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**PECULIARITIES OF HEMODYNAMICS IN INFANT CHILDREN WITH
VENTRICULAR SEPTAL DEFECT**

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Summary: *Congenital heart defects have occupied and currently occupy a leading position among congenital pathologies in children, remaining the leading cause of their mortality. The most commonly diagnosed is a ventricular septal defect (VSD). Pulmonary hypertension is an important component of the natural history of VSD. The natural course of VSD, complicated by pulmonary hypertension, is extremely unfavorable, since heart failure develops very quickly, first right ventricular and then left ventricular, which can ultimately be fatal.*

Key words: *ventricular septal defect, pulmonary hypertension, cardiac arrhythmias.*

**ОСОБЕННОСТИ ГЕМОДИНАМИКИ У ДЕТЕЙ РАННЕГО ВОЗРАСТА С
ДЕФЕКТОМ МЕЖЖЕЛУДОЧКОВОЙ ПЕРЕГОРОДКИ**

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Резюме: *Врождённые пороки сердца занимали и в настоящее время занимают лидирующую позицию среди врождённой патологии у детей, оставаясь ведущей причиной их смертности. Наиболее часто диагностируемым является дефект межжелудочковой перегородки (ДМЖП). Легочная гипертензия – важная составляющая естественного течения ДМЖП. Естественное течение ДМЖП, осложнённое легочной гипертензией крайне неблагоприятно, так как очень быстро развивается сердечная недостаточность, сначала правожелудочковая, а затем и левожелудочковая, что в конечном итоге может закончиться летальным исходом.*

Ключевые слова: *дефект межжелудочковой перегородки, легочная гипертензия, нарушения сердечного ритма.*

Relevance. Ventricular septal defect (VSD) is a congenital anomaly in the development of the septum, in which communication is formed between the left and right ventricles [3,5,6].

VSD is 1.5–3.5 cases per 1000 newborns in full-term infants, 4.5–7 cases per 1000 infants in premature infants. In the general structure of congenital heart defects, about 20% are VSD, which is the most frequently diagnosed defect. The frequency of small, hemodynamically insignificant muscular VSD reaches 53 cases per 1000 live births [3,6,7,11].

The pathophysiological picture, as in an open ductus arteriosus, is also observed in another congenital heart disease - ventricular septal defect, which occurs in 17-40%, on average in 20% of cases among all congenital heart defects, which is confirmed [5,10,12].

The hemodynamic disturbances of this defect are also based on the discharge of blood through the defect, the size of which is determined by the size of the defect, the ratio of general pulmonary and peripheral resistances, as well as the functional state of the myocardium. In utero, the pressure in both ventricles is equal, and the blood flow is determined by the ratio of the resistances of the vessels of both circles of blood circulation. Since the fetal pulmonary vascular resistance is very high, blood shunting can in some cases be from right to left [2,6,11,12].

VSD is the main cause of pathological blood supply to the pulmonary circulation, overfilling it with excess volume (hypervolemia), causing, in turn, volume overload of the left ventricle. In addition, VSD is "aggressive" in relation to the development of such a formidable complication as pulmonary hypertension. Pulmonary hypertension is an important component of the natural history of VSD. (1,8,9).

Pulmonary hypertension is a symptom complex characterized by a progressive increase in pulmonary vascular resistance, which leads to an overload of the right heart and the development of structural changes in the vessels of the pulmonary circulation. (4,8)

The natural course of VSD, complicated by pulmonary hypertension, is extremely unfavorable, since heart failure develops very quickly, first right ventricular, and then left ventricular, and surgical correction is no longer effective, which ultimately ends in death. (1,2,9).

The aim of our study was to study the clinical manifestations of the natural course of VSD.

Materials and research methods. Our work was carried out in the Department of Cardiology on the basis of the Andijan City Regional Medical and Medical Center. Our study included 75 children aged 1 to 3 years with a confirmed diagnosis of VSD. By gender, the ratio of girls and boys was almost the same (40 and 35).

The examination program included a conversation with parents to find out the condition of the child both in the neonatal period and in subsequent age periods.

On the electrocardiogram, there are signs of overload and hypertrophy of the left heart, later - and the right departments as pulmonary hypertension develops; on phonocardiography: high-amplitude systolic murmur, occupying the entire systole with a maximum amplitude at the left edge of the sternum at the level of III-IV intercostal spaces [5,6] (Fig. 1).

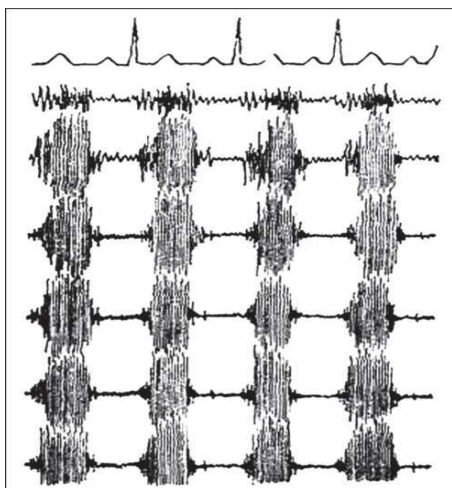


Figure 1 Intense systolic murmur of a ventricular septal defect

Instrumental studies included standard 12-lead ECG, Doppler echocardiography and chest x-ray in direct projection.

Results. All children at the time of the survey received inpatient treatment for pneumonia. General condition at admission was assessed how heavy. Caused by symptoms of heart failure II degree, and children with II-B degree prevailed (58.3%).

The clinical course of VSD and the degree of hemodynamic disturbances were associated with the size of the defect. Thus, among children with VSD with a moderate defect (1/3 of the aorta diameter) accounted for 87% and with a large defect (more than 1/2 of the aorta diameter) 13% of cases. In all examined children, the defect was located in the membranous part of the interventricular septum.

The leading complaints among children with a moderate defect in the interventricular septum were: increased sweating, weakness with episodes of anxiety, local cyanosis, and shortness of breath that occurs during physical activity of the child. According to the mother, recurrent respiratory diseases with hospitalization were noted more than 3 times a year.

47% of children had a tendency to cold extremities, 35% had marbling of the skin associated with peripheral circulatory disorders. All children had parasternal deformity of the chest. A high-intensity systolic murmur with a wide area of irradiation outside the heart was heard along the left edge of the sternum. In 54% of children, the II tone over the pulmonary artery is accentuated, in the rest of the children it is enhanced. Hepatomegaly (1.5 to 3 cm below the costal arch) was present in all children with moderate ventricular septal defect.

An assessment of the rates of physical development showed that the main proportion of children (69.9%) with an average size of a defect in the interventricular septum had weight values with a risk of developing a deficiency.

According to the results of the ECG in all children, the examination revealed: signs of hypertrophy of the right (65%) ventricle, with high electrical activity in 15% of cases and the left (35%) ventricle, in 12% with high electrical activity.

Heart rhythm disturbances are represented by: sinus tachycardia (94%), sinus bradycardia (6%), incomplete blockade of the right bundle branch block (88.5%) and atrioventricular blockade of the 1st degree in three children.

The magnitude of localization and structural changes in the parts of the heart were obtained by us according to echocardiography. In all children, the ejection fraction was not disturbed and was in the range of 66-72%.

On X-ray in direct projection, there was a significant increase in the pulmonary pattern with moderate bulging of the pulmonary artery arch. The size of the cardiac shadow is increased in diameter and the cardiothoracic index ranged from 60 to 66%.

All children with a large defect in the interventricular septum (8 children) were admitted to the hospital in serious condition with symptoms of congestive heart failure II-B degree. Three of the children examined for the severity of the condition received treatment in the intensive care unit. The symptoms of left ventricular heart failure prevailed: dyspnea with participation of accessory muscles at rest, recurrent unproductive cough, persistent oral cyanosis.

Moist rales were heard in the lungs against the background of weakened breathing. Right ventricular heart failure was manifested by hepatomegaly (5-7 cm below the costal arch). All children had a formed heart "hump", in three of them with a pronounced dome-shaped protrusion of the sternum with visualizing precordial pulsation. Systolic murmur with wide irradiation outside the heart.

All children had lagging behind in terms of physical development by one (65.5%) and two (37.5%) standard deviations. These data are due to chronic arterial hypoxia (capillary blood oxygen saturation was 94-88%) and hypoxemia, as well as frequent (more than three times a year) and prolonged hospitalization.

On the ECG: signs of combined hypertrophy of both ventricles, with overload of the right atrium (high-amplitude P wave in leads V1-V2) and the right ventricle (splitting of the ventricular complex in leads aVR, V1-V2), indicating pulmonary hypertension. In addition, three children with a large defect had ECG symptoms of subendocardial ischemia. Rhythm disturbances were manifested by sinus tachycardia (76 children), sinus arrhythmia (2 children), incomplete blockade of the right bundle branch block (in 5 children), impaired repolarization processes (in 3 children).

The radiograph showed a thickening of the lung pattern and an increase in the size of the cardiac shadow (from 62 to 68%) in diameter due to the right sections.

The ejection fraction according to EchoCG was lower than in children with moderate ventricular septal defect and had values of 62-64%.

Conclusions: Thus, in young children with a large defect in the interventricular occlusion, pulmonary hypertension should not be regarded as a complication of the defect. This is an integral part of hemodynamics from the very birth of the child. A huge shunt of blood leads to a pronounced volume overload of the left ventricle. There comes the I emergency stage of compensatory hyperfunction of the heart. Heart failure is predominantly II-B degree: in all children with a large defect and in 52% of cases in

children with a moderate defect in the interventricular septum. Left ventricular heart failure in our studies is represented by: shortness of breath, perioral cyanosis, obsessive cough, moist rales in the lungs; right ventricular failure - hepatomegaly. Cardiac arrhythmias were manifested by: sinus tachycardia (95%), sinus bradycardia (5%), incomplete right bundle branch block (81.7%) and aV blockade of the 1st degree.

USED SOURCES:

1. Baygabulova M.S., Altynbayeva N. et al. Clinical and radiological signs of pulmonary hypertension in children with congenital ventricular septal defect. Bulletin of KazNMU, No. 1-2014, p.103-105

2. Belozerov Yu.M., Bregel L.V., Subbotin V.M. The prevalence of congenital heart defects in children at the present stage. Russian Bulletin of Perinatology and Pediatrics. 2014. №6. With. 7-11.

3. Volosovets O.P. Status of medical care for children with cardio-rheumatological pathology / A.P. Volosovets // Health of the child. - 2015. - No. 5. - P. 125-133.

4. Ganiev AG Mitral valve prolapse in children with connective tissue dysplasia /Quarterly scientific and practical journal// "Hepato-gastroenterological research" №4. Volume 3. 2022. Articles 14-16

5. Kalashnikova E.A., Nikitina N.A. Early neonatal, postnatal diagnosis, clinical manifestation, treatment and prognosis for ventricular septal defect. To help the pediatrician / 2016 No. 6 (74), pp. 63-67.

6. Kalashnikova E.A., Nikitina N.A. Ventricular septal defect: features of early neonatal and postnatal diagnosis, clinical manifestations, treatment and prognosis at the present stage. To help the pediatrician / To help the pediatrician / / 2016., No. 4 (72), p. 71-75.

7. Cardiology of childhood / Ed. HELL. Tsaregorodtseva, Yu.M. Belozerova, L.V. Bregel. — M.: GEOTAR-Media, 2014. — 784 p.

8.Saperova E.V., Vakhlova I.V. Comprehensive assessment of the health status of children in the first year of life with congenital heart disease. Medical advice. 2017., No. 19., p. 198-204.

9.Saperova E.V., Vakhlova I.V. Congenital heart defects in children: prevalence, risk factors, mortality. Questions of modern pediatrics. /2017/. Volume 16 / No. 2., p. 126-133.

10. Khagay E.I. Abilmazhinova G.D. Congenital heart defects in children complicated by pulmonary hypertension. Diagnosis and treatment. Literature review. Science and Healthcare №5, 2017, p.129-144

11. Chepurnykh E.E., Grigoriev E.G. Congenital heart defects. Siberian medical journal. (Irkutsk). 2014., No. 3., pp. 121-127.

12. Faccini A, Butera G: Atrial septal defect (ASD) device trans-catheter closure: limitations. J Thorac Dis 10 (Suppl 24): S2923–S2930, 2018.