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MODERN MEDICAL METHODS OF EARLY DETECTION AND TREATMENT OF KIDNEY STONE DISEASE

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Abstract

The purpose of this article is to study the methods of treatment of kidney stone diseases in modern medicine and to evaluate its practical importance and effectiveness. Diagnosis and treatment of kidney stone diseases consists of pharmacological and invasive approaches, as well as analysis of modern medical technologies.

Key words

Nephrolithiasis, polyetiological, simple urography, excretory urography, renal colic, pyelonephritis, shock wave lithotripsy, ureteroscopy, percutaneous nephrolithotomy

Introduction: The human urine production and excretory system consists of the kidneys and the organs that collect and excrete urine from the body - the urethra, the bladder, and the excretory duct.

Kidneys: Kidneys are paired organs , the main activity of which is to separate metabolic products and foreign substances that need to be removed from the body, to ensure constant exchange of extracellular fluid, and to manage a number of other tasks. It is large bean-shaped, 10-12 cm long, 3-4 cm thick, and weighs about 150-170 g. The kidneys are located behind the abdominal cavity on the sides of the spine. The upper pole of the left kidney is in the area of the XII thoracic vertebra, and the lower pole is between the II and III lumbar vertebrae. The right kidney is located 2-3 cm below the left. The upper part of the kidneys is adjacent to the adrenal gland.

The main functional element of the kidney is called the nephron, and it is the urine-producing system that forms its structural unit. Each kidney of a healthy

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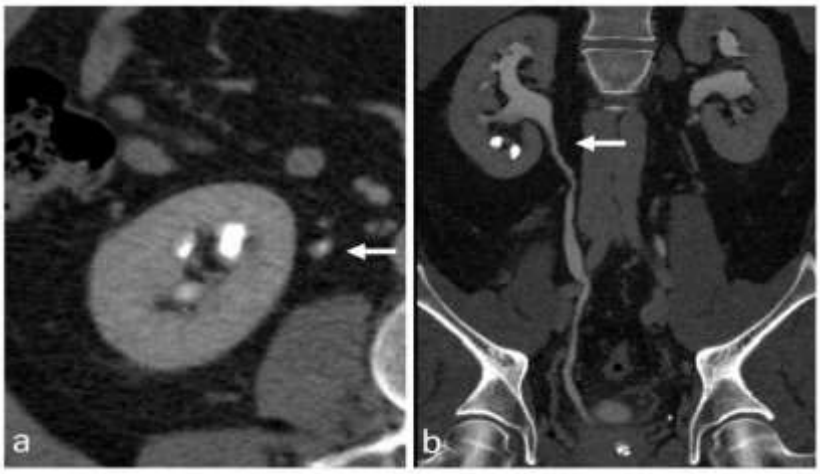
person has about 1.3 million nephrons. Each nephron is 50-55 mm long and consists of tubules and capsule.

The article discusses the causes, symptoms, diagnosis and modern treatment methods of kidney stones.

Materials and methods: The article uses scientific research methods such as analysis of existing scientific literature, comparative analysis, modern computer technologies.

X-ray examination takes the leading place in the detection of stone disease in the kidney and urinary tract. The most common method is simple urography. With its help, we can determine the size and shape of the stone, as well as its localization. A normal urogram should cover the entire area of the kidneys and ureters on both sides. After reviewing the general picture of the urinary tract , excretory urography should be performed. Excretory urography allows us to determine the anatomical and functional state of the kidneys, to determine the type of pelvic cavity and the location of the stone. An important way to diagnose kidney stones is topography , which allows you to distinguish kidney stones from gallstones and other substances unrelated to the urinary system.



a, b- kidney stone disease

Figure 1. The result of urographic examination of the kidney.

Results and Discussion: Kidney stone is a chronic, relapsing metabolic disorder characterized by the presence of stones (concrements) in the urinary system, that is, in the kidney, bladder, and urinary tract. Kidney stones are 3 times more common in men than in women. It occurs more often in the elderly than in people of active age. Kidney stone disease is a polyetiological disease, that is, the cause of origin is different. Every year, more than half a million people go to the emergency room because of pain caused by kidney stones.

kidney stones according to the international classification:

1. Stones in the kidney and urinary tract;

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2. Stones in the lower urinary tract;

According to their location, kidney stone diseases are divided into such types as nephrolithiasis if they are in the kidney, ureterolithiasis if they are in the urinary tract, cystolithiasis if they are in the bladder, and urethrallithiasis if they are in the urethra.

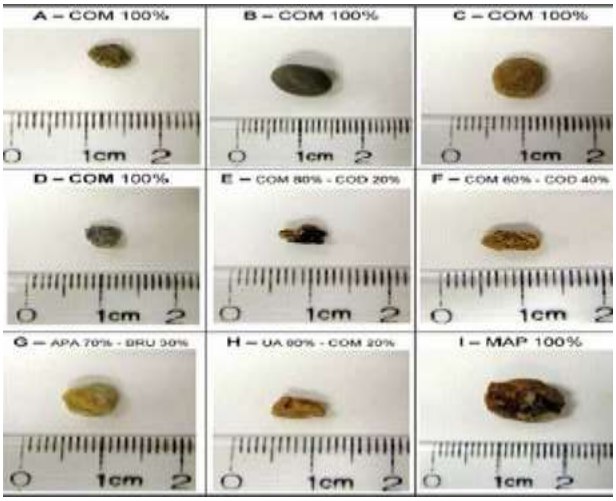

Figure 2. Sizes of kidney stones.

are formed from chemicals in the urine. According to the composition of kidney stones, there are 4 types, namely 1.Uric acid, 2. Calcium oxalate, 3.Urate, 4.Cystine. Kidney stones are divided into 4 groups according to their size. Stones with a diameter of less than 0.5 cm can migrate into the urethra and bladder. Stones with an average diameter of 0.5-1 cm, such stones remain in the kidney and may not interfere with kidney function. Large - stones with a diameter of more than 1 cm . In addition, mega stones can be found, their size can be up to 2 cm. Large-sized stones and mega-stones completely fill the spaces of the kidney and prevent its normal functioning, and may even cause the kidney to lose its full function. Kidney stones are available in round, oval, pointed, curved, crown and giant shapes.

Causes of the disease: Kidney stone disease is a pathology that a person cannot notice until the first symptoms of the disease appear. The main reason for the onset and development of this disease is a metabolic disorder, which leads to the formation of insoluble salts that form stones. Bad water or poor diet, climatic features of the region where a person lives, especially a very hot climate, taking certain medications, abnormalities of the urinary system, stricture of the urinary tract, hyperparathyroidism, deficiency of vitamins A and D, urinary system chronic inflammatory diseases and genetic factors can also lead to the development of kidney stones.

Symptoms of kidney stones:

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Depending on the location of the stone, the patient may have different symptoms. The main symptoms of this disease are:

- ✓ Paroxysmal pains . Stones in the kidney and stones in the upper part of the bladder are usually characterized by pain from the back or side under the ribs . it moves to the inner part, to the area of the stomach. In this case, severe pain - kidney colic begins.
- ✓ Blood in the urine. Renal colic is observed before blood in the urine in kidney stones. Cloudy or foul-smelling urine with sediment can also indicate a stone has passed.
- ✓ Worsening of the general condition, especially nausea, vomiting. These symptoms are especially typical for the beginning of inflammation - pyelonephritis.
- ✓ Sand or stone discharge - malaria and high fever may occur when the stone comes out.

Diagnostics:

In the event of the above-mentioned complaints, the main checks are carried out as follows:

1. Collection of anamnesis, examination of the patient;
2. Objective vision: palpation, percussion;
3. General clinical analysis of blood and urine;
4. Ultrasound examination of the urinary system. This non-invasive, safe and painless examination method can be used several times for dynamic control during treatment;
5. Examination and excretory urography;

Laboratory tests:

1. Multispiral computer tomography: it allows to see the stone, to calculate its density, size, architecture of the urinary system, and to see the condition of the surrounding tissues. If necessary, 3-D reconstruction can be performed;
2. Dynamic and static nephroscintigraphy, which allows to study the function of the kidneys and the degree of its deterioration;
3. With sensitivity to antibiotics, it is possible to determine the level of infection and inflammation in the urinary tract;

Treatment of kidney stones:

After receiving the results of the examination, the urologist determines the treatment tactics for a specific clinical condition. Today, there are various treatment methods for kidney stone disease, including:

- ➢ Medicines aimed at independent removal of stones;
- ➢ Medicinal treatment aimed at dissolving stones;
- ➢ Open surgical interventions;

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- Remote pulse-wave lithotripsy;
- Endoscopic contact lithotripsy;
- Percutaneous nephro lithotripsy;
- Endoscopic surgical interventions;

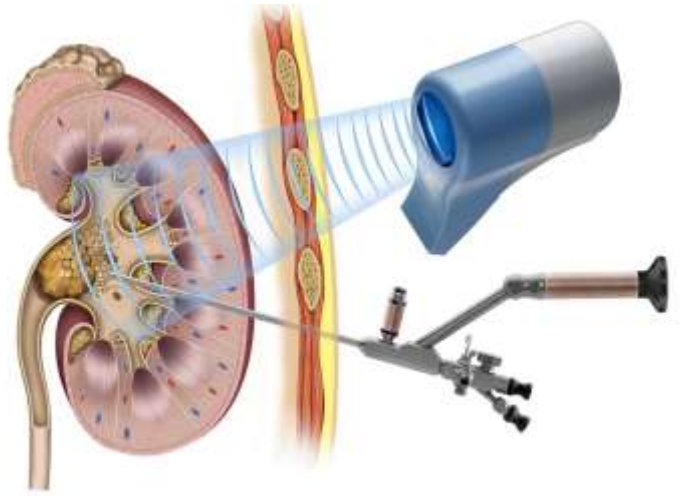

Figure 3. Removal of kidney stones by shock wave lithotripsy.

Diet therapy. Exclusion of foods high in purine compounds (for patients with urate stones). Limitation of products such as calcium, ascorbic acid, oxalate products, cheese, chocolate, green vegetables, black currants, strawberries, strong tea and cocoa (for patients with calcium-oxalate stones), at the same time, inorganic phosphorus foods are also impossible (calcium-phosphate for salts).

General conservative treatment. Preparations for dissolving urinary stones (litholysis) and alkalizing urine (blenarin, Uralit-3). And phytopreparations - cyston, phytolysin, cystinal, urolesan, canephron N. Antispasmodic drugs - no-spa, papaverine, magnesium and vitamin B6 drugs are used.

Modern surgical procedures: If the ureter is blocked by a large or jagged stone , emergency surgery is needed to remove it . The least damaging method is crushing stones in the urinary tract. Laser or ultrasound equipment can be used for this. Grinding is performed laparoscopically or endoscopically. Minimal invasiveness of this intervention shortens the rehabilitation period. In difficult clinical cases, stone removal requires a complete operation in the abdominal cavity. Below are some surgical techniques:

Shock wave lithotripsy (SWL). This is the most common treatment method. It involves the use of high-energy shock waves to noninvasively break up small or medium-sized stones (up to 2 cm). No incisions are made in the skin. During the procedure, the patient lies on the table and the doctor directs the shock waves from

the outside to the kidney. Fragments of broken stones are naturally excreted in the urine. SWL usually takes 1 hour and the patient can go home the same day.

Ureteroscopy. In this procedure, a thin tube with a camera (ureteroscope) is inserted through the ureter and bladder to reach the stone in the ureter or kidney. The doctor can remove the stone directly or use laser lithotripsy to break it into small pieces. Sometimes, a stent is placed to help the stone pieces to come out easily.

Percutaneous nephrolithotomy (PCNL). This operation involves making a small incision in the patient's back to access the kidney. The doctor removes or breaks up the stone using special tools. PCNL is usually used for large stones or when other methods are not suitable.

Open surgery (minimally invasive). Although rarely used, open surgery is used for stones with very large or complex shapes. In this method, the stone is removed directly. Open surgery is used only when other surgical methods cannot be used.

Conclusion: Kidney stone disease is very common in the Central Asian region because it is more common in people living in hot and dry climate. This has motivated us to achieve many achievements in creating new modern and effective methods of treating kidney stone disease. We can dissolve small stones with the above medicines. However, if we carry out these procedures for large stones, they will become blocked in the urinary tract, causing the complications of the disease and the patient will suffer a lot, and many surgical procedures have been created to prevent this. With the help of today's modern medical technologies, early diagnosis and rapid treatment of patients with kidney stone disease are successfully implemented.

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