ПРОФИЛАКТИКА ПРЕЭКЛАМПСИИ: СОВРЕМЕННЫЙ ПОДХОД К ЛЕЧЕНИЮ ОТЕКОВ, ВЫЗВАННЫХ БЕРЕМЕННОСТЬЮ

Кидирниязова К.С.¹, Сутырина А.В.¹,

Нама П.¹, Исмаилова Д.Х.²

Руководитель: Городничева И.Е.

*к.м.н., доцент кафедры акушерства и гинекологии лечебного факультета
Тюменского государственного медицинского университета Минздрава России,
г. Тюмень*

ФГБОУ ВО Тюменский ГМУ Минздрава России¹

Московский государственный университет им. М. В. Ломоносова²

PREVENTION OF PREECLAMPSIA: A MODERN APPROACH TO THE TREATMENT OF EDEMA CAUSED BY PREGNANCY

Kidirniyazova K.S.¹, Sutyryna A.V.¹,

Nama P.¹, Ismailova D.K.²

Head: Gorodnicheva I.Y.

*associate professor at the chair of obstetrics and gynecology,
faculty of medicine Tyumen State Medical University Ministry of Health of
the Russian Federation, Tyumen*

Tyumen State Medical University of the Ministry of Health of the Russian Federation¹

Lomonosov Moscow State University (MSU) Lomonosov Moscow State University²

Аннотация. Выявление гиповолемии гемодинамики у беременных с отеками при помощи метода реовазографии позволяет обоснованно назначать для предупреждения развития преэклампсии инфузионную терапию растворами гидроксипропилированного крахмала.

Abstract. Detection of hemodynamic hypovolemia in pregnant women with edema using the rheovasography method makes it possible to reasonably prescribe infusion therapy with hydroxyethylated starch solutions to prevent the development of preeclampsia.

Ключевые слова: беременность, реовазография, преэклампсия, гиповолемия.

Key words: pregnancy, rheovasography, preeclampsia, hypovolemia.

Relevance.

According to the Ministry of Health of the Russian Federation, based on Rosstat's calculation of the state of health of pregnant women, parturient women, puerperas and newborns in 2019, the percentage of women whose pregnancy was complicated by edema, proteinuria and hypertensive disorders is equal to 6% of the total number of pregnant women who completed childbirth [11, 15, 17, 19].

In the Russian Federation, preeclampsia (PE) is one of the most important causes of maternal and perinatal morbidity and mortality. Maternal mortality is 12 times higher when PE develops before 28 weeks of pregnancy. The risk of PE is 4.1% in the first pregnancy and 1.7% in subsequent pregnancy. However, the risk can reach 14.7% for repeated pregnancies if the first pregnancy was complicated by PE, and 31.9% if the previous two pregnancies were complicated by PE [1, 2, 4, 10, 11, 15, 17].

One of the earliest manifestations of preeclampsia is a violation of the microcirculation of capillary blood flow against the background of generalized arteriolospasm. Endothelial dysfunction, along with an increase in aldosterone synthesis and sodium and water retention in cells, progressive hypoproteinemia contributes to pathological permeability of the vascular wall and the release of the liquid component of blood from the vessels. As a result, additional conditions are created for generalized spasm, hypertension, and edematous syndrome. Emerging endothelial damage and changes caused by it lead to damage to all parts of the microcirculation in preeclampsia [5, 6, 8, 15, 17, 20].

Another factor in increasing the amount of interstitial fluid in edema caused by pregnancy is a violation of the balance between the colloid osmotic pressure of plasma and the tissues surrounding the vessels, which is caused on the one hand by hypoproteinemia, and on the other – sodium retention in the tissues, and, consequently, an increase in their hydrophilicity. Subsequently, pregnant women develop a paradoxical combination-hypovolemia against the background of a significant amount of fluid retention (up to 16 liters) in the interstitial space, which aggravates the decrease in microcirculation [8, 9, 10, 18, 19].

It is proved that changes in the volumic parameters of hemodynamics can be detected before the development of clinical symptoms and syndromes of preeclampsia, in particular hypertension. There is an opinion that in women who subsequently develop preeclampsia, a lack of circulating plasma volume (CP) is a manifestation of the inability of their body to adapt to new conditions due to developing pregnancy, and, in turn, a lack of BCC causes a deterioration in tissue perfusion leading to the development of hypertension, hemodynamic and metabolic disorders [2, 3, 4, 5, 12, 17].

It is impossible to cure gestosis during pregnancy, so the main task of obstetricians is to improve the microcirculation of vital organs and prevent the transition of its lighter forms to heavy ones. Midwives are also faced with the task of prolonging pregnancy to a viable fetus as much as possible and ensuring that it and the mother receive a careful delivery. Early detection and registration of pregnant women with risk factors for developing preeclampsia are among the key preventive measures. For timely diagnosis of diseases, it is necessary to identify the preclinical stage of excessive weight gain during pregnancy (previously called "pregestosis"), which is manifested by a set of changes detected with laboratory and additional research methods from approximately 15-16 weeks of pregnancy [4, 6, 7, 9, 16].

Today, non-invasive methods for studying the volume of fluid sectors and indicators of body structure are being developed. One of these methods is rheovasography-bioelectric impedance analysis (rheography, electroplethysmography). Impedancecometry is a highly sensitive and objective method of studying peripheral blood circulation, which is the registration of pulse oscillations of blood vessels. Thanks to this hardware method, pregnant women can be quickly and painlessly examined for volumic disorders [2, 3, 5, 10, 14, 18, 19].

At the Tyumen State Medical University, the Department of Obstetrics and Gynecology developed a scheme for pathogenetic treatment of excessive weight gain during pregnancy, aimed at preventing the progression of the severity of preeclampsia.

Scheme of pathogenetic prevention of preeclampsia severity progression:

1. Infusion of solutions of hydroxyethylated starch, which is able to "seal the pores" in the damaged endothelium, which appear during gestosis. Hydroxyethylene starch 6% - 250 ml intravenously drip, No. 2-3 every other day.
2. Antiplatelet drugs-curantil per os-25 mg tablets, 1 tablet 2-3 times a day, the course is 4 weeks.
3. Systemic enzyme therapy – phlogenzym 2 tablets 3 times a day, the course is 4 weeks.
4. Multivitamin complex containing selenium-complivit trimestrum-2, 3 (depending on the trimester of pregnancy) 1 tablet 1 time a day.

Objective: to evaluate the effectiveness of the diagnosis of hypovolemia in pregnant women with excessive weight gain by rheovasography.

Materials and methods.

We analyzed the course of pregnancy in 220 women who were registered in the obstetric and gynecological department of the multidisciplinary clinic of TSMU since the introduction (2010) of the method of impedancecometry (rheography) in the department for the diagnosis of hypovolemia. The comparison group consisted of 66 women who were observed in the department of the clinic before the introduction of rheovasography and the "scheme for preventing the progression of gestosis severity".

Examination of pregnant women was carried out using the monitoring complex of the cardio-respiratory system and tissue hydration KM-AR-01 Diamant V 10.2; rheovasography was performed on the SonicaidTeam "Oxford" device with computer analysis of toxicograms – cardiotocography; fetal-placental hemodynamics was determined on the Medison Accuvix V 20 ultrasound device by the Doppler method.

In the main group of patients for integral rheography using the "Diamant" device, the indications were: excessive weight gain (220 patients). In pregnant women with excessive weight gain, hypovolemia was detected in 46% of cases. Patients of the main group with diagnosed hypovolemia received a modern colloidal plasma substitute based on hydroxyethylated corn starch-hydroxyethylene starch 6 %. It is a preparation with a high molecular weight (200 thousand daltons), a degree of substitution of 0.5 ± 0.05 , and a colloidal osmotic pressure of about 28 mm Hg. HEC gradually increases BCC as the molecule cleaves, does not have a toxic effect on the liver and kidneys, accumulates in the cells of the reticuloendothelial system, and has a persistent volumic and rheological effect (more than 24 hours). This drug does not affect the expression of surface antigens of immunocompetent cells, does not cause additional activation of the complement system, prevents the development of a syndrome of increased capillary permeability, is easily metabolized and reduces the number of circulating adhesive molecules. Within 2-3 hours, the drug was injected into the ulnar vein in a day hospital of the university clinic. In 98.2% of cases, a positive effect was observed – excessive weight gain did not progress, no visible edema was subsequently detected. In 1.8% (4 women) – the effect of the therapy regimen was negative-visible edema caused by pregnancy appeared.

The average number of day hospital admissions was 2.0. All pregnant children of the main group were born full-term, without signs of moderate and severe asphyxia.

In the comparison group (women who did not receive a diagnosis of hypovolemia and the "Scheme for pathogenetic prevention of preeclampsia progression"), every second pregnant woman (51%) had a progressive degree of preeclampsia severity and this was an indication for hospitalization of women in the department of pregnancy pathology of an obstetric hospital. The average number of hospitalizations was 2.3. Progression to severe preeclampsia

was observed in only one untreated woman, who was delivered prematurely due to the lack of effect from preeclampsia therapy. The baby was born very prematurely and died on the 7th day after birth.

Results and conclusions.

Thus, the use of rheovasography and the "Scheme of pathogenetic prevention of gestosis progression", including infusion therapy with HES drugs, antiplatelet agents, multivitamins with antioxidant properties and enzyme therapy, in the complex diagnosis and treatment of gestosis, made it possible to reasonably prescribe HES drug to prevent the development and progression of edema caused by pregnancy.

Considering that the women's consultation is the main medical institution where the majority of pregnant women are observed, and taking into account the clear positive effect of using rheovasography and the "Scheme for preventing the progression of preeclampsia", we believe that the introduction of the rheovasography method should be carried out in women's consultations (day hospitals). This combination, started in a timely manner at the outpatient stage, can prevent the progression of the severity of preeclampsia and reduce the frequency of hospitalizations of pregnant women.

Список используемых источников информации

1. Абдрашитова А.В., Василевская А.В., Гурина А.В., Хойрыш А.В., Винокурова Е.А. [Патогенетическая терапия чрезмерной прибавки в весе при беременности](#) // [American Scientific Journal](#). 2020. № 35-2 (35). С.4-6.
2. Абдрашитова А.В., Василевская А.В., Хойрыш А.В. [Патогенетическая терапия чрезмерной прибавки в весе при беременности](#) // В сборнике: Неделя молодежной науки - 2020. Материалы Всероссийского научного форума с международным участием, посвященного 75-летию победы в Великой Отечественной войне. 2020. С. 22.
3. Веропотвелян П.Н., Веропотвелян Н.П., Смородская Е.П., Лазаренко А.Т. Современный взгляд на проблему гестоза. //Медицинские аспекты здоровья женщины. 2011. №6 (46). С. 43-52.
4. Винокурова Е.А. Коррекция антиоксидантами и аспирином гемостазиологических сдвигов у беременных с поздним гестозом. Автореф. дисс. ... канд. мед. наук. Барнаул. 1999. 24 с.
5. Винокурова Е.А. Современные неинвазивные инструментальные методы обследования плода (обзор литературы).// Медицинская наука и образование Урала. 2018. Т. 19. № 4 (96). С. 170-177.
6. Вихляева Е.М. Доклинические проявления системных нарушений, клинические исходы и отдаленные последствия преэклампсии // Акушерство и гинекология. 2009. №1. С. 3-6.
7. Краснопольский В.И., Титченко Л.И., Туманова В.А. и др. Функциональное состояние сосудистого кровотока фетоплацентарной системы у беременных с гестозом // Актуальные проблемы акушерства и гинекологии и перспективы их решения в Московской области. М.: МЕДпресс-информ., 2003; 48–55.
8. Патент 2093069 РФ. Способ определения объемов жидкостных секторов организма (Ю.Н. Волков, В.Г. Покровский, И.П. Николаева, В.Н. Семёнов, И.С. Курапеев. - № 5013462/14; Заявл. 17.11.91; Оpubл. в Б.И., 1997, №29).
9. Полякова В.А., Бышевский А.Ш., Винокурова Е.А. Современное патогенетическое лечение гестоза легкой степени// Научный вестник Тюменской медицинской академии. 2001. № 1. С.34-37.
10. Полякова В.А., Винокурова Е.А., Арабаджи О.А., Рагозина Я.А. Клинический опыт применения реовазографии у беременных с гестозом // Медицинская наука и образование Урала. - 2012. № 3 (71). - Т.13. - С.102-104.
11. Полякова В.А., Винокурова Е.А., Сухарченко Г.И., Ключко Л.В., Ключко Н.А., Бондарь З.М., Сомик А.Г. Перинатальное поражение головного мозга ишемическо-геморрагического характера у новорожденных в раннем неонатальном периоде. Анализ причин// Научный вестник Тюменской медицинской академии. 2001. № 1. С. 60-62.
12. Серов В.Н., Шифман Е.М., Молчанов И.В. Эклампсия: диагностика, анестезия, и интенсивная терапия. Материалы Всероссийской междисциплинарной конференции: «Современные взгляды на актуальные проблемы акушерства и гинекологии». 2002. С. 49-71.
13. Серов В.Н., Маркин С.А., Лубнин А.Ю. Эклампсия. М.: МИА. 2002. 464с.
14. Сидорова И.С., Билявская О.С. Оценка степени тяжести гестоза (по данным литературы) // Акушерство и гинекология. 2008. №3. С. 40-43.
15. Соловьёва А.В., Бриль Ю.А. Отеки беременных: ждать или бежать? // StatusPraesens. Гинекология, акушерство, бесплодный брак. - 2017. - №6. - с. 84-91.
16. Российский статистический ежегодник. 2019 / Федеральная служба государственной статистики (Росстат). М., 2019. URL: <http://www.gks.ru/wps/wcm/connect/rosstat>
17. Esper R., Nordaby R., Vilarino J. et al. //Cardiovasc. Diabetol. 2006. №5. P. 4-22.
18. Lampinen K., Ronnback M., Koaja R., Groop P. J. // Hypertens. 2006. 24. №4. P. 751-756.
19. Maqnussek E.B. Pregnancy cardiovascular risk as predictors of preeclampsia: population based cohort study. // BMJ. 2007. № 335. P. 978-986.
20. Ghulmiyyah L, Sibai B. Maternal mortality from preeclampsia/eclampsia. Semin Perinatol. 2012 Feb; 36(1): 56-9

21. Poon LC, Nicolaides KH. Early prediction of preeclampsia. *Obstet Gynecol Int.* 2014; 297397
22. Sperling JD, Dahlke JD, Huber WJ, Sibai BM. The Role of Headache in the Classification and Management of Hypertensive Disorders in Pregnancy. *Obstet Gynecol.* 2015 Aug; 126(2):297-302
23. Rolnik D.L., Wright D., Poon L.C.Y., Syngelaki A., O’Gorman N., de Paco Matallana C., et al. ASPRE trial: performance of screening for preterm pre-eclampsia. *Ultrasound Obstet Gynecol.* 2017; 50(4): 492–5.
24. Staff A.C., Redman C.W.G., Williams D., Leeson P., Moe K., Thilaganathan B., Roberts J.M. Pregnancy and Long-Term Maternal Cardiovascular Health. *Hypertension.* 2016; 67(2): 251–60.
25. McLaughlin, K., Scholten, R.R., Kingdom, J.C., Floras, J.S., Parker, J.D. Should Maternal Hemodynamics Guide Antihypertensive Therapy in Preeclampsia? *Hypertension.* 2018; 71(4): 550–6.

References

1. .Abdrashitova A.V., Vasilevskaya A.V., Gurina A.V., Khoirysh A.V., Vinokurova E.A. Pathogenetic therapy of excessive weight gain during pregnancy // *American Scientific Journal.* 2020. No. 35-2 (35). pp.4-6. (In Russian).
2. Abdrashitova A.V., Vasilevskaya A.V., Khoirysh A.V. Pathogenetic therapy of excessive weight gain during pregnancy// *V sbornike: Nedelya molodezhnoy nauki - 2020. Materialy Vserossiyskogo nauchnogo foruma s mezhdunarodnym uchastiyem, posvyashchennogo 75-letiyu Pobedy v Velikoy Otechestvennoy voyne.*2020. pp. 22. (In Russian).
3. Veropotvelyan P.N., Veropotvelyan N.P., Smorodskaya E.P., Lazarenko A.T. Modern view on the problem of gestosis. // *Meditssinskiye aspekty zhenskogo zdorov'ya.* 2011. No. 6 (46). pp. 43-52. (In Russian).
4. Vinokurova E.A. Correction of hemostasiological shifts with antioxidants and aspirin in pregnant women with late gestosis. Autoref. diss. ... candidate of medical sciences. Barnaul. 1999. p. 24 (In Russian).
5. Vinokurova E.A. Modern noninvasive instrumental methods of fetal examination (literature review). // *Meditssinskaya nauka i obrazovaniye Urala.* 2018. Vol. 19. No. 4 (96). pp. 170-177. (In Russian).
6. Vikhlyaeva E.M. Preclinical manifestations of systemic disorders, clinical outcomes and long-term consequences of preeclampsia // *Akusherstvo i ginekologiya.* 2009. No. 1. pp. 3-6. (In Russian).
7. Krasnopolsky V.I., Titchenko L.I., Tumanova V.A. et al. Functional state of vascular blood flow of the fetoplacental system in pregnant women with gestosis // *Aktual'nyye problemy akusherstva i ginekologii i perspektivy ikh resheniya v Moskovskom regione.* Moscow: MEDpress-inform., 2003; 48-55. (In Russian).
8. Patent 2093069 RF. A method for determining the volume of liquid secretions of the body (Yu.N. Volkov, V.G. Pokrovsky, I.P. Nikolaeva, V.N. Semenov, I.S. Kurapeev. - No. 5013462/14; Application 17.11.91; Publ. in B.I., 1997, No. 29). (In Russian).
9. Polyakova V.A., Byshevsky A.SH., Vinokurova E.A. Modern pathogenetic treatment of mild gestosis// *Nauchnyy vestnik Tyumenskoy meditsinskoy akademii.* 2001. No. 1. pp.34-37. (In Russian).
10. Polyakova V.A., Vinokurova E.A., Arabaji O.A., Ragozina Ya.A. Clinical experience of using rheovasography in pregnant women with gestosis // *Meditssinskaya nauka i obrazovaniye Urala.* - 2012. № 3 (71). - Vol.13. - pp.102-104. (In Russian).
11. Polyakova V.A., Vinokurova E.A., Sukharchenko G.I., Klochko L.V., Klochko N.A., Bondar Z.M., Somik A.G. Perinatal brain damage of ischemic-hemorrhagic nature in newborns in the early neonatal period. Analysis of causes// *Nauchnyy vestnik Tyumenskoy meditsinskoy akademii.* 2001. No. 1. pp. 60-62. (In Russian).
12. Serov V.N., Shifman E.M., Molchanov I.V. Eclampsia: diagnosis, anesthesia, and intensive care. Materials of the All-Russian interdisciplinary conference: "Modern views on current problems of obstetrics and gynecology". 2002. pp. 49-71. (In Russian).
13. Serov V.N., Markin S.A., Lubnin A.Yu. Eclampsia. M.: MIA. 2002. p. 464 (In Russian).
14. Sidorova I.S., Bilyavskaya O.S. Assessment of the severity of gestosis (according to the literature) // *Akusherstvo i ginekologiya.* 2008. No. 3. pp. 40-43. (In Russian).
15. Solovyova A.V., Bril Yu.A. Edema of pregnant women: wait or run? // *StatusPraesens. Gynecology, obstetrics, infertile marriage.* - 2017. - No. 6. - pp. 84-91. (In Russian).
16. Russian Statistical Yearbook. 2019 / Federal State Statistics Service (Rosstat). Moscow, 2019. URL: <http://www.gks.ru/wps/wcm/conne ct/rosstat>. (In Russian).
17. Esper R., Nordaby R., Vilarino J. et al. // *Cardiovasc. Diabetol.* 2006. №5. P. 4-22.
18. Lampinen K., Ronnback M., Koaja R., Groop P. J. // *Hypertens.* 2006. 24. №4. P. 751-756.
19. Maqnussek E.B. Pregnancy cardiovascular risk as predictors of preeclampsia: population based cohort study. // *BMJ.* 2007. № 335. P. 978-986.
20. Ghulmiyyah L, Sibai B. Maternal mortality from preeclampsia/eclampsia. *Semin Perinatol.* 2012 Feb; 36(1): 56-9
21. Poon LC, Nicolaides KH. Early prediction of preeclampsia. *Obstet Gynecol Int.* 2014; 297397
22. Sperling JD, Dahlke JD, Huber WJ, Sibai BM. The Role of Headache in the Classification and Management of Hypertensive Disorders in Pregnancy. *Obstet Gynecol.* 2015 Aug; 126(2):297-302
23. Rolnik D.L., Wright D., Poon L.C.Y., Syngelaki A., O’Gorman N., de Paco Matallana C., et al. ASPRE trial: performance of screening for preterm pre-eclampsia. *Ultrasound Obstet Gynecol.* 2017; 50(4): 492–5.

24. Staff A.C., Redman C.W.G., Williams D., Leeson P., Moe K., Thilaganathan B., Roberts J.M. Pregnancy and Long-Term Maternal Cardiovascular Health. *Hypertension*. 2016; 67(2): 251–60.
25. McLaughlin, K., Scholten, R.R., Kingdom, J.C., Floras, J.S., Parker, J.D. Should Maternal Hemodynamics Guide Antihypertensive Therapy in Preeclampsia? *Hypertension*. 2018; 71(4): 550–6.