

artículo original

Ozonotherapy for inflammatory diseases in female genital organs

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Abstract

For treatment of 100 patients with non-specific colpitis a method of streaming Ozone-therapy was used with assistance of the ozone generator MEDOZONS-BM and special attachment on the basis of vaginal speculum. The irrigation with an ozone-oxygen mixture with ozone concentration of 2000 mcg/L was carried out within 5 minutes after preliminary moistening of mucosa with sterile bi-distilled water. In the course of the investigations it was established that along with a positive clinical effect, ozonotherapy caused an improvement in vaginal local immunity indices – a credible increase in lysozyme in 70% of patients, a decrease in IgG level in 60% of patients, stabilization of cervical mucus myeloperoxidase in 80% of patients.

Also we have used intrauterine irrigations with ozonized bi-distilled water in case of acute endometritis. This method of treatment has been provided to 100 patients with postnatal and postabortive endometritis. Based on the received results, we have drawn a conclusion that in the course of treatment all patients showed an improvement in general state, body temperature returned to normal, symptoms of intoxication decreased, sleep and appetite got better, pain syndrome disappeared faster and pathological discharges were eliminated. The results of laboratory investigations have demonstrated a credible decrease in ESR, normalization of leukocyte numbers and an decrease in circulating immune complexes.

Thus, for treatment of non-specific colpitis and endometritis we may recommend the given method of ozonotherapy to be used in combination with a basic anti-inflammatory therapy.

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STRUCTURED ABSTRACT

Introduction.

The problem of inflammatory diseases of female genital organs nowadays acquires particularly great importance. The extensive use of new antibiotics does not solve the problem. In this connection, our attention is drawn to the methods of treatment which can be characterized as highly effective against the most frequent causative agents of infection, able to reduce antibiotic and any other drug therapies

Materials and Methods. 200 patients with non-specific bacterial colpitis and bacterial vaginosis and 100 patients with acute forms of post-abortive and postnatal endometritis were included into our investigation.

We have used irrigation and insufflations with ozone-oxygen mixture in 100 patients with colpitis and intrauterine irrigations with ozonized bi-distilled water and insufflations with ozone-oxygen mixture in 100 patients with acute endometritis.

Results and Discussion.

After treatment, the bacterioscopic investigation indicated that in 76% of patients treated with ozonotherapy vaginal smears did not show any opportunistic pathogens, yeast fungi. The bacteriological investigation detected an important decrease in opportunistic pathogen colonization in 74% of patients. The investigation of vaginal local immunity factors among the patients treated with ozone demonstrated an increase in lysocyme activity indices by 25% ($p < 0,05$), an increase in IgA level by 37% ($p < 0,05$), an increase in cervical mucus myeloperoxidase, along with a simultaneous decrease in IgM by 40% and in IgG by 45% ($p < 0,05$).

In the course of the treatment, all patients with endometritis showed an improvement in general state, body temperature returned to normal, symptoms of intoxication decreased, sleep and appetite improved, pain disappeared rapidly and pathological discharges were eliminated. No complications or side effects were observed. The results of laboratory investigations showed a credible decrease in ESR on average by 50% ($p < 0,05$), normalization of leukocyte number in 90% of patients, a decrease in circulating immune complexes on average by 47%, in Ig M – by 30% ($p < 0,01$). The toxic parameters in the plasma evidently decreased – at the end of the treatment the level of medium molecules returned to normal in 100% of patients; C-reactive protein was not detected in 90% of patients. The influence of ozonotherapy on lipid peroxidation was not less, therefore the level of molecular products decreased by 25-40% and the antioxidative activity of plasma increased by 39% ($p < 0,05$).

Conclusion.

An ozone-oxygen mixture with an ozone concentration of 1500 to 2500 mcg/L, is an effective method of treatment of colpitis. The ozone concentration of 4000 to 5000 mcg/L is considered the optimal one for saturation of bi-distilled water, with the aim of producing a bactericidal effect that does not damage mucosa.

Ozonotherapy is not only a reliable method of healing lower female genital organs among patients with non-specific colpitis and bacterial vaginosis, but also serves to restore the body's own defense abilities by stimulating the normalization of the vaginal cell mediated immunity, without producing a disturbing effect on the saprophytes. Ozonotherapy is preferable to conventional treatment in the form of antiseptic solutions.

Medical ozone producing a bactericidal effect at local level facilitates: uterus healing; prevents the generalization of inflammatory processes; reduces treatment time; reduces the use of antibiotic and anti-

inflammatory medication, and it's a well tolerated treatment by patients that makes its application in the treatment of endometritis extremely promising. However, the successful use of ozonized bi-distilled water for intrauterine irrigation does not exclude the treatment with antibacterial and other medicines of the basic anti-inflammatory therapy.

Introduction

The problem of infectious diseases and dysbiosis nowadays acquires particularly great importance because it's connected with growing ecological problems of urbanized society, exposure to various adverse factors having influence on the immunity status in general as well as microbiocenosis of the human body. It is established that the pathological processes of vaginal microbiocenosis, are caused by such stress factors as: treatment with antibiotics (at local and systemic level), hormones, cytostatic preparations, X-ray therapy, particularly on the background of endocrinopathies (most of all, diabetes) anemia, in case of birth defects of genital organs, the use of contraceptives and so on. It is convincingly demonstrated that the disturbances of a quantitative correlation between the associates of vaginal microbiocenosis on the background of local immunity changes lead to clinical appearances of vaginal infection process, the most frequent of them are non-specific vaginitis and bacterial vaginosis. Bacterial vaginosis is detected in 24% of practically healthy women and in 61% of patients with recidivating colpitis of non-specific etiology, frequency of non-specific vaginitis, in reference to different authors, reaches 40 to 50%. (1-7)

The extensive use of new antibiotics does not solve the problem, but in some cases aggravates it by inducing the disturbances of the local and general immunity by: suppressing saprophytic flora, by causing the formation of antibiotic-resistant forms of microorganisms and by creating favorable conditions for infection that increases frequency of recidivating colpitis. In this connection, our attention is drawn to the methods of treatment which can be characterized as highly effective against the most frequent causative agents of infection, able to reduce antibiotic and any other drug therapies and able to restore the normal vaginal biocenosis.

The aim of the present investigation was to study the efficiency of ozonotherapy methods in the treatment of non-specific colpitis and bacterial vaginosis.

Endometritis is still numbered among the most frequent pathologies of fertile women but in spite of considerable success achieved in the treatment of inflammatory diseases, incl. gynecological diseases, the problem of efficient treatment of endometritis is not solved yet.

It can be explained as follows:

1. High frequency of complications due to endometrial manipulations (therapeutic abortion, diagnostic curettage and so on) that mostly appear then in the form of acute endometritis;
2. Considerable risk that the infectious-inflammatory process localized in uterus will generalize;
3. Numerous side effects of medicines to be used within the traditional treatment of endometritis.

In common gynecological practice along with the usual basic therapy, (antibacterial, desensitization, vitamins, sedative remedies) antiseptic preparations have been widely used in the form of intrauterine applications. The aim of this manipulation is to improve the removal of purulent-necrotic masses as well as to produce a medicinal effect directly in the focus of inflammation that however can cause a number of side effects.

In the above we have described the method of treatment for endometritis on the basis of aspiration/irrigation endometrial drainage with dialyzing solution containing dimexide, lidase, calendula tincture, novocaine solution and dimedrol. We feel important to say that the main component producing a healing effect on uterus mucosa is dimexide, which can be substituted for dioxidine. However, the use of these

medicines is limited due to some side effects. Dimexide can cause nausea, vomiting, bronchial spasm and it should be not used in case of toxic liver dysfunction, excretory kidney dysfunction, stenocardia and it can also intensify the toxicity of some medicines. Intrauterine application of dioxidine can cause headache, shivering, an increase in temperature, dyspepsia and convulsions.

Based on the above we think that it is necessary to increase the efficiency of the treatment for endometritis as well as to prevent possible side effects due to this treatment. Medical ozone, which disinfectant properties are well-known, applied in the complex treatment can be useful for endometrial healing that allows discard the medicines which after re-absorption can cause adverse reactions.

Materials and Methods

200 patients with non-specific bacterial colpitis and bacterial vaginosis were included into our investigation. The average age of patients with colpitis were 22,5 years old forming the test group and 23,1 years old forming the control.

Due to mixed infection in an absolute majority of patients, it was impossible to divide the patients into groups by causative agent which was why the patients were grouped in accordance with the used method of treatment. The test group (100 women) included the patients which received ozonotherapy in the form of vaginal circulatory insufflations of an ozone-oxygen mixture. As ozone generator we used the medical ozone device of Medozons (Fig 1) series (Nizhny Novgorod/Russia) equipped with a special gynecological accessory set including intravaginal tip and vaginal catheter fastened onto vaginal speculum (Fig. 2).

The ozone treatment inside the test group was carried out as follows: "ozone-oxygen mixture at concentration from 1500 to 2500 mcg/L was administered into the vagina via the special attachment (Fig. 2). This special intravaginal device allowed us to achieve an optimum intravaginal ozonization with an equal and greater surface contact of ozone with vaginal epithelium. The insufflations were done at a flow rate of 0,5 – 1 L/min for 5 – 10 minutes provided that the vagina had been beforehand treated with ozonized bi-distilled water daily within 5 – 8 days. The ozonization of water should be performed immediately before treatment with saturation concentration of 5000 mcg/L of an ozone-oxygen mixture. Ozonization of 400 ml lasts 15 minutes".

The direct way of introducing gaseous ozone into the vagina, ensures the most complete contact of the active agent with the vaginal epithelium of wrinkled structure. The flow rate 0,5 – 1 L/min and treatment duration 5 - 10 minutes are established as the optimal ones because treatment prolongation leads to drying of vagina walls, and its reduction – to a decrease in the efficiency of treatment. The preliminary moistening of the vagina with ozonized bi-distilled water also increases the efficiency of treatment and protects vaginal mucosa from drying. The duration of one treatment session (5 – 8 days) was determined experimentally – by this time the clinical-laboratory effects achieve the maximum and do not improve any more in case of treatment prolongation, the daily (without intervals) performance of procedures reduces the treatment time.

The control group (100 women) included the patients treated with antiseptic solutions. The treatment was applied as follows: "the vagina is treated with 4% chlorhexidine solution with a single exposure for 5 minutes, during this time up to 99% of vaginal flora are being destroyed. Immediately after this, the tampon enriched with lactobacillus suspension is inserted into the vagina for 8-10 hours. This treatment of vagina is repeated daily within 7-10 days.

All patients underwent a bacterioscopic and bacteriological investigation before and after treatment. The aim of the investigation was to evaluate the dynamics of vaginal local immunity factors – IgA, IgM, IgG levels, vaginal secretion lysozyme and cervical mucus myeloperoxidase, balance coefficient of local im-

munity factors (integrative index allowing to evaluate objectively the homeostatic balance).

100 patients with acute forms of post-abortive and postnatal endometritis received ozonotherapy in the form of intrauterine irrigations with ozonized bi-distilled water. Their age ranged from 18 to 32 years. Clinical symptoms were characterized by pain, purulent uterine secretions and uterus sub-involution. In the course of laboratory investigations it was detected leukocytosis, acceleration of ESR and an increase in circulating immune complexes (CIC).

We investigated:

- The indices of red and white blood cells;
- The level of toxemia according to the levels of C-reactive protein and medium molecules;
- The state of cell-bound and humoral immunity (the levels of Ig A, M, G, circulating immune complexes);
- The lipid peroxidation process and antioxidative defense system according to the biochemiluminometry results. (8)

Ozonized bi-distilled water was produced by conveying an ozone-oxygen mixture with ozone concentration 4000 to 5000 mcg/L through a container with 400 ml of sterile bi-distilled water. The ozonization of the above volume lasts 20 minutes at ozone-oxygen flow rate 1 L/min. After that, the ozonized bi-distilled water was administered into the uterus drop-by-drop through a 2-way PVC catheter which at the same time allowed to remove washing-up liquids. The total volume of ozonized water to be administered into the uterus within one procedure ranged 400 to 1200 ml. The treatment was carried out once a day during 1-3 days without intervals.

Results

The acute form of bacterial colpitis was observed in 12% of women of the test group and in 11% inside the control group, the recurrence was registered in 68% and 64%, respectively. 27% of patients of the test group and 25% inside the control were diagnosed for bacterial vaginosis on the basis of moderate liquid secretions with specific odour, positive amine test, vaginal secretion pH > 4,5 and "key" cells detected in vaginal smear. Clinical symptoms of colpitis varied from clear, (complains about pain, itch, burning sensation, dyspareunia; after examination - hyperemia, swelling and vaginal mucosa infiltration, purulent or curd-cheese secretions) to vague, mostly among the patients with recidivating colpitis forms. The bacterioscopic and bacteriological investigations showed that most of the patients with colpitis had mixed opportunistic-pathogenic flora (the patients with verified chlamydia, gonococcal, trichomonad, herpetic, cytomegalovirus infections were excluded from the investigation during selection). 30% of patients of the test group and 38% inside the control were diagnosed for vaginal candidiasis (as diagnostic criteria there were curd-cheese secretions, negative amine test, yeast cells detected in vaginal smear, no "key" cells).

After treatment, the bacterioscopic investigation indicated that in 76% of patients treated with ozonotherapy vaginal smears did not show any opportunistic pathogens, yeast fungi. The bacteriological investigation detected a credible decrease in opportunistic pathogen colonization in 74% of patients. Special attention was drawn to the fact that investigation of antibiotic resistance showed an increase in sensitivity of the microbial agents to antibiotics.

The investigation of vaginal local immunity factors among the patients treated with ozone demonstrated an increase in lisoenzyme activity index by 25% ($p < 0,05$), an increase in IgA level by 37% ($p < 0,05$), a credible increase in cervical mucus myeloperoxidase along with a simultaneous decrease in IgM by 40% and in IgG by 45% ($p < 0,05$) that led to stabilization of the balance coefficient of local immunity factors.

The analysis of treatment results inside the control group indicated that the bacterioscopic symptoms returned to normal only in 50% of patients, in 25% it did not change, in 25% it got even worse – practically at the same quantity of leukocytes and epithelium cells the content of lactobacillus ($p < 0,05$) decreased or completely disappeared. The sensitivity of the causative agents to antibiotics remained the same, in accordance with the results of an immunological investigation the index of IgA, IgM and IgG did not change incredibly, the levels of cervical mucus myeloperoxidase and vaginal secretion lisoenzims had a tendency to decrease, the balance coefficient of local immunity factors got worse in 25% of cases, and only in 10% it showed an improvement.

Thus, we established that the above described method of treatment with a certain grade of efficiency was linked to a risk of further vaginal dysbiosis and in spite of the use of lactobacillus preparation, there was no evidence of any improvement in the local immunity. Moreover, in some cases of advanced bacterial colpitis owing to the insufficient anti-inflammatory effect it was necessary to use oral antibiotic preparations that did not stimulate the immunity. Among the patients with deep disturbances of microbiocenosis the antibiotics intensified vaginal mucus colonization with opportunistic pathogens. Based on the received results, we may draw the following conclusions: in the course of the treatments all patients with endometritis showed an improvement in general state, body temperature returned to normal, symptoms of intoxication decreased, sleep and appetite got better, pain syndrome disappeared faster, pathological discharges were eliminated. No complications or side effects were observed.

The results of laboratory investigations showed a credible decrease in ESR on average by 50% ($p < 0,05$), normalization of leukocyte number in 90% of patients, a decrease in circulating immune complexes on average by 47%, in Ig M – by 30% ($p < 0,01$). The toxic appearances in plasma decreased particularly evidently – at the end of treatment the level of medium molecules returned to normal in 100% of patients, C-reactive protein was not detected in 90% of patients. The influence of ozonotherapy on lipid peroxidation (9) was not less, so, the level of molecular products decreased by 25-40%, the antioxidative activity of plasma increased by 39% ($p < 0,05$).

Discussion

The intracavitary way of introducing of gaseous ozone into the vagina or ozonized bi-distilled water into the uterine cavity is selected to ensure the most complete contact with the focus of inflammation. The ozone-oxygen mixture with ozone concentration 1500 to 2500 mcg/L is effective method of treatment of colpitis and the ozone concentration 4000 to 5000 mcg/L is considered the optimal one for saturation of bi-distilled water with the aim of sanitation for this one produces a bactericidal effect, but does not damage mucosa. Bi-distilled water is used as a carrier of solute ozone, because water is not subjected to chemical changes. The administered volume of bi-distilled water 400 to 1200 ml is traditionally used for intrauterine irrigation, containers with capacity 400 ml are usually used in the praxis. The ozonization of the above volume lasts 20 minutes at ozone-oxygen flow rate 1 L/min.

The received clinical and laboratory results allow us to speak about high efficiency of ozonotherapy in regard to the most important symptoms of disease, and there is evidence of not only sanitation action of ozone-oxygen mixture in colpitis. Ozonized water also has systemic action, realized through ozone re-absorption in endometry.

Conclusion

The results of the conducted investigations allow us to draw a conclusion that ozonotherapy is not only a reliable method of healing of lower female genital organs among the patients with non-specific colpitis and bacterial vaginosis, but also serves to restore the body's own defense abilities by stimulating the normalization of vaginal mucosa local immunity. Without producing a disturbing effect on the saprophytes,

ozonotherapy is preferable to conventional treatment in the form of antiseptic solutions.

Medical ozone producing a bactericidal effect (10, 11) at local level facilitates uterus healing, prevents the generalization of inflammatory processes, reduces the treatment time, permitting to discard the use of preparations for dialysis and is well tolerated by patients that make its application in the treatment of endometritis extremely promising. However, the successful use of ozonized bi-distilled water for intrauterine dialysis does not exclude the treatment with antibacterial, desensitization, sedative and other medicines of the basic anti-inflammatory therapy.

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