Anatomy of the Genitourinary System

In most people the urinary system consists of two kidneys that are drained by ureters into the bladder. The kidneys are solid organs in the back of the abdomen, below the ribs. The kidneys filter blood and remove waste products. The waste is then passed out of the body as urine. The kidneys drain into narrow tubes called the ureters. The ureters carry urine to the bladder. The bladder is a hollow, muscular organ in the lower abdomen. The bladder wall relaxes and expands to store urine. It then contracts to empty urine through the urethra. The urethra is a tube which allows urine to pass outside the body during the voiding process. This is also called urination.

Vesicoureteral Reflux (VUR)

The two ureter tubes travel through the bladder wall creating a type of one-way valve. When the bladder is full or during urination, this valve is “pinched off” or closed. This prevents urine from flowing backward toward the kidneys. In patients with vesicoureteral reflux this valve does not work well. Vesicoureteral reflux (VUR) is when urine flows backward from the bladder toward the kidney. Reflux affects about one percent of all children. It is more common in girls than boys. It also tends to run in families. Siblings of children with reflux have about a 25-35 percent chance of also having reflux. Some suggest that siblings of children with reflux also be screened.

Reflux can lead to serious health issues. Reflux can expose the kidneys to infection, called pyelonephritis. It can also lead to scarring of the kidneys. Renal scarring can lead to impaired growth of the kidneys, hypertension, and complications during pregnancy. The greatest risk of renal scarring after an infection is during the first five to six years of life. Reflux may also cause urinary incontinence or frequent urination.
Grading VUR

Reflux is graded on a scale of 1-5 (1 is the least severe, Grade 5 most severe). About 80 percent of children with Grades 1 or 2 will outgrow their reflux within five years. About 50 percent of children with Grade 3 will also outgrow their reflux within five years. The more severe the reflux, the less likely it is that the child will outgrow it. As few as 10 percent of children with Grade 5 reflux will outgrow it.

How is VUR diagnosed?

Reflux is diagnosed by doing a test called a voiding cystourethrogram (VCUG). During this test a small catheter is placed in the urethra into your child’s bladder. The bladder is filled with X-ray contrast “dye.” X-rays are taken during filling and during urination. We need to do the VCUG while your child is awake. This is so he/she can tell us when their bladder feels full. Your child will also need to be able to urinate during the test. There may be mild discomfort. In most cases, this does not require medicine. American Family Children’s Hospital Child Life Specialists can be there to help distract and play with your child during this test. Parents are encouraged to stay close to their child throughout this test to help comfort them.

Children with reflux will also have routine ultrasounds of the kidneys and bladder. This is to assess for renal growth and the presence of hydronephrosis. Hydronephrosis is dilation of the kidney. It can go along with vesicoureteral reflux.

VUR and Voiding Dysfunction

For many children vesicoureteral reflux is caused by dysfunctional voiding. Dysfunctional voiding is when the pelvic floor muscles contract during voiding. Symptoms may include urinary urgency, frequency, and incontinence. This may result in high pressure urination or filling of the bladder. This then leads to vesicoureteral reflux. The prompt evaluation and treatment of voiding dysfunction will improve or resolve vesicoureteral reflux.

Your provider may order a test called uroflow with electromyography (Uroflow/EMG). This test will assess your child’s bladder. The test will tell us how fast urine flows out of the bladder and the quality of the urinary stream. The test will also assess the muscle activity during urination.

Treatment of voiding dysfunction involves pelvic floor muscle rehabilitation or biofeedback. Treatment may improve or resolve vesicoureteral reflux.

How is VUR treated?

Most children will outgrow reflux. The treatment plan for your child will depend on his/her age. It will also depend on the presence of urinary tract infections and the grade of reflux. Urinary tract infections can also cause kidney scarring. To prevent urinary tract infections your child will be prescribed a daily antibiotic. A VCUG and renal bladder ultrasound will be performed every 12 to 18 months. These tests are done until the reflux has resolved or the decision has been made to proceed with surgery.

Surgical Management of VUR

Although most children with reflux will outgrow it, some do require surgery. Your child may need surgery if urinary tract infections are present despite antibiotics, the reflux is getting worse, your child has trouble taking the antibiotic, or if your child has severe reflux. Other reasons for surgery include advanced age in which reflux has not resolved, decline of renal function or failure of renal growth, and presence of other birth defects.

If surgery is needed, there are two options to correct vesicoureteral reflux. One option is ureteral reimplantation. The other option is outpatient endoscopic minimally invasive treatment. Both of these are performed with general anesthesia at American Family Children’s Hospital.
Tools will be inserted through the incisions. The robot is then brought to the patient. It has several different arms. These arms will be attached to the tools. The surgeon controls the robot arms at a console to perform the procedure. The skin openings are closed with stitches and waterproof glue. This will dissolve on its own in about one week.

After surgery, your child will spend one or two nights in the hospital. He or she will then return for a clinic appointment after surgery. A VCUG will be done about three months after surgery. This is to confirm the reflux is no longer present. Your child will keep taking antibiotics until a VCUG confirms that the reflux has fully resolved. Your child will also need kidney and bladder ultrasounds for about two years after the surgery.

Endoscopic Treatment

This treatment uses a gel-like material called Deflux. It is a minimally invasive method of treating lower grades of reflux. Deflux is a material made from two synthetic sugars. A small tool is passed through the urethra. The Deflux material is injected where the ureter meets the bladder. The Deflux gel provides a better backing, or support to the ureter. It helps form a better one-way valve system. This prevents the reflux of urine up towards the kidneys. Treatment of Grade 3 or less VUR has a success rate of about 75-80 percent. You can repeat this treatment if needed.

For this treatment, your child will be asleep with general anesthesia. This is called a minimally-invasive procedure because no incisions are made. Your child will come to the hospital and go home the same day. Children will return for a clinic appointment about one month later. Your child will have a kidney and bladder ultrasound. About three months later your child will need a VCUG. Your child should keep taking antibiotics until the VCUG confirms reflux has resolved.

Common Questions

Is VUR harmful?

Lower grades of reflux are not believed to be harmful if no infection is present. Children who have a higher grade of reflux have an increased risk of getting an infection. Pyelonephritis can lead to kidney scarring which is harmful and can cause future health problems. It is crucial that children with reflux are placed on a daily antibiotic to prevent infection.
Is a daily dose of an antibiotic safe?

A daily antibiotic can help prevent infection. In most cases antibiotics given in a small dose are safe and rarely cause long term problems. The risk with daily antibiotic use is far less than the risks with infection. Your primary care provider will answer any questions you may have about the safety of antibiotics. Your provider can also talk to you about how they are used to manage children with reflux.

How often will my child need a VCUG?

Children will need a renal bladder ultrasound and a VCUG every 12 months.

What are signs of a urinary tract infection?

Signs of urinary tract infection vary with your child’s age. They can include fever, abdominal, side, or back pain, blood in the urine, burning during urination, vomiting, urinary urgency and incontinence. If children with reflux have any of these symptoms they should have a urine sample checked.

It can be hard to tell if infants are showing signs or symptoms of urinary tract infection. Symptoms can include fever, irritability, and decreased feeding. If your infant has reflux and has a fever or any other symptoms that concern you, he or she should be checked for infection. A catheter will be used to collect a urine sample from an infant.

Does reflux run in families?

Yes, VUR does tend to run in families. Siblings of children with reflux may have as high as a 35 percent chance of also having VUR. We suggest that younger siblings are screened for reflux with a VCUG and/or kidney and bladder ultrasound.

Contact information

If you have questions about vesicoureteral reflux, please call the Pediatric Urology Clinic at (608) 263-6420.