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OZONE THERAPY IN PRACTICE

HEALTH MANUAL

Nizhny Novgorod, Russia
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Ozone therapy in Practice. Health Manual. - Nizhny Novgorod

The Health Manual offers a variety of information on recognized methods and techniques for clinical application of ozone therapy in various pathologies. It briefs the readers on ozone properties and therapeutic effect of ozone-oxygen mixtures administered in different diseases, including the dosage and schemes of treatment that are used by Russian doctors.

Ozone therapy in Practice is a practical guide for doctors of various specialities, who use medical ozone in their practice, as well as for interns, residents in medicine and senior medical students

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INTRODUCTION

Recent years have been marked by increasing number of people susceptible to allergic diseases and weakened response to antibiotics. In these conditions and regarding the constantly growing prices for medicinal preparations the appearance of new non-medication methods can be only welcomed and appreciated.

Among these new methods ozone therapy has been gaining a justified recognition in many countries of the world thanks to ozone disinfective effect and its capacity to transport and release oxygen into tissues. The properties of medical ozone have been used in therapy, surgery, obstetrics and gynecology, dermatology, stomatology, in infectious and venereal diseases.

Ozone therapy has found its way into medical practice in Germany, where it is successfully used. Germany was the first country to start manufacturing medical ozonators and to use ozone-oxygen mixtures in vascular surgery, stomatology and geriatrics. Italian ozone-therapists have focused their activity on medical cosmetology. Specialized ozone therapeutic clinics operate in Switzerland and other countries of West Europe. Cuba is well-known for its Ozone Research Center. Interesting and promising results with the help of medical ozone have been received in some clinics of the USA, Mexico, Brazil and Japan.

Ozone therapy was found to be efficient, easy to use, ensuring good tolerance and no side-effects.

According to the chosen therapeutic concentration ozone can produce its immune-modulating, anti-inflammatory, bactericidal, virucidal, fungicidal, analgesic and other effects.

Medical ozone proves to be of great therapeutic potential for in numerous cases it exceeds the resources of medication-based methods. The procedures of its application are simple, economically preferable and beneficial. However, medical communities and practical health service still prefer not to notice the available convincing facts and evidences that might bring it into wide practice. By now, there have been accumulated quite enough experimental and clinical findings that make it possible to present the routes of ozone therapy application for effective and safe management of patients with various pathologies.

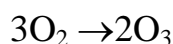
FUNDAMENTALS OF OZONE THERAPY

OZONE AS IT IS

Ozone is known to be one of the most important gases in the stratosphere. It acts as a screen for ultraviolet radiation of short wavelength of 260-280 nm, thus protecting the living organisms on earth and absorbing infra-red radiation coming from the earth and, hence, preventing its cooling.

Protective ozone layer with its maximal width not exceeding 2-3 mm and ozone concentration of 1mg/m^3 is found about 20-30km above the surface of the earth. Diminution of ozone concentration in ozonosphere results in its depletion and developing of ozone holes. At the same time in the lower atmosphere under the influence of ultraviolet rays and in the presence of atmospheric oxygen ozone is generated from different components of the smog. Ozone concentration is used to estimate the intensity of industrious smog and air pollution. In contrast to ozone, generated from medical oxygen, ozone in the polluted air together with toxic nitrogen oxides produces harmful effect on the epithelium of the respiratory track.

Ozone is highly reactive chemical element. It is constantly formed as a colourless gas at about 20-50 km above the surface of the earth under the influence of vacuum ultraviolet (UV) light from atmospheric oxygen:



And on the contrary, a molecule of ozone can absorb a particle of UV so producing diatomic oxygen again. Ozone molecules dissociate into their constituent atoms. These atoms combine with oxygen molecules to form ozone and as a result of this process ozone layer – ozonosphere is formed, which acts as a shield from the sun's ultraviolet radiation, maintaining the biological balance in biosphere. Insignificant amount of ozone due to turbulent flows reaches the lower layers of atmosphere so that it can be traced by a characteristic smell after a thunderstorm.

Ozone - O_3 is a reactive allotrope of oxygen. Oxygen can be present in one of its forms:

1. Monatomic oxygen – highly reactive and unstable form, for it has two free covalent bonds – (O).
2. Diatomic oxygen – the most abundant and stable form, for it has not no free bonds (O-O)
3. Ozone – a molecule formed from three atoms of oxygen, having a free bond resulting in its high reactivity.

Ozone appears to be a more powerful oxidant compared with oxygen for it can oxidize practically all organic and non-organic compounds.

Regarding bioorganic compounds, ozone was found to have a selective reactivity with double bonds compounds: amino acids, peptides, proteins, nucleic acids, and primarily, unsaturated fatty acids, making up the basis for lipid bio layer of cellular membranes and lipoprotein complexes of blood plasma. In biological media ozone reactions with unsaturated fatty acids are dominating and are accompanied by formation of various products, including ozonides (compounds, containing various number of oxygen atoms in a molecule).

DISCOVERY OF OZONE AND OZONE PROPERTIES

Ozone as a chemical element was discovered at the end of XVIII century. In 1785 Martinus Van Marum, a Dutch physicist, subjecting oxygen to electrical discharges noted some specific “odor of electrical matter”. In 1848 C.Schonbein, a German physicist, having repeated the experiments, named the smelling gas Ozone (from the Greek “ozone”-odorant) and described some of its properties. He thought it to belong to the same class of bromine and chlorine and to have negative electric charge. Mariniak and Delarive showed that it is an allotropic form of oxygen and Mulliken and Dewar clarified its molecular structure) A century later, in 1953 Andrews reported on ozone being an allotropic form of oxygen. In 1957 Warner created tubes for magnetic induction, capable to produce ozone in large quantities and that launched an extensive research of ozone properties.

The use of ozone is based on its oxidative, disinfective and bactericidal properties. Ozone inactivates bacteria and fungi in a much less time compared with chlorine. It is also very effective in destroying viruses and carcinogenic agents, which in most cases are not killed by usual chemicals used for water purification. Being able to destruct smell-creating substances, ozone came to be used as deodorant agent.

For water purification ozone has been used for about 80 years. In Paris they use ozone-treated water. With its high oxidative potential ozone is used in textile and cellulose industry as a bleaching means. Ozone bactericidal properties are successfully used in breeding oysters and mollusks as well as in mineral water industry.

The history of medical ozone starts in the XX century. The pioneers to apply ozone in clinical practice were E. Payer, A. Fish and H. Wolf. Ozone as an antiseptic means had been known and used from the beginning of the XX century, however, extensive and systemic research in the field of ozone therapy, and primarily in Germany, started in mid 70s, when ozone-resistant polymer materials and convenient ozone generating equipment came into every day clinical practice.

The interest to ozone therapy was growing with the growing number of reports coming from different clinics the world over on biological ozone effect and its successful use in the treatment of various diseases.

At present time the International Ozone Association(I.O.A.), incorporated in the United States of America, holds its World Congresses every second year in various parts of the world. Within the (I.O.A.) framework physicians from different countries and of different specialties share their results and achievements through conferences, workshops, symposia proceedings and other public information media.

In Europe different companies manufacture different ozone generators meeting the needs of practical doctors.

Profound research work is carried on in Russia under supervision of two main schools of ozone therapy with their Research Centers and Clinics in Moscow and Nizhny Novgorod.

CLINICAL EFFECTS OF OZONE THERAPY

Ozone can produce different effect according to the chosen concentration and the way of its administration. In medical practice the most important are the following ones.

1. Bactericidal, fungicidal and virucidal

When applied externally in a form of gaseous mixture or in ozonated solution it is recommended to use high ozone concentrations which produce direct oxidative effect on the

microorganism membrane. Ozone can destroy practically all kinds of bacteria, viruses, fungi and protozoa. Gram-positive bacteria and capsular viruses having a lipid bio-layer are particularly sensitive to oxidation.

The use of therapeutic ozone concentrations provides bactericidal effect which indirectly activates the non-specific defense system (phagocytosis activation, enhanced synthesis of cytokines-interferons, interleukin tumor necrotic factor) as well as components of cellular and humoral immunity.

There have been reported evidences of partial oxidation of virus receptors that makes them incapable to virus binding.

Besides there was revealed inhibition of reverse transcriptase enzyme which promotes AIDS virus destruction.

2. Anti-inflammatory effect is revealed in ozone capacity to oxidize the compounds containing double bonds, the arachidonic acid (20:4) and its derivatives - prostaglandins, in particular. These biologically active substances participate in the development and sustaining the inflammatory process. Besides, ozone regulates metabolic reactions in tissues at the place of inflammation and resolves pH.

Ozone therapy efficiency in bronchial asthma can be partially explained by oxidation of double bonds in such pathological compounds as leukotriens also derived from arachidonic acid.

3. Ozone analgesic effect is provided by oxidation of the products of albuminolysis, the so-called allopeptides. They act on the nerve endings in the damaged tissue and determine the intensity of pain response. To add to that,

analgesic effect is also caused by normalization of antioxidant system and accordingly, by the decrease in the amount of toxic molecular products of lipid peroxidation on cellular membranes, that modify the function of membrane-inbuilt enzymes, which participate in ATP synthesis and in maintaining the vital activity of organs and tissues

4. Detoxication effect of ozone is revealed in correction and activation of metabolic processes in the hepatic and renal tissues, thus ensuring their main function of neutralization and evacuation of the toxic compounds from the organs.

5. Activation of oxygen-dependent processes. Ozone doses, however low they are, cause the increase in the content of free and dissolved blood oxygen with rapid intensification of enzymes that catalyze aerobic oxidation of carbohydrates, lipids and proteins with formation of ATP energy substrate. Of great importance is the mitochondrion activation of H-ATP-ase, responsible for conjugation of respiratory processes and oxidative phosphorylation, resulting in ATP synthesis.

6. Optimization of pro- and anti-oxidant systems is regarded as one of the main effects of systemic ozone therapy which is realized through its influence on cellular membranes and bringing to balance the levels of lipid peroxidation products and of antioxidant defense system. In response to ozone there occurs the compensatory increase in the activity of antioxidant enzymes -superoxidismutase (SOD), catalase and glutatioperoxidase. Due to restored aerobic metabolic reactions there is the accumulation of NADH₂ and NADPH₂ which function as proton donors to restore the oxidized components of non-enzymic antioxidant system (glutathione, vitamin E, ascorbic acid, etc.). The use of exogenic antioxidants with preliminary calculated dose is obligatory when high ozone concentrations are used.

7. Ozone haemostatic effect depends on the dose. High concentrations administered for external use cause evident hyper coagulation effect, while parenteral administration of low concentrations is characterized by the decrease in thrombocytic and coagulative levels of hemostasis and increase in fibrinolytic activity.

8. Ozone immune-modulating effect is based on its interaction with lipid structures of cellular membranes and depends on the chosen dose. Low ozone concentrations promote the accumulation of ozonides on the membranes of phagocytic cells –monocytes and macrophages. Due to ozonides these cells stimulate the cytokines synthesis of different classes. Cytokines being biologically active peptides, contribute to the further activation of non-specific defense system (elevation of body temperature, generation of acute-phase peptides in the liver) and, apart from it, they activate cellular and humoral immunity. All together they facilitate the treatment of secondary immune-deficiency.

Ozone high concentrations produce aggravating effect on the processes of lipid peroxidation in cellular membrane of the same phagocytic cells with the accumulation of the toxic and hard products of lipid peroxidation (malon dealdehyde and Schiff bases), which inhibit cytokines synthesis and thus eliminate the activation of T-helpers lymphocytes, aimed at regulation of immune globulin generation by B-lymphocytes. This effect is used in the management of patients with auto-immune pathology (rheumatoid disease, disseminated sclerosis, sclerodermia) without the administration of drug treatment.

METHODS OF OZONE THERAPEUTIC EFFECT

Topical ozone therapy is the very first method of applying ozone in the history of medical practice. It should be noted that high concentrations are used for disinfection, while low concentrations promote epithelialization and healing

External administration includes

- The use of ozonated antiseptic salines
- Application of ozonated ointments and ozonated vegetable oil
- Ozone aerated plastic bags under lowered pressure(Gas bags)
- Balneotherapy

Parenteral methods include:

- Major and Minor autohemotherapy with ozonized blood
- extracorporeal plasma and lymph treatment
- subcutaneous ozone injections into biologically active points
- paravertebral intramuscular injections
- intravenous infusions of ozonated physiological solution

The method of intravenous infusions of ozonated physiological solution is the priority of the Nizhny Novgorod School of Ozone therapy. It was developed and clinically tested in the Central Research Laboratory of the Medical Academy of Nizhny Novgorod by Sergey P.Peretyagin and Claudia N. Kontorschikova. The method was recognized as safe and easy to use.

In 1997 Professor Sergey D. Razumovsky, a well-known chemist, completed the investigation of ozone effect on standard isotonic physiologic solution.

It was found that with the use of ozone neither chemical reactions take place in the solution, nor new compounds (type of chlorine active derivatives) are accumulated.

Enteral method of ozone oxygen mixture is recommended in gastro-intestinal pathology. It includes

- intake of ozonated distilled water per os;
- intestinal irrigation with ozonated distilled water
- rectal insufflations with ozone oxygen mixtures

In numerous experimental studies in vitro and in vivo we defined the optimal tachometric blood-gaseous ozone ratio, where powerful ozone oxidative effect is reduced to its minimum, while its metabolic effects are significant. (5 to 40mcg of Ozone per 1 liter of blood). The suggested dosage does not exceed the summary antioxidant potential of the body and its use does not cause any negative reactions (Patent№ 2020945 of 1986. Authors: Claudia N. Kontorschikova, Sergey P. Peretyagin, Gennady A. Boyarinov)

GENERAL QUESTIONS

FORMS AND METHODS TO USE OZONATED MATERIALS

Ozone therapy is used in a form of parenteral and enteral administration of ozone/oxygen mixtures, aeration in closed volumes (gas bags) and applications with ozonated materials. Clinical trials reported very few cases of side effects or complications when the procedures were done properly. Of primary importance is the dose of the administered ozone, which must not exceed the potential of antioxidant enzymes. This requirement is to be observed to prevent the surplus of active forms of oxygen.

This book presents the schemes of treatment with the doses selected for the pathologies treated at the Medical Center of the Department for New Medical Technologies at the Medical Academy of Nizhny Novgorod. The doses were chosen on the basis of experimental and clinical trials done at the Academy and regarding the available published reports.

Ozonated Distilled Water

Water barbotage with ozone/oxygen mixture is done in glass bottles with the concentration of 5mg/l (O_3/O_2), duration depending on the volume of water to be ozonized(3 liters – 30 min., 5 liters – 46 min., 10 liters –60 min.). Ozonated water is widely used in surgery and gynecology for irrigations and lavage. In gastroenterology it is administered per os as a drinking water in esophagitis, gastritis and ulcers. In colitis it is used for clyster procedures. In stomatological practice ozonated water is administered in a form of gargarism (mouthwash) as a disinfection of oral cavity in paradontosis, stomatitis, contaminated wounds and suppuration of dental canals. In otolaryngology ozonated water is used for inhalations.

On being barbotaged ozonated water should be used within 30 minutes.

Ozonated Vegetable Oil

Ozone disinfectant properties are well revealed in the use of ozonated vegetable oil. Ozonated oil was found to have antiseptic activity several hundreds higher compared with ozonated saline. It is used for oral administration and in a form of ozonated applications.

For ozonation we use refined vegetable oil (sunflower, olive, maize etc.).The barbotage is done with different concentrations and duration:

- For oral administration 100ml of oil is ozonized for 10 min with ozone concentration of 20mg/l (O_3/O_2), 5 min –ozone concentration 40mg/l (O_3/O_2).
- For external use 100ml of oil is ozonized for 15 min with ozone concentration of 20mg/l (O_3/O_2), 30 min –ozone concentration 10mg/l (O_3/O_2).
- For external administration in mycosis 100ml of oil is ozonated for 15 min with ozone concentration of 24mg/l (O_3/O_2), 8 min –ozone concentration 50mg/l (O_3/O_2).

Ozonated oil should be kept in a dark glass bottle. According to the latest data it can preserve its properties for 4 month when kept in room temperature, when kept in refrigerator it can be used for 2 years.

When administered for oral use, it should be started with one teaspoonful 20-30min before meals 2-4 times a day, gradually increasing the dose to one tablespoonful 2-4 times a day.

Ozonated Saline for Intravenous Infusions

Ozonated saline is administered to solve different clinical tasks by using different concentrations ranging from 400 to 100000mcg/l of ozone/oxygen mixtures at the outlet of ozone generator.

To achieve general stimulating metabolic effect we use the method of simultaneous saturation and intravenous infusion of physiological saline. Ozone concentration is calculated by of 40mcg per kg of body weight, e.g. patient's weight is 80 kg, so ozone concentration is $40 \times 80 = 3200$ mcg at the outlet of ozone generator.

Physiologic saline saturation can be achieved in the following way. Ozone/oxygen mixture is passed through a 200 ml flask for 10 minutes and then the saline is intravenously infused by drops for 15-30 minutes.

Introduction of Ozone/Oxygen Mixture In Gaseous Phase

This method provides analgetic, anti-inflammatory and stimulating effect.

Subcutaneous and intracutaneous injections are done into painful and acupuncture points, 1ml per each; for microinjections of focal lesions we use 5-10ml with ozone concentration - 10mg/l. In peri-articular microinjections we use 1-3ml with the concentration-10-15mg/l

Intramuscular injections are done with 10-20ml, concentration being 10-15 mg/l.

Intra-articular injections are done with the concentration- 15mg/l and the volume of

- 1-1,5ml for minor joints
- 5-7ml for middle joints
- 20ml for major joints

Rectal Insufflations With Ozone/Oxygen Mixture.

The procedures are done with Janet syringe or with a help of special poly-chlor-vinil tube with a patient lying on the left side with knees bent. Purgative enema is to be done two hours before the procedure. Rectal insufflations are done with ozone concentration in ozone/oxygen mixture of 10-60mg/l, the volume ranges from 150ml to 1000ml, depending on the pathology, its course and stage. For newborns the volume is 20-50ml, for children –50-100ml (H. Dorstewitz, 1990).

Intestinal insufflations can be administered, first of all, as anti-inflammatory and disinfectant remedy to restore the bacterial flora misbalanced by pathogenic microorganisms. Secondly, it can be administered as an alternative to major autohemotherapy, because ozone/oxygen mixture on being instantly absorbed produces general metabolic effect. This procedure can be turned to in those cases when intravenous injections are difficult to handle

The usual therapeutic dose to produce metabolic effect is 75mcg per 1kg of patient's weight, e.g. for a patient of 80kg the ozone dose is to be $75 \times 80 = 6000$ mcg. The course of treatment is to be started with a half-dose and minimal volume of ozone/oxygen mixture (150-200ml) which is gradually increased to the required one.

Vaginal Insufflations with Ozone/Oxygen Mixtures

Vaginal insufflations are done with ozone concentration of 2-2,5mg/l in ozone/oxygen mixtures with the gas rate – 0, 5-11/min for 5-10 minutes. The procedures are done with

special nozzles put on the vaginal speculum. Vacuum suction is obligatory to prevent ozone inhalation effect on the patient and the doctor. (Гречканев Г.О. с соавт. 2000).

Minor Autohemotherapy with Ozone/Oxygen Mixtures

MAHT is used to produce a stimulating effect in conditions with immune deficiency. The procedure is simple and easy to perform. Venous blood (5-10ml) on being taken into a 20ml syringe with 10-15 ml of ozone/oxygen mixture, ozone concentration –10-40mg/l, and carefully mixed, is then injected intramuscularly.

Major Autohemotherapy with Ozone/Oxygen Mixtures

For Major Autohemotherapy we use a flask or a special plastic bag with anticoagulant and fill it with 50-150ml of venous blood taken from the patient. The blood upon being mixed with ozone/oxygen mixture, ozone concentration should not exceed 40mg/l (according to V.Bocci, higher ozone concentrations can lead to hemolysis) is returned to the patient via intravenous injection.

According to S.Rilling and R.Vieban instructions (1987), ozone in the doses of 6-10 mg produce immune-suppressive effect and it should be administered in cases of active rheumatism and rheumatic arthritis. In atherosclerotic diseases of cardio-vascular system, in contaminated surgery and in chronic diseases that require immune stimulating treatment the recommended ozone dose is 1-3mg, in rare cases 4mg (R.D.Rentschke, 1986).

Ozone doses of 8-9mg are administered in acute stage of infectious hepatitis, which are gradually reduced to 2,0-0,8 mg with remittance of the exacerbation (H.Wolf, 1986). The same doses are used in herpetic infection.

Ozone Aerated Plastic Bag

The method has proved to be highly efficient in the treatment of trophic ulcers, purulent sluggish wounds, bed sores, painful cicatrices, burns and defects caused by sequestrations of irradiated surficial and subcutaneous tumors

Before the procedure the affected leg is damped with water or saline and then a plastic bag is put on and hermetically sealed. The bag is filled with gas mixture until the excessive pressure is reached. Then a destructor is switched on. The aerating is done for 15-20 minutes.

In patients with vascular diseases when the skin surface is not affected ozone concentration is 6-8ml/l of ozone/oxygen mixture.

In cases of trophic ulcers or purulent wounds the affected area should be covered with a dressing soaked in saline or distilled water. The initial ozone concentration is 5-6mg/l until ulcer becomes detersive. At the stage of granulations the concentration is diminished to 1-1,2mg/l.

CONTRAINDICATIONS TO OZONE THERAPY

1. All cases with Blood Coagulation Failure
2. Bleeding Organs
3. Thrombocytopenia
4. Ozone Allergy

5. Hemorrhagic or Apoplectic Stroke

6. Ozone Intolerance

Note. Ozone in low concentrations is known to produce a moderate hypo-coagulation effect, so all the drugs decreasing blood coagulation (anticoagulants, aspirin, etc.) are to be discontinued during the course of ozone therapy. In women the treatment course is to be broken up for menstrual periods.

OZONE THERAPY IN DIFFERENT PATHOLOGIES

OZONE THERAPY IN SURGERY

Contaminated surgery was one of the first to recognize ozone therapy and it is contaminated surgery where it has been widely used.

General Peritonitis

Diffuse Peritonitis

In the treatment of general peritonitis, including the cases complicated by “intestinal insufficiency” ozone has been used for its powerful bactericidal properties concerning aerobic and anaerobic microorganisms. It was found to be effective in reduction of lipid peroxidation (LP) processes and of antioxidant defense system (AOS), in reparation and immune system stimulation, in intoxication control.

Medical ozone displays its best therapeutic capacities when used in combination with conventional treatment and included into a complex management of a patient

Routes

Ozone therapy during the operation

Intra-operational sanitation of abdominal cavity with ozonated physiological saline

Ozone therapy in postoperative period

Peritoneal lavage with ozonated physiological saline or programmed laparostomy

Intravenous infusions of ozonated physiological saline

Major autohemotherapy

Management

Ozone therapy during the operation

Intraoperational sanitation of abdominal cavity with ozonated physiological saline (volume not less than 5-7 liters, ozone concentration 4-5mg/l) is to be done for 20 minutes on having eliminated the source of peritonitis and small intestine decompression. Laparotomy is to be completed with drainage of the abdominal cavity and adjustment of silicone tubes for lavage to follow.

Ozone therapy in postoperative period

In postoperative period lavage procedures of the abdominal cavity are recommended. The first procedure is done 4-6 hours after the operation for 25-30 minutes with the use of ozonated saline via the tubes adjusted in the upper part of the abdominal cavity. The saline being continuously ozonated is introduced via intravenous infusion drip. The procedure is repeated twice – 4-6 and 8-12 hours later. On the average postoperative lavage is done within the period of 72 hours following the operation.

Programmed laparotomy proved to be an effective method in the treatment of peritonitis. On having the surgical intervention performed, the source of peritonitis eliminated, the sanitation of the abdominal cavity done and small intestine being decompressed (nasointestinal tube), the abdominal cavity is not to be closed completely with the edges brought together over the

cellophane drape covering the intestines. During the first 24 hours after the operation peritoneal lavage is done every 8 hours with ozonated saline, ozone concentration being 5-6mg/l, the volume - not less than 5liters. The lavage is done till the flushing waters become clean. Prior to bracing of the abdominal wall, the abdominal cavity is filled with 0,5l of ozonated saline. Drainage is done via small pelvis. On the second postoperative day the procedure is done every 12 hours. On the third day the procedure is done only once followed by laparorhaphy.

Intravenous infusions are done with 200ml of ozonated saline once a day during the first two postoperative days, and then every second day. Major autohemotherapy is done within the first 12 hours after the operation and then every second day. The course consists of 2-3 procedures.

Such a course of complex schemes of treatment resulted in earlier control of endotoxiosis events, normalization of biochemical and immunological parameters and less cases of early postoperative complications (from 33% to 14%) with 15% decrease in lethal outcome (Векслер Н.Ю. с соавт. 2000, Семенов С.В. с соавт., 2000, Снигоренко с соавт. 2000)

Warning: Never use ozone/oxygen mixture in gaseous form to treat abdominal cavity, for it can lead to the development of peritoneal adhesions

The use of ozone does not exclude the whole complex of medical procedures to correct homeostasis disorders.

Localized Peritonitis

Routes

- Intra-operational sanitation of the abscess cavity with ozonated physiological saline
- Intravenous infusions of ozonated saline
- Minor autohemotherapy
- Major autohemotherapy

Management

Intra-operation sanitation of the abdominal cavity is done with 0,5-0,8liter of ozonated saline. The lavage is done only in the area of inflammatory process, followed by careful suction of flushing waters. Biluminal drainage tube is brought to the peritonitis focus and taken out through a special micro-incision. Laparorrhaphy is done up to aponeurosis with retention sutures upon the skin. During the first post-operative day the lavage procedure is done 3 times with 30-50ml of ozonated saline, ozone concentration - 5-6mg/l. After a period of 15-20 minutes the remnants of the saline are either sucked out with a syringe or removed by the natural way.

Intravenous infusions of 200ml of ozonated saline are done one procedure for the first two days and then every second day. The course consists of 4-5 procedures. Two procedures of minor autohemotherapy are done every second day and major autohemotherapy – 1-2 procedures a week. In cases when peritonitis is progressing relaparotomy is performed, followed by sanitation and one of the recommended techniques of intra-operation and post-operation abdominal sanitation

Contaminated Wounds of Soft Tissues

Optimal results can be achieved in a complex treatment of contaminated wounds when alongside with major autohemotherapy or intravenous infusions of ozonated saline and minor autohemotherapy, the wound is ozonized with wet tampon and then the limb is put into a plastic bag (Родоман Г.В. с соавт., 2000).

Routes

- Major autohemotherapy
- Intravenous infusions with ozonated saline(or rectal insufflations with ozone/oxygen gaseous mixtures)
- Minor autohemotherapy
- Wound aeration with ozone/oxygen mixture in a plastic bag under high or low pressure
- Wound treatment with a stream of ozone/oxygen mixture under the sphere
- Stimulation of biological active points in wounds of low extremities
- Sterile dressings with ozonated oil

Management

In the course of treatment the phase of wound process should be taken into consideration. The treatment should be a complex one and include all forms of ozone therapy.

Wound aeration with ozone/oxygen mixture

The procedure starts with mechanical (sparing) wound cleansing from detritus, then a drape soaked in ozonated saline or distilled water is put into the wound. Aeration is performed either in a plastic bag or under a sphere for 20-30 minutes, ozone concentration 5-6 mg/l.

Wound aeration is to be done 2-3 times a day until the wound is cleansed from pyonecrotic discharge. On development of granulation tissue and epithelization the procedures are done every second day with ozone concentration of 2-2,5mg/l. When marginal epithelization appears, the concentration is diminished to 0,8-1,2mg/l

Major Autohemotherapy

The course consists of 5-6 procedures. The first 3 procedures are done every second day, the rest – every third day.

Intravenous infusions or rectal insufflations with ozonated saline

The procedures can be done as an alternative to major autohemotherapy. The course consists of 8-10 procedures, the first three are to be done daily, the rest – every second day.

Minor Autohemotherapy

The course consists of 3-5 procedures done every second day in combination with intravenous infusions or rectal insufflations with ozonated saline.

Dressings with Ozonated Oil

The dressings are to be applied as soon as wound epithelialization appears.

Stimulation of Biological Active Points

The procedures are recommended when wounds are on lower limbs by making subcutaneous injections of ozone/oxygen mixtures, volume-0,5-1,0ml., ozone concentration –10mg/l. The shin points are – BL-40, BL-57; foot points are- Liv-1, St-45, GB-44.

Osteomyelitis Of Long Tubular Bones

Ozone therapy proved to be effective in the treatment of osteomyelitis and purulent arthritis (Зайцев А.Б. 1998, 2000)

Routes

- Ozonated saline to soak the dressings (Ozonated dressings).
- Aeration with ozone/oxygen mixture in a plastic bag
- Intravenous infusions with ozonated saline
- Minor Autohemotherapy
- Major Autohemotherapy
- Intra-osseous infusions with ozonated saline

Management

The treatment includes all the routes of ozone therapy enlisted above.

Regarding the stage of the purulent process, ozonated dressings are to be changed once or twice every day. Plastic bags are to be put on for 20-30 minutes, ozone concentration-5-6mg/l. The procedures are done until the fistulas are closed and pyorrhea disappears.

Intravenous infusions with ozonated saline are to be done daily within the first three days and then - every second day (up to 10-12 procedures)

Minor Autohemotherapy is to be done every second day (up to 4-5 procedures).

Intra-osseous injections of ozonated saline are to be done daily within the first three days and then - every second day (up to 10-15 procedures).

Intravenous infusions with ozonated saline and minor autohemotherapy can be substituted by 6-8 procedures of major autohemotherapy done every second day.

Arthroempyesis

Routes

- Abarthrosis puncture washing with ozonated saline.
- Abarthrosis flushing drainage with ozonated saline.
- Intravenous infusions with ozonated saline
- Minor autohemotherapy
- Intra- and peri-articular injections of ozone/oxygen mixtures
- Major autohemotherapy

Management

Arthrocentesis is done with the evacuation of purulent materials and abarthrosis washing with ozonated saline is done till the washing waters become clean.

In cases when puncture washing appears to be ineffective, it is necessary to prepare the flushing drainage system to wash articular cavity. To do it micro-incisions are to be done along the lateral articular surface and micro-drainages are put into the articular cavity and anchored to the skin. One of the drainages is used for the continuous instillation of ozonated saline. The saline ozonation is done by a non-stop barbotage, with ozone concentration in the saline being 4-5mg/l.

Puncture washing and flushing drainage are to be done at least for two days, till the beginning of the inflammatory regress. Then the drainage system is removed, followed by intra- and peri-articular injections of ozone/oxygen mixtures (up to 4-5 procedures).

Alongside with the topical treatment, intravenous infusions with ozonated saline are done daily till the regress of the inflammation and then – every second day. The course of treatment consists of 10-12 procedures of intravenous infusions and 4-5 procedure of minor autohemotherapy.

Intravenous infusions with ozonated saline and minor autohemotherapy can be substituted by 6-8 procedures of major autohemotherapy done every second day.

Note. Artificial ankylosis is obligatory until the pyo-inflammatory process subsides.

Trophic Ulcers. Decubitus Ulcers

Applications with ozonated oil are successfully used in the treatment of trophic ulcers of different etiology (Кузнецов Н.А. с соавт. 2000, Газин И.К. 2000, Горбунов С.Н. 2000).

Routes

- Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture
- Minor Autohemotherapy
- Major Autohemotherapy
- Aeration with ozone/oxygen mixture in a plastic bag under high or low gas pressure
- Ulcer treatment with the stream of ozone/oxygen gas mixture under the sphere
- Stimulation of biologically active points, when wound is located in the lower extremity.
- Microinjections with ozone/oxygen mixture along the ulcer ends

Management

The course of treatment should include all kinds of enlisted route procedures. The obligatory condition is to clean the ulcer surface completely from the incrustation.

Ulcer Aeration with Ozone/Oxygen Mixture

The procedure is to be done daily in a plastic bag or under the sphere for 20 minutes with ozone concentration of 6-7mg/l until the ulcer gets cleared off the purulent coat. With the development of granulation tissue and epithelization the procedures are done every second day with ozone concentration of 2-2,5mg/l, with development of marginal epithelization the concentration is diminished to 0,8-1,2mg/l.

The skin of the treated surface is to be damp. That is why it is to be either covered with wet napkin or wiped with a damp cloth. The ulcer surface is to be filled with gauze dressing soaked with ozonated saline.

Dressings with Ozonated Oil

The dressings are to be applied with the beginning of ulcer epithelization

Intravenous infusions with ozonated saline, minor autohemotherapy, major autohemotherapy

- Along with topical treatment intravenous infusions are done daily till the abatement of the inflammatory process and then every second day up to 12-15 procedures. Minor autohemotherapy are done up to 6-8 procedures. Intravenous infusions and minor autohemotherapy procedures can be substituted by 10-12 procedures of major autohemotherapy, the first four procedures are to be done every second day, the rest - two times a week.

Microinjections with ozone/oxygen mixture

Microinjections are done daily until the ulcer detersion.

Stimulation of biological active points

The procedures are done when ulcers are localized on lower limbs by subcutaneous injections of ozone/oxygen mixtures with volume of 0,5-1,0ml, and ozone concentration –10mg/l. The shin points are – BL-40, BL-57; foot points are- Liv-1, St-45, GB-44.

Osteoarthritis

Intra-articular injections of ozone/oxygen mixtures proved to be very efficient in the treatment of osteoarthritis.

Routes

- Intra-articular(intrasynovial) injections of ozone/oxygen mixtures
- Peri-articular injections of ozone/oxygen mixtures
- Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture
- Minor autohemotherapy

Management

- The course of treatment should combine all the above listed routes Intra-articular injections of ozone/oxygen mixtures are to be done every second day and alternated with intravenous infusions with ozonated saline (or rectal insufflations with ozone/oxygen mixture) and peri-articular injections. Minor autohemotherapy is to be done once a week. The early stages of osteoarthritis require a 2-3 week treatment course, while the late ones – 4 or 5 weeks.

Atherosclerosis Obliterans Of Peripheral Vessels

In instituting the course of ozone therapy we regarded the stages of chronic arterial insufficiency (CAI), which are used for differential treatment and regular medical check-up (B.Ф. БОЛГОВ с соавт.,2000):

CAI-1 stage – 1 and 2a stages of ischemia;

CAI-2 stage – 2b and 3a stages of ischemia;

CAI-3 stage - 3b and 4 stages of ischemia.

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy
- Minor Autohemotherapy
- Stimulation of biological active points in the lower extremities with ozone/oxygen injections
- Aeration with ozone/oxygen mixture in a plastic bag under excessive gas pressure

Management

The management depends on the stage of chronic arterial insufficiency.

Patients with the CAI-1 stage undergo through 10 procedures of Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture done every second day and 2-3 minor autohemotherapy procedures done every third day. This scheme can be substituted by 6-8 major autohemotherapy procedures. These patients are also administered 2 procedures of stimulation of biological active points

Patients with the CAI-2 stage undergo through 10 procedures of Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture done every second day and 3-4 minor autohemotherapy procedures done every second day. This scheme can be substituted by 6-8 major autohemotherapy procedures. The patients receive 4-5 procedures for stimulation of biological active points done every second day. The treatment is complemented with aeration with ozone/oxygen mixture in a plastic bag under excessive gas pressure. Each procedure (10 for the course) lasts for 20 minutes, ozone concentration being 5-6mg/l, and is done every second day.

Patients with the CAI-3 stage undergo through 10-12 procedures of intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture done every second day, 4 - 5 minor autohemotherapy procedures done every third day. This scheme can be substituted by 8 -10 major autohemotherapy procedures. The stimulation of biological active points includes 4 –5 procedures. Aeration with ozone/oxygen mixture in a plastic bag under excessive gas pressure is obligatory. The procedures are administered every second day to patients without any trophic skin changes in the foot and the shin. Daily procedures are administered in cases with trophic changes. The number of the procedures – from 10 to 20, ozone concentration being 5-6mg/l; duration – 20-30 minutes

The results received in 147 patients that underwent the course of treatment in our clinic are presented in the following table (Болгов В.Ф. с соавт.,2000).

Results of Ozone Therapy done in Patients with Obliterating Atherosclerosis in Lower Extremities

The stage of Chronic Arterial Insufficiency	Number of patients	Results		
		Positive	Satisfactory	Unacceptable
CAI-1 stage	6	6	-	-
CAI-2 stage	109	106	2	1
CAI-3 stage	32	30	2	-
Results of Treatment (%)		96%	3%	1%

OZONE THERAPY IN INTERNAL DISEASES

Atherosclerosis And Ischemic Heart Disease (IHD)

Ozone has been found to produce hypolipidemic effect. According to different authors (Камышева Е.П. с соавт., 1998, Густов А.В. с соавт., 1999, Быков с соавт., 2000), after the course of ozone therapy patients with atherosclerosis had evident decrease in the levels of total cholesterol (6,4-18,4%), of lipoproteins of low density (7 - 28,7%), of triglycerides (10,5 - 17,2%) and increase of lipoproteins of high density (3,7 – 6,8%) levels.

The development of atherosclerosis is known to be caused not only by hypercholesterolaemia but also by disorders in regulation of free radical processes. Lipoproteins of low density undergo the process of oxidative modification in the liver and become more atherogenic. On being secreted into the blood, they start intensively accumulate, due to macrophages, in the endothelial cells in the damaged area and then get transformed into foam cells, which make the basis for atherosclerotic plaque.

Ozone therapy when using small doses of ozone increases LP processes and, what is more important, it activates antioxidant defense system, thus eliminating lipoprotein toxicity, decreasing their capacity to penetrate the vessel wall, making it more resistant. Hence, ozone therapy can be regarded as an antisclerotic method of treatment.

Ozone therapy proved to be effective in all IHD patients (stenocardia, cardiosclerosis, arrhythmias) at various stages of the disease from mild forms to severe ones). Its efficiency was found to be more pronounced in severe forms for it helps to control hypoxia in tissues which develops with the advance of heart insufficiency. In tissues with insufficient blood circulation the oxygen uptake by cells is done in much greater volume under ozone influence, This effect cannot be achieved with the help of medication orders. This statement seems to be extremely important for it explains the positive effect of the method.

Routes

- Intravenous infusions with 200ml of ozonated saline with ozone concentration of 20 μ g/kg of patient's weight (ozone concentration at the output from the generator)
- Rectal insufflations with ozone/oxygen mixture, ozone dose being 75 μ g/kg of patient's weight
- Major Autohemotherapy, ozone dose being 1-3 mg.

Management

In the course of treatment we use one of these routes The management is done according to the patient's condition, which is evaluated on the basis of the accepted functional classes (FC):

- 6-8 procedures for FC-I patients;
- 8-10 procedures for FC-II patients;
- 8-10 procedures for FC-III and FC-IV patients.

The first 2 procedures of intravenous infusions or rectal insufflations are to be done every day, the rest – every second day. The procedures (6-8) of major autohemotherapy are to be done twice a week.

Note. In cases when patients are on conventional treatment and start ozone therapy, coronaractive preparations are not discontinued immediately. The dose is gradually diminished with the improvement of patient's condition.

The following table presents the results we received on having used ozone therapy for 142 patients with different FC of IHD.

The Results of Ozone Therapy in 142 Patients with IHD

Severity of the Disease	Number of Patients	Results of Treatment		
		Positive	satisfactory	unacceptable
I	3	3	-	-
II	82	74	6	2
III	50	45	4	1
IV	7	7	-	-
Results of Treatment (%)		91 %	7 %	2%

The improvement in the condition of patients with stenocardia was defined by the less episodes of heart strokes and nitroglycerinum intake. Angina attacks were completely regulated in 50% of patients; in 41% of patients the number of attacks was double decreased.

Hypertensive Disease

Ozone therapy is a pathogenic method for hypertension treatment. It corrects the decreased energy of cells, the main component of pathogenesis. No other available hypotensive preparations are known to have such properties. In the management of Hypertensive disease ozone therapy can be used as a monotherapy and in combination with other medications. As a monotherapy it is efficient in patients at the initial stage of the disease, in mild, labile hypertension. Positive results were received in 70% of patients.

Patients with steady hypertension are to combine ozone therapy with hypotensive preparations. According to our findings, conventional hypotensive preparations can be administered in lower doses when combined with ozone therapy. In combined treatment clinical manifestations of hypertensive disease, such as headaches, dizziness, heart pains – either disappeared within a shorter time period or abated.

Routes

- Intravenous infusions with 200ml of ozonated saline with ozone concentration of 20µg/kg of patient's weight (ozone concentration at the output from the generator)
- Rectal insufflations with ozone/oxygen mixture, ozone dose being 75µg/kg of patient's weight
- Major Autohemotherapy, ozone dose being 1-3 mg.

Management

In the course of treatment we use one of these routes. The treatment with intravenous infusions or rectal insufflations starts with 2-3 daily procedures, the rest 3-4 procedures are done every second day. With the decrease of arterial pressure the number of procedures is

diminished to two procedures a week, and then one procedure a week. The total number of procedures is 8-10. Major autohemotherapy is done twice week with a total number of procedures up to 6-8.

Diabetes Mellitus

Ozone therapy appears to be an effective method for DM treatment. The reason is in ozone mechanisms when it can perform a number of processes, which provide its positive effect.

First, ozone improves the penetration of cellular membranes for glucose. It is achieved by stimulating pentose-phosphate pathway and aerobic glycolysis that in case of DM are inhibited. It promotes hyperglycemia decrease due to better transport of glucose into tissues.

We observed a group of 70 patients with insulin-dependent and non-insulin-dependent diabetes. After the course of ozone therapy the average level of hyperglycemia had a 26% decrease.

Ozone activates glucose metabolism that results in increasing content of 2,3 diphosphoglycerate in erythrocytes which provides better oxygen supply into the tissues. Patients with diabetes mellitus have the so called glycosylated hemoglobin forming very strong bonds with oxygen, thus, inducing hypoxia and determining the severity of the disease. That is why hypoxia control with the help of ozone therapy is of the key importance in the course of treatment.

After the course of ozone therapy the patients had significant decrease in the levels of urine, cholesterol and fibrinogen.

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy
- Minor Autohemotherapy
- Subcutaneous microinjections with ozone/oxygen mixture
- Stimulation of biological active points with ozone/oxygen injections

Management

The basic treatment includes intravenous infusions of ozonated saline or rectal insufflations with ozone/oxygen mixtures which are done every second day (8-10 procedures). These procedures can be substituted with major autohemotherapy which is done twice a day up to 6-8 procedures for the course of treatment. Other procedures are administered according to the type of diabetes mellitus and the presence of complications.

In DM, Type-2 the treatment course also includes stimulation of biological active points with ozone/oxygen injections using the conventional schemes.

In signs of secondary immune deficiency (pustular inflammatory diseases) in addition to the basic course of treatment subcutaneous microinjections with ozone/oxygen mixture are done in the area of purulent foci. Minor autohemotherapy is done every second day up to 6-8 procedures for the course.

Note. Due to the fact that ozone has hypoglycemic effect the dose of glucose decreasing preparations must be corrected and glucose level in the blood must be under constant control through out the course of treatment.

Positive effect was received in 92% of insulin-dependent cases and 89% of non-insulin-dependent cases. It was expressed in decrease of hyperglycemia, thirst reduction, disappearance of polyuria, pruritus, weakness etc. (Масленников О.В. с соавт., 2001).

One of the main signs for successful treatment of diabetes mellitus is the achievement of compensation of the patients condition. After the course of ozone therapy the number of compensated patients increased (by 4 times) and decompensated patients decreased (by 5 times).

Patients who underwent the course of ozone therapy could take a 20-25% reduced dose of glucose-reducing preparations for the period of 3-6 months.

Ozone therapy proved to be effective in the treatment of complicated forms of diabetes mellitus. In patients with diabetic foot syndrome ozone therapy, combined with topical treatment of purulent necrotic focus and with total metabolic effect, allowed to half-shorten the period for wound detersion from pyo-necrotic mass and development of regenerative processes, to lessen the number of limb amputations and of fatal outcomes, to decrease invalidism (Мошуров И.П., Глянцев В.П., 1998, Беляев А.Н. с соавт. 2000, Газин И.К., 2000).

Clinical observations in the course of lung tuberculosis in patients with diabetes mellitus, who were on ozone therapy, showed ozone therapy to produce glucose-reducing effect and to influence on the course of specific process. The most impressive was elimination of adiphoria to antituberculosis preparations. (Белянин И.И. 1997)

Chronic Bronchitis. Bronchial Asthma

Ozone immune modulating properties are of primary importance in the treatment of chronic bronchitis. Ozone therapy provides anti-infection immune response to viral-bacterial infection invading the human body. It is revealed in intensifying local and general immunity which is suppressed in chronic bronchitis.

The principles in the treatment of bronchial asthma are known to be the following: activation of immune system and elimination of the following factors - viral and bacterial infection, bronchoconstriction, allergic reactions, hypoxia.

Ozone therapy efficiency is explained by its ability to influence various aspects of pathological process. First of all, it is its capacity to cope with bronchospasm as a result of dilatation effect on the smooth muscle of NO-radical which is formed in the endothelial cells due to ozone.

Ozone capacity to cope with tissue hypoxia is also of great significance. Patients with bronchial asthma are known to suffer from hypoxia resulting from pulmonary insufficiency caused by bronchospasmus. Ozone provides blood saturation with oxygen by-passing the lungs and delivering it to tissues via erythrocytes, thus improving blood rheology and eliminating hypoxia.

Immune modulating ozone effect can be revealed in activation of cytokines (interferon, tumor necrosis factor, interleukins) production by lymphocytes and monocytes.

Stimulation of immune system helps to suppress the inflammatory process, decreasing the activity of effector cells and diminishing their release of biological active substances responsible for bronchospastic reactions.

Routes

- Intravenous infusions with ozonated saline

- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy
- Stimulation of biological active points with ozone/oxygen injections
- Inhalations with ozonated distilled water

Management

The treatment is a complex one, including all the above enumerated routes. The course starts with 2 intravenous infusions of ozonated saline or rectal insufflations done daily. On improving the condition the next 5-7 procedures are done every second day and then once or twice a week (up to 7-10 procedures for the whole course)

Acupuncture with ozone/oxygen mixture is done according to conventional accepted methods.

Inhalations with ozonated distilled water are done once or twice a day daily for a period of 10-15 days.

Major autohemotherapy is administered in cases when positive effect is not received after 7-10 days of treatment and it is done instead of intravenous infusions or rectal insufflations. Procedures are done every second day up to 4-8 for the course of treatment.

The results of ozone therapy in chronic bronchitis in our practice are the following: the condition improved in 79% of patients, 29% having significant improvement(complete elimination of such symptoms as cough, breathlessness, weakness, rales) and 21% having satisfactory improvement.

Ozone therapy in 42 patients with bronchial asthma followed in our clinic gave the following results. The majority of patients (83%) had a moderate course of the disease. All the patients were on broncholytic preparations, some of them taking steroid hormones. After the course of ozone therapy the valid improvement in the condition was noted in 86% of patients who had half fewer episodes of suffocation and could reduce the dose of conventional preparations. In 7% of patients we achieved a complete control of asthmatic attacks and discontinued the intake of medications. In the rest 7% of cases we could not achieve improvement in their condition.

Chronic Pyelonephritis

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy
- Minor Autohemotherapy

Management

The treatment combines minor autohemotherapy (6-8 injections) with intravenous infusions of ozonated saline or with rectal insufflations with ozone/oxygen mixture (8 - 10 procedures). During the first three days the procedures are to be done daily and then every second day. Major autohemotherapy (6-8 procedures) is to be done twice a week and can be used as an alternate method, substituting the first three.

Chronic Gastritis. Type "B"

Ozone therapy proved to be an effective remedy in the treatment of chronic gastritis. Ozone due to its properties produces therapeutic effect on all the main pathogenic mechanisms responsible for the development of the disease. It produces bactericidal effect on *Helicobacter Pylori* (up to 93,7%)

Its anti-inflammatory effect is achieved due to oxidation of arachidonic acid, known as a precursor for prostaglandin E that starts the inflammatory process. To add to that, ozone produces its immune-modulating, anti-aggregation and analgetic effect (Андосов С.В. с соавт., 2000).

Ozonated oil and ozonated water produce bactericidal effect and deliver active oxygen to tissue, shortening the healing processes.

Ozone has been found to produce changes in the local immunity, increasing the release of secretory IgA by lymphocytes and plasmatic cells, responsible for the immune defense of the surface cells of the stomach.

Routes

- Ozonated water.
- Ozonated oil
- Minor Autohemotherapy
- Stimulation of biological active points with ozone/oxygen injections

Management

The treatment consists of daily intake of ozonated water (100-150ml) 30-40 minutes before meals 1-3 times a day. Ozonated oil is to be taken 3 times a day 15 minutes following the intake of ozonated water, starting with 1 teaspoonful, gradually increasing the dose to tablespoonful, if patients tolerate it well. The water and oil are to be taken for 2 – 3 weeks.

Minor autohemotherapy is to be done according to the following scheme. The first 3 procedures are to be done daily, the next 3 – every second day, and the remaining procedures – twice a week. The course consists of 8-10 procedures.

Acupuncture with ozone/oxygen mixture are done according to the conventional methods.

Ozone therapy was instituted to 101 patients. The received results were assessed as “significant improvement” in 57%, “improvement” – in 40% and satisfactory in 3% of cases. Clinical results were confirmed by endoscopic findings that revealed significant decrease or disappearance of inflammation, signs of hyperaemia and mucous edema.

Ulcer

Multifunctional ozone effect in the treatment of peptic ulcer is revealed first of all in its anti-inflammatory and anti-helicobacterial action. It results in accelerating the epithelization processes, infiltrate elimination in mucous membrane within a shorter period, compared with the traditional therapy. V.Maximov (1998) considering different schemes of ulcer treatment comes to the conclusion, that ozone therapy can substitute antibiotics and metronidasol preparations, providing better results regarding the ulcer healing and the degree of HP eradication.

Ozone therapy was found to produce positive effect on general and local immunity.

Ulcer Of The Stomach

Routes

- Ozonated water.
- Ozonated oil
- Rectal insufflations with ozone/oxygen mixture
- Minor Autohemotherapy
- Intravenous infusions with ozonated saline
- Major Autohemotherapy
- Stimulation of biological active points with ozone/oxygen injections

Management

Ozonated water and ozonated oil are to be taken following the scheme of the chronic gastritis.

The treatment begins with rectal insufflations with ozone/oxygen mixture done every second day up to 5-6 procedures. Starting from the second week the treatment is complemented with Minor autohemotherapy alternately with rectal insufflations. During the 3-d and the 4-th weeks the same procedures are done every second or third day. In cases when rectal insufflations are unacceptable, they are substituted by intravenous infusions with ozonated saline up to 12-15 procedures done every second day or by major autohemotherapy done twice a week with 6-8 procedures for the course.

Microinjections into paravertebral points with ozone/oxygen mixture are to be done every second day on the Th 6 - Th 9 level (up to 5-8 procedures for the course)

Ozone acupuncture is done according to the conventional methods.

Ulcer Of The Duodenum

Routes

- Ozonated water.
- Ozonated oil
- Minor Autohemotherapy
- Major Autohemotherapy
- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Stimulation of biological active points with ozone/oxygen injections

Management

Ozonated water and ozonated oil are to be taken following the scheme of the chronic gastritis.

The course begins with minor autohemotherapy procedures. The first 3 procedures are to be done daily, then 2 or 3 procedures are to be done every second day, the remaining ones are to be done twice a week. The course includes 8-10 procedures.

Starting with the second week the treatment is complemented with intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture up to 3-4 procedures that are alternated with minor Autohemotherapy.

Intravenous infusions of ozonated saline and minor autohemotherapy can be substituted by major autohemotherapy (8-10 procedures), the first two procedures are to be done every second day and afterwards – twice a week.

Ozone acupuncture is done according to the conventional methods.

The treatment course lasts 3-4 weeks. After cicatrization, ozonated oil is kept on to be taken 1 spoonful before going to bed at night for a period of 1-1,5 month.

In our practice we used ozone therapy as a mono therapy in 69 patients at the stage of exacerbation, 10 suffering from ulcer of the stomach, 59 from duodenal ulcer.

The results of treatment were regarded as “significant improvement” in 8 patients with complete healing of the ulcerative defect and disappearance of all the symptoms. In 2 cases the results were assessed as “improvement of the condition”, for the healing was not complete, though the symptoms disappeared completely.

The condition of patients treated for duodenal ulcer was regarded as “significant improvement” in 56% of cases, “improvement of the condition” – in 39%. “Partial improvement” was assessed in 5% of patients that had incomplete healing of the ulcer defect and some of the remaining symptoms.

Note. Ozone therapy can be used both as a mono therapy and in combination with medicinal forms. Follow-up results of ozone therapy in 290 patients with duodenal ulcer were analyzed by S.Karatayev et al.(1998). Within the period of 4 years the cases of the recurrence of the disease were noted 5 times less in the group of patients that were on combined treatment compared with those that underwent the conventional therapy.

Chronic Nonulcerative Colitis

Ozone therapy in the management of patients with chronic non-ulcerative colitis takes a special place regarding the following reasons.

First, the use of rectal insufflations with ozone /oxygen mixture produces both topical anti-inflammatory effect and general multi-faceted including anti-hypoxic, immune-modulating, etc due to ozone capacity to be quickly absorbed by blood.

Second, chronic colitis is often concomitant with dysbacteriosis. Ozone advantages become evident, for it does not produce any harmful effect on flora of the intestine, compared with antibacterial preparations such as antibiotics and sulfanilamides

When rectal insufflations are used ozone gets stuck to mucous membrane and interferes with the infectious process penetrating the microbial cells thus preventing their further reproduction Besides, ozone enforces phagocytosis, improving blood circulation and humoral immunity. It leads to refection of homeostasis, with the normalization of microbial balance and subsiding inflammatory signs.

Contrary to various antiseptics still causing some damaging effect in tissues, ozone does not produce any harmful or ulcerative effect and, more than that, it does not induce any resistance to ozone therapy.

Routes

- Rectal insufflations with ozone/oxygen mixture
- Minor Autohemotherapy
- Stimulation of biological active points in the lower extremities with ozone/oxygen injections

Management

During the exacerbation period ozone insufflations of gaseous mixture are done every second day with the dose of 100µg per kg of patient's weight for the first two weeks, then 2 times a week with the dose of 75µg/kg. The whole course consists of 10-15 procedures.

Minor autohemotherapy is done 1-2 times a week up to 4-6 injections for the course.

Microinjections with ozone/oxygen mixture into the paravertebral points at Th 10 - L5 level are to be done daily or every second day up to 5-7 procedures for the course. Acupuncture procedures with ozone/oxygen mixture are done according to the conventional methods.

In colitis of various etiology some authors (B.A.Максимов с совт. -1998) recommend the use of intra-intestinal gaseous ozone up to 200-500ml with the concentration 60 mg/l.

In the Russian Centre of Restorative Medicine and Spa-resort Treatment they recommend rectal insufflations with concentration in the range of 10-40µg/ml and volume of 50-300ml for patients with inflammatory intestinal diseases. In atonic intestine they recommend low concentrations, in spastic conditions - higher concentrations.

Chronic Hepatitis

Ozone therapy can be used as a mono-therapy in the management of patients with chronic hepatitis.

In the treatment of infectious hepatitis the major effect is achieved due to ozone antiviral property. Inactivation of viruses results from peroxide oxidative activity when virus cell receptors get destroyed and cannot penetrate the host cell. The failure in virus multiplication process is also caused by RNA virus breakdown due to ozone. According to A.Zmyzгова (A.B.Змызговой с соавт.-1998) 2-months ozone therapy courses reveals no viraemia signs in 66% of cases with chronic viral B-hepatitis, and in 60% of cases with chronic C-hepatitis.

Peroxides activate endogenous cellular metabolism in Kupffer's cells, responsible for phagocytosis. Ozone therapy activates both, cellular and humoral immunity. Ozone induces lymphocytes and monocytes to release cytokines and, primarily, interferon which is regarded as one of the most important endogenous defense factors, protecting the body from the viral infection.

Ozone effect in alcoholic hepatitis is explained by the fact that newly-formed peroxides act as a trigger for antioxidant mechanism to detoxicate the glutathione system, which prevents hepatic cell membrane from being damaged due to LP activation processes.

Routes

- Rectal insufflations with ozone/oxygen mixture
- Minor Autohemotherapy
- Intravenous infusions with ozonated saline
- Major Autohemotherapy

Management

Apart from the exacerbation period the most common procedures in chronic hepatitis are rectal insufflations with the dose of ozone of 75µg/kg done alternately with minor autohemotherapy. For the first two weeks rectal insufflations are done every second day and then twice a week up to 20-30 procedures for the course. Minor autohemotherapy is done 2 times a week.

The preference for rectal insufflations can be explained by findings published by H.G.Knoch (1987,1988). Ozone/oxygen mixture infused via the rectum is of particular significance in the treatment of different forms of hepatitis. Rapid gas absorption causes immediate rise in the partial oxygen pressure in portal vein, thus providing “the shortcut” for the oxygen to the liver and contributing to the efficiency of the treatment.

Rectal insufflations can be substituted with intravenous infusions of ozonated saline (the same number of procedures) or with major autohemotherapy.

- In cases with the exacerbation of the disease the preference is given to major autohemotherapy and intravenous infusions of ozonated saline. During the exacerbation period major autohemotherapy is done daily with a high dose of 6-8mg up to 5-8 procedures and then 2-3 times a week till the exacerbation subsides. Then the doses is decreased to 1-1,5mg

Intravenous infusions of ozonated saline (ozone concentration produced by ozone generator is 2mg/l) are done daily during the period of 10-12 days, and then every second day until the exacerbation subsides. After that – 2 times a week.

During the exacerbation period rectal insufflations with ozone dose of 100µg/kg of patient’s weight are done daily. When exacerbation subsides the procedures are carried according to the conventional protocol.

In the course of treatment the major autohemotherapy procedures can be alternated with intravenous infusions of ozonated saline and rectal insufflations with ozone/oxygen mixtures.

The course of treatment lasts from 3 to 6 months.

Hepatic cells affected by the virus are less resistant to peroxide action compared with healthy cells. These weakened cells on being exposed to high peroxide concentration get destroyed alongside with viruses and eliminated. This phenomenon is described by A. Bolcany (1989), who revealed the elevation of transaminase level after the very first procedures of ozone therapy and explained it by the destruction of hepatic cells due to viral invasion.

OZONE THERAPY IN GYNECOLOGY AND OBSTETRICS

GYNECOLOGY

Inflammatory Diseases Of The Organs In The True Pelvis (Adnexitis, Endometritis, Parametritis, Pelvioperitonitis)

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy, ozone dose being 1-3 mg.
- Intrauterine irrigations with ozonated distilled water

Management

The treatment consists of intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture. Both can be substituted with major autohemotherapy.

Daily infusions with 200- 400 ml of ozonated saline, ozone concentration in ozone/oxygen mixture at the output from ozone generator being 1200µg/l are to be done for 5 - 7 days.

Rectal insufflations with ozone/oxygen mixture are done according to the accepted method reckoned on the basis of 75µg/kg of patient's weight. The gas volume is from 300 to 600ml with ozone concentration of 10-40 mg/l.

Major autohemotherapy is done twice week with a total number of procedures up to 4-6.

Intrauterine irrigations with ozonated distilled water (400ml) with ozone concentration of 4-5 mg/l are done to provide entire contact with the site of inflammation and to exclude any damage to the mucous membrane in different forms of endometritis. On being ozonated the water via the biluminal catheter is introduced into the uterine cavity and then evacuated via the same catheter . The procedure can be repeated 3 times during one session, which is done once a day (Гречканев Г.О., Качалина Т.С., Качалина О.В., 2000).

In combination with basic anti-inflammatory therapy the described sanitation of the uterine cavity prevents the generalization of the inflammatory process, shortens the course of treatment and makes it possible to discontinue any other dialysis preparations.

Note. The use of ozone therapy allows to decrease the dose of medications with detoxicating, rheologic, antioxidant, immune-correcting, analgetic and sedative effect.

Profuse bleedings are regarded as the main contra-indication for ozone therapy. Smearred bloody discharge and predisposition to hemorrhage require more careful and accurate control.

In cases of surgical intervention ozone therapy can be used in aftercare course.

Inflammatory Diseases Of Genital Tracts

Colpitis, Bacterial Vaginosis

Routes

- Vaginal irrigations with ozonated saline
- Applications with ozonated oil
- Vaginal insufflations with ozone/oxygen mixture

Management

Vaginal irrigations with ozonated saline with the volume up to 1liter and ozone concentration of 6-10mg/l are to be done daily(8-10 procedures per course) and are to be complemented with applications with ozonated oil (1-2times a day).

These procedures can be substituted by vaginal insufflations with ozone/oxygen mixtures, that are to be done daily within 5-8 days. Using special nozzle to vaginal speculum ozone/oxygen mixture, ozone concentration being 1,5-2,5mg/l, is introduced into the vagina. Before the insufflation procedure the vagina is to be washed with distilled water for 5-10 minutes at the rate of 0,5-1l/min.

This method resulted in a steady improvement in all 50 patients with nonspecific colpitis, elimination of pathogenic and opportunistic microorganisms in bacteroscopy and restored the immunity balance in vaginal secretion. The use of the method made it possible to discontinue the medicinal therapy. (Качалина Т.С. с соавт.1998, Гречканев с соавт.,2000).

Kraurosis Vulvae

Routes

- Applications with ozonated oil

Management

Applications with ozonated oil are to be applied daily on the damaged surface within the period of 8-10 days

Note. The oil (100ml) is to be barbotaged with ozone/oxygen mixture for 20 minutes, ozone concentration-10mg/l.

OBSTETRICS

The use of ozone therapy produces positive effect on the clinical course in such conditions as the risk of miscarriage, gestosis, anaemia of pregnancy, intrauterine growth retardation and risk of complications in obesity. It is linked with the immune-correcting and antioxidant ozone effect. The improvement in oxygen supply, rheology and microcirculation contributes to hormone-producing function (Кулаков В.И. с совт.,2001, Миненков А.А. с соавт.,2001).

Miscarriage. Early Toxicosis

Routes

- Intravenous infusions with ozonated saline or
- Major Autohemotherapy, ozone dose being 0,4-0,5 mg.

Management

Daily instillation infusions of 400 ml of ozonated saline, ozone concentration in ozone/oxygen mixture being 400µg/l, are to be done for 5 days. Ozone therapy proves to be most effective in the end of the first and the beginning of the second trimesters of pregnancy.

Major autohemotherapy is done twice week with a total number of procedures up to 4-6.

Note. Ozone therapy is contraindicated in genital tract bleedings of different intensity and can be instituted only after its entire termination. The immune-correcting and antioxidant preparations, including vitamins, as well as sex hormones can be discontinued for the time of ozone therapy.

Gestational Toxicosis. Anaemia Of Pregnancy

Routes

- Intravenous infusions with ozonated saline or
- Major Autohemotherapy, ozone dose being 0,4-0,5 mg.

Management

Daily instilled infusions of 200 ml of ozonated saline, ozone concentration in ozone/oxygen mixture being 400µg/l, are to be done for 5 days. Ozone therapy proves to be most effective in mild and moderate gestosis.

Major autohemotherapy is done twice week with a total number of procedures up to 4-6.

Note. Ozone therapy is contraindicated in genital tract bleedings of different intensity and can be instituted only after its entire termination. The preparations with anti-oxidant, immune-correcting, sedative, rheologic and detoxicating effect can be discontinued for the time of ozone therapy.

Intrauterine Infection

The prevention and treatment of pregnant women that are in the risk group for fetal infection are to be done during the second trimester of pregnancy.

Routes

- Intravenous infusions of ozonated saline or
- Major Autohemotherapy, ozone dose being 0,4-0,5 mg.

Management

Daily instillation infusions of 200 ml of ozonated saline, ozone concentration in ozone/oxygen mixture being 800µg/l are to be done for 3 – 5 every second day. -6 procedures.

.Major autohemotherapy is done twice week with a total number of procedures up to 4-6.

Note. Antioxidants and immune-correcting preparations can be cancelled during the course of ozone therapy.

OZONE THERAPY IN DERMATOLOGY

The use of ozone therapy in the management of patients with various inflammatory skin diseases makes it possible to delimit the inflammation and to improve trophical processes. Out of 495 patients that were on ozone therapy a complete disappearance of clinical picture or significant improvement were observed in a patients with dermatosis and herpes(100%); pyoderma(95%); - eczema(75%); neurodermatitis(66%) and psoriasis(60%) (Криваткин С.Л, Криваткина Е.В., 1998).

Neurodermititis. Eczema

Ozone therapy is used in the treatment of some limited forms of neurodermititis

Routes

- Intravenous infusions of ozonized physiological saline or rectal insufflations with ozone/oxygen mixtures or major autohemotherapy
- Ozonized vegetable oil
- Aeration with ozone/oxygen mixture in a plastic bag

Management

The course consists of 10-12 procedures of intravenous infusions with ozonized saline or rectal insufflations with ozone/oxygen mixtures done every second day. Major autohemotherapy is done twice a week up to 5-6 procedures.

Ozonized vegetable oil is applied on the injured surface twice a day for 20 minutes until the eruption disappears.

The aeration course consists of 5-8 procedures, done every second day for 20 minutes with ozone concentration being 5-20mg/l

Positive result in the treatment of patients with eczema was noted in 86,8% of cases (complete clinical cure was achieved in 29,4% and significant improvement(70% eruption regress) –in 57,4% (Кошелева И.В., Иванов О.Л, 2000).

Acneiform Eruption

Routes

- Minor autohemotherapy
- Major autohemotherapy
- Ozonated vegetable oil

Management

In mild cases (isolated eruption) Minor Autohemotherapy is administered up to 8-10 procedures done every second day.

In severe cases (massive eruption) Major Autohemotherapy is indicated up to 8-10 procedures done twice a week.

Ozonized vegetable oil is to be applied on the injured surface twice a day for 20 minutes. Applications are to be done until the eruption disappears.

Furunculosis. Pyodermia

Routes

- Major Autohemotherapy
- Minor Autohemotherapy
- Intravenous infusions with ozonated saline
- Subcutaneous microinjections with ozone/oxygen mixture around the focus of inflammation

Management

The course of treatment begins with Major Autohemotherapy up to 5 procedures done every second day, followed by intravenous infusions with ozonized saline which are alternated with Minor Autohemotherapy (6-8 procedures). Microinjections around the focus of inflammation are to be done every day till the rupture of the furuncle. The ruptured furuncle is to be irrigated with ozonized saline

Herpes

Routes

- Major Autohemotherapy
- Minor Autohemotherapy
- Ozonated vegetable oil

Management

The course of treatment includes 10-15 procedures of Minor Autohemotherapy done every second day and 4 procedures of Major Autohemotherapy done once a week. Ozonized oil is to be applied two times a day on the dry elements till the rupture of the papules.

Note. In some cases there can be the exacerbation of the process at the very beginning of treatment. The exacerbation is less pronounced and is soon eliminated.

Psoriasis

Routes

- Intravenous infusions of ozonated physiological saline or rectal insufflations with ozone/oxygen mixtures
- Major Autohemotherapy
- Minor Autohemotherapy
- Ozonized vegetable oil

Management

Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixtures are done every second day up to 10 procedures. Minor autohemotherapy includes 6 procedures done twice a week.

Instead of intravenous infusions with ozonized saline, rectal insufflations with ozone/oxygen mixtures and minor autohemotherapy and a course of major autohemotherapy can be done. It includes 8-10 procedures, the first two procedures are to be done every second day, the remaining procedures are done twice a week.

Ozonated vegetable oil is to be applied on the injured surface twice a day for 20 minutes within a month to follow.

Mycosis

Routes

- Ozonated vegetable oil
- Minor Autohemotherapy

Management

The treatment consists of ozonated tampons applied on the nail plates twice a day for 30-40 minutes for a period of 3-6 months for fingernails and of 6-9 months for toe-nails (until the new nail plate grows)

A course of major autohemotherapy of 3-6 procedures is done every three months, the procedures are done every second day.

OZONE THERAPY IN NEUROLOGY

Chronical Forms Of Cerebrovascular Insufficiency (Discirculatory Encephalopathy)

Routes

- Intravenous infusions of ozonated saline.

- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy

Management

The course consists either of intravenous infusions of ozonated saline (the procedures can be substituted by rectal insufflations) or major autohemotherapy procedures.

Intravenous instilled infusions are to be done daily up to 8 –10 procedures.

Major Autohemotherapy procedures are to be done every second day up to 6 –8 procedures.

Rectal insufflations with ozone/oxygen mixture are to be done according to the scheme. The initial dose is 200ml, which is to be increased by adding 100ml more each day until the required dose (see Forms and Methods to Use Ozonated Materials).

The received results, that can testify to the efficiency of ozone therapy in this category of patients, are presented in the Table “The Results of Ozone Therapy in Patients with Discirculatory Encephalopathy”

The Results of Ozone Therapy in Patients with Discirculatory Encephalopathy

Severity of the Disease	Number of Patients	Results of Treatment		
		Positive	satisfactory	unacceptable
I	30	26	2	2
II	26	16	5	5
III	5	5	---	---
Results of Treatment (%)		78 %	11 %	11%

Neurologic Manifestations of Spinal Osteochondrosis

Ozone analgetic effect has been successfully used in treating patients with vertebrogenic pain syndrome due to algopeptides direct oxidation, suppression of ischemia radices and blocking prostaglandin synthesis. Subcutaneous injections with ozone/oxygen mixtures into trigger points in combination with minor autohemotherapy and intravenous infusions of ozonated saline provide positive result in the majority of patients with osteochondrosis of cervical, thoracic or lumbar spine.

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Minor Autohemotherapy
- Para vertebral injections of ozone/oxygen mixtures
- Subcutaneous injections of ozone/oxygen mixtures into trigger points and biological active points

Management

The course consists of two alternated schemes of treatment

- 1) Intravenous infusions with ozonated saline or rectal insufflations are to be complemented the same day with subcutaneous injections along the nuchal bones line

and with para-vertebral injections. Paravertebral injections are in the points of palpatory tenderness into the depth of 5 – 6 cm with the volume of 5 –10ml.

1. Minor Autohemotherapy procedures are done the same day with the subcutaneous injections of ozone/oxygen mixtures into biologically active points (V19 -V28, V40, V57, V60, VB30, VG4, E32, E44, RP9, F9). Subcutaneous injections into biologically active points are done into the depth of 1 –1,5cm with the volume of 1-2ml. The course consists of 8 -10 procedures.

Inflammatory Brain Diseases (Menigitis, Encephalitis)

Routes

- Intravenous infusions with ozonated saline
- Minor Autohemotherapy
- Major Autohemotherapy -ozone dose –1000-1200µg/100ml of blood

Management

The treatment includes all the above listed procedures. Major Autohemotherapy is done every second day alternated with intravenous infusions of ozonated saline or minor autohemotherapy , upon the whole, 12-15 procedures.

Note: Ozone therapy is performed complementary to anti-inflammatory treatment.

Migraine, Cephalgia

Routes

- Intravenous infusions with ozonated saline, ozone concentration being 1200µg/l
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy
- Minor Autohemotherapy
- Subcutaneous injections with ozone/oxygen triggers and biologically active points

Management

The treatment consists of the above listed procedures.

Intravenous infusions with ozonated saline or rectal insufflations with ozone/oxygen mixture are to be done daily or every second day up to 8-10 procedures. Minor autohemotherapy is done twice a week, up to 3 – 4 procedures.

Intravenous infusions with ozonated saline, rectal insufflations with ozone/oxygen mixture and minor autohemotherapy can be substituted with major autohemotherapy up to 8 – 10 procedures, the first two done daily and then 2 –3 times a week.

Subcutaneous injections with ozone/oxygen triggers and biologically active points of neck and collar zone are to be done daily though out the course of treatment.

The use of ozone therapy in 132 patients with various cephalgias resulted in significant improvement in the patient's self-assessed condition, revealed in the headaches with less intensity and of different character, as well as prolonged painless periods in 83% of patients with migraines, in 73% of patients with stress headaches and in 69% of cases with vertebrogenic cervicocranialgias (Мочалов А.Д., Котов С.А., 2000).

Mono- And Poly-Neuropathias Of Ischemic And Compression Type

Ozone therapy, though it does not eliminate the causes of compression of the nerve trunk, it stimulates the regeneration of the damaged nerve by improving the hemorheology and microcirculation, decreasing hypoxia and activating oxygen metabolism in the ischemic nervous tissue with aerobic processes.

Routes

- Intravenous infusions with ozonated saline
- Rectal insufflations with ozone/oxygen mixture
- Major Autohemotherapy

Management

The course consists of any of the above listed routes up to 8 –10 procedures. Intravenous infusions with ozonated saline are done daily or alternately. Rectal insufflations with ozone/oxygen mixture are done accordingly, starting with 200ml, which is to be increased by adding 100ml more each day until the required dose (see Forms and Methods to Use Ozonated Materials).

Major Autohemotherapy is to be done every second day.

Positive clinical results due to ozone therapy have been obtained in 95% of cases with significant decrease of paresthesias improved sensitivity in enervation zone of the damaged nerve (Потехина Ю.П.,1997).

Cerebral Circulatory Embarrassment. Ischemic Insults

Energy metabolic imbalance and significant decrease in the contents of macro-energetic compounds are considered to be the primary cause responsible for the changes taking place in neurons in ischemic stroke. The use of ozone therapy in patients with brain infarction appears to be highly recommended due to ozone optimizing effect on oxygen-transport blood function, increased oxygen utilization by brain cells due to activation of glycolysis, Krebs' cycle, β -oxidation of fatty acids (Густов А.В. с соавт.,1999).

Routes

- Intravenous infusions with ozonated saline
- Major Autohemotherapy -ozone dose-1mg/100ml of blood.

Management

In the course of treatment one of the routes is to be chosen.

The first 3 – 4 intravenous infusions with ozonated saline are to be done daily, then every second day(3 –4 procedures) with the rest done twice a week. The course includes 10 – 12 procedures.

The first 2 major autohemotherapy procedures are done daily, the next 3 – every second day, the rest – twice a week, up to 8 –9 procedures for the course.

The patients with ischemic stroke showed positive changes in oxygen-transport blood system (43% increase in PO₂ following the ozonated saline infusion and 26% increase after the course of ozone therapy), in blood coagulation system (10-15% decrease thrombocyte aggregation capacity with 8-10% fibrinolysis activation), the improvement in lipid spectrum

(10-12% decrease in the total cholesterol, 7-10% in β -lipoproteins, 12-15% decrease in atherogenic coefficient). These changes brought positive results in the acute stage of the disease in 79% of cases and in 69% of cases in recovery phase (Густов А.В. с соавт., 1999).

Note. Ozone therapy is contraindicated in hemorrhagic strokes and in combined ischemic and hemorrhagic insults. Ozone therapy should not be administered in cases of ischemic strokes with unconfirmed diagnosis

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