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MODERN CONCEPTS OF DIAGNOSIS AND TREATMENT OF CHILDREN'S ISCHEMIC INSULT

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Annotation: This article includes a review of the results of characteristic CT and MRI studies associated with the monogenetic causes of ischemic and hemorrhagic stroke in children and adolescents. Stroke is a relatively rare, but significant cause of short-term and long-term morbidity and mortality in children. We studied it in three categories: arterial ischemic stroke (AIS), hemorrhagic stroke (HI), and cerebral synovial thrombosis (CST). The etiology of AIS in children is diverse and differs from the etiology of adult stroke, the main ones being congenital heart diseases, vasculopathies, hematological disorders, and prothrombotic conditions. Additional factors may be related to age group, ethnic and geographical factors. Early detection allows for the start of rapid therapy and thereby reduces the risk of further recurrence and complications. Comparative analysis of symptoms in arterial ischemic stroke (AIS) and stroke-like conditions in children, the presumed stroke scale in children for prehospital diagnosis of AII in children and their analysis.

Keywords: stroke, pediatric stroke, arterial ischemic stroke, stroke masks, pre-hospital diagnosis of stroke, early diagnosis of stroke.

Аннотация: В данной статье представлен обзор результатов характерных КТ и МРТ, связанных с моногенетическими причинами ишемического и геморрагического инсульта у детей и подростков. Инсульт является относительно редкой, но значительной причиной краткосрочной и долгосрочной заболеваемости и смертности у детей. Мы разделили его на три категории: артериальный ишемический инсульт (АИИ), геморрагический инсульт (ГИ) и церебральный синовозный тромбоз (ЦСТ). Этиология ДИА у детей разнообразна и отличается от этиологии инсульта у взрослых, основными из которых являются врожденные заболевания сердца, васкулопатии, гематологические нарушения и протромботические состояния. Дополнительные факторы могут быть связаны с возрастной группой, этническими и географическими факторами. Раннее выявление позволяет начать быструю терапию и тем самым снизить риск последующих рецидивов и осложнений. Сравнительный анализ симптомов при артериально-ишемическом инсульте (АИИ) и инсультоподобных состояниях у детей, шкала предполагаемого инсульта у детей для догоспитальной диагностики АИИ у детей и их анализ.

Ключевые слова: инсульт, детский инсульт, артериальный ишемический инсульт, маски для инсульта, догоспитальная диагностика инсульта, ранняя диагностика инсульта.

Аннотация: Ушбу мақола болалар ва ўсмирларда ишемик ва геморрагик инсультнинг моногенетик сабаблари билан боғлиқ характерли КТ ва МРТ натижаларини кўриб чиқишни ўз ичига олган. Инсульт болаларда қисқа ва узоқ муддатли касалланиш ва

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ўлимнинг нисбатан кам учрайдиган, аммо анча аҳамиятли сабабидир. Уни уч тоифага артериал ишемик инсульт (АИИ), геморрагик инсульт (ГИ) ва серебрал синовоз тромбоз (ССТ) бўлиб ўргандик. Болалар АИСнинг этиологияси турлича ва катталар инсультининг этиологиясидан фарқ қилади, уларнинг асосийлари туғма юрак касалликлари, васкулопатиялар, гематологик бузилишлар ва протромботик ҳолатлардир. Қўшимча омиллар ёш гуруҳи, этник ва географик омиллар билан боғлиқ бўлиши мумкин. Эрта аниқлаш тезкор терапияни бошлашга имкон беради ва шу билан кейинги қайталаниш ва асоратлар хавфини камайтиради. Болаларда артериал ишемик инсульт (АИИ) ва инсультга ўхшаш ҳолатларда симптомларнинг қиёсий таҳлили, болаларда АИИни шифохонагача ташхислаш учун болаларда тахмин қилинган инсульт шкаласи ва уларнинг таҳлили.

Калит сўзлар: инсульт, болалар инсульти, артериал ишемик инсульт, инсульт ниқоблари, инсультнинг шифохонагача диагностикаси, инсультнинг эрта диагностикаси.

Stroke is defined as focal brain damage and neurological deficits resulting from sudden blockage or rupture of cerebral arteries or veins. Types of stroke caused by vascular occlusion include arterial ischemic stroke (AIS) and cerebral sinovenous thrombosis (CSVT), while stroke resulting from vascular rupture is called hemorrhagic stroke. Stroke in children is relatively uncommon and often leads to lack of recognition and delayed diagnosis. The etiology of stroke in children is multifactorial, and unlike the single-factor etiology in adults, several risk factors typically coexist in pediatric cases. Vasospastic conditions such as congenital or acquired heart disease, malformations, metabolic and hematological disorders, and migraines are more common in childhood strokes. The purpose of the diagnostic assessment is to confirm the presence of cerebrovascular damage, exclude other types of neurological dysfunction, and determine the etiology of the stroke. Treatment of stroke in children is primarily aimed at stabilizing systemic factors and eliminating the main causes. Various antithrombotic and non-antithrombotic therapies are discussed. The use of anticoagulant therapy in AIS in children is increasing. Mortality after a stroke in children is 20-30% depending on the localization and underlying cause. More than 50% of survivors have residual neurological dysfunction.

Childhood stroke has several etiologies, which differ mainly from those of adults. Genetic discoveries in the last decade have shown that monogenic diseases, including ischemic stroke of small vessels and arteries, are a rare but significant cause of ischemic stroke in children and young people. These discoveries helped to understand that stroke in children can be a sign of a major genetic disorder. Identification of these diseases requires a detailed medical and family history, a thorough clinical assessment and neuroimaging assessment to identify systemic symptoms and signs. Correct etiological diagnosis and understanding of genetic risk factors for stroke are important steps for identifying the underlying mechanisms, optimizing the development of specific prevention strategies, and in some cases, identifying new therapeutic goals.

1. Arterial ischemic stroke (AIS)

- Arterial ischemic stroke occurs when blood supply in one of the cerebral vessels is disrupted, often due to thrombus formation or embolism. This leads to insufficient intake of

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oxygen and nutrients into brain tissue, which can cause their injury or death. Three types of AIJ are distinguished:

- Thromboembolic stroke - an embolism caused by the formation of a thrombus in the vessels of the brain or obstruction of the vessels of the brain by a thrombus or a piece of tissue of another organ (often from the heart).
- Cardiogenic stroke - occurs due to embolism, often caused by heart diseases such as atrial fibrillation or heart defects.
- Stenosing stroke develops due to arterial stenosis, which limits blood flow to the brain, especially in the carotid artery area.

2. Hemorrhagic stroke (HS)

Hemorrhagic stroke occurs as a result of hemorrhage into brain tissue due to rupture of a blood vessel in the brain. Hemorrhagic stroke is divided into two types:

- Intracerebral hemorrhage (IH) is the most common type, with hemorrhage occurring directly in brain tissue, often due to hypertension, aneurysm, or atherosclerosis.
- Subarachnoid hemorrhage (SAH) - the entry of blood into the space between the meninges (subarachnoid space), often caused by rupture of a brain aneurysm.

3. Cerebral synovial thrombosis

Cerebral synovial thrombosis is a rare disease in which a thrombus forms in the cerebral veins, disrupting the normal flow of venous blood. This leads to venous congestion, brain edema, and neuronal damage. This type of stroke can be caused by various factors, such as infections, injuries, blood clotting disorders, or pregnancy.

Despite the increasing recognition of monogenic causes of stroke, genetic diseases in children with stroke have not been sufficiently studied and are therefore rarely detected. For timely and accurate diagnosis, it is very important to increase the knowledge of medical workers in this area. In this review, we provide a brief overview of the main monogenous diseases that can manifest as ischemic stroke in childhood and describe their clinical signs. Based on the subtype and descriptive features of stroke, which may indicate a monogenic diagnosis of ischemic stroke in children, we present a set of practical recommendations for identifying these rare causes of stroke. The current difficulties in genetic analysis of children with ischemic stroke and future prospects will also be discussed.

Congenital heart disease, vasculopathies, hematological disorders, and prothrombotic conditions are a group of diseases that can have a significant impact on children's health. These disorders can manifest at an early age and require a comprehensive approach to diagnosis and treatment. To improve the quality of life of children and provide timely intervention, it is important to understand these diseases, methods of their diagnosis and treatment.

Congenital heart disease (CHD) is an anomaly that occurs as a result of improper formation of the heart and blood vessels during the fetal period. VZS can range from mild disorders to severe defects requiring surgical intervention. The most common types of VAT include:

1. Anomalies of the heart septum (defects of the interatrial and interventricular septum). These are the most common defects, which are often diagnosed in children in the first years of life.

2. Stenoses and insufficiency of the heart valves. These conditions can lead to blood flow difficulties and heart strain.
3. Tetralogy of Fallot - a complex defect involving several anomalies, such as pulmonary artery stenosis, ventricular septal defect, etc.

Vasculopathies are vascular diseases that can affect their structure and function. The following diseases occur in children:

1. Minor vasculopathies (e.g., Kawasaki disease) are inflammation of the vessels, which can lead to aneurysms and other complications. This condition often occurs in young children and requires immediate treatment.
2. Childhood atherosclerosis - although atherosclerosis is usually age-related, in some cases children may have symptoms of vascular diseases associated with heredity or other factors.
3. Hematological disorders in children can be diverse, including:

Anemia - a decrease in hemoglobin levels in the blood, which can lead to fatigue, weakness, and growth retardation. Anemia can be caused by a deficiency of iron, folate, vitamin B12, or other factors.

1. Thrombocytopathy and thrombocytopenia are disorders of platelet count or function that can lead to increased bleeding or, conversely, to thrombus formation.
2. Haemophilia and other hereditary coagulopathies are disorders of blood clotting that can cause prolonged bleeding after injuries or surgeries.

Prothrombotic conditions are diseases with a high risk of thrombus formation. In children, these conditions may be associated with:

1. Hereditary disorders of the blood coagulation system. For example, antithrombin III or protein C, Leiden factor B deficiency.
2. Adaptive states - for example, inflammatory diseases, infectious diseases, or prolonged immobilization.
3. Genetic disorders that may increase the tendency to thrombus formation, such as antiphospholipid antibody syndrome.

Congenital heart diseases, vasculopathies, hematological disorders, and prothrombotic conditions require timely diagnosis and treatment. Caring for children with these diseases requires the joint efforts of a pediatrician, cardiologist, hematologist, and other specialists. The earlier the diagnosis and treatment is initiated, the higher the chances of improving the child's health and preventing serious complications.

Childhood stroke has several etiologies, which differ mainly from those of adults. Genetic discoveries in the last decade have shown that monogenic diseases, including ischemic stroke of small vessels and arteries, are a rare but significant cause of ischemic stroke in children and young people. These discoveries helped to understand that stroke in children can be a sign of a major genetic disorder. Identification of these diseases requires a detailed medical and family history, a thorough clinical assessment and neuroimaging assessment to identify systemic symptoms and signs. Correct etiological diagnosis and understanding of genetic risk factors for stroke are important steps for identifying the underlying mechanisms, optimizing the development of specific prevention strategies, and in some cases, identifying new therapeutic goals. Despite the increasing recognition of monogenic causes of stroke, genetic disorders in children with stroke have been little studied and therefore little recognized. For timely and accurate diagnosis, it is important to raise the awareness of

medical workers. In this review, we provide a brief overview of the main monogenous diseases that can manifest as ischemic stroke in childhood and describe their clinical manifestations. Based on the subtype and descriptive features of stroke, which may indicate a monogenic diagnosis of ischemic stroke in children, we present a set of practical recommendations for the diagnosis of these rare causes of stroke. Existing barriers and future prospects in the genetic analysis of children with ischemic stroke are discussed.

Stroke is a rare occurrence in children, with rates ranging from two to eight per 100,000 children under 14 years of age, and in most cases, the underlying disease manifests as heart disease, prothrombotic conditions, sickle cell disease, and vascular malformations. Currently, there are no clear indications for the treatment of stroke in children, although the central elements include supportive treatment, monitoring, and in some cases, anticoagulation as secondary prevention. The prognosis depends on the degree of brain damage and the underlying disease, but in most cases, the frequency of recurrence is high.

RESULT

Early diagnosis of stroke in children is very important, and pediatricians should be aware of the non-specificity of symptoms to prevent late outcomes and improve quality of life. Ischemic and hemorrhagic stroke remains a common cause of acquired disability in children and adolescents, but is not sufficiently recognized. Cerebral parenchymal and vascular tomography is usually performed as part of a comprehensive assessment of young patients with stroke. Familiarization with these patterns of the disease allows for early detection of the underlying hereditary disease. The results of the study allow us to speak about the predominance of motor and coordination disorders and general cerebral symptoms in AII in stroke-like conditions in children. The most common "stroke mask" is migraine. Based on the research results, a Scale was proposed, and a preliminary assessment of the effectiveness of the Scale was carried out using the example of confirmed cases of AII and "stroke masks". Timely hospitalization of children with AII can not only reduce mortality, but also allow for the use of modern diagnostic and treatment methods to reduce the volume of brain damage, and allow for the full restoration of motor and cognitive functions. It is necessary to conduct a deeper analysis of the sensitivity and specificity of the proposed scale.

LITERATURE:

1. Aroor S, Singh R, Goldstein L. BE-FAST (Balance, Eyes, Face, Arm, Speech, Time) Reducing the Proportion of Strokes Missed Using the FAST Mnemonic. Stroke. 2017;48(2):479-481.
2. Bigi S, Fischer U, Wehrli E, Mattle HP, Boltshauser E, Burki S, et al. Acute ischemic stroke in children versus young adults. Ann Neurol. 2011; 70:245–54.
3. Roach ES, Golomb MR, Adams R, Biller J, Daniels S, Deveber G, et al. Management of stroke in infants and children: a scientific statement from a Special Writing Group of the American Heart Association Stroke Council and the Council on Cardiovascular Disease in the Young. Stroke. 2008;39:2644–91.
4. Salih MA, Abdel-Gader AG, Al-Jarallah AA, Kentab AY, Alorainy IA, Hassan HH, et al. Stroke in Saudi children: epidemiology, clinical features and risk factors. Saudi Med J. 2006;27:S12–20.

5. Fullerton HJ, Wu YW, Sidney S, Johnston SC. Risk of recurrent childhood arterial ischemic stroke in a population-based cohort: the importance of cerebrovascular imaging. Pediatrics. 2007;119:495–501.
6. Mallick AA, O'Callaghan FJ. The epidemiology of childhood stroke. Eur J Paediatr Neurol 2010; 14:197–205.
7. Rajani NK, Pearce K, Campion T, et al. Pediatric stroke: current diagnostic and management challenges. Quant Imaging Med Surg 2018; 8:984–991.
8. Galvin J, Hewish S, Rice J, Mackay MT. Functional outcome following paediatric stroke. Dev Neurorehabil 2011; 14:67–71.
9. Tan RYY, Traylor M, Megy K, et al.; NIHR Bio-Resource: Rare Diseases Consortium. How common are single gene mutations as a cause for lacunar stroke? A targeted gene panel study. Neurology 2019; 93:e2007–e2020.
10. Щедеркина И.О. Инсульт и цереброваскулярная патология у детей и подростков: руководство для врачей. М.: ГЭОТАР-Медиа; 2022;27. Shchederkina IO. Stroke and cerebrovascular pathology in children and dolescents: a guide for doctors. M.: GEOTAR-Media; 2022;27. (In Russ.).
11. Lambers M, Goldenberg NA, Kenet G, et al. Role of reduced ADAMTS13 in arterial ischemic stroke: a pediatric cohort study. Ann Neurol 2013; 73:58–64.
12. Yanagawa S, Ito N, Arima K, Ikeda S. Cerebral autosomal recessive arteriopathy with subcortical infarcts and leukoencephalopathy. Neurology 2002; 58:817–820