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The Role of Echocardiography in the Diagnosis of Cardiorheumatological Diseases in Children

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Abstract: Echocardiography (ECHOCG) is an ultrasound examination of a child's heart. This examination is also called "ultrasound of the heart". It is the main tool of cardiologists for non-invasive assessment of the condition of the heart and the quality of its work.

Keywords: echocardiography, ultrasound of the heart, procedure, heart valves, echocardiography.

Introduction.

Echocardiography can be performed at any age - even before the baby is born, since the method uses regular ultra-high frequency sound waves that are harmless to the organs and tissues of the fetus, not to mention children or adolescents. The images obtained using ultrasound allow us to evaluate the structure of the heart and blood vessels, evaluate muscle contraction and relaxation, valve function, and measure the size of the heart chambers. Echocardiography is often used for long-term monitoring of children with structural heart defects, muscle anomalies, or after surgery. Echocardiography helps to identify heart dysfunctions long before symptoms appear.

Echocardiography is a safe, painless diagnostic procedure that uses high-frequency sound waves (ultrasound works in a similar way to sonar or radar) to produce moving images of the heart. Sound waves are directed toward the heart from a small, hand-held device (transducer), which sends and receives these signals as they bounce off anatomical structures. Objects such as the heart walls and valves reflect some of the sound waves back to the transducer, where they are analyzed and used to create a computer image of the heart on a screen. This can measure the size of each of the heart's four chambers, examine the appearance and movement of the heart valves, and infer how effectively the heart muscle is contracting. Measurements taken from these images help determine how well your baby's heart is working and can also help determine if there are any structural abnormalities. These sound waves are also used to assess the speed, amount, and direction of blood flow through parts of the heart and large vessels (Doppler echocardiography). This test can be used to determine the presence of congenital heart defects, valve abnormalities, or heart chamber abnormalities.

Materials.

The child can eat and do his/her usual activities unless otherwise instructed. The examination is painless and the child will not feel any discomfort. It is recommended that the child wear separate top and bottoms as he/she will need to undress to the waist. This examination does not require stopping regular medications unless advised to do so by the doctor.

An echocardiographic examination is performed and recorded by a highly qualified physician - a specialist. A complete echocardiogram to assess the structure and function of the heart takes from 20 minutes to 1 hour, depending on how easily the necessary information is obtained.

The transducer of the device must be placed directly on the chest wall or upper abdomen of the child for the examination to be performed. The doctor will provide a gown or sheet to keep you warm and minimize cooling of the area of the chest that must be exposed during the examination.

Research and methods.

An electrocardiogram (ECG) is also recorded during the procedure using small sticky electrodes and wires. The ECG is useful for timing events in the heart. In some cases, more than one transducer is placed on the chest, and heart sounds or pulse may be recorded along with the echocardiogram. In some cases, a loud heart murmur may be heard with Doppler echocardiography.

During the examination, the lights in the room are usually dimmed to reduce glare and make it easier to see the screen. The patient is usually asked to lie down on a hospital bed or examination table. Changing body positions is sometimes necessary to obtain better images, and the child is often asked to change from lying flat to lying on his or her side.

Ultrasound waves do not travel well through bones or lungs, so breath holding is sometimes used to keep air-filled lungs out of the path of the ultrasound beam and to allow the heart to get closer to the transducer.

The role of echocardiography in the diagnosis of cardiorheumatological diseases

1 .1. Main indications for echocardiography

Echocardiography is used to diagnose and monitor the following conditions:

Rheumatic carditis (acute and chronic).

Myocarditis and endocarditis (infectious and autoimmune genesis).

Systemic connective tissue diseases (juvenile arthritis, systemic lupus erythematosus).

Heart defects (congenital and acquired).

Pericarditis (exudative and constrictive).

Results.

1 .2. EchoCG in rheumatic carditis

Rheumatic carditis is the most common manifestation of acute rheumatic fever in children. The main echocardiographic signs are:

Thickening and hardening of the mitral and aortic valve cusps.

Signs of mitral and/or aortic regurgitation .

Impaired mobility of valve structures.

Enlargement of the left atrium with severe regurgitation .

1 .3. EchoCG in infective endocarditis

Infective endocarditis in children is less common, but requires timely diagnosis. EchoCG can detect:

Vegetation on valve flaps.

Destruction of valve structures.

Abscesses in the aortic root area.

Paraprosthetic complications in the presence of artificial valves.

1 .4. EchoCG for myocarditis

In myocarditis , echocardiographic changes include:

Diffuse decrease in myocardial contractility.

Enlargement of the heart chambers.

Signs of diastolic dysfunction.

Detection of pericardial effusion in combination with pericarditis.

Discussion.

2. Methods of echocardiographic examination in pediatric cardiology and rheumatology

2 .1. Transthoracic echocardiography (TTE)

This is the main method for assessing the morphology and function of the heart. Two-dimensional (2D), Doppler and tissue Dopplerography are used.

2 .2. Doppler echocardiography

Allows you to assess the speed and direction of blood flow, the degree of regurgitation on the valves, and also to identify stenotic processes.

2 .3. Tissue Dopplerography (TDE)

It is used to assess longitudinal contractility of the myocardium, which is important in myocarditis and cardiomyopathy.

2.4 . Transesophageal echocardiography (TEE)

Prescribed for complex diagnostic cases, especially when infective endocarditis, abscesses or blood clots are suspected.

Conclusion.

3. Dynamic monitoring of patients with cardiorheumatological diseases

EchoCG allows not only to diagnose diseases, but also to monitor their progress:

Assessment of the degree of progression of valve pathology.

Monitoring the effectiveness of antibacterial and anti-inflammatory therapy.

Evaluation of hemodynamics after surgical treatment.

Identification of possible complications.

References:

1. Bokeria L.A., Ivanitsky A.B., Makhachev O.A., Karabegov R.P. Echocardiographic diagnostics of abnormal pulmonary venous drainage. // Publishing house of the A.N. Bakulev Scientific Center of Cardiovascular Surgery, Russian Academy of Medical Sciences, 2004.
2. Burakovsky V.I., Bokeria L.A. et al . Manual: " Cardiovascular surgery". Moscow "Medicine" 1996. Second edition, supplemented.
3. Zubkova G.A. "Two-dimensional and Doppler echocardiography in diagnostics of congenital heart defects in newborns and children of the first year of life. // Doctoral dissertation. Moscow - 1992.
4. Ivanitsky AV Angiocardiographic diagnostics of the origin of the aorta and pulmonary artery from the right ventricle. - Thoracic surgery. - 1976.-№5.-p. 27-35.

5. Ivanitsky AV, Khamzabaev Zh.Kh., Podashev BI. Anomalous drainage of pulmonary and systemic veins. - Alma-Ata 1991.
6. Karabegov PP Echocardiographic diagnostics of abnormal pulmonary venous drainage. // Diss . . MD. Moscow - 2002
7. Makhachev OA Clinic and diagnostics of right ventricular hypoplasia and associated congenital heart defects. // Dis. of Medical Sciences . - M. - 1984.
8. Yu. Petrosyan Yu. S./Bukharin V. A., Ivanitsky A. V. Conotruncus defects . // Moscow . Medicine - 1982.
9. P. Podzolkov V.P., Rakhmankulov K.B., Makhachev O.M. et al . //Thorax and cardiovascular surgery, - Moscow. 1997.- No. 2.- p.39.
10. Saidova M.A. Three-dimensional echocardiography: yesterday, today, tomorrow. // Consilium-medicum . 2006.- vol. 8.- №5.- p. 127-132.
11. Saidova M.A., Stukalova O.V., Sinitsyn V.E., et al. Three-dimensional echocardiography in assessing the mass of the left ventricular myocardium: comparison with the results of one- and two-dimensional echocardiography and magnetic resonance imaging. // Ter.arch . - 2005. - No. 4. - p. 11-14.
12. Sharykin A.S. Congenital heart defects. //M. 2005. - pp. 8 - 9.1 b. Yurpolskaya L.A. X-ray and magnetic resonance computed tomography in the diagnosis of congenital heart defects. // Diss . .D.Sc. M. - 2008.
13. Abu-Suliman RM, Hashmi A., McCrindle BW, Williams WG, Freedom RM Anomalous origin of one pulmonary artery from the ascending aorta: 36 years' experience from one center. // Cardiol . Young. 1998.- Vol.8. — p.449 - 54.
14. Acar P., Laskari C., Rhodes J., et al. Three-dimensional echocardiographic analysis of valve anatomy as a determinant of mitral regurgitation after surgery for atrioventricular septal defects. //Am. J. Cardiol . 1999. - Vol. 83.-p. 745-749.
15. Acar Ph., Abadir S., Brierre G. So-called 'absence' of the leaflets of the pulmonary valve. // Cardiol . Young.- 2008. Vol. 18.- p. 535 - 536.
16. Acherman RJ, Smallhorn JF, Freedom RM Echocardiographic assessment of pulmonary blood supply in patients with pulmonary atresia and ventricular septal defect. //J. Am. Coll. Cardiol . 1996. - Vol. 28. -p.1308- 1313.
17. Akintuerk H., Michel-Behnke I., Valeske K., et al. Stenting of the arterial duct and banding of the pulmonary arteries. Basis for combined Norwood stage I and II repair in hypoplastic left heart. // Circulation.- 2002. Vol. 105.- p. 1099-1103.
18. Akintiirk H., Michel-Behnke I., Valeske K., Mueller M. et al. Hybrid transcatheter-surgical palliation. // Pediatr . Cardiol . — 2007. Vol. 28. - p. 79 -87.
19. Al Marsafawy HM, Yen Ho. S., Redington AN, Anderson RH The relationship of the outlet septum to the aortic outflow tract in hearts with inerruption of the aortic arch. //J. Thorac . Cardiovasc. Surg. - 1995. - Vol. 109.-p. 1225-36.
20. Albanese SB, Carotti A., Toscano A., Marino B., Di Donato RM Pulmonary atresia with intact ventricular septum and systemic-pulmonary collateral arteries. //Ann. Thorac . Surg. 2002. - Vol. - 73. - p. 1322 - 4.
21. Alexi Meshishvili V., Dahnert I., Ovroutsk S., Hetzer R. Right pulmonary artery to - left atrium communication. //Tex. Heart Inst. - 2001. - Vol. 28.-p. 120-124.
22. Allan LD, Sharland GK The echocardiographic diagnosis of totally anomalous pulmonary venous connection in the fetus. //Heart. - 2001. - Vol. 85.-p. 433-7.

23. Allan LD. Congenital heart disease //Heart. 2000. - Vol . 83. - p. 367 - 70.

24. Al- Naami GH, Al- Mesned AA Transposition of great arteries with constrictive ductus arteriosus revisited. // Pediatr . Cardiol . 2008. - Vol. 29. -p. 827-829.

25. Alves PM, Ferrari AH Common arterial trunk arising exclusively from the right ventricle with hypoplastic left ventricle and intact ventricular septum. //Int. J. Cardiol . 1987. - Vol . 16. - N. 1. - p. 99 - 102.

26. Anderson KR, McGoon DC, Lie JT Surgical, significance of the coronary arterial anatomy in truncus arteriosus communis. //Am. J. Cardiol . -1978.-Vol. 41.-p. 76-81.

27. Anderson RH, Anderson C., Zuberbuhler JR Further morphological studies on heart with pulmonary atresia with intact ventricular septum./ / Cardiol . Young.- 1991.-Vol. l.-p. 105-13.

28. Anderson RH, Macartney FJ, Shinebourne EA, Tynan M. Interruption of the aortic arch. //In: Pediatric Cardiology. Edinburgh: Churchill Livingstone.- 1981.-p. 1087-121.

29. Andrews Jr EC Five cases of an undescribed form of pulmonary interstitial fibrosis caused by obstruction of the pulmonary veins. //Bull. Johns. Hopkins Hosp. 1957. - Vol. 100. - p. 28 - 42.

30. Arbona GL, Kilman JW, Van Aman ME Type IV total anomalouse pulmonary venous connection. Unusual survival and review of the literature. // J. Cardiovasc. Surg. 1982. - Vol. 23. - p. 49 - 53.