

**A COMPREHENSIVE CLINICAL AND LABORATORY
APPROACH TO THE EARLY DIAGNOSIS OF
HEMORRHAGIC VASCULITIS IN CHILDREN**

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Introduction. According to the data of the World Health Organization (WHO), hemorrhagic vasculitis is the most common type of systemic vasculitis among children. Each year, on average, 10-20 children per 10,000 pediatric population are affected by this disease. Hemorrhagic vasculitis (Henoch–Schönlein purpura, IgA vasculitis) is a widespread immune-inflammatory disease in children that manifests in various clinical variants. The course and prognosis of the disease are mainly determined by the degree of renal involvement. Due to the diversity of clinical manifestations, early diagnosis of hemorrhagic vasculitis remains a relevant clinical challenge. In this regard, evaluating the diagnostic significance of modern biomarkers is of particular importance.

As a systemic microcirculatory vasculitis, hemorrhagic vasculitis affects the skin, joints, gastrointestinal tract, and kidneys. The clinical course of the disease is heterogeneous, and its severity and long-term prognosis are largely determined by the extent of renal damage. In recent years, an increasing incidence of hemorrhagic vasculitis has been observed in pediatric practice.

The disease most commonly occurs in children aged 4-10 years and is more prevalent among boys. Viral infections, environmental factors, and genetic characteristics of the immune system play an important role in disease development. The pathogenesis is based on the deposition of IgA1-containing immune complexes in the vascular wall, activation of the complement system, and the development of endothelial dysfunction.

Hemorrhagic vasculitis in children presents in several clinical forms. The mildest and most common form is the cutaneous form, which is characterized by symmetrically distributed palpable purpura. Skin rash is the earliest and most persistent clinical manifestation of the disease and is observed in almost all patients. In this form, the general condition is usually satisfactory, and no significant abnormalities are detected in laboratory parameters.

The cutaneous-articular form is identified in the majority of pediatric patients and is characterized by purpura accompanied by joint pain, swelling, and limitation of movement. This condition is usually reversible and does not lead to permanent joint deformities. Clinically, it requires differential diagnosis with certain rheumatologic diseases.

The cutaneous-abdominal form is considered one of the most variable and diagnostically challenging variants of the disease. It is associated with hemorrhagic inflammation of the intestinal wall and manifests with severe abdominal pain, vomiting, diarrhea, and signs of gastrointestinal bleeding. In some cases, this form may mimic an “acute abdomen” and be confused with conditions requiring urgent surgical intervention.

The cutaneous-renal form is the most severe and prognostically significant clinical variant of hemorrhagic vasculitis. It is characterized by the development of glomerulonephritis, with urinalysis revealing hematuria, proteinuria, and cylindruria. Renal involvement usually develops several weeks after disease onset and may be clinically silent, leading to delayed diagnosis.

This form is associated with a high risk of progression to chronic renal failure in the future.

In the generalized form, cutaneous, articular, abdominal, and renal syndromes occur simultaneously. In some cases, involvement of the cardiovascular, pulmonary, or central nervous system vasculature may also be observed. Laboratory investigations play an important role in the diagnosis of hemorrhagic vasculitis alongside clinical findings. General inflammatory markers such as C-reactive protein and erythrocyte sedimentation rate (ESR) are elevated during the active phase of the disease. Increased levels of these markers reflect inflammatory activity but are not specific to hemorrhagic vasculitis.

Immunological studies reveal elevated IgA levels as one of the most characteristic laboratory findings of hemorrhagic vasculitis. In particular, increased IgA1 fractions and the formation of IgA-C3 immune complexes are closely associated with renal involvement. Changes in complement system components, including C3 and C4, are also important in assessing disease activity.

Urinalysis is the primary method for early detection of the nephritic form. The appearance of proteinuria and hematuria indicates the onset of immune-mediated inflammatory processes in the kidneys and necessitates long-term patient monitoring.

In recent years, significant attention has been paid to modern biomarkers for the early diagnosis and prognosis of severe forms of hemorrhagic vasculitis. Inflammatory cytokines such as IL-6, IL-8, and TNF- α are sensitive indicators of disease activity, and their elevated levels are associated with severe clinical courses, particularly the development of abdominal and nephritic forms.

Markers of endothelial dysfunction, including VCAM-1, ICAM-1, and E-selectin, reflect the degree of vascular endothelial damage. Their increased levels are associated with purpura activity, microangiopathy, and generalized

forms of the disease. Von Willebrand factor is an important marker for assessing endothelial injury and hemostatic disorders. Oxidative stress markers, particularly elevated malondialdehyde (MDA) levels, indicate disease severity. In nephritic forms, MDA levels are significantly increased and are accompanied by reduced activity of antioxidant defense enzymes.

Modern biomarkers such as NGAL, KIM-1, and cystatin C demonstrate high sensitivity for the early detection of renal injury. These markers appear before clinical and standard laboratory abnormalities, enabling timely identification of nephritic complications and appropriate adjustment of therapeutic strategies.

In conclusion, hemorrhagic vasculitis in children is a clinically heterogeneous disease with a high risk of complications. Early diagnosis and effective monitoring require not only careful assessment of clinical manifestations but also the application of laboratory investigations and modern biomarkers. Biomarkers allow evaluation of disease activity, early identification of severe clinical forms, and prediction of renal complications. A comprehensive clinical and laboratory approach contributes to improved treatment efficacy and reduces the risk of long-term complications in children with hemorrhagic vasculitis.

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