Methodical approaches to the diagnosis of varicocele in children.

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ABSTRACT

The methodological and clinical approaches to ultrasound examination were studied depending on the age groups of children. Improvement of the technology of ultrasound examination of the scrotal organs in case of suspected varicocele. The features of the ultrasound image of varicocele in the gray-scale echography and doppleography modes are presented.

Keywords: Methodology, Varicocele, Ultrasound Features.

Relevance.

Ultrasound examination is often the only method of primary diagnosis of the scrotal organs in children. The accumulated experience in this direction indicates a high sensitivity to the specificity of this method in identifying congenital and acquired pathology of the scrotal organs [5,2].

However, important issues related to the echography technique have not been sufficiently investigated. Thus, conducting a study without taking into account the age in children leads to psychological and tactical diagnostic errors.

Target.

Improvement of complex ultrasound examination in case of suspected varicocele in children, taking into account the psychosomatic state. This report summarizes the experience of improving the technologies of ultrasound studies of the scrotum organs, accumulated during the implementation of a joint project between researchers from Uzbekistan and Russia [1] over the past 10 years.

The indications for the examination of the organs of the scrotum are:

- Clinical signs of varicocele
- Pain syndrome
- Asymmetric testicular reduction
- Differential diagnosis of acute pain of thrombosis in varicocele
- Suspected subclinical varicocele
- The presence of fluid in the scrotum
- An increase in the size of the testicles
- Swelling and redness of the testicles.

No special preparation is required for ultrasound examination of the scrotum organs.

Materials and research methods.

The present study is based on the improvement of tactical and methodological approaches in the study of the scrotal organ in different age groups. Over the past 2 years, as a result of the development of high-tech methods of ultrasound diagnostics, new opportunities have opened up in the clarifying diagnosis of varicocele. In 30 children, no pathology of the

scrotal organs was revealed (control group), in 60 children aged 3-17 years varicocele of varying severity was established.

The studies were carried out on modern ultrasound diagnostic devices SONOSCAPE S 22, Aplio 500 and Philips Affinity 50G using high-density linear transducers at a frequency of 10.0 - 14.0 MHz. Ultrasound examinations were carried out in B-mode, pulse-wave Doppler, color and power Doppler mapping modes. The study was carried out according to clinical guidelines [3,6,7] in the supine position with legs slightly bent and apart and in a standing position. Scanning of the scrotal organs was started in B-mode and the dimensions (length, width, thickness), volume, shape, echogenicity and homogeneity of the testicular structure were determined. The structure of the testicular parenchyma in the gray-scale spectrum was assessed by the mean gray value (MGV) - histogram. Children under 5 years old were examined with the participation of parents, over 6 years old - without parents.

The results of the study showed that when working with children, it is necessary to take into account their age-related psychological characteristics. Thus, an ultrasound scan of a young child was performed in the presence of his mother or his caregiver. When conducting ultrasound, the body of a young child is minimally exposed, which prevents hypothermia. As a rule, parents are advised to remove the shoes from the child, since when excited and resisted examination, small children throw their legs high and hard shoes can injure themselves and others.

Children 3-6 years old are usually afraid of examination. Therefore, we show him the sensor, let him touch it, so that the child is convinced that "there are no needles there". You can allow the baby's mother to take the transducer and put it on the baby's tummy, as “the mother never hurts” [3].

Starting from school age, children take doctor's recommendations more or less seriously. During this period of the child's age, it is important to have good contact between the doctor and the child, and to clarify the need for research.

It should be noted that adolescent boys generally do not want their parents to be present during the study. Therefore, we believe that the presence of parents (especially mothers) during ultrasound of the scrotum in adolescents is not desirable. Our experience has shown that all adolescent children respond positively to communication with a doctor and are attentive to his advice and recommendations.

An ultrasound examination of the scrotal organs begins with an orthostatic test. The sensor is installed at the root of the scrotum, positioned in length, towards the bottom of the scrotum, the diameter of the veins in orthostasis is recorded, and in the Doppler mode, the presence of retrograde blood flow in the veins is determined.

After that, the child is offered to lie on his back. An ultrasound of the testicles is performed in B-mode and the sizes of both testicles are measured. Then, in the clinostasis, the presence of the aciniform plexus in the veins is assessed.

The next step is to conduct a Valsalva test: the sensor is placed at the root of the scrotum, the color Doppler study is turned on. In young children, they tend to perform the Valsalva test when he cries. In adolescents, at the request of the doctor, the child consistently takes a deep breath and then strains the abdomen; during this time, the vascular pattern is assessed in the projection of the groin-shaped plexus. With a positive Valsalva test at the entrance, the reversal of blood flow and a significant increase in the vascular pattern are determined, which reaches a maximum during the tension of the anterior abdominal wall.

The next stage of the study involves a standard ultrasound of the kidneys and assessment of the renal vein to exclude aorto-mesenteric compression.

The main echographic criteria for the diagnosis of varicocele are the expansion of the diameter of the veins of the aciniform plexus. Usually, the diameter of the veins of the aciniform plexus should not exceed 2 mm, practically should not change in the orthostatic position, and the Valsalva test should be negative. If the diameter of the veins in clinostasis is more than 2.5 mm, a close

examination of the venous network of the testis is required, and in case of a doubtful Valsalva test, such a patient requires dynamic observation.

Anatomically, the scrotum is a baggy skin structure with a septum that contains the testicles, their appendages and the scrotal spermatic cord.

The testicle is a paired organ, with an average size of 25x20x40 mm. The testicles are covered with a tunica albuginea and a visceral layer of the vaginal membrane. The tunica albuginea is visualized as a thin hyperechoic band around the testicle. Between these membranes, there is normally a small amount of serous fluid, which is visualized as a hypoechoic cavity 1-3 mm thick. On echograms, unchanged testicles have an ovoid shape during longitudinal scanning, clear and even contours, fine-grained structure, medium echogenicity. In the region of the posterior edge in the upper parts of the testicle, the white membrane is formed by a thickening of a triangular shape, echographically displayed in the form of a wedge-shaped structure of moderately increased echogenicity, representing the mediastinum of the testicle.[8,9]

The epididymis is adjacent to its posterior edge and is visualized as an oval or clavate formation with clear, even contours. It distinguishes between head, body and tail. The head is located at the upper pole of the testicle, the body, as a continuation of the head, is adjacent to the posterior edge of the testicle. The tail section is the lowest part. Echographically, the epididymis is homogeneous, the echogenicity is comparable to the echogenicity of the testicle.

The spermatic cord is directed from the inner ring of the inguinal canal to the posterior edge of the testicle and consists of the vas deferens, testicular artery, venous plexus, lymphatic vessels and nerves. The composition also includes a venous uviform plexus located in the scrotum on the inner side of the cord. The spermatic cord and the aciniform plexus are visualized above the testis in the form of a cord of a cellular structure with many anechoic areas. The diameter of the veins of the spermatic cord is not more than 2 mm, when conducting the Valsalva test in ortho- and clinostasis, the diameter of the veins does not increase normally (Figure 1).

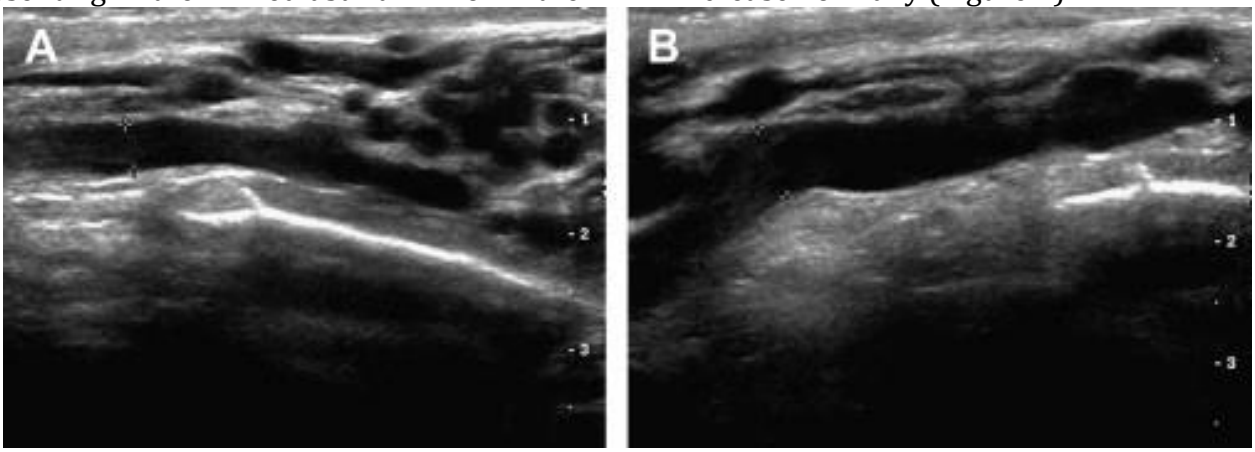

Figure 1. Ultrasound images are normal in B-mode: initial echogram (A) and after Valsalva test (B).

The World Health Organization (WHO, 1993,1997) recommends the following classification of varicocele:

- I degree, when the dilated veins in the scrotum are not visible or palpable, except for their expansion during the Valsalva maneuver.
- II degree, when the dilated veins in the scrotum are not visible, but easily palpable.
- III degree, when the dilated vein plexuses protrude through the skin of the scrotum and are easily palpable.

In the case of clinical varicocele, color Doppler ultrasonography of the spermatic cord and the aciniform plexus is clearly visualized in anechoic color formations of a round or oval shape of various diameters, having a different degree of severity and length, depending on the

stage of varicocele.[4,10]

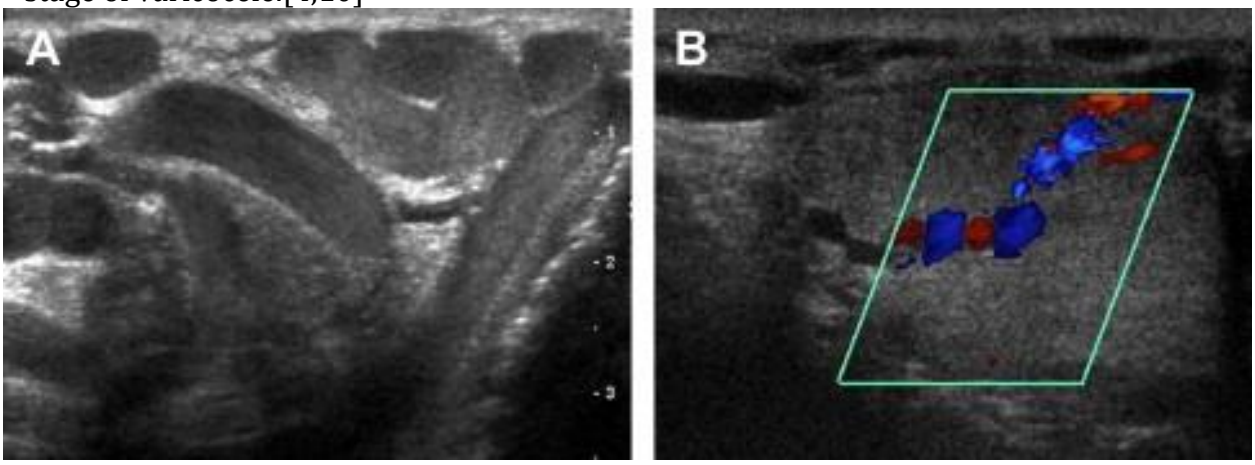

Figure 2. Visualization of an ultrasound image in B-mode (A) and in color Doppler mode (B).

Conclusion. Studies have shown that, depending on the age of the child, tactical and methodological approaches are needed to successfully conduct a study with suspected varicocele in children. The use of gray-scale echography in combination with Doppler ultrasonography improves the degree of dilatation of the vascular plexus of the testicles.

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