

CONGENITAL HEART DEFECTS (TETRALOGY OF FALLOT, TRANSPOSITION OF THE GREAT ARTERIES)

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Annotatsiya: Tugʻma yurak nuqsonlari yurak va yirik qon tomirlarning embrional rivojlanish jarayonida buzilishlar natijasida yuzaga keladigan ogʻir patologik holatlardir. Bu nuqsonlar yurak tuzilishining deformatsiyasi, qon aylanishining buzilishi va organizmda gipoksiya rivojlanishiga olib keladi. Fallo tetradasi va asosiy stvol transpozitsiyasi eng ogʻir sianotik tugʻma yurak nuqsonlari hisoblanadi. Ular murakkab anatomik oʻzgarishlar, gemodinamik buzilishlar va erta klinik namoyon boʻlishi bilan xarakterlanadi. Ushbu maqolada ularning embriologik kelib chiqishi, morfologik xususiyatlari, patogenez, kompensator mexanizmlari va klinik oqibatlari tahlil qilindi.

Kalit soʻzlar: tugʻma yurak nuqsonlari, fallo tetradasi, transpozitsiya, gipoksiya, gemodinamika

Аннотация: Врожденные пороки сердца являются тяжелыми патологическими состояниями, возникающими вследствие нарушений эмбрионального развития сердца и крупных сосудов. Эти нарушения приводят к выраженным анатомическим дефектам, нарушению кровообращения и развитию тяжелой гипоксии. Тетрада Фалло и транспозиция магистральных артерий относятся к наиболее тяжелым цианотическим врожденным порокам сердца. Они характеризуются сложными анатомическими изменениями, значительными нарушениями гемодинамики и ранним клиническим проявлением в младенчестве. В данной статье проанализированы их эмбриональное происхождение, морфологические особенности, патогенез, компенсаторные механизмы и клинические последствия.

Ключевые слова: врожденные пороки сердца, тетрада Фалло, транспозиция, гипоксия, гемодинамика

Abstract: Congenital heart defects are severe pathological conditions that arise due to disturbances in the embryonic development of the heart and great vessels. These abnormalities lead to structural malformations, impaired blood circulation, and systemic hypoxia. Tetralogy of Fallot and Transposition of the great arteries are among the most severe cyanotic congenital heart defects. They are characterized by complex anatomical changes, significant hemodynamic disturbances, and early clinical manifestation in infancy. The present study analyzes their embryological origin, morphological features, pathogenesis, compensatory mechanisms, and clinical consequences based on scientific literature.

Keywords: congenital heart defects, tetralogy of fallot, transposition, hypoxia, hemodynamics, embryology

Introduction

Congenital heart defects represent one of the most complex groups of cardiovascular diseases. They develop during early embryogenesis when the cardiac tube fails to properly divide into chambers and when the arterial trunk does not undergo correct septation. As a

result, the normal separation between systemic and pulmonary circulation is disrupted, leading to mixed blood flow and oxygen deficiency in tissues.

Tetralogy of Fallot and Transposition of the great arteries are classified as cyanotic congenital heart defects due to the presence of deoxygenated blood in systemic circulation. These conditions are usually diagnosed shortly after birth because of severe cyanosis and respiratory distress.

Étienne-Louis Arthur Fallot first described Tetralogy of Fallot as a combination of four anatomical defects.

Maude Abbott contributed significantly to the classification of congenital heart diseases.

William Harvey established the scientific basis of blood circulation, which is essential for understanding hemodynamic disorders.

Literature review

Robbins Basic Pathology describes congenital heart defects as a result of embryological developmental errors affecting cardiac septation and outflow tract formation. It highlights that Tetralogy of Fallot consists of pulmonary stenosis, ventricular septal defect, overriding aorta, and right ventricular hypertrophy, all contributing to reduced pulmonary blood flow and systemic hypoxia.

Gray's Anatomy explains in detail the embryological development of the heart, especially the formation of the cardiac septa and great vessels, emphasizing how errors in truncus arteriosus division lead to transposition defects.

Moore Clinically Oriented Anatomy provides a clinical perspective on congenital heart defects, describing their anatomical basis and physiological consequences in newborns and infants.

World Health Organization reports that congenital heart defects occur in approximately 8 per 1000 live births and are a major cause of neonatal mortality worldwide.

American Heart Association classifies Tetralogy of Fallot as the most common cyanotic congenital heart defect requiring early surgical correction.

Mayo Clinic reports that Transposition of the great arteries causes severe hypoxemia immediately after birth and requires urgent surgical intervention.

Methods

This study is based on analysis of scientific literature in pathology, embryology, cardiology, and pediatrics. Embryological development of the heart, septation of cardiac chambers, formation of great vessels, and hemodynamic changes were systematically reviewed. Pathogenetic mechanisms of hypoxia, compensatory myocardial hypertrophy, and circulatory adaptation were also analyzed.

Results

Tetralogy of Fallot consists of four main anatomical abnormalities: pulmonary stenosis, ventricular septal defect, overriding aorta, and right ventricular hypertrophy. These defects collectively reduce pulmonary blood flow and cause mixing of oxygenated and deoxygenated blood, resulting in cyanosis.

In Transposition of the great arteries, the aorta arises from the right ventricle while the pulmonary artery arises from the left ventricle. This creates two parallel circulatory systems that do not communicate effectively, leading to severe systemic hypoxia and life-threatening conditions shortly after birth.

Conclusion

Congenital heart defects significantly alter the normal structure and function of the heart. Tetralogy of Fallot and Transposition of the great arteries are severe conditions that require early diagnosis and surgical correction. Understanding their pathological anatomy is essential for accurate clinical management and improving patient outcomes.

Adabiyotlar, References, Литературы:

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