



Kapi'olani Pediatric Urology **Vesicoureteral Reflux**

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What is vesicoureteral reflux?

Vesicoureteral Reflux (VUR or simply reflux) occurs because of a developmental abnormality where the kidney connects to the bladder. Urine normally flows in a one-way direction from the kidneys down connecting tubes called ureters into the bladder. See Figure 1. A valve-like mechanism in the bladder prevents urine from jetting back upstream. In children with reflux, a problem occurred during fetal development, causing and the ureter(s) to become slightly displaced from their normal location. The result is a malfunction of the one-way valve-like mechanism. The problem occurs with varying degrees of severity. See Figure 2. Treatment depends on what degree of reflux your child has. As children grow there is a possibility that low grades of reflux will resolve spontaneously.

The most significant problem posed by reflux is that kidneys may become exposed to infectious organisms (pyelonephritis) if the urine becomes infected. This can cause considerable damage and scarring to the kidneys if unrecognized or if there is delay in treatment.

Reflux occurs in one to two percent of children, more often in those of Scandinavian and northern European descent and rarely in those of African descent. The condition is genetically linked and runs in families. Reflux may be found in 20 to 50 percent of children who have had a urinary tract infection.

(see next page)



Figure 1. Levels of the urinary tract

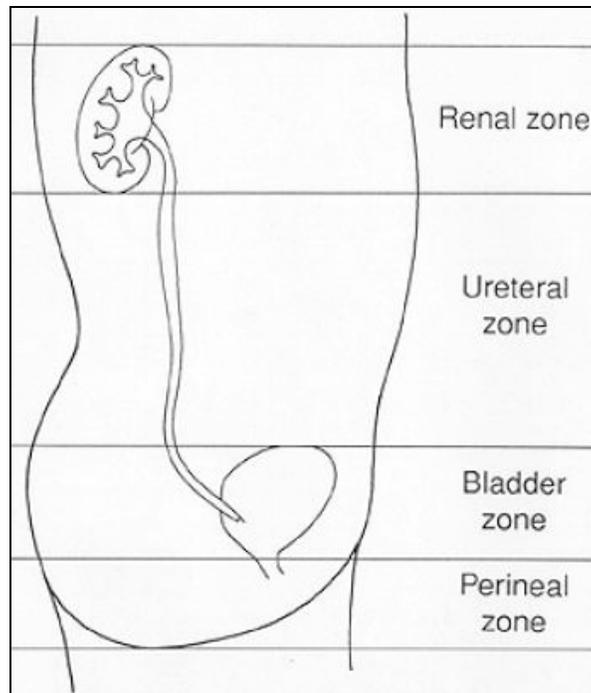
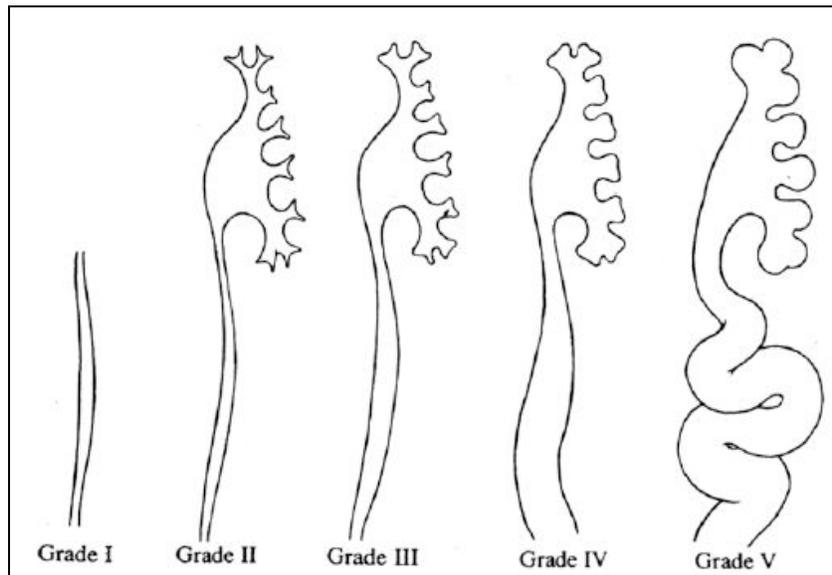


Figure 2. The grades of reflux



How is reflux diagnosed?

- **Urinary tract infection.** Reflux does not cause any noticeable symptoms (such as pain), but if urine becomes infected, the child may develop fever, abdominal or side pain, and may experience urinary urgency, frequency, and burning. The diagnosis of reflux is made after the infection is recognized, treated, and an x-ray of the bladder (voiding cystourethrogram – VCUG) is performed. The x-ray will show the extent of the reflux as well as any other bladder or urethral abnormalities.
- **Newborns with hydronephrosis.** Another way reflux may be detected is during the workup of newborn babies who were found to have prenatal dilation of the urinary tract (hydronephrosis).

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One of the causes of this dilation is reflux, so a VCUg will be performed to confirm or rule out the diagnosis.

- **Siblings and children of refluxers.** Siblings of children with reflux (less than school age) or babies born to mothers with a history of reflux should undergo screening by ultrasound and VCUg to make sure they do not have reflux. Again, this condition is silent and may not be detectable except by VCUg.
- **Other tests.** An ultrasound of the kidney and bladder will need to be performed to assess the tissues of the kidney and bladder. Another test called a renal scan may be required to more carefully assess scarring in the kidney and the overall kidney function.

How is reflux treated?

There are three treatment approaches, depending upon the severity of reflux. They are observational, medical, and surgical.

- **Medical.** The daily use of low-dose antibiotics is an effective way to prevent recurrence of kidney infections while waiting for the reflux to either resolve or be corrected surgically. This may take years depending on how young the child is and degree of reflux at time of diagnosis. Antibiotics in low dose have been shown to be very safe for children, even if taken for long periods of time. The risk of side effects (such as developing an allergic reaction) is very low. A potential risk is the development of a urinary infection with bacterium that may be resistant to the antibiotic the child has been taking.

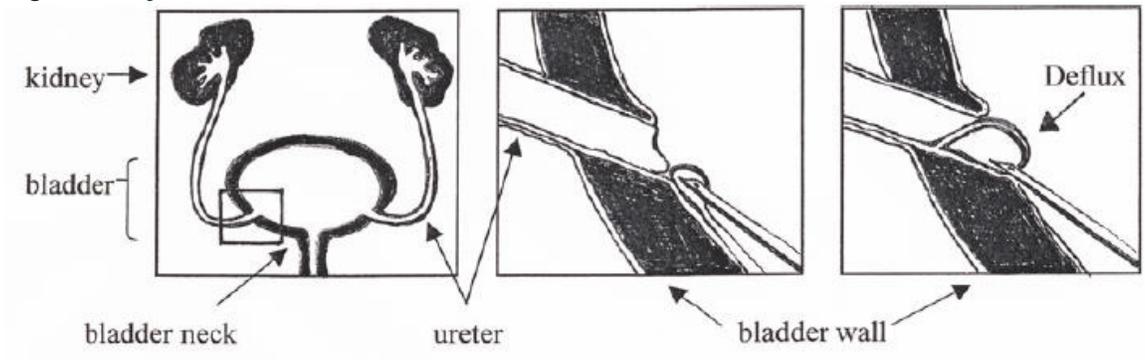
Another important part of medical therapy for reflux is making sure the child has developed normal toileting behavior and does not have urinary holding, urinary accidents (during the daytime only), and/or constipation (infrequent, hard stools) or stool soiling in the underwear. Presence of any of these factors may mean that the child may not be emptying the bladder completely when voiding or that there is abnormally high pressure in the bladder during voiding. Your doctor and nurse will make sure that elimination dysfunction is completely addressed because it has been shown to be an important factor in preventing urinary tract infections.

- **Surgical.** If your child has grade IV or V reflux, the chance of outgrowing the reflux is small and the risk of kidney infections is high, despite medical treatment. Further, if a child on medical treatment for any grade of reflux experiences a “breakthrough” infection, the kidney may be at risk for further damage and scarring. For these reasons, surgery is usually recommended. There are two main types of operations to correct reflux, open or endoscopic.
 - An open operation is the most successful way to correct the reflux with success rates as high as 98 percent. A small incision is made just above the pubic bone (below the bikini line). One of two approaches is taken to re-implant the refluxing ureters back into the bladder in such a way to restore the one-way valve effect. The first approach is through an opening in the bladder (intra-vesical technique). The second is to go behind the bladder and make the repair from outside (extra-vesical technique).

The open bladder technique will require a hospital stay of two or three days. The extra-vesical technique calls for one day in the hospital. Low-dose antibiotics are given for about three months after the operation. No additional bladder x-ray (VCUG) is necessary. Drawbacks with an open operation are the discomfort afterward and the postoperative recovery. If the operation was performed by opening the bladder, the child may experience bladder spasms (severe urgency) and blood in the urine for several days following the surgery. Children are usually ready to return to school after a week. If the operation is done behind the bladder for both ureters, there is a small possibility that the nerves that enable bladder emptying may be “stunned” and make it difficult to empty the bladder (urinary retention). If this happens, a catheter would be left in place for several days until normal sensation returns. For this reason, the operation behind the bladder is usually selected when a child has reflux only in one ureter. Leaving the other side undisturbed prevents the problem of urinary retention.

- Endoscopic correction of reflux entails inserting a small scope into the urethra and bladder under general anesthesia. *(see next page)*
 In this brief procedure, the surgeon will inject a biocompatible substance called Deflux through the scope into the bladder and ureter. See Figure 3. This permanent substance will enhance the muscular backing of the junction of the ureter and bladder. Although the success rate of endoscopic treatment is less than that of an open operation (70 to 80 percent), the advantages are distinct. The operation is done as an outpatient and is painless. The child resumes normal activity on the same day. Another drawback with the endoscopic procedure is the need for a post-operative bladder x-ray (VCUG) three months later. If there is still reflux present, it is usually of a lower grade and may be amenable to re-treatment with Deflux or observation.

Figure 3. Injection of Deflux beneath the ureter



- **Post-operative tests.** An ultrasound will be performed one month after the operation (open or endoscopic) to check on the healing of the ureter. If endoscopic Deflux treatment is done, a VCUG will be performed at three months. If the open operation is performed, no VCUG is necessary. Preventive antibiotic treatment will be necessary for three months after both types of operations.

What are the long-term effects of reflux?

Scarring of the kidneys from infection can lead to high blood pressure and possible kidney failure. Usually the most significant renal scarring occurs with the first severe infection. Once scarring has occurred, it is irreversible.

When girls affected by reflux grow to child-bearing age, there is a higher chance that kidney infections may return. The reason for this predisposition is not clear. It is important for pregnant women with a history of reflux to have themselves checked again.

Because the reflux condition is genetically transmitted, there is a 50 percent chance that the child will transmit the gene to his or her offspring.

If you desire to make an appointment or have questions about reflux, please Kapi'olani's Pediatric Urology Office at (808) 983-6210.