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MEDICAL OZONE IN THE TREATMENT OF OBSTETRIC-GYNECOLOGICAL PATHOLOGY

Physician's Manual

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1. INTRODUCTION

Ozone has been successfully used in different fields of medicine for about 100 years. The therapeutic effect of ozone is based on the well-known mechanisms of its biological action:

1. Owing to its high oxidating power, highly concentrated ozone used at local level produces bactericidal, fungicidal and viricidal effect versus the most important species of gram-positive and gram-negative bacteria, viruses, pathogenic fungi and protista.
2. The systemic effect of medium and low ozone concentrations produced by parenteral route in medical conditions associated with hypoxia situations is based on the activation of the oxygen-dependent processes.
3. The ozonides resulted from the ozonolysis of unsaturated fatty acids modify cell membranes at structural-functional level, intensify enzymatic systems and thereby improve energy metabolism.
4. The immunomodulating effect of ozone is based on its ability to activate the phagocytosis through formation of peroxides and stimulation of production of cytokines by lymphocytes and monocytes.
5. The modification of blood corpuscle membranes and fine-structure of vascular bed as well as decrease in the viscosity properties of blood lead to the improvement of blood micro-flow and of respiratory metabolism at tissue level.

Indications for ozone therapy in obstetrics and gynecology are the following:

- Spontaneous abortion;
- Gestosis;
- Pregnancy anemia;
- Prevention of intrauterine fetus infection;
- Early toxicosis;
- Fetoplacental insufficiency;
- Inflammatory diseases of genitals;
- Bacterial vaginosis;
- Vulvar dystrophy.

The above-mentioned pathological conditions are actual for practical obstetrics and gynecology, on the one hand, and contain in their pathogenesis prerequisites for successful use of therapeutic effects of ozone, on the other hand.

Before the practical use of ozone in clinics for women, the following fundamental facts were experimentally established:

1. During the pregnancy ozone concentration in the ozone/oxygen gas mixture bubbled into the physiological saline (method of intravenous drop-by-drop infusions of ozonated physiological saline) may range within 400–800 mcg per liter. This result was obtained on the basis of investigations into the influence of different ozone concentrations on the parameters of lipid peroxidation and antioxidant defense system in blood samples taken from the patients with different obstetric pathologies (series of experiments in vitro).
2. The safety of these ozone concentrations relating to teratogenicity was confirmed by a series of experiments in vivo on pregnant laboratory rats.

Further fundamental investigations have fully confirmed the applicability of ozone therapy in the treatment of gestational complications since it has been reliably established that the use of ozone leads to the correction of basic links of pathogenesis and the most important clinical appearances of disease:

- Improvement of macro- and microcirculation that results in the normalization of placenta hormonogenic function;
- Decrease in the activity of lipid peroxidation processes and simultaneous stimulation of the antioxidant defense system of human body;
- Immunomodulating action develops particularly through a decrease in blood level of circulating immune complexes, IgM, group and Rh antibodies, increase in the phagocytic activity of neutrophiles;
- Decrease (if available) in the hypercoagulation activity of blood;
- Intensification of the protein-synthesizing function of liver;
- Ozone therapy exerts a beneficial influence on the clinical course of threatened abortion, gestosis, pregnancy anemia, fetoplacental insufficiency, reduces a risk of intrauterine fetus infection and a risk of fatness-associated pregnancy complications, improves a prognosis of these diseases;
- Ozone therapy reduces stationary treatment time, reduces the use of medicinal agents;

- Ozone therapy significantly reduces a risk of such complications as delivery weakness, postnatal and early postnatal bleedings;
- The use of ozone as a component of treatment complex improves perinatal adaptation of newborn children.

Inflammatory diseases of pelvic organs i.e. internal genitals being considered one of the most frequent pathologies of woman's body require a new therapeutical approach due to resistance of microorganisms to available antibiotics, high allergization of human body, immunodeficiency and metabolic disturbances associated with the basic pathology.

As a result of the experiments conducted in vivo the pathogenetically proved and at the same time safe ozone concentration is 1200 mcg per liter of ozone/oxygen gas mixture bubbled into the physiological saline.

The clinical part of investigations allowed making the following conclusions:

1. Ozone therapy for inflammatory diseases of pelvic organs is considered an element of antioxidant therapy as well as exerts a corrective influence on the cellular and humoral immunity confirmed by the increase in immunoregulative index, decrease in the level of IgM and circulating immune complexes.
2. The addition of medical ozone to a multimodality therapy exerts a positive influence on the clinical appearances of acute inflammatory diseases of pelvic organs providing a detoxication, analgesic and sedative effect that allows considerably reducing the use of appropriate traditional medicaments. This improves immediate results, particularly reduces residuals of inflammation. The decrease in relapse percentage after the use of ozone as a component of pathogenetic therapy speaks in favor of optimization of remote results.

The experimental-clinical investigations into the influence of ozone on the course of inflammatory processes of lower female genitals have shown that ozone in gas phase at certain concentrations and methods of administration exerts a beneficial influence on the factors of local genital immunity that allows stopping the inflammation.

The well-known antimicrobial properties of ozonized olive oil as found out can be successfully used in the treatment of vulvar dystrophic diseases. Ozone therapy produces not only an anti-inflammatory effect, but also improves tissue trophism, allows rejecting the use of hormonal ointments and laser therapy.

The practice has shown that the method of intravenous drop-by-drop infusions of ozonated physiological saline is the most suitable and applicable one for obstetric clinic. Physiological saline is the optimal carrying agent of ozone, as it does not undergo any chemical conversions during the ozonization. Ozonated physiological saline is produced by conveying an ozone-oxygen gas mixture produced by medical ozone generators of Medozons series through a standard glass bottle with 400 ml of sterile 0,9% sodium chloride solution for 15-20 minutes (by using a 200 ml bottle the ozonization lasts for 10-15 minutes). In consideration of the comparative instability of ozone in aqueous medium, the ozonated physiological saline should be used immediately after its production. It is recommended to administer the ozonated physiological saline in the form of drips into the elbow vein at flow rate 8-10 ml per minute similar to flow infusions that ensures a minimum loss of ozone. With consideration for dose-dependent effects of ozone, it is necessary to follow strictly the given mode of ozonization. The safety measures are usual for intravenous infusions.

The method of intravenous drop-by-drop infusions of ozonated physiological saline has proved very well in the treatment of inflammatory diseases of pelvic organs as well (ozone saturation concentration is different from that used for complicated pregnancy, see point 2.1.1.). Systemic ozone therapy can be also provided in the form of flow rectal insufflations of ozone/oxygen gas mixture (see point 3.1.1.).

In case of inflammatory process in uterine or vaginal cavity it is possible to use the antimicrobial effect of ozone in different variants of its local application (as a carrying agent of ozone can be used distilled water, purified olive oil, ozone therapy in gas phase is possible too).

The ozonized distilled water is produced like the ozonated physiological saline, but with consideration that the half-life of ozone in distilled water is more (1,5-2 hrs); therefore the ozonized distilled water keeps its properties longer than the ozonated physiological saline.

The ozonization of olive oil requires more time due to lower solubility of ozone in olive oil and depends on the volume of oil produced (ozone saturation of 100 ml of oil lasts for 2 hrs). It is recommended to use high-purified pharmaceutical olive oil. Storage time of ozonized olive oil is practically not limited (if refrigerated, it becomes thick and matt white, but being thawed out it returns its initial appearance without losing ozone).

The use of ozone in gas phase is possible by means of special attachments (see points 3.1.1; 3.1.2; 3.2; 3.3.).

2. OZONE THERAPY OF OBSTETRIC COMPLICATIONS

2.1. Ozone therapy of spontaneous abortion

At appearance of threatened abortion symptoms regardless of pregnancy term the woman should be hospitalized to receive a multimodality therapy including medical ozone. Ozone therapy may be used under conditions of threatened, but not incipient abortion as the thrombolytic effect of ozone in case of bleeding associated with partial detachment of chorion (placenta) can be adverse. Ozone therapy should be included into the treatment only after fully stopping the bleeding by means of traditional methods. By using ozone therapy in patients with threatened abortion you should strictly follow the recommendations for low ozone concentrations considered pathogenetically proved and safe. It is not allowed to exceed the given concentrations. One course of ozone therapy should consist of 5 treatments in the form of intravenous drop-by-drop infusions of 400 ml of ozonated physiological saline once a day, without intervals, ozone saturation concentration 400-500 mcg per liter of ozone/oxygen gas mixture. Ozone therapy performed at the end of the 1st – at the beginning of the 2nd trimester of pregnancy is the most effective.

In consideration of the manifested sedative effect of ozone therapy and its ability to potentiate the action of spasmolytics, it is recommended to reduce the dosage of the last-mentioned preparations under individual control. By taking into account the normalizing action of ozone therapy on the hormonogenic function of fetoplacental complex it is recommended to exclude the preparations of genital hormones. Owing to the stimulating action of ozone on the antioxidant defense system of human body, it is advisable to reject the use of medicinal agents with antioxidative properties (vitamin E, vitamin C, unithiol etc). High efficiency of ozone therapy relating to a decrease in circulating immune complexes, blood concentration of group and rhesus antibodies allows to avoid the use of plasmapheresis, which can be associated with allergic reactions and is an expensive procedure.

In case of incompetent cervix it is recommended to use ozone therapy in combination with surgical treatment only.

In case of hyperandrogyny ozone therapy should be used in addition to the treatment with glucocorticoids under the control of urinary excretion 17-CS.

2.2. Ozone therapy of EPH-gestosis

As a component of multimodality therapy for EPH-gestosis ozone therapy is performed in accordance with the following schema: 5 treatments in the form of intravenous drop-by-drop infusions of ozonated physiological saline daily. The volume of physiological saline infused per one treatment is 200 ml in order to reduce water consumption for a pregnant woman with the given pathology, ozone saturation concentration – 400-500 mcg per liter of ozone/oxygen gas mixture.

Ozone therapy as a component of multimodality therapy for EPH-gestosis allows reducing the use of medicaments with antioxidant, rheological, immunocorrecting and detoxication effects as ozone therapy is considered the method of correction of different metabolic and immunological disturbances. In consideration of the sedative effect of ozone, for treating late toxicosis it is recommended to reduce the dosage of neuroleptics and tranquilizers under individual control.

Medical ozone should be included into the complex of therapeutic methods for EPH-gestosis at early stages of disease as ozone therapy is more effective for light forms of the given pregnancy complication.

With consideration for a high risk of pregnancy complications, particularly fatness-associated gestosis, ozone can be used as a component of multimodality preventive therapy. In patients suffered from fatness ozone therapy is performed in accordance with the following schema: 5 treatments in the form of intravenous drop-by-drop infusions of 200 ml of ozonated physiological saline daily, ozone saturation concentration 400-500 mcg per liter of ozone/oxygen gas mixture.

It is recommended to prescribe ozone therapy during the second prophylactic course of treatment in patients with fatness at pregnancy term of 24-26 weeks that allows in women with the given pathology to reduce effectively a risk of such complications as late gestosis, premature pregnancy termination, anemia, postmature delivery, delivery weakness, natal and postnatal bleedings as well as to reduce the number of surgical interferences and postoperative complications.

Ozone therapy used as a component of treatment complex allows reducing the use of medicaments with antioxidant effect, tranquilizers and sedative preparations.

2.3. Ozone therapy of pregnancy anemia

The patient diagnosed for iron deficiency anemia regardless of pregnancy term should be hospitalized to receive an appropriate multimodality therapy including medical ozone.

The treatment schema with ozone is equal to that used in the treatment of patients with EPH-gestosis. With consideration for stimulation of protein-secretory function of liver through ozone, especially owing to an increase in albumin secretion, it is possible to exclude the use of protein preparations. Due to the manifested action of ozone on the antioxidant defense system of human body, it is advisable to use ½ dosage of medicines with antioxidative properties (unitiol, folic acid, methionine, aevit). The basic and associated diseases of iron deficiency anemia require an etiotropic therapy in combination with medical ozone.

The scheduled repeated hospitalization of pregnant patients with high risk of iron deficiency anemia should be performed at critical terms of pregnancy for examination and preventive treatment.

The pregnancy and delivery control should be done in accordance with the generally accepted rules of health care service for pregnant women with iron deficiency anemia.

2.4. Ozone therapy as a component of prophylactic complex of intrauterine fetus infection

The prophylaxis and treatment of pregnant women of risk group relating to intrauterine fetus infection should be performed in the 2nd trimester of pregnancy.

For the treatment of pregnant women with chronic focuses of extragenital infection along with etiotropic and local therapeutic methods the multimodality therapy should include the use of medical ozone as follows: 5 treatments in the form of intravenous drop-by-drop infusions of 200 ml of ozonated physiological saline daily, ozone saturation concentration 700-800 mcg per liter of ozone/oxygen gas mixture.

Ozone therapy as a component of treatment complex for pregnant women with chronic focuses of extragenital infection allows reducing the use of antioxidants and immunocorrectors.

2.5. Ozone therapy of early toxicosis

Ozone therapy is performed in accordance with the treatment schema equal to that used in threatened abortion.

2.6. Ozone therapy of fetoplacental insufficiency

The treatment should be directed against the causative factors of fetoplacental insufficiency, and the complex of therapeutic methods can include a course of intravenous drop-by-drop infusions of ozonated physiological saline produced by using ozone saturation concentration 400-500 mcg per liter of ozone/oxygen gas mixture. The volume of ozonated physiological saline infused per one treatment is 400 ml, 5-7 treatments per one treatment course.

3. OZONE THERAPY OF GYNECOLOGICAL DISEASES

3.1 Ozone therapy for inflammatory diseases of pelvic organs

For patients with inflammatory diseases of small pelvis (with the exception of purulent tubo-ovarian growths) and post-operative purulent-inflammatory complications the optimal method of ozone therapy are rectal insufflations of ozone-oxygen gas mixtures when 700-800 ml of gas mixture at ozone concentration of 2000-2500 mcg/L is introduced into the rectum for 2-3 min. One treatment course consists of 5-7 procedures performed daily (possible intervals in the treatment not more than 1-2 days).

Rectal ozone insufflations should be performed after preliminary cleansing enema, the patient takes a lying position with bended knees. It is important to note that complete removal of gas from the intestine takes several hours and in order to prevent artifacts do not perform at the same day x-ray examination of intestine. Any other examinations and manipulations after rectal ozone insufflations are possible.

3.1.1. Ozone therapy of inflammatory adnexal diseases

As a component of multimodality anti-inflammatory therapy in the acute course of inflammatory diseases of pelvic organs ozone therapy is performed as follows: 5 treatments in the form of intravenous drop-by-drop infusions of 400 ml of ozonated physiological saline daily or every two days with ozone saturation concentration 1000-1200 mcg per liter of ozone/oxygen gas mixture.

Since ozone therapy is considered the method of correction of metabolic and immunological disturbances, it allows within the complex treatment of the given pathology to reduce the use of medicaments with detoxication, rheological, antioxidant and immunocorrecting effects. Owing to the sedative and analgesic effects of ozone, it is recommended to reject the use of analgesics or reduce their dosage under individual control. Since the regulable peroxide explosion associated with ozone therapy is based on the indirect antimicrobial action, the use of medical ozone can lead to correction of etiologic therapy (reducing time of treatment with antimicrobial preparations under individual control).

If there are indications for operative treatment of the given pathology, ozone therapy can be used as a method of rehabilitation treatment after the appropriate surgical stage.

Systemic ozone therapy of the given pathology can be also carried out in the form of flow rectal insufflations of ozone/oxygen gas mixture. It has some advantages (noninvasive, fast in performance, economical due to minimal oxygen consumption). However, the use of this method is complicated for lying patients at the early postoperative stage or debilitated patients.

For performing flow rectal insufflations the ozone-oxygen gas mixture with ozone concentration 1000-2000 mcg per liter is inflated into the rectum (after its preliminary cleansing) by means of special attachment, which ensures both inflow and outflow of gas mixture at flow-rate 0,25-0,5 liter per min, daily, one treatment course lasts for 5-10 days.

The introduction of gas mixture into the rectum due to the well-developed vascular net in this area ensures fast blood resorption of gas that is extremely important to administer a systemic effect on the human body.

3.1.2. Ozone therapy of endomyometritis

The treatment schema with ozone for endometritis is the following.

Conveying an ozone-oxygen mixture with ozone concentration 4000 to 5000 mcg/L through a glass container with 400 ml of sterile distilled water produces ozonized distilled water. The ozonization of the above volume lasts for 15-20 minutes at ozone-oxygen flow rate 1 L/min. After that, the ozonized distilled water is administered into the uterus drop-by-drop through a 2-way PVC catheter, which at the same time ensures a passive outflow of washing-up liquids. The total volume of ozonized water to be administered into the uterus per one procedure ranges 400 to 1200 ml. The treatment is carried out once a day for 1-3 days without intervals.

The use of systemic ozone therapy in the form of intravenous drop-by-drop infusions of ozonated physiological saline or rectal insufflations of ozone/oxygen gas mixture should be considered individually depending on the inflammatory process, available toxic appearances, immunity state and so on. In case of positive decision, systemic ozone therapy is performed in accordance with the treatment schema used for inflammatory diseases of pelvic organs.

3.2 Ozone therapy of inflammatory diseases of lower female genitals

Ozone therapy of colpitis, endocervicitis is carried out in the form of intravaginal continuous-flow insufflations of ozone-oxygen gas mixtures. The procedure is performed in a gynecological chair. Ozone/oxygen gas mixture at ozone concentration of 1500-2500 mcg/L is introduced into the vagina through a special attachment (intravaginal tip) fastened onto the Kusko' vaginal speculum at flow-rate of 0,5-1 L/min for 5-7 minutes, residual ozone-oxygen gas mixture is forcedly removed to a destructor by means of vacuum pump connected to the outlet of intravaginal tip (see Fig. 1, 2). Before the procedure the vagina should be moistened with distilled water to prevent drying of mucosa. Rectal ozone insufflations should be performed daily in a cycle of 5-7 procedures. At the same time ozonized distilled water or physiological saline can be introduced into the vagina in the form of fine-dispersions.

Intravaginal ozone insufflations can be also indicated in the pre-operative period for prophylaxis of purulent-inflammatory complications after gynecological operation.

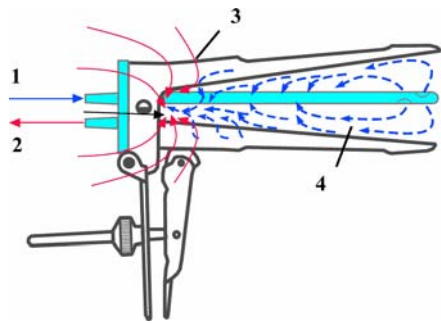
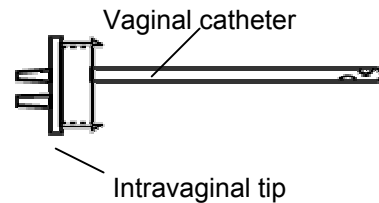


Fig. 1 : Attachment for vaginal ozone therapy



1. Inflow of ozone-oxygen gas mixture
2. Outflow of ozone-oxygen gas mixture
3. Vaginal Kusko' speculum
4. Ozone-oxygen gas mixture

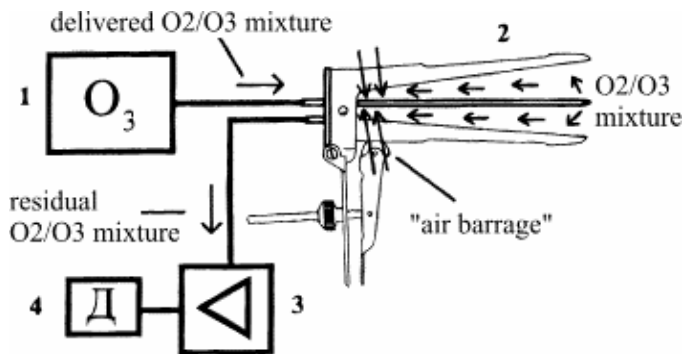


Fig. 2: Functional schema of intravaginal continuous-flow treatment with O_2/O_3 gas mixture

1. Medical ozone generator Medozons-BM
2. Vaginal speculum in construction with intravaginal tip and vaginal disposable catheter
3. Ozone-resistant pumping unit
4. Destructor for removal of residual O_2/O_3

Ozone therapy according the above-mentioned schema can be recommended for patients with non-specific colpitis including pregnancy time. There are no contraindications for use.

3.3. Ozone therapy of bacterial vaginosis

In consideration of the results of beneficial influence of flow rectal insufflations of ozone/oxygen gas mixture on the factors of local vaginal immunity, the above-mentioned method of ozone therapy can be effective for bacterial vaginosis as well.

3.4. Vulvar dystrophy

Owing to the well-known healing properties of ozonized olive oil that is very actual in connection with associated secondary vulvitis as well as its ability to improve tissue trophism, ozone therapy for vulvar dystrophy is carried out in the form of ozonized olive oil applied on the affected surfaces daily. Ozonized olive oil is produced by conveying an ozone/oxygen gas mixture with ozone concentration 5000-10000 mcg/L through a container with olive oil at flow-rate 0,25-0,5 liter per min. One treatment course lasts for 7-10 days.

Applications of ozonized olive oil are used in case of primary vulvar dystrophy and/or its relapses.

4. CONTRAINDICATIONS FOR OZONE THERAPY

General contraindications for ozone therapy are the following:

- Hyperthyroidism;
- Manifested hypocoagulation of blood;
- Chronic, often recidivating pancreatitis;
- Acute phase of myocardial infarction;
- Hemorrhagic attack;
- Individual intolerance to ozone;
- Bleeding during pregnancy
- Cramp syndrome;
- Thyrotoxicosis.

In obstetric practice absolute contraindication for ozone therapy is bleeding of any intensity that is explained by thrombolytic action of ozone. In case of bleedings in gynecological patients needed the use of ozone therapy the treatment should be performed under the control of hemostasis system. Menstrual bleeding is not a reason for ozone therapy termination (it can lead to insignificant menstruation prolongation and some increase in general blood loss).

Complications and side-effects of ozone therapy

If the correct indication has been established and the known contraindications have been considered, if the methodical recommendations have been strictly followed and the equipment used has complied with the safety requirements, any complications due to ozone therapy are impossible. Among the side-effects there can be sense of heat at the bottom of abdomen, improvement of appetite, sleepiness. In the course of observations (above 2000 patients) there was no one case of individual intolerance to ozone.