

Differential diagnosis of CNS pathologies in children (literature review)

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Abstract: The diagnostic process of CNS pathologies in children has its own characteristics. When determining diagnostic tactics, the priority of choice is less invasive and more informative methods. This article discusses the features of the differential diagnosis of CNS pathologies in children.

Key words: CNS pathologies, differential diagnosis, ultrasound, X-ray methods.

When examining a child from a variety of additional methods, it is necessary to choose the most informative and least traumatic. It is advisable to use complex types of research only when the diagnosis is unclear and to determine the most rational treatment tactics. Many instrumental studies in young children should be performed under general anesthesia.

Clinical studies of the scrotum in young children are difficult due to the small size of the testicles and adnexa. It is difficult to reach agreement with young patients when examining these organs, and it is sometimes impossible to collect an anamnesis. Therefore, ultrasonic examinations (ultrasound) are of particular importance, which are the method of choice for visualization of the scrotum [1-3, 5, 7]. Ultrasound of the scrotum organs is obligatory in the decreed terms: 6 months, 2 years, 7 years, 10-12 years, 13 and 15 years. At different age periods of a child's life, the soil for the development of pathological processes in the organs of the reproductive system is different. If malformations are more common in children of a younger age group, then acquired diseases are more common in older children [4, 6, 8, 9].

With the introduction of expert-class ultrasound equipment, the diagnosis of CNS pathologies has reached a new level. An experienced specialist in ultrasound diagnostics can differentiate acute orchiepididymitis from testicular torsion, according to the ultrasound picture, it became possible to determine the blood flow in the affected testicle [10, 12].

Safety, non-necessity of special preparation of the patient, non-invasiveness made ultrasound examination in emergency uroandrology convenient and necessary.

With the help of ultrasound, the size, shape, echostructure of the testicles, appendages, the presence or absence of volumetric formations and fluid in the scrotal cavity are assessed.

Ultrasound examination is indicated for pain in the scrotum, injuries, an increase in the size of the scrotum, the presence of unusual palpable formations, the absence of testicles on palpation, a decrease or increase in their size, syndromes of dolichostenomelia, hypogonadism, chromosomal pathology. Ultrasound of the blood flow through the

vessels of the testicle and its parenchyma is indicated for suspected testicular torsion, varicocele, inflammation, trauma, tumor, with a sliding and undescended testicle [11, 13, 14, 15].

One of the most common diseases of the scrotum in children is cryptorchidism. According to the location of the testicle, cryptorchidism is divided into inguinal and abdominal. In most cases, cryptorchidism can be detected by ultrasound, since in 80% of cases they are located in the inguinal canal [16, 17, 18, 20]. The testicles located in the abdominal cavity near the internal inguinal ring are much more difficult to visualize. With a high location of the testicles near the walls of the small pelvis, they are difficult to detect. In these cases, an MRI is recommended. The optimal choice is the T2-weighted mode with signal suppression from adipose tissues. To study the area of the inguinal canal and the lower floor of the abdominal cavity, it is recommended to scan in the coronal plane, to search for testicles in the abdominal cavity - in the axial and sagittal planes. In this case, the scan is carried out until an image of the lower pole of the kidney is obtained. For the examination of patients in whom it was impossible to detect the testicles in the abdominal cavity, the final procedure is diagnostic laparoscopy, which allows either to visualize the testicles or to prove their absence, a reliable sign of which is the blind completion of the testicular vessels. Only this criterion allows us to establish with certainty the fact of the absence of the gonads. This condition refers to genetically determined forms of violation of sex formation [19, 21, 22, 23]. In the examination protocol of a patient with cryptorchidism, regardless of his age, unilateral or bilateral lesions, and other factors, ultrasound and Doppler ultrasound are a mandatory diagnostic procedure. Making a decision on surgical treatment without taking into account these data is not only inappropriate, but also unacceptable.

Another common condition is testicular torsion. There are 2 types of torsion: extravaginal and intravaginal [24, 25]. extravaginal torsion is only possible perinatally when the conductor (gubernaculum) and tunica vaginalis are not fixed to the wall of the scrotum. The testicle is necrotizing. Clinically, a painless volumetric formation is determined in a newborn in the scrotum. Ultrasound reveals that the testicle is enlarged in size, heterogeneous density, there is no blood flow in it and in the vascular bundle of the spermatic cord, sometimes ipsilateral hydrocele [26, 27]. intravaginal torsion occurs after tunica attachment albuginea to the wall of the scrotum. Testicular torsion may be complete ($>360^\circ$) or incomplete ($<360^\circ$). Testicular torsion usually makes itself felt at night, acute pain is typical, followed by nausea, vomiting, low-grade fever. In contrast to orchitis, the pain is constant, does not increase with palpation or movement, and does not decrease when the scrotum is raised to the symphysis. The skin of the scrotum is hyperemic, may be retracted at the base of the scrotum (Hera's symptom), the testicle is located high and horizontal (Brunzel's symptom). The most informative diagnostic

method is color dopplerography. Lack of blood flow is a sign of testicular ischemia. In complete torsion, blood flow disappears initially in the epididymis. After 6 hours, collateral blood flow opens from a. epigastrica inferior, which can cause false negatives. With incomplete torsion in the region of the gate, arterial blood flow is preserved. Venous blood flow is blocked, with Doppler sonography a reversion of the venous flow is determined [28, 29].

The gray scale image may not change or be non-specific during the first hours. A small hydrocele or slight thickening of the scrotal wall is recorded. After a few hours, the testis and epididymis increase in size, their echogenicity decreases, hypoechoic foci of hemorrhages in the gonadal tissue may appear, and the spermatic cord thickens. One day after the start of untreated torsion the echographic picture of the testicle normalizes, after 10–14 days, its hypotrophy is determined first, and then atrophy [30]. Thus, the volume of the testis, as the most informative parameter, undergoes successive changes: first, an increase, later, normalization, and, finally, a decrease.

In case of varicocele, for the purpose of differential diagnosis, ultrasound of the abdominal cavity should also be performed [31]. Varicocele may be visible, palpable, or subclinical. Subclinical and palpable (but invisible) varicocele is well detected by ultrasound. In gray scale mode, multiple tubular structures are visualized, hypoechoic, sickle-shaped, with a diameter of more than 2 mm. With dopplerography in the vertical, horizontal positions of the patient, when straining, the direction and intensity of blood flow are determined. Dopplerography with the measurement of parameters of arterial and venous blood flow allows you to clarify the condition of the testicles and predict the course of the disease. An accurate assessment of the volume of the testicles and the prostate gland makes it possible, in conjunction with the Doppler study, to fully assess the state of the reproductive system. A patient who has undergone surgical treatment needs follow-up observation with Doppler ultrasound and ultrasound of the scrotum for 1.5–2 years [32].

The results of a number of studies have demonstrated the need for early detection of uroandrological pathology in children in order to carry out timely and effective correction to prevent the development of fertility disorders in the future.

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