Intrauterine Disorders of Kidney Anomaly Formation

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ABSTRACT

Renal development anomalies are intrauterine disorders of kidney formation caused by genetic mutations and the impact of teratogenic factors on the foetus in the first trimester of pregnancy. They are manifested by pain in the lumbar region, attacks of renal colic, fever, general weakness, changes in urine and blood. Diagnosed by ultrasound with Doppler, excretory urography, CT, MRI, laboratory tests and other methods. Treatment of renal anomalies includes uroseptic, antibiotics, hypotensive drugs. If indicated, extra kidney removal, cyst removal and other surgeries are performed.

Keywords: Anomalies of kidney development, anatomy, kidney doubling and polycystic kidney disease

Introduction. Renal anomalies are the most common malformations. They account for 30-40% of all congenital anomalies. Kidney doubling and polycystic kidney disease are the most common, the latter often accompanied by cystic dysplasia of neighbouring organs. There are gender differences in some malformations. Thus, variants of aplasia are more common in boys, and kidney doubling - twice as often in girls. The prognosis for this pathology in most cases is quite favourable, except for severe combined malformations and bilateral anomalies. The relevance of malformations of the urinary system in modern paediatrics is determined by their significant share in the structure of all congenital diseases and the importance of the filtration function of the kidneys, the loss of which requires transplantation of the organ with all its difficulties.

Causes

Like any malformations, anomalies of kidney development are formed intrauterine due to improper laying, differentiation of tissues and persistence of cells of embryonic structures. Pathologies can arise as a result of the impact on the foetus of harmful factors: drugs (antibiotics, ACE inhibitors), radiation, infectious agents. If the cause is a genetic breakdown, abnormalities of kidney development are combined with malformations of other localisation, forming different syndromes. Depending on which process is disturbed, we can talk about dysplasia, dystopia and other anomalies.

Classification

Developmental anomalies of the kidneys are divided into anomalies of number, structure, position and vascular anomalies. These renal anomalies are often combined with other urogenital malformations.

- Abnormalities of quantity include uni- and bilateral agenesis and aplasia of the kidney, as well as doubling and third extra kidney.
- Anomalies of structure are otherwise known as dysplasias and represent abnormal development of renal tissue. These include all cystic formations.
- Anomalies of position can manifest as dystopia, which is the location of the organ in an atypical place, usually below the lumbar region.

Symptoms of kidney anomalies

Improperly developed or located kidney clinically does not manifest itself in any way, pathology is often detected accidentally. Bilateral malformations are usually noticeable shortly after birth due to insufficient function of the organ. The most severe abnormalities of kidney development (agenesis), even unilateral, often lead to death in the first months and years of life, not only because of severe renal failure, but also because they are almost always accompanied by malformations of the skeleton and various organs.

Hypoplasia, extra kidney, doubling and polycystic kidneys may present with symptoms of pyelonephritis, which results from impaired urine flow. The child complains of pain in the lumbar region, there may be fever and signs of intoxication. Anomalies of kidney development are often accompanied by arterial hypertension, since the kidneys are involved in the regulation of blood pressure (renin-angiotensin system).

One of the clinical signs of an extra kidney is urinary incontinence. There may also be attacks of renal colic. The patient or his parents may complain of changes in the urine: blood, cloudy urine, urine the colour of 'meat slop'.

Diagnosis

Prenatal diagnosis of many renal anomalies is possible from 13-17 weeks of gestation, when it is possible to suspect a defect by the absence of a lining at the location of the kidney or to notice the absence of the bladder, which is also an indirect sign of renal anomalies. Clinical diagnosis is carried out in the presence of symptoms on the part of the urinary system. In this case, the paediatrician prescribes urine and blood tests to assess kidney function and detect signs of inflammation. It is also possible to detect the causative agent of secondary pyelonephritis for targeted antibiotic therapy.

Anomalies of kidney development are confirmed by instrumental methods of examination;

- Renal ultrasound. Detects abnormalities in number, position and allows to suspect renal dysplasia. Dopplerography shows the state of the kidney vessels, since their abnormal development also accompanies various anomalies.
- X-ray. Excretory urography evaluates urinary function, the structure of the calyx-lochanous system and can indicate signs of hydronephrosis, as well as quantitative anomalies. CT and MRI are also performed in case of ambiguous ultrasound findings and suspected polycystic disease.

Treatment of renal anomalies

In the absence of clinical signs, no treatment is required. Conservative therapy includes antibiotics for the treatment of infectious kidney damage, hypotensive drugs, uroseptic agents. Surgical intervention is indicated in case of pronounced stenosis of the calyx-lochanous system, dystopia and any other anomalies of renal development in case conservative therapy methods are ineffective. Removal of an extra or doubled kidney, stenting of vessels and renal pelvis is performed. Removal of cysts does not require surgical intervention using open access, the contents are evacuated by puncture during endoscopic surgery.

Conclusion: The prognosis in renal anomalies is often favourable. As already mentioned, the functions of the urinary system often remain normal. Medication and surgical treatment also quickly lead to improvement in the child's condition. Exceptions are gross combined malformations and bilateral anomalies, which may require kidney transplantation and regular haemodialysis. Prevention of kidney anomalies is carried out during pregnancy. It is necessary to follow a diet, avoid bad habits and correct somatic status.

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