

BLOOD SUPPLY OF CARDIAC CONDUCTION SYSTEM WITH COMPLEX CONGENITAL HEART DISEASE

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The increasing attention has been drawn to the study of cardiac conduction system due to demands of cardiology and cardiovascular surgery. A significant impulse to the study of its anatomy was given by improvement of surgical methods of treatment of arrhythmia and congenital heart disease. However, in surgical practice there are still some complications connected with [injury](#) of the CCS and its feeding vessels.

The aim of the work is to identify the peculiarities of the blood supply to the atrioventricular node, the bundle of the same and its branches in the case of complex CHD. The study of the blood supply to the atrioventricular portion of the CCS was carried out on 44 specimens of fetuses, newborn infants and children under 3 years old with complex CHD (complete atrioventricular septal defect, tetralogy of Fallot, hypoplastic left heart syndrome, ventricular septal defect accompanied by common arterial trunk, absence of the atrial septum). In order to study the blood supply to the CCS, injection of the coronary arteries with radiographic contrast and staining enhancements was used, followed by radiography, dissection, differentiation, and preparation of serial histological sections. It was established that the blood supply to the AV portion of the CCS of a normally formed heart and the one with CHD had some common features. The vascularization of the AV node and the bundle of the same name involves the same coronary arteries, as in the case of normal development. However, the participation of branches of the first anterior atrial arteries in the blood supply of the AV node increases by 5 times on an average. The said condition can be probably explained by hypertrophy of atrial arteries and their branches due to increased load on them in conditions of disturbed hemodynamics. In the case of CHD, the AV node artery emerges from the artery determining the type of cardiac blood supply. In 65.4% of the cases, it emerges from the right coronary artery. In the case of a complete atrioventricular septal defect the presence of a U-shaped curve of coronary artery at the place of origin of the AV node artery is irregular, which is probably connected with location of the AV node in fetal position. There is a marked variability in the [pattern](#) of branching and distribution of branches of the AV node artery in the case of CHD. It was discovered that large branches emerged from AV node artery towards the interatrial septum (in the case of atrial dilation), towards posterior wall of the right atrium and myocardium of the posterior section of the sinus portion of the interventricular septum (in the case of tetralogy of

Fallot), to the posterior wall of the single atrium (absence of the atrial septum), unusual branches (aneurysm of membranous interventricular septum). In the case of CHD, as in the case of normal development of heart, the primary branch goes through the node from the artery of the same name. The tortuosity of branches of the AV node artery was detected, including the branch going through the node. In the literature there is no single opinion on the degree of development of the anterior septal branches in the case of CHD. Half of the specimens with CHD showed equal development of the three first anterior septal arteries. In the remaining specimens the first and the second anterior septal arteries prevailed in outside diameter. In the case of tetralogy of Fallot the first and the second anterior septal arteries are the largest. In the case of CHD, as in the case of normal heart development, the intensity of the first anterior septal branches determines the degree of participation of all of them in the blood supply to the anatomical bifurcation of the atrioventricular bundle (AV bundle) and its branches. In the case of CHD we disclosed a connection between the position of the ventricular portion of the AV bundle and the vessels that supply it with blood. When the ventricular portion of the AV bundle is located on the left side of the muscular ridge of the sinus portion of the interventricular septum (tetralogy of Fallot), the branches of the first anterior septal artery supplying it with blood are displaced to the left side of the interventricular septum. In 14,3% of heart specimens with CHD we found a large posterior upper artery of the interventricular septum feeding blood to the AV node, the ventricular portion of the bundle of the same name, the initial parts of its branches. According to the obtained data, in the case of CHD the branching pattern of the smaller vessels reaching the ventricular portion of the AV bundle, and its branches, is the same as in the case of normal development. In the case of CHD we detected an increase in the number of smaller vessels and “corrugation” of their walls at the location of the sections of the CCS atrioventricular portions.