

Signs And Mechanisms Of Membranolysis in Childhood Glomerulonephritis

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Abstract

Objectives: To study of acute and chronic glomerulonephritis and effect of Sermion on this disease.

Patients: 82 children in the age group of 4-15 years with acute and chronic glomerulonephritis were studied.

Results: Acute glomerulonephritis was seen in young children of the school going age (51.8%). Chronic glomerulonephritis was seen in young as well as middle aged children (35.3% and 37.3% respectively).

Combined vascular / intra vascular changes as well as single vascular disorders were seen in chronic glomerulonephritis.

Decrease of total protein was seen in 54% of children with acute and 10.6% children with chronic form of glomerulonephritis. 4 patients with acute glomerulonephritis were diagnosed with haemorrhagic syndrome. In most of the cases studied Sermion was exclusively important for a treatment of glomerulonephritic when it was added to traditional therapy leading to restoration of physiological properties of the blood.

Conclusion: Trials indicate strong recommendation of Sermion in the treatment of glomerulonephritis.

INTRODUCTION

Chronic glomerulonephritis (GN) and its dynamics is often seen in the Neonatology practice. Although GN has been keenly studied over the past several years, the focus in the last decade has been on the sorbitioning ability of erythrocytes and concentration of middle-molecular marker of the disease.

Earlier, we investigated the microcirculation impairment in children with nephrotic type of glomerulonephritis in correlation with the degree of pathologic process activity - many pathological processes were observed in relation to the haemodynamic disorders in the microcirculation. They were related to changes in rheological and physico-chemical properties of the blood. In this work we investigated the density-elasticity properties of the blood of children with nephrotic type of glomerulonephritis and evaluated approaches to pathogenetic management of this disease.

We have examined 82 children with confirmed diagnosis of "acute" and "chronic" type of Glomerulonephritis in the age group of 4-15 years [Ignatova M. S. 1979]. The acute form

of Glomerulonephritis has been seen in young children of school going age [51.8%]. The chronic form has been seen in young and middle aged children [35.3% and 37.3%]. The acute form starts with general edema, arterial hypertension, toxemia, anuria, proteinuria, and fewer and lumbar pain. In chronic patients the disease starts on a significantly slower pace. Many of children had anemia, increased ESR, hypo- and dysproteinemia, hyperlipidemia, hyperholisterinemia and increased levels of urea and creatinine in the blood serum. All patients were divided into two subgroups depending on sex, age and stage of disease. Patients in the first group were managed routinely with NFGN including Prednisolone [1-1.5 mg/kg], Heparin [100u/kg per day], Curantile [3-5 mg/kg], diuretics, hypotension drugs, antibiotics and other medications. The second group patients were managed in the same way except with the addition of a vasodilating agent - Sermion [1-2 mg/kg]. Measurement of its density and velocity of the movement under different hydrostatic pressures have been studied under the rheological properties of blood. The physico-chemical properties of erythrocyte membranes were measured by "Dzetta" - potential, electrophoretic and electric properties

(Pytvisky method). Considering many variations in rheological blood properties in the healthy children (depending on climate and meteorological conditions), we examined 15 healthy children of similar age group as study control, which were not vaccinated or suffered from any disease in a time period of last 3 months preceding the study.

RESULTS AND DISCUSSION

Our studies on microcirculation in the bulbar conjunctiva by means of TV biomicroscopy in children with NFGN showed significant changes. Their properties and manifestation depended on the severity of the pathological process [Table 1]. This table shows 75 of 82 children. 100% of children with acute form of glomerulonephritis and 84.2% with the chronic form showed the development of compensatory mechanisms in central and peripheral haemodynamics.

In 30 of 82 children we noticed that there was simultaneous perivascular, vascular and intravascular changes. Their rates were dependent on the activity of the process. For example they were observed in 25 of 54 of 3rd stage activity patients and in 5 of 28 children with 2nd stage activity. All three types of disorders were seen in patients suffering from acute NFGN [21 out of 35 vs. 9 out of 47 children with chronic form]. The combined vascular and intravascular changes as well as single vascular disorders were seen in the chronic course of the disease [20 of 32 and 18 of 47 observed patients].

Among the vascular disorders the changes in the vessel diameter similar to arteriole diameter were seen. In advanced type of AGN, a general vascular spasm was observed. The changes of vessel diameter precipitated an increase of arteriole-venular ratio (AV-ratio). Irregularities of arteriole diameter accompanied with venular alterations were seen as well. These changes usually seen in AGN depending on activity of pathophysiological process. Another manifestation of vascular disease was aneurysm, twists and reticularity of vessels and venous congestion. The number of functional capillaries was diminished and in some parts there was no vessel at all (especially in limb area – “limb capillaropathy”) – this depended on the severity of pathophysiological process. Intravascular changes of the conjunctiva were noted during biomicroscopy [MBS] in all 35 patients suffering from AGN and in 33 of 47 patients suffering from CGN. It was dependent on the severity of the process (up to 90% in 3rd and 71.4% in 2nd stage of activity). Commonly they appeared in form of erythrocyte aggregation combined with microhaemodynamic disorders.

The haemodynamic disorder manifested with slow velocity of the blood stream, especially in AGN, and a tendency of slow down in the chronic form. Mostly they were observed at the curves of capillaries, contributing to the stasis and Slag phenomenon. The changes in colloid properties of blood contributed the slogging.

The signs of venous congestion, such as slow rate of blood flow clearly correlates with the severity of oliguria [$g=0.68$], which occurs due to altered vessel permeability. But the quantity of filtrated plasma was increased markedly contributing to the hypoalbuminemia and the related colloid-osmotic pressure. The proteins that passed through the vessels resulted in perivascular edema. It has been seen in 54.3% children with acute and in 10.6% children with chronic form. In 4 patients with acute NFGN it was combined with haemorrhagic syndrome.

The investigations showed significant increase in viscosity of blood and decrease in its velocity, especially with low hydrostatic pressure. If pressure is 2 mm of water scale, these parameters were not seen. This stage and its frequency were consistent with the duration of disease.

The blood viscosity is dependent on the charge of erythrocytic membrane which is important in preventing its coagulation [₆]. We studied the physico-chemical properties of erythrocyte membranes in children with acute and chronic NGNI. Decrease of EFP and Dzetta-potential of the erythrocyte membrane were about 34.0 and 35.3% in acute and 39.8% and 40.5% in chronic NFGN. In preliminary data published [₇] the increase of cholesterol concentration, fibrinogen and globulin played an important role in decreasing the charge of the erythrocytes membrane. We observed that hypercholesterolanemia and increased levels of highly dispersed proteins clearly correlates with low value of EFP and Dzetta-potential [$g=0.64$, $g=0.69$]. Significant depositions of these substrates in the blood stream of children suffering from NFGN consisted mostly of erythrocytes. Their charges have been decreased due to the forces of erythrocyte repulsion. On the other hand, increase in cholesterol and decreases of phospholipids levels in erythrocyte biomembranes also change its charge. Hynalinal structures in the endothelium of vessels in GN change their surface charge simultaneously with a decrease in the electrical properties of the erythrocyte membrane charge, and causes vessel wall cell sedimentation to increase resulting in a decrease of the blood flow rate.

Traditional basic therapy caused clinical-laboratory

remittance and contributes to decrease of perivascular, vascular and intravascular changes, except tortuosity of venules and capillaries, single slogs, and decreased blood stream. Restoration of diuresis and elimination of inflammatory changes under the effect of corticosteroids and diuretic therapy reduced the perivascular edema and hemorrhage.

The positive improvement clearly correlates with decrease in the proteinuria [$g=0.74$], restoring the level of albumin in the blood serum. While normal therapy helps to remove vascular and intravascular changes of microcircular channel, bulbar conjunctivitis remains uncured.

The changes in rheological properties of blood were stable and remained so during the period of clinical -laboratory remittance, even in favorable periods of disease, which showed weaker effect in anti-agregative therapy. We concluded that the charge of the erythrocytic membrane and their EFM has been increased during the clinical-laboratory remittance in children suffering from HFGN. This fact is due to decrease of hyperlipidemia and hyperholesterolanemia. The preservation of these disorders with NFGN demonstrates the importance of the proposed treatment.

In recent years, there was a discussion about positive effect of Sermion [Nysergolin] on microhaemodynamics during different pathological conditions [8]. Sermion in appropriate dosage added to the basic therapy of 15 patients, decreased vascular, intravascular and perivascular changes in children suffering from bulbar conjunctivitis up to 46.3%, 26.7% and 6.7%. The tortuosity, irregularity, aneurysm and reticularity of vessels, as well as venous congestion in the blood stream also have been decreased. At the same time, the diameter of arterioles, capillaries and venules has been expanded. The aggregation of erythrocytes and decrease of the blood flow rate has been observed only in 2 out of 15 patients. The features of perivascular edema and hemorrhage have not been observed. The positive improvements in microvascular changes reflects the classical form of the disease. Arterial

pressure was observed to decrease in 5-6 days and edema and proteinuria disappeared within 7-8 day. In contrast, using traditional therapy, these pathological changes decreased only after 7-8 and 9-10 days of treatment. The clinical-laboratory remittance was achieved in 7-10 days. Partial remittance has been observed in 10-15% patients.

CONCLUSIONS

In summary, Sermion added to the traditional therapy of NFGN in children not only leads to restoration of rheological and physicochemical properties of the blood, but also has good effect on clinical course of the disease. We strongly recommend the addition of Sermion into the therapeutic regimen for NFGN.

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