Kidney Examination

Kidneys belong among the most important organs in our body. They not only eliminate waste products and potentially harmful substances into the urine, but they also help to maintain blood pressure and internal environment, including the bone metabolism. For this reason, severe kidney diseases may significantly affected the whole organism and cause life-threatening complications.

Examination methods

Anamnesis and physical examination

We should focus on gaining information about any clinical signs of difficulties that may be related to disorders of kidney functions (of acute or chronic renal failure, symptoms of renal colic, pyelonephritis, nephrotic syndrome, etc.). We should have also information about the patient's known diseases and current medication. Physical examination should focus on palpation and percussion of the kidneys. Under normal circumstances, the kidneys are practically impalpable and painless.

Blood tests

We evaluate serum concentration of the so-called renal parameters - substances known as urea and creatinine. These nitrogen substances are eliminated from the body by the kidneys and their serum concentration increases during acute or chronic renal failure. In addition, we should evaluate concentrations of certain ions that can be affected by impaired renal functions such as calcium, phosphate, potassium and others.

Urinalysis

Urine is a liquid produced by the kidneys and therefore, its composition can give us a lot of information about the kidney functions. The density of the urine may be indicative of renal concentrating ability (the ability to concentrate the urine). Bacteria in urine can occur in urinary tract infections, blood in urine may be present in infections, glomerulonephritis or kidney cancer. Protein in the urine may be associated with a variety of kidney diseases, including kidney damage in chronic diabetes and in glomerulonephritis.

Examination of the filtering ability

This is a very important examination, which helps to evaluate the ability of the kidneys to filter the blood. The unit of filtration capacity is typically done in milliliters per second [ml/s]. The value can be inaccurately counted from concentration of urea and creatinine, gender, age and weight by using special formulae. The most accurate information can be counted from the amount of a substance (usually the creatinine) excreted into the urine within 24 hours. The calculation needs collecting the urine for 24 hours, assessing its volume and taking a sample to know the concentration of creatinine in urine.

Imaging methods

The most basic imaging method is abdominal X-ray focused on the urinary tract. It helps to diagnose certain types of urinary stones. Abdominal ultrasound is great in diagnosing obstruction of ureters and
hydronephrosis, kidney cysts and both benign and malignant kidney affections. An experienced doctor can use the ultrasound to confirm pyelonephritis, but this is not always reliable. When in doubt, it is possible to perform more sophisticated computed tomography or intravenous urography. This procedure includes intravenous application of a contrast agent and observation of its excretion into the urine by X-ray.

**Ureteroscopy**

This is a urologic endoscopic examination method when a special tube with a video camera is introduced through the urethra into the urinary bladder and further into the ureter towards the renal pelvis, which is a place where the urine is drained from the kidney. The ureteroscopy allows to diagnose tumors or urinary stones located in the urinary tract.

**Kidney biopsy**

This is a procedure that is performed rather in specialized nephrological departments. The target kidney is punctured by a special needle, which allows to obtain a small samples of tissue for further examination. It is very valuable when we suspect any kind of glomerulonephritis.

**Other examinations**

We must not forget that an extensive kidney examination should include checking the blood pressure and blood glucose (glycemia) to exclude the influence of untreated high blood pressure or diabetes on the kidney damage.

**Conclusion**

The examination of kidneys aimed to diagnose a renal affection should begin from the most accessible and minimally invasive. The conversation focused on patient's problems and medical history should be followed by physical examination, blood tests, urinalysis and basic imaging methods, especially by abdominal ultrasound. Further approach depends on the result of these examination methods.