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Diagnosis Of DIC Syndrome In Severe Complications Of Pregnancy

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Abstract: Objective: To assess hemostasiological parameters in severe complications of pregnancy. Materials and Methods: We studied 67 patients between 2020 and 2023: 55 patients with severe preeclampsia, 12 patients with eclampsia, including 8 pregnant women with HELLP syndrome, and 12 women with fetoplacental complex disorders (intrauterine growth retardation, antenatal fetal death). Results: When studying the main links of the hemostasis system, phenomena of coagulopathy and consumption thrombocytopathy were established, which coincided with a progressive increase in residual nitrogen in the blood and protein in the urine. Conclusion: The course of pregnancy, labor, and the postpartum period in pregnant women with severe hypertensive complications (severe preeclampsia, eclampsia, HELLP syndrome, fetoplacental insufficiency) proceeds with the development of a general biological, nonspecific intravital DIC syndrome.

Keywords: DIC syndrome, pregnancy, preeclampsia, eclampsia, HELLP syndrome, fetoplacental insufficiency.

Introduction: Maternal and child health protection remains a constant concern in our republic today. Over the years of sovereignty, Uzbekistan has achieved significant success in obstetrics, perinatology and gynecology. However, certain reserves remain for improving maternal and child health protection. Currently, these primarily concern pregnancy complications, which continue to occupy a prominent place in the structure of perinatal and maternal mortality. One of the most serious complications of the gestational process remains hypertensive syndrome in the form of preeclampsia, eclampsia, and HELLP syndrome, against which complications of fetoplacental insufficiency and other disorders develop, significantly affecting the mother's body, the fetus, and leading to long-term adverse outcomes with the development of chronic damage to vital organs in women and newborns [2,6,8].

Over the past decades, new data have been obtained on the important role of DIC syndrome in the pathogenesis of various pregnancy complications. DIC syndrome is a general biological pathological, nonspecific universal expression of the hemostasis reaction to the influence of various factors on the human body. The essence of DIC syndrome lies in the intravital formation of platelet-fibrin thrombi in the microcirculatory system of vital organs. DIC syndrome contributes to the emergence and development of thrombotic, hypoxic, and hemorrhagic disorders. The study of the hemostasis system during pregnancy allows timely detection of intravascular thrombosis in the capillaries of vital organs and systems. As a result, clinical manifestations of preeclampsia, eclampsia, fetoplacental insufficiency, complicated labor, and dysfunction of parenchymal organs (brain, kidneys, liver, placenta, etc.) may develop [1,3,5].

In obstetric practice, DIC syndrome occurs in acute, subacute, and chronic forms. We studied 67 patients between 2020 and 2023:

- 15 patients with severe preeclampsia,
- 12 with eclampsia,
- 12 with fetoplacental complex disorders (intrauterine fetal growth retardation, antenatal fetal death),
- 8 pregnant women with HELLP syndrome.

All these patients were hospitalized in obstetric departments, where intensive therapy was carried out according to generally accepted standard treatment protocols. The gestational age ranged from 27 to 35 weeks. These women suffered from urinary system diseases, kidney disorders, and hypertension. When studying the main links of the hemostasis system, phenomena of coagulopathy and consumption thrombocytopathy were identified, which coincided with a progressive increase in residual nitrogen in the blood and protein in the urine. When studying chronometric indicators of hemostasis, a significant prolongation of these indicators was revealed (Table 1).

In these pregnant women, positive tests were observed in determining RKMF and FDP (Table 2). When studying the platelet component of the hemostasis system in the above-mentioned patients, a significant decrease in platelet count and an increase in their aggregation capacity (consumption thrombocytopathy) were found.

Table 1. Some indicators of the procoagulant component of the hemostasis system in patients with severe preeclampsia and eclampsia.

Examined Indicator	Healthy Pregnant Women at the End of the Third Trimester (n=30)	Severe Preeclampsia and Eclampsia (n=42)	P1-2
Fibrinogen (g/L)	4,95±0,7	1,69±1,7	<0,01
APTT (sec.)	34,1±2,5	52,1±4,8	<0,01
AVR (sec.)	51,1±4,8	78,5±5,9	<0,01
Prothrombin Index (%)	103,8±3,1	99,4±3,7	<0,05
TEG: A) “r+k” (mm) B) “m” (mm) C) ITP (arbitrary units)	 17,1±2,1 55,2±2,4 13,1±0,9	 37,1±3,9 29,1 ±2,9 2,2±0,6	 <0,01 <0,05 <0,01

We conducted a dynamic study of the concentration of fibrin-fibrinogen degradation products (FDP) and soluble fibrin monomer complexes (RKMF) in pregnant women and postpartum women who had experienced severe forms of the listed pathological conditions during pregnancy. RKMF was assessed using a protamine sulfate test with dilutions and was positive in the main group. At the same time, this test was negative in the control group. The level of FDP in postpartum women who had undergone complicated pregnancies remained positive even on days 10-12 after childbirth and surgeries.

Our research showed that in patients with severe preeclampsia, eclampsia, HELLP syndrome, as well as in cases of fetoplacental insufficiency, signs of intravascular circulation of thrombin and plasmin were detected at significantly higher concentrations than in healthy pregnant women. This was indicated by high levels of RKMF and FDP, with intravascular conversion of fibrinogen into fibrin in the main group progressing more intensively than the synthesis of fibrinogen and other blood coagulation factors. Therefore, such pregnant women exhibited relative hypofibrinogenemia, prolonged APTT, and activated recalcification time (AVR).

When analyzing the coagulation profiles of the main group of pregnant women, the following findings were established: reduced fibrinogen concentration (1.63 ± 1.05 g/L), pronounced thrombocytopenia (85±15*10ˆ9/L), prolonged APTT (52.1±14.8 sec) and AVR (78±5.8 sec), as well as high levels of RKMF and FDP.

The results obtained in the examined pregnant women indicate the presence of Phase II (coagulopathy and consumption thrombocytopathy) due to intravascular consumption of hemocoagulation factors and a subacute form of DIC syndrome.

To clarify the causes of hypocoagulation, the transfer test by Raby is recommended, which is performed using a thromboelastograph. Given that not all medical institutions have this device, we resorted to a modified version of this test, making it more accessible. The test is based on determining recalcification in the patient's plasma, in the plasma of a healthy donor, and in a mixture of equal amounts of the patient's and donor's plasma. The essence of the method is that adding donor plasma to the tested plasma leads to a shortening of recalcification time (hypercoagulation). It is important to note that, in addition to consumption coagulopathy (Phase II of DIC syndrome), we also observed consumption thrombocytopathy in pregnant women with severe complications. This condition arises due to platelet consumption into clots, leading to thrombocytopathy.

Table 2. Frequency of positive tests for the determination of RKMF and FDP complexes in patients with severe preeclampsia and eclampsia.

Examined Indicator	Control Group (n=30)	Severe Preeclampsia and Eclampsia (n=42)
RKMF: A) Ethanol Test (Positive) B) Protamine Sulfate Test 2++++	 30/0 30/0	 17/11 17/17
FDP: A) Hemagglutination Inhibition Test (1×10^{-3} g/L) 10 mcg/mL B) Dilution Titer 1:32	30/0 30/0	17/17 17/17

Note: In the numerator – the total number of examined patients; In the denominator – the number of positive tests in this group of patients.

In patients with eclampsia and HELLP syndrome, in whom hypocoagulation was detected, the transfer test was positive, indicating an acquired nature of hypocoagulation, caused by intensive intravascular blood coagulation.

To illustrate this, we present the following case: A 22-year-old patient, S., was admitted to the intensive care unit of the maternity complex in a severe condition. Diagnosis upon admission: Second pregnancy, 33-34 weeks of gestation, first labor. Upon admission, the patient was unconscious. According to her husband, the pregnant woman had not attended antenatal consultations for the past month, despite multiple invitations to see a doctor. In recent weeks, she complained of weakness, drowsiness, fatigue, thirst, periodic headaches, especially in the occipital region and epigastric area, nausea, and visual disturbances (seeing flashing spots before her eyes). One hour before admission, she suddenly experienced a convulsive seizure and lost consciousness. During transportation in the ambulance, she had another convulsive seizure.

Medical history (according to her husband):

- This is her second pregnancy. One year ago, her first pregnancy ended in a spontaneous miscarriage at three months of gestation.
- She has been married for 2.5 years.

Examination findings:

- Edema in the lower extremities, abdomen, and face
- Bite marks on lips
- Blood pressure (BP): 200/130, 210/130 mmHg
- Proteinuria: 12%
- Residual blood nitrogen: 68 mg%

Obstetric status:

- Fetal position: Longitudinal
- Presentation: Cephalic
- Fetal head: Located above the entrance to the small pelvis
- Fetal heart rate: Muffled, 170-180 bpm

Internal examination:

- Birth canal not prepared
- Pelvic capacity normal

Hemostasis system indicators:

- Fibrinogen: 1.5 g/L

- Prothrombin index: 91.3%
- Activated partial thromboplastin time (APTT): 55.5 sec
- Activated recalcification time (AVR): 80 sec
- Antithrombin III (At-III): 0.75 g/L
- RKMF:
  - Ethanol test: Positive
  - Protamine sulfate test: Positive
- FDP:
  - Staphylococcal agglutination test: 1:1024
  - Hemagglutination inhibition test: 40 mcg/mL
- Platelet count: 65,000 per mm³

Analysis of the Coagulation Profile:

This coagulation profile indicates the presence of severe hypofibrinogenemia, thrombocytopenia, with prolonged APTT and AVR, which confirms hypocoagulation.

An elevated RKMF level proves the presence of active thrombin in circulating blood and the occurrence of the thrombin-fibrinogen reaction.

A significant increase in FDP confirms the plasmin-fibrinogen reaction, meaning reparative fibrinolysis has occurred.

Thus, the analysis of the obtained results showed that pregnancy, labor, and the postpartum period in pregnant women with severe hypertensive complications (severe preeclampsia, eclampsia, HELLP syndrome, fetoplacental insufficiency) proceed with the development of a general biological, nonspecific intravital DIC syndrome. Timely diagnosis of its forms and phases contributes to the development of preventive and therapeutic strategies.

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