Hydronephrosis

Hydronephrosis is an extension of the calyces and renal pelvis (" dilatation of **C**alyceal-**P**elvical **S**ystem"), which is due to congestion of urine and its persistence can lead to atrophy of the renal parenchyma.

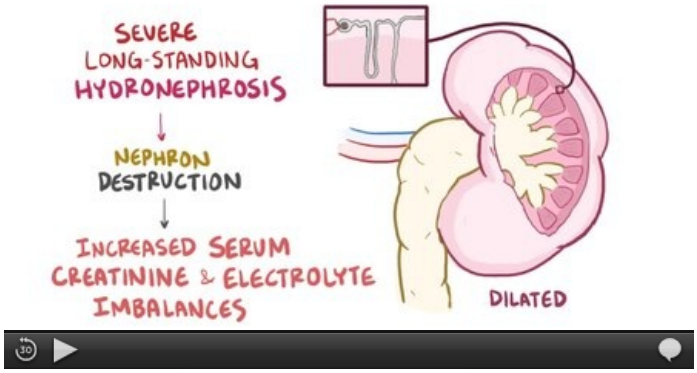
Etiology

- **Primary (congenital) hydronephrosis**:
  - *Pyeloureteral junction obstruction* (PUJ), ie. pelvic to ureteral transition - mostly caused by narrowing of the PUJ, persistent and fixed embryonic folds of the ureter, anomalous distance of the ureter or its compression, accessory or aberrant vessel; secondary obstruction in urethral angulation during dilatation and elongation caused by VUR or UVJ obstruction;
  - *Ureteral-vesical junction obstruction* (UVJ), ie the transition of the ureter into the urinary bladder - the most common cause is the aperistaltic juxtavesical section of the ureter, which leads to dilatation of the ureter - when dilated above 7 mm, it is referred to as **megaureter**;
  - Obstruction associated with *duplication of CPS and ureter*:
    1. ureterocele (cystic dilatation of the intravesical part of the ureter, which can cause drainage failure and subsequent megaureter),
    2. ectopic ureter (leads outside the top on trigonum),
    3. posterior urethral valves.
  - Vesicoureteral reflux (VUR);
  - high distance of the ureter from the pelvis;
- **Secondary**:
  - ureterolithiasis,
  - stricture and stenosis of the ureter,
  - ureteral tumor compression ,
  - mucosal valves,
  - urethral stricture,
  - external sphincter spasms,
  - phimosis.

When obstructing the bladder - unilateral hydronephrosis; bladder disorders and more distally - bilateral hydronephrosis.

Clinical Manifestation

- Most **primary hydronephrosis** is asymptomatic and is diagnosed through prenatal or postnatal neonatal screening. Less often, the first symptom is acute pyelonephritis, abdominal pain, palpable resistance in the abdomen or growth failure.
- The symptomatology of **secondary hydronephrosis** is based on the cause. These are usually nephralgia, hematuria, renal colic, acute pyelonephritis. Recurrent urinary tract infections with fever, abdominal pain, haematuria and pyuria may also occur. In the case of a solitary kidney, there can be oliguria or anuria as a symptom, if the obstruction is complete.



English summary video - definition, pathogenesis, symptoms, complications, treatment.

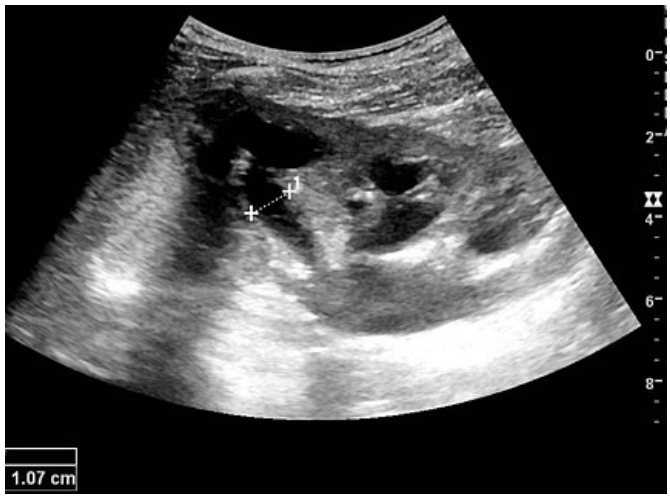
Complications

- polyuria,
- arterial hypertension,
- infectious urinary tract lithiasis,
- chronic kidney disease.

Diagnosis

- Ultrasound of the kidneys and urinary tract (prenatal and postnatal);
  - kidney length and width, parenchymal echogenicity and degree of dilatation of the CPS according to the *Society for Fetal Urology (SFU)* are evaluated:
    1. degree: slightly enlarged pelvis;
    2. degree: enlarged pelvis and one or more calyces;
    3. degree: dilated pelvis and all calyces;
    4. degree: large dilatation of the pelvis and calyces and reduction of the renal parenchyma;
  - it is recommended to examine the newborn babies at the earliest after 48 hours of life, preferably on days 3 to 4, due to lower hydration and physiological oliguria in the first days of life; very early ultrasound examination is indicated only in case of severe prenatal findings (suspicion of the posterior urethral

valve, significant bilateral dilatation of the CPS, ...); the frequency of control ultrasounds depends on the severity of the finding;
    - physiological findings in infants: parenchyma width > 8 mm, its echogenicity is equal to or higher than liver echogenicity, 1st-degree dilatation according to SFU, intrarenal pelvic width < 10 mm, the diameter of the ureter < 5 mm;
- dynamic scintigraphy of the kidneys – mutual comparison of the functional ability of the kidneys; shows the kinetics of intravenously administered radiopharmaceuticals (MAG3) and their transport through the urinary tract; a diuretic curve can be obtained by administering furosemide; it is performed in indicated cases between the 4th and 6th week of life;
- excretory urography – currently less used;
- magnetic resonance – native MR-urography with 3D reconstruction, MR-angiography with 3D reconstruction, diuretic 3D MR-urography.



Ultrasonography of hydronephrosis with dilated anechoic pelvis and calyces, along with cortical atrophy.

Treatment

- **Primary hydronephrosis**:
    - Mostly tend to adjust spontaneously. Patients undergo repeated USG and isotope examinations.
    - Cases with low relative function (<35%) of the affected kidney confirmed on first isotope examination, kidney with extreme dilatation of the CPS (≥ 50 mm in the anteroposterior dimension) or if dilatation increases or decreases relative kidney function during follow-up is indicated for surgical treatment. Furthermore, patients with symptomatic congenital hydronephrosis (pain, recurrent pyelonephritis, ...) are also indicated to undergo the surgery. During the operation, so-called **pyeloplasty** is performed, most often of the resection type. Part of the renal pelvis, pyeloureteral junction and part of the proximal ureter is removed. The ureter is then pulled out, cut and sutured to the rest of the renal pelvis.
- **Secondary** – elimination of the root cause.

- In indicated cases (eg recurrent urinary tract infections) long-term antibiotic therapy is used.
- Nephrectomy of the dysfunctional kidney.

Prognosis

It depends on the cause, duration and extent of hydronephrosis.

- **In primary hydronephrosis,** in case of early surgery, the renal function returns to baseline. If the obstruction lasts a long time (the patient didn't go to the checkups), the decline in function may be permanent.
- **The prognosis of secondary hydronephrosis** is determined by the underlying cause of the disease and the duration of the urinary outflow obstruction.

References

Related Articles

- Urolithiasis
- Vesicoureteral reflux
- Radiodiagnostic examination of the urinary tract

Exteral Links

- Doporučené postupy ČLS JEP: Hydronefróza (http://www.cls.cz/dokumenty2/postupy/t174.rtf)

Použitá literatura

- HANUŠ, Tomáš. *Urologie.* 1. edition. V Praze : Triton, 2011. 207 pp. pp. 21-23. ISBN 978-80-7387-387-5.
- ŠMAKAL, O.. *Obstrukční uropatie dětského věku* [online]. ©2007. [cit. 2012-09-19]. <https://www.prolekare.cz/specialist-agreement>.
- MUNTAU, Ania Carolina. *Pediatrie.* 4. edition. Praha : Grada, 2009. 440 pp. ISBN 978-80-247-2525-3.
- BENEŠ, Jiří. *Studijní materiály* [online]. ©2008. [cit. 2010-01-15]. <http://jirben.wz.cz>.