TETRALOGY OF FALLOT: ORIGIN, DIAGNOSIS, AND PATHOLOGICAL CHANGES

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Introduction: Tetralogy of Fallot (see Tetralogy of Fallot image) accounts for 7-10% of all congenital heart defects. Associated anomalies include right aortic arch defects (25%), altered coronary artery anatomy (5-10%), pulmonary artery stenosis, presence of aortopulmonary collateral vessels, patent ductus arteriosus, complete atrioventricular septal defect, atrial septal defect, and accessory septal valve defect. Tetralogy of Fallot has 4 features: a large ventricular septal defect, obstruction of the right ventricular outflow tract and pulmonary valve stenosis, right ventricular hypertrophy, and dextroposition of the aorta. Symptoms include cyanosis, dyspnea on feeding, poor growth rate, and severe hypercyanotic symptoms (sudden, potentially fatal episodes of severe cyanosis). A coarse systolic murmur is often heard at the upper left sternal border, with a single second heart sound (S2). The diagnosis is made by echocardiography. The definitive treatment is surgical repair of the defect.

The ventricular septal defect in tetralogy of Fallot is often described as a type of displacement, as the conus septum is displaced anteriorly. This displaced septum projects into the pulmonary outflow tract, often resulting in obstruction and hypoplasia of key structures, including the pulmonary valve, pulmonary trunk, and branches of the pulmonary arteries. The ventricular septal defect is usually large; therefore, the systolic pressures in the right and left ventricles (and aorta) are the same. The pathophysiology depends on the degree of right ventricular outflow obstruction. Moderate obstruction may result in a pure left-to-right shunt across the ventricular septal defect; severe obstruction causes a right-to-left shunt, resulting in low systemic arterial saturation (cyanosis) that is unresponsive to supplemental oxygen.

Research methods and materials: These factors lead to the formation of a vicious circle, which is caused by an initial decrease in arterial blood PO2, which stimulates the respiratory center and leads to hyperpnea and increased adrenergic tone. The increase in circulating catecholamines increases contractility, which increases the obstruction of the outflow tract.

Signs and symptoms of tetralogy of Fallot

Newborns with severe right ventricular outflow tract obstruction (or atresia) will have significant cyanosis and dyspnea during feeding, leading to poor weight gain. Newborns with mild obstruction may not have cyanosis at rest.

Hypercyanotic spells may be triggered by activity and are characterized by hyperpnea (rapid, deep breathing), irritability, prolonged crying, increasing cyanosis, and decreased or absent heart sounds. Attacks occur most often in young children; the peak incidence occurs between 2 and 4 months of age. Severe attacks can cause lethargy, seizures, and sometimes death. Some infants may occasionally drool during play, a condition that increases systemic vascular resistance and aortic pressure, which reduces right-to-left ventricular shunting and therefore increases arterial oxygen saturation.

Auscultation reveals a coarse systolic ejection murmur of grade 3-5/6 at the left mid-upper border of the chest (see Heart Murmur Intensity Table). The murmur in tetralogy is associated with pulmonary stenosis. The ventricular septal defect is usually asymptomatic because it is large and lacks a pressure gradient. Therefore, the murmur is softer as the pulmonary outflow obstruction becomes more pronounced. The second heart sound (S2) is usually single because the pulmonary component is significantly reduced. Right ventricular beats and systolic chest vibrations may be present.

Results: The diagnosis of tetralogy of Fallot is supported by history and clinical examination, chest radiography and ECG, and is established by two-dimensional echocardiography with color flow and Doppler studies.

Chest radiography reveals a wooden shoe heart with a concave segment of the pulmonary artery and reduced pulmonary vascular markings. A right aortic arch is present in 25%.

The ECG reveals right ventricular hypertrophy, right axis deviation, and sometimes right atrial enlargement.

Cardiac catheterization is rarely required unless there is a suspected coronary artery anomaly that may interfere with surgical management (e.g., anterior descending coronary artery disease) and is not detectable by echocardiography. MRI or CT may also be used to demonstrate coronary artery anatomy.

Conclusion: The diagnosis of generalized anomalous pulmonary venous drainage is based on chest radiography and echocardiography. Cardiac catheterization is rarely required; Sometimes cardiac MRI or CT angiography may be necessary to better define the anatomy of the pulmonary venous return. Radiography reveals severe diffuse pulmonary edema in the presence of small heart

and pulmonary venous obstruction; otherwise - cardiomegaly with increased pulmonary vascular pattern. In the supracardiac type of generalized anomalous pulmonary venous drainage (TAPVD), the entire heart shadow begins to resemble the shape of a snowman, the upper part of its circumference is formed by a rounded shadow given by the entry of the pulmonary veins into the drainage vein.

The ECG shows right axis deviation, right ventricular hypertrophy, and sometimes right atrial enlargement.

Preoperative treatment of heart failure with medications (e.g., diuretics, digoxin, angiotensin-converting enzyme inhibitors)

In neonates with complete anomalous pulmonary venous return obstruction, immediate surgical reconstruction is required. Later in life, heart failure should be treated, followed by surgery once the infant's condition has stabilized.

Surgical treatment consists of creating a wide anastomosis between the pulmonary venous connection and the posterior wall of the left atrium. It is important to ligate the vessel to decompress the site of the connection to the systemic venous circulation to prevent postoperative left-to-right shunting. Correction of the defect to return to the coronary sinus is different: in this case, the coronary sinus is transferred to the left atrium and its opening to the right atrium is closed.

Endocarditis prophylaxis is recommended before surgery, but is required for the first 6 months after defect repair unless there is a residual defect near the surgical site or prosthetic material.

REFERENCES

1. Andryev S. et al. Experience with the use of memantine in the treatment of cognitive disorders //Science and innovation. – 2023. – T. 2. – №. D11. – C. 282-288.
2. Antsiborov S. et al. Association of dopaminergic receptors of peripheral blood lymphocytes with a risk of developing antipsychotic extrapyramidal diseases //Science and innovation. – 2023. – T. 2. – №. D11. – C. 29-35.
3. Asanova R. et al. Features of the treatment of patients with mental disorders and cardiovascular pathology //Science and innovation. – 2023. – T. 2. – №. D12. – C. 545-550.
4. Begbudiyev M. et al. Integration of psychiatric care into primary care //Science and innovation. – 2023. – T. 2. – №. D12. – C. 551-557.

5. Bo'Riyev B. et al. Features of clinical and psychopathological examination of young children //Science and innovation. – 2023. – T. 2. – №. D12. – C. 558-563.
6. Borisova Y. et al. Concomitant mental disorders and social functioning of adults with high-functioning autism/asperger syndrome //Science and innovation. – 2023. – T. 2. – №. D11. – C. 36-41.
7. Ivanovich U. A. et al. Efficacy and tolerance of pharmacotherapy with antidepressants in non-psychotic depressions in combination with chronic brain ischemia //Science and Innovation. – 2023. – T. 2. – №. 12. – C. 409-414.
8. Nikolaevich R. A. et al. Comparative effectiveness of treatment of somatoform diseases in psychotherapeutic practice //Science and Innovation. – 2023. – T. 2. – №. 12. – C. 898-903.
9. Novikov A. et al. Alcohol dependence and manifestation of autoagressive behavior in patients of different types //Science and innovation. – 2023. – T. 2. – №. D11. – C. 413-419.
10. Pachulia Y. et al. Assessment of the effect of psychopathic disorders on the dynamics of withdrawal syndrome in synthetic cannabinoid addiction //Science and innovation. – 2023. – T. 2. – №. D12. – C. 240-244.
11. Pachulia Y. et al. Neurobiological indicators of clinical status and prognosis of therapeutic response in patients with paroxysmal schizophrenia //Science and innovation. – 2023. – T. 2. – №. D12. – C. 385-391.
12. Pogosov A. et al. Multidisciplinary approach to the rehabilitation of patients with somatized personality development //Science and innovation. – 2023. – T. 2. – №. D12. – C. 245-251.
13. Pogosov A. et al. Rational choice of pharmacotherapy for senile dementia //Science and innovation. – 2023. – T. 2. – №. D12. – C. 230-235.
14. Pogosov S. et al. Gnostic disorders and their compensation in neuropsychological syndrome of vascular cognitive disorders in old age //Science and innovation. – 2023. – T. 2. – №. D12. – C. 258-264.
15. Pogosov S. et al. Prevention of adolescent drug abuse and prevention of yatrogenia during prophylaxis //Science and innovation. – 2023. – T. 2. – №. D12. – C. 392-397.
16. Pogosov S. et al. Psychogenetic properties of drug patients as risk factors for the formation of addiction //Science and innovation. – 2023. – T. 2. – №. D12. – C. 186-191.

17. Prostyakova N. et al. Changes in the postpsychotic period after acute polymorphic disorder //Science and innovation. – 2023. – T. 2. – №. D12. – C. 356-360.
18. Prostyakova N. et al. Issues of professional ethics in the treatment and management of patients with late dementia //Science and innovation. – 2023. – T. 2. – №. D12. – C. 158-165.
19. Prostyakova N. et al. Sadness and loss reactions as a risk of forming a relationship together //Science and innovation. – 2023. – T. 2. – №. D12. – C. 252-257.
20. Prostyakova N. et al. Strategy for early diagnosis with cardiovascular diseaseisomatized mental disorders //Science and innovation. – 2023. – T. 2. – №. D12. – C. 166-172.
21. Rotanov A. et al. Comparative effectiveness of treatment of somatoform diseases in psychotherapeutic practice //Science and innovation. – 2023. – T. 2. – №. D12. – C. 267-272.
22. Rotanov A. et al. Diagnosis of depressive and suicidal spectrum disorders in students of a secondary special education institution //Science and innovation. – 2023. – T. 2. – №. D11. – C. 309-315.
23. Rotanov A. et al. Elderly epilepsy: neurophysiological aspects of non-psychotic mental disorders //Science and innovation. – 2023. – T. 2. – №. D12. – C. 192-197.
24. Rotanov A. et al. Social, socio-cultural and behavioral risk factors for the spread of hiv infection //Science and innovation. – 2023. – T. 2. – №. D11. – C. 49-55.
25. Rotanov A. et al. Suicide and epidemiology and risk factors in oncological diseases //Science and innovation. – 2023. – T. 2. – №. D12. – C. 398-403.
26. Sedenkov V. et al. Clinical and socio-demographic characteristics of elderly patients with suicide attempts //Science and innovation. – 2023. – T. 2. – №. D12. – C. 273-277.
27. Sedenkov V. et al. Modern methods of diagnosing depressive disorders in neurotic and affective disorders //Science and innovation. – 2023. – T. 2. – №. D12. – C. 361-366.
28. Sedenkova M. et al. Basic principles of organizing gerontopsychiatric assistance and their advantages //Science and innovation. – 2023. – T. 2. – №. D11. – C. 63-69.
29. Sedenkova M. et al. Features of primary and secondary cognitive functions characteristic of dementia with delirium //Science and innovation. – 2023. – T. 2. – №. D11. – C. 56-62.
30. Sedenkova M. et al. The possibility of predicting the time of formation and development of alcohol dependence: the role of genetic risk, family weight and its level //Science and innovation. – 2023. – T. 2. – №. D12. – C. 173-178.

31. Shamilov V. et al. Disorders of decision-making in the case of depression: clinical evaluation and correlation with eeg indicators //Science and innovation. – 2023. – T. 2. – №. D12. – C. 198-204.
32. Solovyova Y. et al. Protective-adaptive complexes with codependency //Science and innovation. – 2023. – T. 2. – №. D11. – C. 70-75.
33. Solovyova Y. et al. Suicide prevention in adolescents with mental disorders //Science and innovation. – 2023. – T. 2. – №. D11. – C. 303-308.
34. Solovyova Y. et al. The relevance of psychotic disorders in the acute period of a stroke //Science and innovation. – 2023. – T. 2. – №. D12. – C. 212-217.
35. Spirkina M. et al. Integrated approach to correcting neurocognitive defects in schizophrenia //Science and innovation. – 2023. – T. 2. – №. D11. – C. 76-81.