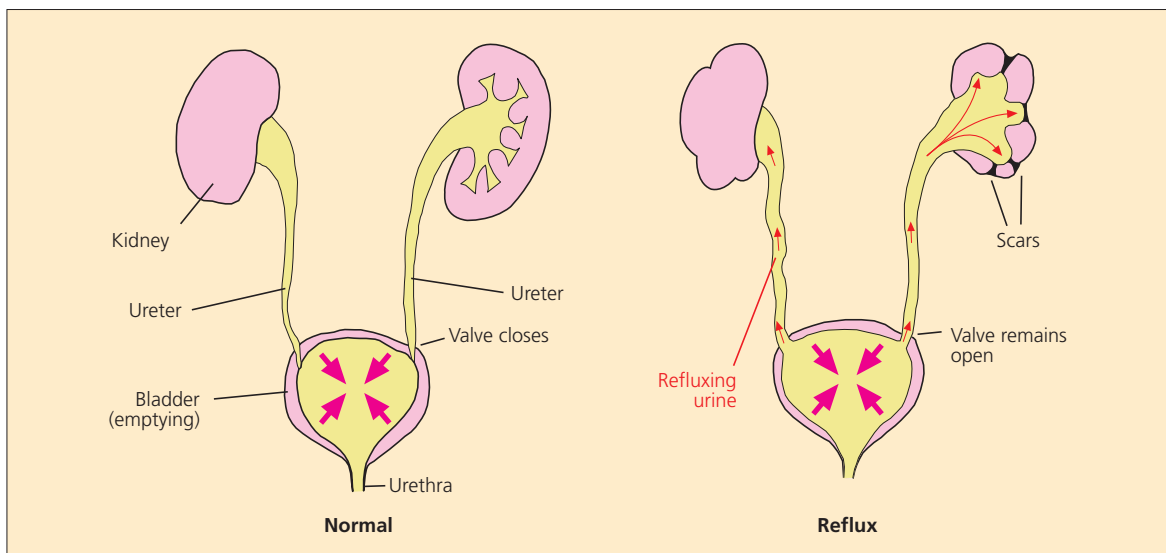


Figure 1. A normal and a refluxing urinary system (the kidney on the right in each diagram is shown 'cut away'). Normally, as the bladder contracts a valve closes, preventing urine from passing back up the ureter. In reflux, urine is forced back up towards the kidney, causing scarring



problem of scarring. Scarring may be made more likely by abnormal development of the kidneys before birth and during infancy.

### **What is the result of having reflux?**

Reflux often causes no symptoms; many people are even unaware that they have it. However, others may have a variety of problems as a result of reflux and these are described below.

### **Urinary tract infections**

People with reflux are more prone to urinary tract infections (UTIs) – either within the bladder (cystitis) or, more seriously, in the kidney (pyelonephritis). Screening children for reflux is often recommended after a first urine infection. UTIs are very common in women, and about one in 20 women with a UTI would be found to have reflux if the right tests were performed.

### **High blood pressure**

High blood pressure is common in adults who have signs of reflux nephropathy. Although it is mild in the majority of cases, reflux may occasionally be responsible for very high blood pressure, which can cause a rapid decline in kidney function.

### **Kidney damage**

It is rare to see new scars developing after the age of five years, but in some people kidney function continues to deteriorate slowly. In older children and adults this is probably not related to either reflux or urine infections, but it can lead to kidney failure and the need for dialysis or a kidney transplant. Similar deterioration can be seen in kidneys which have been damaged long before by other diseases. High blood pressure seems to be an important part of the process, and in many cases the deterioration can be delayed, or even prevented, by controlling blood pressure as tightly as possible.

### **Pain**

Reflux is usually painless, but some people may experience loin pain, particularly with a full bladder or at the start of urination. Occasionally, kidney stones may develop in the scarred portions of the kidney, and this can lead to pain. This is more likely to occur with uncontrolled or repeated urine infections.

### **How is reflux diagnosed?**

There are two groups of investigations that may be used to detect reflux (Box 1). Reflux may be picked up in childhood or later, during

#### **Box 1. Investigations used to detect kidney scarring and reflux**

##### **Tests to show kidney scarring**

###### **Ultrasound**

Ultrasound is the most common test for looking at the kidneys. It shows the shape of the kidney and can provide evidence of scarring, but is not the best test for showing the scars or reflux nephropathy.

###### **Intravenous urogram (IVU) or intravenous pyelogram (IVP)**

A small amount of a non-radioactive dye is injected into a vein in the arm. The dye becomes concentrated in the kidneys and means that they, along with the tubes down to the bladder (ureters), can be seen on a series of plain X-rays. These are taken over a period of an hour or so.

###### **Isotope renogram**

As above, a small amount of radioactive dye is injected into an arm vein and becomes concentrated in the kidneys. The kidneys can then be seen with a special camera. This test provides information on both scarring and individual kidney function (Figures 2 and 3, opposite).

##### **Tests to show reflux**

###### **Ultrasound**

Ultrasound cannot show urine flowing the wrong way, as would occur in reflux, but it may demonstrate the resulting dilatation, as well as other abnormalities of the urinary tract.

###### **Micturating cystourethrogram (MCUG)**

A catheter is inserted into the bladder and a non-radioactive dye is placed into the bladder. X-ray pictures are taken while the person urinates to show reflux happening.

###### **Isotope renogram**

After the isotope renogram is performed as above, the radioactive material collects in the bladder. Pictures taken during urination may then show the radioactivity going back to the kidneys if reflux is present. Both MCUG and isotope renogram allow reflux to be detected and graded.

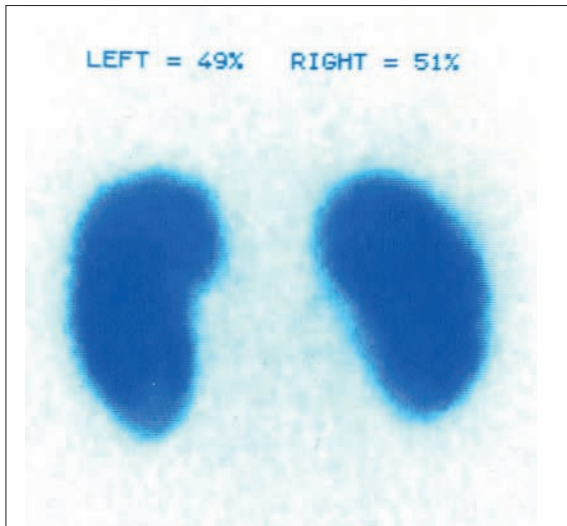


Figure 2. An isotope renogram showing two normal kidneys, which are bean-shaped and smooth. The percentages show how much of total kidney function comes from each kidney: about half from each

investigations for urinary infection. Sometimes – particularly in adults – it is picked up after the discovery of protein in the urine, high blood pressure or abnormal kidney function.

### Can reflux be treated?

Although there is no 'cure' for reflux, steps can be taken to control infections and protect kidney function.

### Urinary infections

The main aims of treating urinary infections are to relieve the symptoms and to prevent the infection from reaching the kidneys.

As well as treating infections with antibiotics whenever they arise, further preventive steps can be taken, including:

- Drinking plenty of fluid to continually wash through the urinary system
- Emptying your bladder last thing at night. 'Double emptying' may also be beneficial. This involves emptying your bladder, then going again ten to 15 minutes later to empty the small amount that may have collected during that time. It is also recommended for women to empty their bladders after sexual intercourse
- Drinking cranberry juice. There is strong evidence that this helps to protect against urinary infections, if drunk on a daily basis.

If urinary infections are troublesome despite the above measures, then preventive, low-dose antibiotic therapy may be useful. Initially, this would be on a nightly basis, but the frequency may be reduced over time and the situation assessed at intervals. It may be possible to stop these after a while, after consulting your doctor.

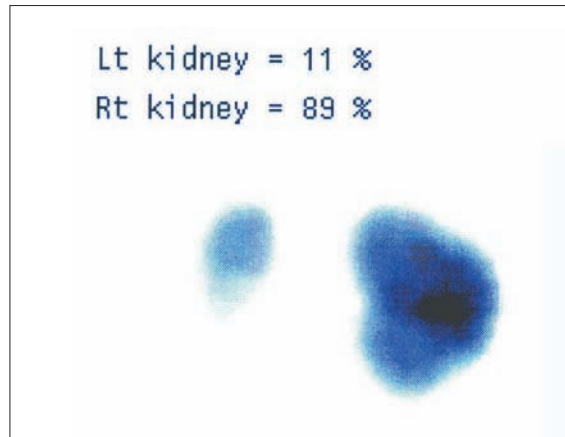


Figure 3. An isotope renogram showing kidneys with damage due to reflux nephropathy. The left kidney looks tiny and only contributes 11% of renal function, while the right kidney shows scarring at the top and the bottom. This patient had a little under half of total normal kidney function

There is no risk of further kidney scarring in adults with reflux and urinary infection, unless there is an obstruction to urine flow or kidney stones are present.

### Protecting against further kidney damage

Excellent control of blood pressure is the most important aspect of the long-term care of reflux nephropathy that will reduce, or even prevent, any deterioration in kidney function. This will involve the use of one or more types of blood pressure-lowering medicines. Reducing salt content in the diet and increasing your general level of fitness will also have a beneficial effect on blood pressure.



Reflux may be picked up for the first time during pregnancy as a result of routine urine and blood pressure checks

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### Can an operation cure reflux?

An operation can be performed to reimplant the lower end of the ureters into the bladder to improve the antireflux muscle tunnel within the bladder. However, trials have shown that although this does usually cure reflux, it often does not prevent the progression of kidney damage, even when done in quite young children. There is, therefore, no place for surgery in the prevention of renal scarring in adults with reflux.

An operation might be needed only if there are repeated severe kidney infections despite attempts to prevent them. Injections of Teflon® around the trigone – that is, where the ureters enter the bladder – may be an alternative to reimplanting the ureters. This is called a ‘STING’ (subtrigonal injection) operation.

Sometimes, the removal of a severely damaged kidney can help to control infections or reduce blood pressure. This may be considered if the other kidney is functioning normally.

### Reflux may be picked up for the first time during pregnancy

### Is reflux a severe problem?

For most people reflux is a minor problem. There are three simple measurements that can help to show whether there is very likely to be much further trouble:

- Blood pressure measurement
- Testing the urine for protein
- Kidney function (blood and urine tests).

If all these tests are normal, the risks of serious trouble in later life are very low. The risks become higher as the number of abnormal tests, and their severity, increases. It is sometimes possible to have one kidney much more severely affected than the other. One good kidney is enough for a healthy life – as shown by people who have donated a kidney to a relative with kidney failure.

### How can reflux affect pregnancy?

Reflux may be picked up for the first time during pregnancy as a result of the regular urine and blood pressure checks that are routinely undertaken at this time. Anyone who is known to have reflux should have their urine checked for bacteria every three months, and if bacteria are detected, antibiotics will be required. Repeated infections will require prophylactic antibiotic therapy during pregnancy.

Blood pressure and the presence of protein in the urine (pre-eclampsia) will also need to be closely monitored, as reflux probably increases the risk of developing high blood pressure in pregnancy. Serious kidney damage with poor kidney function can substantially increase the risk to both mother and baby during the pregnancy, but this situation is very rare.

### Will my children be affected?

Children of parents with reflux, or those who have a close relative with reflux, should be investigated for reflux after birth ■

### Key points

- ‘Reflux’ describes the process whereby urine passes back up the wrong way from the bladder to the kidney while the bladder is trying to empty, causing kidney damage or ‘nephropathy’.
- Reflux tends to improve with time, and disappears by the age of two years in about 50% of affected children.
- People with reflux are more prone to urinary tract infections, either within the bladder or, more seriously, the kidney.
- Excellent control of blood pressure is the most important aspect of the long-term care of reflux nephropathy.
- An operation may be needed only if there are repeated severe kidney infections despite attempts to prevent them.
- Removal of a severely damaged kidney can help to control infections or reduce blood pressure, as long as the other kidney is functioning normally.

### Useful websites for further information



Royal Infirmary of Edinburgh Renal Unit ([www.edren.org](http://www.edren.org))  
Click on ‘SEARCH this site’ and type in ‘reflux nephropathy’

National Kidney and Urologic Diseases Information Clearinghouse  
([www.niddk.nih.gov/health/kidney/summary/vesico/vesico.htm](http://www.niddk.nih.gov/health/kidney/summary/vesico/vesico.htm))

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