What I tell families about kidney and bladder problems detected before birth

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Ultrasound examinations are now a routine part of antenatal care. Most women receive a booking scan at approximately 12 weeks, and most are offered a detailed scan at 18–20 weeks. Further scans may be carried out later in the pregnancy to check on the baby's growth or position, or for other reasons which are decided by the obstetrician.

On any of these scans a problem may be detected in the baby's kidney and bladder (the urinary tract). Most of these abnormalities are mild but some may be severe. It may take repeated ultrasound examinations before it is possible to discover exactly what is wrong.

What causes abnormalities to occur before birth?

We know from our studies that an abnormality of the urinary tract can occur in about one in every 350 births.[1] Sometimes the abnormality is associated with other problems in the developing baby, or with an abnormality of the chromosomes – in some cases this can be a rare inherited abnormality.

The most severe abnormality that can occur is that the kidneys do not develop at all, and we call this agenesis. The kidneys are involved in the production of womb fluid (liquor) and if there are no kidneys then there is a severe lack of liquor, a condition that is known as oligohydramnios. In this rare situation, the baby does not usually survive because the lungs also fail to develop.

However, most abnormalities occur as isolated problems affecting only the baby's urinary tract to a much lesser degree. It is important to appreciate that babies are constantly growing and changing in the womb and so the appearances of the urinary tract may also change on the ultrasound during this time.

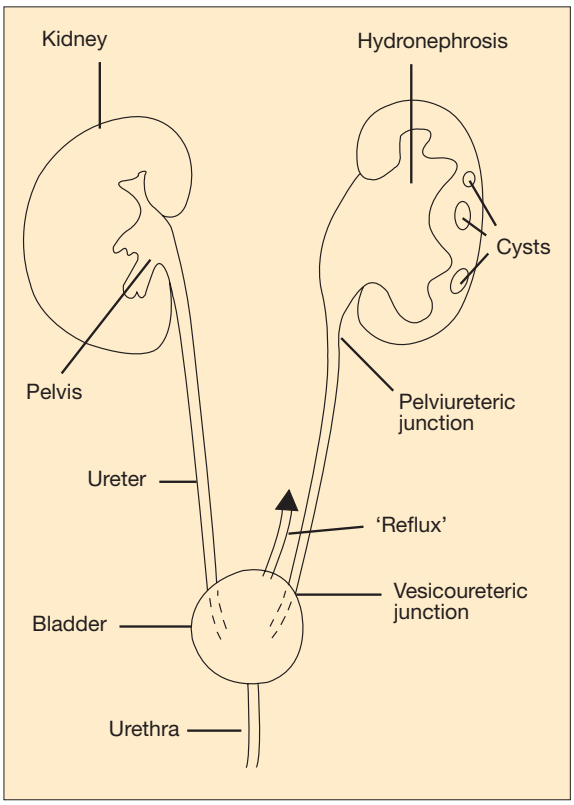

Figure 1. The urinary tract showing where possible abnormalities can occur

What kind of abnormalities may occur?

1. Hydronephrosis

The commonest type of problem that we notice is called hydronephrosis. This is where there is a build-up of urine in the pelvis of the kidney, so that it appears distended and more readily noticeable on the scan. The commonest causes of hydronephrosis are described below.

- A pelviureteric junction obstruction (called simply PUJ). As you can see from Figure 1 this is a narrowing of one of the ureters at the junction with the pelvis of the kidney so that urine is literally 'dammed' back into the kidney. Most cases of PUJ turn out to be mild and require no long-term follow-up. Indeed, at present we do not know the lower limit of normal for the size of the pelvis, so your baby may be scanned on a couple of occasions in the womb and at least once after birth. Occasionally, children have a moderate PUJ, which requires follow-up and closer observation, but no operation. Rarely, a child may have a severe PUJ – this may require an

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operation to drain the kidney shortly after birth (nephrostomy) or an operation in the first year of life to improve the drainage of the kidney (pyeloplasty).

- Another cause of hydronephrosis is vesicoureteric junction obstruction (called simply VUJ), where the narrowing is at the lower junction of one of the ureters with the bladder. Since urine is held up in the ureters and the kidneys, there is a large dilated ureter as well as hydronephrosis. Few children with this condition require an operation in the long term.
- Hydronephrosis may also be caused by vesicoureteric reflux (called simply 'reflux'). This is due to a weakness at the point where the ureter(s) enter the bladder, allowing urine to pass back up towards the kidney. Again, reflux can be mild, moderate or severe. Sometimes the affected kidney with reflux will work very poorly and may not function well after birth. When a child is found to have reflux, we would usually place them on a small dose of antibiotics, to be taken once at night for a couple of years.[2] This is because there is a danger of infected urine being carried back up to the kidneys and causing damage. Only rarely is an operation required – if there are problems with recurrent infections.

2. Cysts in the kidney

Sometimes we discover cysts in the kidneys. The causes of this condition, and its treatment, are explained below.

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After the birth you will be allowed to go home at the usual time, as long as your baby is passing urine normally

- The second most common condition that we recognise before birth is a condition known as multicystic dysplastic kidney (usually referred to as MCDK).[3] What this usually means is that a ureter has not joined up with a kidney during development, causing the kidney to develop abnormally, with cysts in areas of abnormal tissue, which is called dysplasia. Most babies with this condition have it on only one side and the affected kidney usually disappears with time, while the remaining kidney becomes enlarged. It should be stressed that the child can lead a perfectly normal life with the one good kidney.
- If a baby is shown to have cysts in both kidneys, it may have been caused by an inherited condition known as polycystic kidneys. If the child has inherited the autosomal dominant or the adult type of polycystic kidneys, then no problems should arise and there should only be a few cysts, although problems may occur in adult life.[4]

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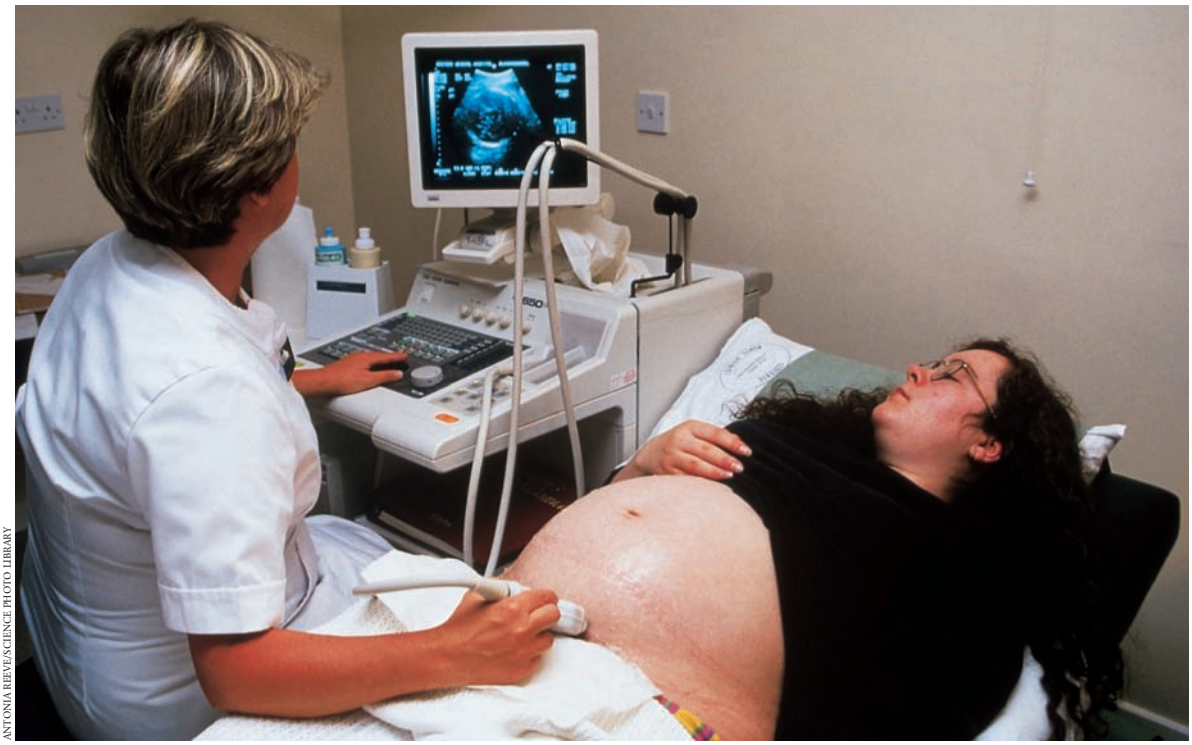

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However, if the baby has the much rarer autosomal recessive or infantile type of polycystic kidneys, it can be a very serious matter depending on how large and how damaged the kidneys are.

3. Posterior urethral valves

This is a rare condition, which occurs in male babies when there is a blockage in the urethra. The urethra is a tube leading from the bladder to the outside, through the penis. The result of a blockage is a damming of urine, which leads back into the bladder and up through the ureters to the kidneys.

The blockage can be noted at any time during the pregnancy, and it may be that scans between 12 and 20 weeks are normal and it is only later that the blockage is recognised. If the baby's bladder and kidneys are very dilated and there is a lack of womb fluid or liquor around the baby, then we may consider whether to perform tests to check how well the kidneys are working and whether we should relieve the pressure on the baby's bladder by putting a drain into the bladder. All the options will be carefully discussed with you by an obstetrician and a children's kidney specialist or surgeon. Sometimes it may be appropriate to deliver the baby early if there is this severe involvement.

Are there any other problems that can be recognised before birth?

The following problems might be detected before your baby is born.

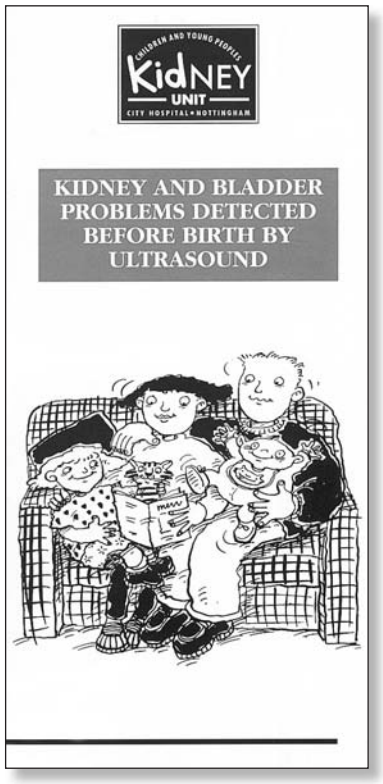
- Occasionally, the kidneys develop with two tubes on one side and we call this a duplex or double system. One tube may be dilated or blocked by a swelling at the lower end, in the bladder region that we call an ureterocele. It may be necessary to deal with this after the birth by a simple operation.
- The kidneys may both develop on one side only (crossed ectopia).
- The kidney may be down in the pelvis and not in its normal position (pelvic kidney).
- Two kidneys may be joined together (horseshoe kidney).
- There may be only one kidney detected on ultrasound. The other kidney may not have developed or may have disappeared – as in the case of the MCDK, for example. As long as the remaining kidney grows and enlarges to compensate, the child should have no problems during life. In fact, it is often said that the commonest kidney abnormality found in adults is a single kidney (one in 1,000 people).

Will my baby need treatment in the womb?

As you can see, there are a number of problems that can occur during the development of the kidneys and urinary tract. It is important to emphasise that as long as your baby is growing well in the womb, no other abnormalities have been found and the volume of the liquor is normal, then your child's kidneys are not likely to be significantly damaged. The vast majority of babies require no operations, either while they are in the womb or after birth.

What happens at delivery?

Labour and delivery will usually proceed as normal and only in the very few circumstances mentioned above will the obstetrician suggest early delivery or other treatment.



We have produced a booklet – Kidney and bladder problems detected before birth by ultrasound – *to help families to understand the possible problems and how they are treated*

What happens after the baby is born?[5]

After delivery the paediatrician will examine your baby carefully. As long as the baby is passing urine normally and there is nothing unusual to find, you will be allowed home at the usual time. Only if we strongly suspect vesicoureteric reflux or a severe obstruction, such as posterior urethral valves, will your child be sent home on antibiotics.

Arrangements will be made for you to bring your baby back for tests which will usually consist of an ultrasound of the kidneys and bladder to show their outlines.

Some babies also require a bladder X-ray called a micturating cystourethrogram (or cystogram for short), which requires a small tube to be passed up the urethra into the bladder. This is usually organised after the first month or so. To prevent any infection occurring at the time of the bladder X-ray, your child is usually prescribed an antibiotic called trimethoprim. This should be given twice a day for two days, starting on the day of the bladder test. If we strongly suspect that there is reflux, then your child may be on antibiotics from birth. If we find severe reflux then your child will be given other antibiotics for five days before continuing on trimethoprim prophylaxis.

After delivery the paediatrician will examine your baby carefully

Most babies will also require a renal scan, which will usually be completed in their first three months. You will be asked to bring your baby back to the ward, where a small amount of radioactive tracer will be injected into a vein. This tracer is excreted by the kidneys into the bladder and we can follow its progress under a special

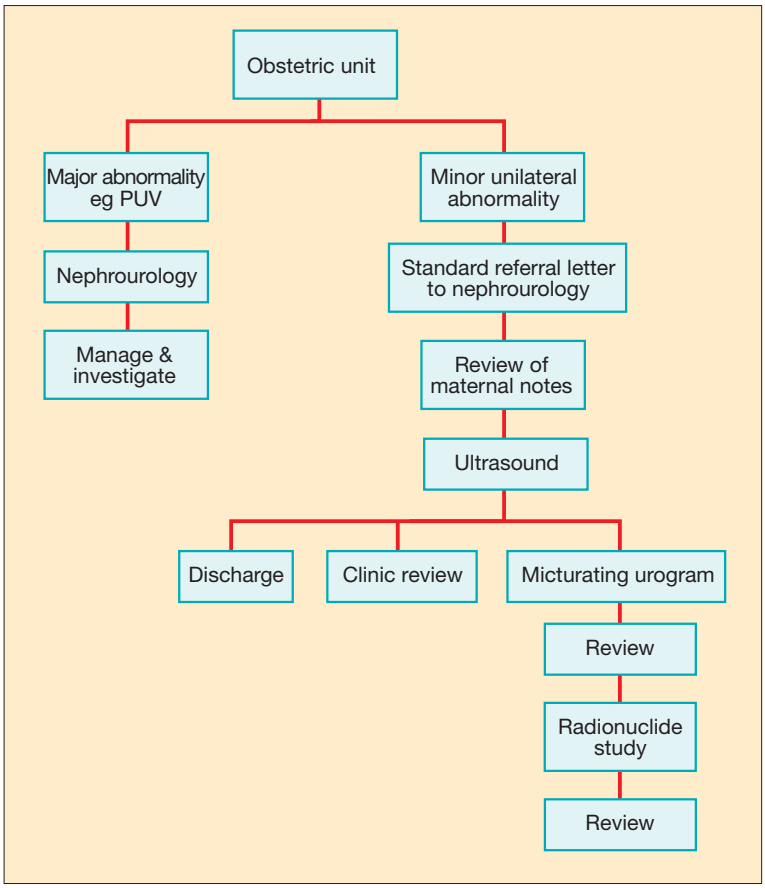


Figure 2. Postnatal management of urinary tract abnormalities detected before birth

camera in the X-ray department. There are two types of renal scan – one is called a DMSA scan and the other a Mag 3 scan.

Will I receive more information about these tests?

The children's unit will have more detailed information about the tests and you can always feel free to ask any questions that may worry you. We may wait to complete all the tests before seeing you again with the baby in the children's clinic.

What is the long-term outcome?

If the baby's problem is severe, such as posterior urethral valves or a severe blockage, then the options will be discussed with the paediatric surgeon or urologist as to when an operation will be necessary. However, we would emphasise that most problems recognised before birth are mild or moderate and we will generally watch your child's progress in the children's outpatient clinic. Babies grow rapidly, both in the womb and after birth, which means that the kidneys, tubes and bladder are also developing. Therefore, we are always cautious as we know that, for example, most children with hydronephrosis or reflux will improve with time. Since few, if any, babies show any symptoms, we prefer to wait and watch. This may mean repeated tests but we try to minimise these and use painless tests such as ultrasound.

Will other family members need to be investigated?

Some kidney abnormalities do run in families (such as duplex kidneys) but the only one we would consider screening other children for is vesicoureteric reflux. There is about a 30% chance of other children in the same family having the condition, and we might suggest doing an ultrasound on them if the initial child has severe reflux ■

If you would like to receive additional copies of the *What I tell my patients about...* features from this issue, please send your request and mailing address by post to Charlotte Rust at Hayward Medical Communications, Rosemary House, Lanwades Park, Kentford, Newmarket CB8 7PW.

NB: *Kidney and bladder problems detected before birth by ultrasound* is available from the Secretary, Children and Young People's Kidney Unit, City Hospital, Nottingham NG5 1PB

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Key points

- **Ultrasound examinations are now a routine part of antenatal care.**
- **When a problem is detected in the baby's kidney or bladder, it may take repeated ultrasound examinations to discover what is wrong.**
- **Most abnormalities occur as isolated problems affecting only the baby's urinary tract.**
- **The vast majority of babies with urinary tract problems require no operations, either while they are in the womb or after birth.**
- **Some kidney abnormalities run in families but the only one we would consider screening other children for is vesicoureteric reflux.**