ULTRASOUND EXAMINATION AS THE HIGHEST LEVEL OF CLINICAL DIAGNOSTICS

Davranov I.I., Shodmanov F.J.

SamSMU, Uzbekistan.

Recent advances of clinical diagnosis are largely determined by the improvement of research methods. Significant leap in this regard was made by the development and introduction of fundamentally new ways of medical imaging, including ultrasound method. Extremely valuable is the ability of ultrasound to visualize the internal structure of the solid organ that was not available in the traditional X-ray. Due to the high information content and reliability of the ultrasonic method of diagnosis of many diseases and injuries has risen to a new level. The author has carried out an analysis of numerous literary sources and concluded that ultrasound has a high diagnostic capability and prognostic value of advanced new technologies in the diagnosis of various pathologies. Ultrasonography using a high-resolution technology in the clinic allows us to differentiate the severity of the pathological process, determine its dynamics and reliably monitor the effectiveness of treatment.

Keywords: ultrasound, clinical diagnostics, ultrasound, imaging

Modern advances in clinical diagnostics are largely determined by the improvement of research methods. A significant leap in this issue was made due to the development and introduction into practice of fundamentally new methods for obtaining a medical image, including the ultrasound method. Extremely valuable is the ability of echography to visualize the internal structure of parenchymal organs, which was not available with traditional X-ray examination [1]. Due to the high information content and reliability of the ultrasound method, the diagnosis of many diseases and injuries has risen to a qualitatively new level. Currently, along with computed tomography and other more modern methods, ultrasound diagnostics is used everywhere, being one of the leading diagnostic methods in many areas of clinical medicine [17, 24]. In recent years, due to the very widespread use of ultrasound equipment, it has become available for any, even very small, medical institutions [13, 26]. In this regard, there is a growing need for specialists who are fluent in the methodology and technique of ultrasound (ultrasound).

Ultrasound is a widely used diagnostic method, it does not expose the patient to radiation exposure and is considered harmless [25]. However, ultrasound has a number of limitations. The method is not standardized, and the quality of the study depends on the equipment used for the study and the qualifications of the doctor [2, 3, 4]. Additional restrictions for ultrasound - overweight and / or flatulence

- interfere with the conduction of ultrasonic waves [21]. Ultrasound diagnostic apparatus (ultrasound scanner)

- a device designed to obtain information about the location, shape and structure of organs and tissues and measure the linear dimensions of biological objects by ultrasonic location [8, 12].

Depending on the functional purpose, the devices are divided into the following main types: ETS - echotomoscopes (devices intended mainly for examining the fetus, abdominal organs and small pelvis); EX-echocardioscopes (devices designed to study the heart); EES - echoenceloscopes (devices designed to study the brain); EOS - echo-ophthalmoscopes (devices designed for examining the eyes).

Ultrasound is the standard diagnostic method used for screening. In situations where the patient's diseases and complaints

not yet, ultrasound should be used for early preclinical diagnosis. In the presence of an already known pathology, it is better to choose CT or MRI as methods for clarifying diagnosis.

The areas of application of ultrasound in medicine are extremely wide. For diagnostic purposes, it is used to detect diseases of the abdominal organs and kidneys, pelvic organs, thyroid gland, mammary glands, heart, blood vessels, in obstetric and pediatric practice. Ultrasound is also used as a method for diagnosing emergency conditions requiring surgical intervention, such as acute cholecystitis, acute pancreatitis, vascular thrombosis, etc.

The new Acuson Class S ultrasound systems, based on Siemens' extensive experience in the field of diagnostic technology, are designed to bring ultrasound to a new level of diagnostic significance [11, 13, 15, 16]. An ultrasonic diagnostic system of a new expert class is introduced into use, which presents unique imaging technologies. These ultrasound systems represent a new era in ultrasound technology, offering superior quality in 2D, color, power, spectral Doppler, M-mode, 3D and 4D imaging, the latest technology and superior communication capabilities combined in an aesthetic and ergonomic platform.

The technology is designed to study the formations of milk jelly h, lymph nodes, thyroid gland in order to obtain early data on malignancy of pathological structures and to form an objective expediency for fine-needle aspiration biopsy (FNA).

Ultrasound during pregnancy is a planned event that is included in the mandatory program for pregnancy management. Fetal ultrasound is a kind of acquaintance with the baby. Ultrasound is performed 2-3 times throughout pregnancy: at 10-14, 16-21 and 32-37 weeks.

Currently, 3D and 4D ultrasound methods have become widely used, which differs from 3D in that time is added to the length, height and depth of the image as a fourth dimension. While 3D is static, 4D shows the subject in motion in real time, allowing recording on a variety of media. With 4D ultrasound, the picture is completely different: firstly, the image is three-dimensional and color, and secondly, the appearance of the baby is visible in all details. Volumetric images make it possible to better examine some structures that are difficult to study in the usual two-dimensional mode, and make it easier for future parents and doctors of other specialties to understand the image.

Thanks to 3D ultrasound, doctors can evaluate various parts of the fetal body in three projections at the same time, which is very important for detecting abnormalities in intrauterine development of the fetus. Three-dimensional study data provide additional information for the diagnosis of malformations: limbs, face, spinal column.

On 4D ultrasound, the sex of the child is more clearly visible. With the help of a 4D image during pregnancy, you can see the baby's facial expressions. This allows you to find out the emotions that he experiences - smiling, upset, apathetic. Thus, it is easy to understand how he feels. Bad emotions can arise from more serious problems. For example, an apathetic depressed state can be the cause of asphyxia - insufficient oxygen supply, which entails a number of problems.

Modern ultrasound machines operate in the mode of an automated organ scanner, which increases the reliability of the diagnosis of various tumors. The breast volume scanner expands the possibilities of diagnosing breast cancer. Such systems are designed to obtain an ultrasound 3D image of the breast. Automated breast volume scanning provides a three-dimensional image of the breast, which allows you to examine the breast not only from the front and back, but also from top to bottom and from any side. It is a very reliable screening method for diagnosing breast cancer.

Doppler ultrasound allows you to examine the blood flow in the main arteries and veins. Ultrasound dopplerography of the main arteries of the head (USDG MAG), or ultrasound dopplerography of the brachiocephalic arteries (USDG BCA) is a hardware method that allows you to examine the state of blood flow in the vessels and assess the existing violations of the patency of the vessels of the head. For greater information content, ultrasound MAG is carried out in combination with the study of intracranial vessels - transcranial dopplerography (TCD). The combination of MAG ultrasound and TCD is the most optimal screening method for diagnosing cerebrovascular diseases (brain strokes), which is a priority for the Ministry of Health of the Republic of Kazakhstan. The method of duplex scanning of the main arteries of the head (DS MAG), or duplex scanning of the brachiocephalic arteries (DS BCA), combines the study of blood flow using the Doppler effect with

simultaneous visualization of blood vessels and surrounding tissues. In this case, as a result of computer processing of the received signals, both the Doppler spectrum and the color cartogram of the flow can be displayed on the monitor. Triplex scanning of brain vessels has even greater visualization. All of the above methods for studying cerebral blood flow are completely painless and have no contraindications [35, 36, 37, 38].

Duplex scanning and Doppler ultrasound of the vessels of the neck and brain are performed in patients suffering from headaches, dizziness, impaired coordination, episodes of short-term loss of consciousness and other neurological symptoms (numbness and weakness in the arms and legs, speech disorders), as well as in patients who have undergone transient ischemic attacks or strokes. Duplex scanning of the vessels of the neck is a screening tool in the early diagnosis of atherosclerosis and is indicated for all middle-aged people [34, 39, 41]. Duplex scanning of the vessels of the neck and renal arteries is indicated for people with high blood pressure. Duplex scanning of the arteries of the lower extremities should be performed for people with complaints of pain in the muscles of the legs when walking, numbness in the legs, trophic disorders on the skin of the legs. The study allows to identify the localization and nature of the lesion of the vessels of the legs and, as a result, to choose the right treatment [23, 27, 32]. Duplex scanning of the veins of the lower extremities should be performed in patients with a pronounced venous network in the legs and leg edema. In the study of the veins of the lower extremities, it is possible to diagnose to prevent varicose disease, thrombosis of deep and superficial veins of the lower extremities [29, 33].

It should be noted that the principles of ultrasound are used in echocardiography (EchoCG). The technique combines ultrasound imaging for a detailed study of the structure and functioning of the heart with the simultaneous use of color Doppler imaging to study blood flow in the vessels.

Ultrasound of the vessels of the upper and lower extremities is one of the safest and most effective methods for studying the state of the vessels. Modern equipment allows you to explore the vessel under the control of the monitor screen in real time. At the same time, the lumen of the vessel is recorded, blood flow parameters are measured, and valvular insufficiency of the veins is determined. In the presence of a thrombus, ultrasound diagnostics allows you to determine its size and monitor its changes during the treatment process.

It should be noted that recently vascular diseases occupy one of the leading places among all diseases characteristic of middle-aged and older people. This is facilitated by adverse environmental factors, a sedentary lifestyle combined with unhealthy diet and, of course, smoking.

Ultrasound scanning of blood vessels is recommended in cases where the work is associated with a constant stay on the legs, if the patient feels heaviness in the arms and legs, numbness, cramps, pain in the limbs, if spider veins appear on the skin or saphenous veins are dilated. The described method is completely painless and allows you to identify vascular diseases at the earliest stages and control the effectiveness of the treatment used.

Thus, ultrasound has a high diagnostic capability and prognostic value among modern new technologies in the diagnosis of various pathologies. Ultrasound using high-resolution technologies in the clinic makes it possible to differentiate the severity of the pathological process, determine its dynamics and reliably control the effectiveness of treatment.

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