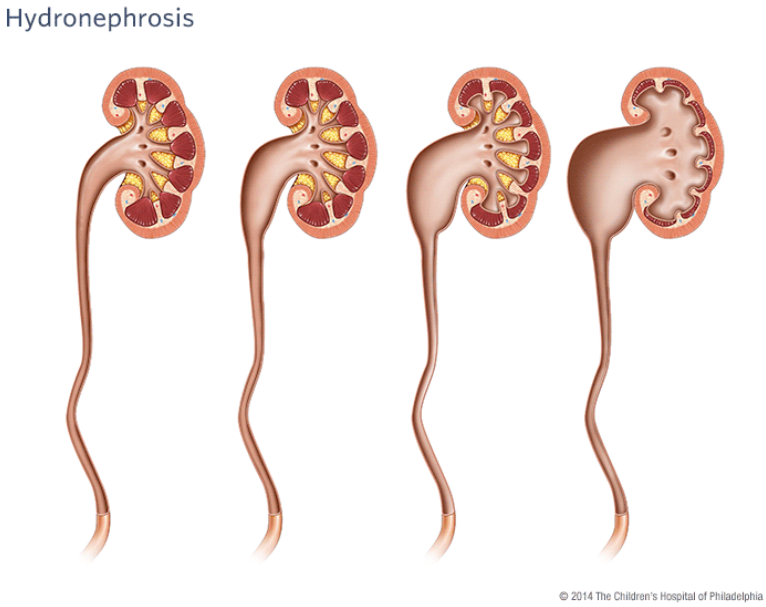
CORONAVIRUS UPDATES
Get the latest information about how CHOP is responding to COVID-19, policies in place to keep our patients, families and staff safe, what to expect during your visits, visitor restrictions and more »

Children's Hospital of Philadelphia

Hydronephrosis/Urinary Tract Dilation

What is hydronephrosis?

Hydronephrosis, also known as urinary tract dilation, is when the area of the kidney where urine is collected is enlarged, or dilated. It can range from mild to severe, depending on the cause of the dilation. Often children who have hydronephrosis have it from the time of birth.



Hydronephrosis or urinary tract dilation refers to dilation of the pelvis and calyces of the kidney where urine is collected. Pictured left to right: Normal appearance of the renal pelvis, followed by increasing severity of hydronephrosis.

Prenatal hydronephrosis (which may also be called antenatal hydronephrosis, or fetal urinary tract dilation) is one of the most common fetal anomalies diagnosed before birth.

Due to the increased use of prenatal ultrasound, hydronephrosis is now found in 1 out of 100 pregnancies. Hydronephrosis can be detected on ultrasound as early as the first trimester of pregnancy and is typically seen on the anatomy ultrasound around 20 weeks' gestation. In most cases, prenatally diagnosed hydronephrosis is followed throughout the remainder of the pregnancy with repeated ultrasounds.

The repeated ultrasounds will monitor amniotic fluid levels, the amount of dilation, if the dilation is in one kidney or both, if the ureters are dilated, and if there is normal filling and emptying of the bladder.

Children's Hospital of Philadelphia (CHOP) developed a detailed clinical pathway for providers dedicated to the evaluation, monitoring and management of perinatal urinary tract

CONTACT US
DIVISION OF UROLOGY
9 LOCATIONS

Appointments, Referrals and Video Visits
215-590-2754

Fax
267-426-7335

REQUEST AN APPOINTMENT
CONTACT US ONLINE

dilation/hydronephrosis.

Causes of hydronephrosis

- **Vesicoureteral reflux (VUR)**. VUR is a condition in which urine travels backward from the bladder up towards the kidney. This may affect one or both ureters (the tubes that normally carry urine from the kidney to the bladder).
- **Obstruction or blockage**. An obstruction can occur at any location along the urinary tract:
  - The ureteropelvic junction (UPJ), where the ureter is connected to the kidney
  - The ureterovesical junction (UVJ) where the ureter enters the bladder; this can be an intrinsic narrowing, or may be associated with ureterocele, which is a balloon-like obstruction at the end of the ureter
  - In the urethra in boys (posterior urethral valve, PUV)
- **No significant abnormality**. The dilation in many of these kidneys eventually resolves over time and no specific etiology is discovered.

Signs and symptoms of hydronephrosis/urinary tract dilation

Many children with hydronephrosis or urinary tract dilation may not have any symptoms. About 75% of hydronephrosis detected before birth will resolve on its own. In more severe cases of hydronephrosis, some babies will not have any symptoms, while other children may experience acute kidney pain, bleeding or urinary tract infections, depending on the underlying cause.

Testing and diagnosis of hydronephrosis

Renal bladder ultrasound (RBUS)

This procedure uses sound waves to outline the kidneys and bladder. It will enable us to see the degree of hydronephrosis.

Images from the ultrasound are used to evaluate the size and appearance of the "collecting system" (which is made up of the renal pelvis and calyces), and the appearance of the renal parenchyma, ureter and bladder.

Voiding cystourethrogram (VCUG)

In a voiding cystourethrogram (VCUG), a catheter (tube) is placed through your child's urethra into the bladder. The tube will be used to slowly fill the bladder with a contrast solution and pictures will be taken.

While the bladder is being filled, a special machine (fluoroscopy) is used to take pictures. If special ultrasound contrast is used, these pictures can be taken with an ultrasound machine (this is called a contrast-enhanced voiding cystourethrogram or CeVUS). The radiologist looks to see if any of the solution is going back up into the kidneys. This study confirms the diagnosis of VUR.

Additional pictures are taken while your child is urinating. The radiologist will look at the urethra while urine is passing to be sure there is no blockage noted (PUV, or improper contraction of the urethral sphincter).

MAG III renal scan

This study may be performed to determine how each kidney is functioning and how well the kidney drains into the ureter and down into the bladder. An intravenous line (IV) is used to inject a special solution called an isotope into the veins. The isotope is processed by the kidney so that it can show how well the kidney works. A catheter will also be placed into your child's bladder to make sure the bladder is empty all the time. Pictures of the kidneys will be taken with a large X-ray machine that rotates around your child.

MRI/MRU

MRI is a radiation-free diagnostic procedure that uses a combination of a large magnet, radiofrequencies and a computer to produce detailed images of the body.

Magnetic resonance urography (MRU) also requires an intravenous line (IV) to inject a contrast called gadolinium, and a catheter will also be placed into your child's bladder. The contrast is processed by the kidney so that the MRI can capture very detailed pictures of the kidneys, ureters and bladder. This study helps us understand how well the kidneys function and drain, as well as showing the anatomy very clearly.

Hydronephrosis treatment

Our team in the Division of Urology will take a thorough history, review any imaging with you, and tailor a hydronephrosis treatment plan based on your child's individual needs.

Treatment for hydronephrosis depends on several factors, including the cause of the hydronephrosis, if it is causing any symptoms (pain, infection), or if the hydronephrosis may be causing any damage to the kidney over time. Treatment may include:

- Close observation with periodic ultrasound to make sure the dilation in the kidney goes away
- Use of a low dose of antibiotic once a day to prevent infection
- Surgery

Every child is different, and so each treatment plan is tailored to your child's specific needs.

Resources for clinicians

This clinical pathway can be used to guide the evaluation and management of patients presenting with ultrasound findings of perinatal urinary tract dilation (UTD). This pathway should be used by pediatricians, neonatologists, and urologists to guide risk based evaluation and treatment based on pre-natal and post-natal ultrasound findings.

Review the pathway: Evaluation and Management of Neonates Presenting with Findings of Perinatal Urinary Tract Dilation.

Reviewed by Dana A. Weiss, MD, Jennifer Kirk, BSN, MSN, CPNP

Providers Who Treat Hydronephrosis/Urinary Tract Dilation

Douglas A. Canning, MD

Thomas F. Kolon, MD

Christopher J. Long, MD

Sameer Mittal, MD, MSc

Aseem R. Shukla, MD

Arun K. Srinivasan, MD, MRCS

Gregory E. Tasian, MD, MSc, MSCE

Jason Van Batavia, MD

Dana A. Weiss, MD

Mark R. Zaontz, MD

Stephen A. Zderic, MD

CONTACT US

DIVISION OF UROLOGY

9 LOCATIONS

Appointments, Referrals and Video Visits
215-590-2754

Fax
267-426-7335

©2020 The Children's Hospital of Philadelphia

Language Assistance Available: