ANALYSIS OF CLINICAL CASES OF AORTIC COARCTATION IN CHILDREN OF GRODNO REGION

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Background. Coarctation of aorta (COA) is a congenital heart defect which leads to discrete narrowing of the aorta. It typically involves a thoracic preductal location distal to the left subclavian artery. COA accounts for 6-8% of all congenital heart diseases which has an incidence of approximately 3 cases per 10 000 births [1, 2]. Usually severe cases are presented in neonatal period with a male predominance. Rarely coarctation of the aorta develops later in life due to traumatic injury severe hardening of the arteries (atherosclerosis) and inflamed arteries (Takayasu arteritis). Coarctation also can be more complicated when it presents as aortic arch hypoplasia and with other left-sided heart lesions (mitral stenosis, aortic stenosis, hypoplastic left heart syndrome). In children COA can be combined with other congenital heart defects such as bicuspid aortic valve, subaortic stenosis, patent ductus arteriosus, ventricular and atrial septal defects and congenital mitral valve stenosis.

COA eventually leads to pressure overload in the arterial circulation proximal to the coarctation and hypoperfusion distal to the coarctation. Pressure overload causes left ventricular hypertrophy and hypertension in the upper body, including the brain. Hypoperfusion affects the abdominal organs as well as lower extremities. Malperfusion of the intestine increases the risk of sepsis due to enteric organisms. In due course, the pressure gradient increases collateral circulation to the abdomen and lower extremities. Long-term (chronic) high blood pressure is the commonest complication of coarctation of the aorta. Other complications of coarctation of the aorta may include brain aneurysms and hemorrhage, aortic dissection, aortic aneurysm.

Method of data collection. Case reports of these patients was collected from the Grodno Regional Children's Hospital and used to investigated necessary data. Case report included most necessary diagnostic documents such as complete blood count, biochemical tests, ultrasounds, electrocardiogram, etc. Statistical processing of the data obtained as a result of the research was carried out using traditional methods of variation statistics using the application package Statistica 10.0 and Excel. When comparing relative frequencies within one or two groups, a two-tailed Fisher test was used. The inclusion criteria for this study was pediatric patients with coarctation of aorta who has either surgical intervention to correct or given medication at the Grodno Regional Children's Hospital during the years from 2017 to 2022. In this study case histories of 23 pediatric patients were used.

Results and discussion. The number of male patients was 14 (60,87%) and female patients – 9 (39,13%), p=0,14.

By age, patients were distributed as follows: newborns accounted for 47,8%, at the age of 7 months – 1 year – 17,3%, over 1 year – 34,9% of children. Full term

newborns were predominated 16 (69,6%) and premature children were only 7 (30,4%), h=0,01.

Mode of delivery of patients during their birth was vaginal in 13 cases (56,5%), caesarian section was performed in 7 (30,4%) and 3 (13,1%) without any data. Out of the 23 patients, 11 (47,8%) were the 1st born, 5 (21,8%) – 2nd born, 4 (17,4%) – 3rd born, 1 (4,3%) was 4th born and 2 (8,7%) were 5th born. 3 (13,0%) newborns had patent ductus arteriosus (PDA) and 1 (4,3%) – pyelonephritis. The others did not present with any disorders.

Mothers of 2 (8,7%) of the patients had diabetes during pregnancy and 2 (8,7%) had moderate preeclampsia. Other diseases during pregnancy were acute respiratory infections – 4 cases (17,4%), chronic pyelonephritis – 2 (8,7%), anemia – 1 (4,3%), cholecystitis – 1 (4,3%), hypertension – 1 (4,3%), retinopathy – 1 (4,3%), diabetic polyneuropathy 1 (4,3%), cervical erosions 1 (4,3%) and polyhydroamnios 1 (4,3%). Complications during childbirth were seen in 2 cases: 1 case of placental insufficiency and 1 case of umbilical cord entanglement.

At the time of admission to the hospital, the patietns' condition was assessed as severe in 12 cases (52,2%), moderate – in 4 (17,4%), satisfactory – in 7 (30,4%). Average O2 saturation of patients on admission was 95,1%.

When evaluating the clinical picture, 5 (21,7%) cases of dyspnea , 3 (13.0%) cases of fever, 2 (8,7%) cases of cyanosis, 3 (13,0%) presented with respiratory symptoms (this includes cough, nasal congestion, wheezing, acute respiratory insufficiency, etc) and joints pains was present in 2 (8,7%) cases.

During the clinical examination blood pressure in lower limbs was dropped in 16 (69,6%) of patient. Pulsation of the femoral artery was reduced in 5 (21,8%) patients. In 10 (43,4%) patients breathing rate was increased. Systolic murmur was present in 16 (69,6%) cases. Out of that murmur was localized at the left edge of the sternum in 3 (18,7%) patients, 7 (43,8%) in the entire heart, 2 (12,5%) at the base of the heart and in 4 (25%) patients at the 5th point.

According to electrocardiogram investigations of patients, sinus tachycardia was seen in 7 (30,4%), sinus bradycardia in 3 (13,0%) and extrasystoles in 1 (4,3%) patient. The reminder of the patients had normal sinus rhythms (52,3%).

Heart failure was seen in most of the patients. 5 (21,7%) of the patients had heart failure of class IA, 6 (26,0%) had heart failure of class IIA.

Concomitant diseases were present as follows: anemia in 6 (26,0%) patients, protein deficiency in 4 (17,4%), cerebral ischemia in 2 (8,7%), encephalopathy in 3 (13%), psychomotor functional retardation in 1 (4,3%) patient and newborn respiratory insufficiency in 6 (26%) patients.

Other cardiac pathologies and deformations were present as such: atrial septal defect in 4 (14,8%) patients, aortic valve hypoplasia in 1 (4,3%), mitral regurgitation in 1 (4,3%), hypoplasia of aorta in 3 (13,0%), bicuspid aortic deformation in 1 (3,7%) patient, congenital pulmonary arterial defect in 1 (4,3%), ventricular septal defect in 1 (4,3%), arterial hypertension in 1 (4,3%), pulmonary hypertension in 1 (4,3%), arteriovenous malformation of lung vessels in 1 (4,3%), stenosis of pulmonary veins in 1 (4,3%), other pulmonary vessel defects in 2 (8,7%) cases.

According to the laboratory studies following parameters were observed: erythrocytosis was seen in 4 (17,4%) patients and leukocytosis – in 2 (8,7%). Anemia was diagnosed in 6 (26,1%) children and increased level of Hb was seen in 3 (13,0%). Thrombocytosis was detected in 6 (26,1%) cases. Increased sedimentation rate was identified in 5 (21,7%).

According to the biochemical analysis of blood hyperuricemia was detected in 5 (21,7%) patients, hypokalemia – in 4 (17,4%) patients, hypercalcemia – in 2 (8,7%) patients, CRP level increased in 4 (14,8%) patients, ALT was increased in 3 (13,0%) patients and LDG – in 3 (13,0%) patients.

Reduced pCO2 was seen in 5 (21,7%) patients and increased pO2 in 13 (56,5%) cases. Reduced blood oxygen saturation was seen in 14 (60,9%). Increased serum bicarbonate seen in 1 (4,3%) and reduced in 1 (4,3%). According to the coagulogram increased aPPT seen in 2 (8,7%) cases, increased PT in 3 (13,0%) and reduced in 2 (8,7%), increased INR was seen in 9 (39,1%) of cases and fibrinogen was increased in 7 (30,4%) cases.

Surgical correction was done to 17 patients (73,9%) out of which 1 patient passed away. Pharmacological treatment given were as follows: 8 (34,8%) patients were given diuretics, 8 (34,8%) were given ACE inhibitors and 4 (17,4%) were given digoxin.

Conclusion

1. Among these children with coarctation of aorta, full-term newborns were predominated 16 (69,6%), h=0,01.
2. Analysis of data obtained showed newborns' respiratory insufficiency (26,0%) and protein calorie deficiency (17,4%) as main concomitant diseases in children with coarctation of aorta.
3. At the time of admission to the hospital, the patient's condition was assessed as severe in half of the cases – 52,2%. A high frequency of children with coarctation of aorta presented with heart failure (47,8%).
4. In significant number of patients' (69,6%) lower limb blood pressure was reduced.
5. Surgical correction was done in 73,9% patients (p=0,002) and treatment for heart failure was given to 47,8%.

REFERENCES

1. Torok, R. D. Coarctation of the aorta: Management from infancy to adulthood / R. D. Torok, M. J. Campbell, G. A. Fleming // World J Cardiol. – 2015. – Vol. 7. – P. 765–775.

2. Doshi, A. R. Coarctation of Aorta in Children [Electronic resource] / A. R. Doshi, S. Chikkabyrappa // Cureus. – 2018. – 10 (12). – Mode of access : https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6368362. – Date of access: 05.12.2018.