



## Etiopathogenesis, Diagnosis, Treatment, Prognosis And Prevention Of Preeclampsia In Pregnant Women

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### ABSTRACT

Preeclampsia is a severe variant of gestosis that occurs after the 20th week of gestational age, is characterized by multiple organ disorders with predominant damage to the central nervous system, and precedes eclampsia. It is manifested by headaches, nausea, vomiting, visual impairment, hyperreflexia, lethargy, drowsiness or insomnia. It is diagnosed based on data from daily blood pressure monitoring, general urinalysis, coagulogram, transcranial Dopplerography. Infusion therapy, anticonvulsants, antihypertensive, anticoagulant, membrane stabilizing agents are used for treatment. If the appointments are ineffective, an emergency caesarean section is indicated.

### Keywords:

preeclampsia, pregnant women, convulsive syndrome, women

**Introduction.** Preeclampsia often develops after the 28th week of gestation against the background of milder forms of gestosis. Preeclamptic condition is observed in 5% of pregnant women, women in labor and women in childbirth. In 38-75% of patients, it occurs during the prenatal period, in 13-36% — during childbirth, in 11-44% — after childbirth. In 62% of cases, preeclampsia precedes eclampsia, although, according to some authors, the disorder remains unrecognized in other patients due to the rapid development of convulsive syndrome. More often, the disease occurs in predisposed women with the first teenage, late, multiple pregnancies, repeated gestation with a history of preeclampsia, obesity, extragenital pathology (chronic arterial hypertension, liver, kidney diseases, collagenoses, diabetes mellitus, antiphospholipid syndrome).

### Causes of preeclampsia

The etiology of the disorder, as well as other forms of gestosis, has not been definitively established to date. A likely factor contributing to the development of preeclampsia is

considered to be the pathological reaction of the body of a predisposed woman to physiological restructuring during pregnancy. Specialists in the field of obstetrics have proposed more than 30 reasoned etiopathogenetic theories of the occurrence of the disease, the main of which are:

- Hereditary. The role of genetic factors in the development of preeclampsia is confirmed by its more frequent diagnosis in patients whose mothers suffered from gestosis. The patients have defects in the genes 7q36-eNOS, 7q23-ACE, AT2P1, C677T. The path of inheritance is presumably autosomal recessive.
- Immune system. The penetration of foreign fetal antigens into the maternal bloodstream is accompanied by the retaliatory production of antibodies. The deposition of the formed immune complexes in various tissues triggers complex defense mechanisms, which are manifested by activation of endothelial cells and acute endotheliosis.
- Placental. Some authors associate preeclampsia with impaired cytotrophoblast invasion. As a result, there is no transformation of the smooth muscle layer of the uterine

arteries, which subsequently leads to their spasm, deterioration of the interstitial blood flow, hypoxia and, as a result, damage to the endothelium.

- **Cortico-visceral.** Proponents of the theory consider preeclampsia as a neurotic disorder of hemodynamics caused by a violation of the relationship between the cortex and subcortical divisions. This approach explains the provoking role of severe stress and is confirmed by functional changes in the EEG.

Since individual theories cannot fully explain all the clinical manifestations of the disease, it is justified to consider gestosis as a polyetiological condition with common pathogenesis mechanisms. The immediate causes of the development of preeclampsia are incorrectly selected therapy for dropsy of pregnant women and nephropathy, non-compliance with medical recommendations by the patient, high therapeutic resistance of milder variants of gestosis.

#### Pathogenesis

A key link in the mechanism of preeclampsia development is the generalization of acute endotheliosis and vasoconstriction, initially localized in the placenta, with the involvement of brain tissues in the pathological process. Vascular dysfunction leads to damage to cell membranes, impaired metabolism of neurons with the appearance of hypersensitivity and increased excitability of nerve cells. The lesion of suprasegmental subcortical structures is accompanied by polysystemic vegetative disorders, detected in more than 90% of patients with severe forms of gestosis. In parallel, pregnant women and women in labor with preeclampsia develop pyramidal insufficiency, which indicates a disorder at the level of the cortical departments and is manifested by tendon-periosteal hyperreflexia, anisoreflexia, the appearance of pathological reflexes, increased convulsive readiness. The latter affect the stem parts of the brain. Destructive processes caused by microcirculation disorders also occur in other organs — the liver, kidneys, and lung tissue. The situation is aggravated by coagulopathic disorders characteristic of gestosis.

#### *Symptoms of preeclampsia*

Usually, the disorder occurs against the background of previous nephropathy. Existing edema, arterial hypertension, moderate asthenovegetative symptoms (dizziness, weakness, insufficient sleep, metotropicity, emotional lability) are joined by signs of central nervous system damage and increased intracranial pressure. The patient complains of intense headache, heaviness in the back of the head, fatigue, looks inhibited, sluggish, indifferent, sometimes responds inappropriately. There is increased drowsiness or insomnia, trembling of outstretched fingers, sweating of palms and feet.

In 25% of women with a preeclampsia clinic, visual disorders are detected — a feeling of blurred vision, flashing sparks or flies, fear of light, double vision, loss of individual fields of vision. Nausea, vomiting, and pain in the epigastrium and right hypochondrium may occur. In severe cases, muscle twitching, delirium, hallucinations, petechial rash occur, indicating a violation of blood clotting. The preeclamptic condition is relatively short, lasts no more than 3-4 days, after which it is stopped by proper therapy or goes into eclampsia.

#### Complications

Eclampsia is considered to be the most serious complication of preeclampsia — the most severe type of gestosis with high rates of maternal and perinatal mortality. 1-3% of patients have vision loss (amaurosis) caused by edema, vascular changes, retinal detachment or ischemia of the occipital lobe of the cortex due to circulatory disorders in the basin of the posterior cerebral artery. It is possible to develop a hypertensive crisis, cerebral edema, stroke, HELLP syndrome, detachment of the normally located placenta, the occurrence of postpartum coagulopathic bleeding and DIC syndrome. Fetoplacental insufficiency is usually aggravated, and signs of intrauterine fetal hypoxia are increasing.

Women who have had preeclampsia are 4 times more likely to develop cardiovascular diseases in the future (hypertension, angina pectoris, heart attacks, strokes, congestive heart failure), and the risk of type 2 diabetes is doubled. In one third of patients, gestosis is diagnosed in subsequent pregnancies.

*Diagnostics*

Timely diagnosis of preeclampsia is usually not particularly difficult if a pregnant woman has been under the supervision of an obstetrician-gynecologist for a long time about previous nephropathy. At the initial treatment of a patient with characteristic complaints, an examination plan with the identification of specific markers of gestosis is recommended:

- Blood pressure monitoring. Daily monitoring with automatic blood pressure measurement using a special device is shown. In patients with preeclampsia, blood pressure usually exceeds 180/110 mmHg. with a pulse amplitude of more than 40 mmHg. The index of arterial hypertension is 50% or higher.
- Assessment of the hemostasis system. Gestosis is characterized by consumption coagulopathy and activation of the fibrinolytic system. It is recommended to study the content of fibrinogen, its degradation products (RFMC), antithrombin III, endogenous heparin, evaluate APTT, prothrombin (MHO), and thrombin time.
- General urine analysis. Proteinuria is considered an important sign of preeclampsia. The protein content in urine exceeds 5 g/l, granular cylinders, leukocyturia may be detected. Hourly diuresis is often reduced to 40 ml or less. To assess the severity of kidney damage, the daily amount of protein in the urine is determined.
- TCDG of cerebral vessels. It is used for an objective assessment of cerebral blood flow. Transcranial dopplerography confirms the presence of signs of increased cerebral perfusion pressure and decreased vascular resistance characteristic of preeclampsia.

Taking into account possible obstetric complications, the patient is shown ultrasound of the uterus and placenta, dopplerography of uteroplacental blood flow, CTG, fetometry, phonocardiography of the fetus. Differential diagnosis is carried out with diseases of the brain (thrombosis of the sinuses of the dura mater, meningitis, tumors, stroke), convulsive forms of epilepsy, retinal detachment. The pregnant woman is advised by an anesthesiologist, intensive care physician, therapist, neurologist, oculist, cardiologist, nephrologist.

*Treatment of preeclampsia*

The patient is urgently hospitalized in the intensive care unit of the nearest medical institution with a delivery room. The main therapeutic task is to reduce reflex and central hyperreactivity, prevent convulsive syndrome, stabilize vital functions, and correct multiple organ disorders. A pregnant woman with preeclampsia is shown a strict therapeutic and protective regime. The treatment regimen includes the appointment of the following groups of drugs:

- Anticonvulsants. The "gold standard" is the introduction of magnesium sulfate through an infusion machine. The drug has a sedative, anticonvulsant, antispasmodic, hypotensive effect, effectively reduces intracranial pressure. Simultaneously with the improvement of cerebral hemodynamics, it relaxes the myometrium and increases the intensity of blood flow in the uterus. If necessary, tranquilizers are additionally used.
- Antihypertensive drugs. Imidazoline derivatives are preferred, which have a central  $\alpha_2$ -adrenomimetic effect, stimulate  $I_1$ -imidazoline receptors in the nucleus of the solitary tract and thereby enhance the parasympathetic effect on the myocardium. Parenteral administration of peripheral vasodilators, hybrid  $\beta$ - and  $\alpha_1$ -adrenoblockers with rapid antihypertensive action is possible.
- Infusion formulations. To normalize oncotic and osmotic pressure, colloidal, protein, balanced crystalloid solutions are injected intravenously. Infusion therapy can improve the rheological properties of blood, central and peripheral hemodynamics, tissue perfusion, reduce the severity of multiple organ disorders, and restore the water-electrolyte balance. According to indications, sedatives, direct-acting anticoagulants, antioxidants, membrane stabilizers, drugs to improve blood flow in tissues, and prevent fetal respiratory distress syndrome are used. If intensive care is ineffective during the day from the moment of hospitalization, emergency delivery by caesarean section is recommended. In patients with rapidly increasing symptoms of preeclampsia, surgery is performed within 2-4 hours. Natural childbirth with high-quality

anesthesia (prolonged epidural anesthesia), perineotomy or episiotomy is possible only with a significant improvement in the patient's well-being, stable stabilization of blood pressure, and laboratory parameters.

#### *Prognosis and prevention*

The outcome of gestation in pregnant women with symptoms of preeclampsia depends on the availability of medical care and the correct choice of management tactics. In any case, the prognosis for the mother and fetus is considered serious. In recent years, the maternal mortality rate has been reduced to 0.07 per 1,000 births, and perinatal mortality ranges from 21 to 146 per 1,000 cases.

**Consultation.** Prevention of preeclampsia involves regular checkups in a women's clinic, monitoring of blood pressure and laboratory parameters in patients with dropsy of pregnant women, nephropathies, careful implementation of all medical appointments, normalization of sleep and rest, psycho-emotional rest, weight gain control, a protein-enriched diet with a low salt content.

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