

CLINICAL AND LABORATORY DIAGNOSTICS OF PYELONEPHRITIS

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КЛИНИКО-ЛАБОРАТОРНАЯ ДИАГНОСТИКА ПИЕЛОНЕФРИТА

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Annotation. Laboratory diagnosis of pyelonephritis plays a key role in the timely and accurate determination of the patient's condition. This disease, characterized by inflammation of the kidneys, requires a detailed study of clinical and laboratory parameters. Modern diagnostic methods make it possible not only to confirm the presence of infection, but also to assess the degree of kidney damage, which is critical for choosing the optimal treatment tactics.

Key words: laboratory diagnostics, pyelonephritis, modern methods of laboratory diagnostics, prognosis.

Аннотация. Лабораторная диагностика пиелонефрита играет ключевую роль в своевременном и точном определении состояния пациента. Это заболевание, характеризующееся воспалением почек, требует детального изучения клинических и лабораторных показателей. Современные методы диагностики позволяют не только подтвердить наличие инфекции, но и оценить степень поражения почек, что критически важно для выбора оптимальной тактики лечения.

Ключевые слова: лабораторная диагностика, пиелонефрит, современные методы лабораторной диагностики, прогноз.

Introduction. Pyelonephritis is an inflammatory kidney disease that most often occurs as a result of infection. The etiology of pyelonephritis includes many factors that may contribute to the development of this inflammatory kidney disease. The main causative agents of infection are bacteria, with the most common being *Escherichia coli*, *Klebsiella*, *Enterobacter* and *Proteus*. These microorganisms usually enter the kidneys via the ascending route from the bladder, which is often associated with urinary outflow problems and urinary congestion.

One of the key reasons predisposing to the development of pyelonephritis is various anatomical and functional changes in the urinary tract. Such changes may occur due to urological diseases such as kidney stones, urethral strictures or developmental abnormalities. Factors related to the state of the immune system also play a critical role: reduced immune defense can contribute to the activation of pathogenic bacteria [1, 4, 6].

In addition, pyelonephritis can occur against the background of systemic diseases such as diabetes mellitus or chronic inflammatory processes. In women, the risk of developing pyelonephritis increases as a result of anatomical features - a short urethra and proximity to the anal area contribute to an easier ascending infectious process [2, 5, 7].

One of the primary roles in the pathogenesis of pyelonephritis is played by the pump of the urinary system, which can be disrupted by various pathologies, such as stones, developmental abnormalities, or enlargement of the prostate gland. These conditions contribute to stagnation of urine, which creates favorable conditions for the growth of bacteria. The body's immune response also plays an important role in pathogenesis. When the kidneys become infected, various parts of the immune system are activated, which can lead to the formation of an inflammatory infiltrate and the development of interstitial nephritis. However, an overreaction of the immune system can worsen damage to kidney tissue, causing further impairment of kidney function [1, 8, 18].

Laboratory diagnosis of pyelonephritis plays a key role in the timely and accurate determination of the patient's condition. Diagnosis of pyelonephritis usually

begins with a general blood and urine test. A general urine test is an important diagnostic method for pyelonephritis, as it allows you to assess the condition of the kidneys and identify the presence of inflammatory processes. The analysis pays special attention to the color, clarity, pH, density of urine, as well as the content of protein, leukocytes and bacteria. With pyelonephritis, urine, as a rule, becomes cloudy, may acquire an unpleasant odor and vary in color - from light yellow to dark [3, 13, 15].

An increased number of white blood cells in the urine (leukocyturia) is one of the key signs of inflammation. In this case, proteinuria is also possible - the presence of protein in the urine, which indicates damage to the renal tubules. The presence of nitrites may also be detected, indicating bacterial flora that usually causes pyelonephritis.

It is important to note that a general urine test is not the only diagnostic method. It is usually used in combination with other tests, such as kidney ultrasound and general clinical tests, which allows you to get a more complete picture of the disease and determine treatment tactics.

In some cases, additional tests, such as a kidney ultrasound or computed tomography, will be required to evaluate the condition of the organ and identify possible anatomical abnormalities.

Biochemical urine analysis is also an important tool in the diagnosis and monitoring of pyelonephritis. This disease, which is an inflammation of the kidneys, requires careful examination of the composition of the urine to identify specific changes that may indicate the presence of infection and damage to the kidney structures. During the analysis, basic parameters are examined, such as the level of protein, red blood cells, leukocytes, as well as the presence of bacteria and casts [3, 9, 17].

Increased protein content in the urine (proteinuria) may indicate damage to the glomeruli of the kidneys, which is often observed during inflammatory processes associated with pyelonephritis. An increased number of white blood cells (leukocyturia) is a classic sign of infection, while identification of bacteria confirms the presence of pathogenic flora. Attention is also paid to creatinine and urea levels, which may indicate kidney function and the degree of kidney damage.

Additionally, biochemical blood tests are used to assess kidney function and identify signs of systemic inflammation. Creatinine and urea levels can indicate the extent of kidney tissue damage, which helps doctors make informed treatment decisions. Modern diagnostic technologies include the use of polymerase chain reaction (PCR) to identify specific pathogens, which greatly improves diagnostic accuracy. In addition, electron microscopy and ultrasound help to visualize changes in renal tissues and determine the degree of damage [1, 10, 11].

An important area is the analysis of markers of inflammation and the immune response, which allows us to obtain additional information about the severity of the patient's condition. The combination of these methods provides doctors with the opportunity for more accurate diagnosis and successful treatment of pyelonephritis.

The prognosis of pyelonephritis, like many other diseases, depends on a number of factors, including the timeliness of diagnosis, the adequacy of treatment and the general health of the patient. The acute form of pyelonephritis, if it is detected promptly and treated correctly, usually has a favorable prognosis. In most cases, if medical recommendations are followed, patients recover completely and kidney function is restored within a few weeks [2, 14, 16].

However, chronic pyelonephritis may have a more difficult prognosis. This condition is characterized by periodic exacerbations and remissions, which can lead to irreversible changes in the kidneys. Since chronic pyelonephritis often occurs against the background of other diseases, such as diabetes mellitus or arterial hypertension, it is important to consider their influence on the course of the disease. If not properly monitored, such patients are at risk of developing renal failure.

Выводы. Conclusions. Early diagnosis and adequate treatment, including antibiotic therapy and correction of concomitant diseases, can significantly improve the prognosis. It is also important to carry out regular monitoring with a nephrologist to assess the condition of the kidneys and adapt treatment depending on the dynamics of the disease. Lifestyle factors such as proper nutrition, avoidance of bad habits and moderate physical activity also play a significant role in prognosis. Maintaining overall health and strengthening the immune system helps reduce the risk of exacerbations and improve the quality of life of patients with pyelonephritis.

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