THE POTENTIAL OF CARBOXYTHERAPY IN DISEASES OF THE UROGENITAL SYSTEM ORGANS

Recently carboxytherapy has been widely used for the treatment of many diseases, and it is associated with the high efficiency and low cost. Carboxytherapy as the method of treatment has been used for 70 years in the international medical practice and more than 50 years in aesthetic medicine.

Aim. To substantiate the use of carboxytherapy as an innovative method of treatment for diseases of the urogenital system organs.

Materials and methods. The analysis of scientific sources concerning the treatment of sexual dysfunction, erosion of the cervix, menopause, vulvovaginal atrophy, initial stages of the stress urinary incontinence, erectile dysfunction, and impotence was performed.

Results. It has been determined that various variants of carboxytherapy can be used to obtain the antihypoxic, regenerative, vasodilator, anti-inflammatory, analgesic and antioxidant effects in clinical practice as a result of the treatment. Patients with different pathologies of the urogenital system noted improvement in functioning of urogenital organs, release of pain, decrease in inflammation, mood stability, and good mental and physical performance. Therefore, the quality of life has been improved.

Conclusions. Thus, СО₂ can be considered as a unique medicinal product, and carboxytherapy as an alternative treatment for many diseases.

Key words: carboxytherapy; carbon dioxide; hypoxia; oxygenation; diseases of the urogenital system
Один из основных этиологических факторов в развитии болезней мочеполовой системы является гипоксия. Роль гипоксии в развитии болезней мочеполовой системы недостаточно изучена, но известно, что гипоксия может стать причиной развития различных патологических процессов в организме.

Результаты. Установлено, что в клинической практике используются различные варианты карбокситерапии для лечения ангиопатического, репаративно-регенеративного, спазмолитического, противовоспалительного, анальгезирующего и антиоксидантного эффектов. В результате лечения пациенты с различными патологиями органов мочеполовой системы отмечали улучшение самочувствия, улучшение функционирования этих органов, устранение боли, воспаления, повышенную активность, общий физический и умственное благополучие, а также иное.

Выводы. Таким образом, можно считать CO₂ уникальным лекарственным средством, а карбокситерапию альтернативным методом лечения при многих заболеваниях.

Ключевые слова: карбокситерапия; углекислый газ; гипоксия; оксигенация; заболевания мочеполовой системы.

Материалы и методы. Анализ литературы проводили путем обработки научных статей относительно лечения сексуальной дисфункции, эрекции, менопаузы, болезней мочеполовой системы.

Результаты. В литературе были обнаружены различные варианты использования карбокситерапии для лечения сексуальной дисфункции, эрекции, менопаузы, болезней мочеполовой системы. Установлено, что карбокситерапия может быть использована в качестве альтернативного метода лечения при многих заболеваниях.

Выводы. Таким образом, карбокситерапия может быть использована в качестве альтернативного метода лечения при многих заболеваниях.
However, only 16% of them visit a doctor since this problem has a psychological background [16]. Problems associated with erectile dysfunction are increasing with age. This is associated with emergence of risk factors: chronic diseases, obesity, diabetes mellitus, microangiopathy, arterial hypertension, increased cholesterol level, atherosclerosis [17]. Psychological disorders because of erectile dysfunction can be more devastating than the pathological problems of a chronic medical condition. Erectile dysfunction and depression are interrelated: in 50-90% of patients with depression there is a decreased interest in sex, and on the contrary, erectile dysfunction leads to an increase of depression. Impotence is much broader term that includes not only the problems with erection, but also with the sexual desire (libido), ejaculation or achievement of orgasm (culmination) [18]. According to the Massachusetts study of aging in men [19] 52% of men between 40 and 70 years suffer from impotence. The frequency of this disorder increases with age. Risk factors for erectile dysfunction and impotence include arterial hypertension, hypercholesterolemia, diabetes mellitus and other peripheral vascular diseases when hypoxia of the pelvic organs occurs.

Carboxytherapy is an innovative medical technology aimed at the non-invasive and painless treatment of erectile dysfunction. The goal of this therapy is to increase the blood circulation and oxygenation in the pelvic organs, improve the erection with the reflex action (by analogy with the shock wave) [8].

Due to the pharmacological properties of CO₂, carboxytherapy is able to affect pathogenesis of these pathologies, reducing symptoms and improving the patients’ quality of life [10]. Today, doctors’ experience covers 30 years of carboxytherapy in gynecology, andrology, urology and nephrology, in the treatment of diseases of the prostate and urinary system.

The mechanism of the carboxytherapy action in diseases of the urogenital system is associated with an increase in tissue oxygenation due to the Bohr effect: it shows the effect of the CO₂ concentration and the pH value on the process of binding and releasing of O₂ from hemoglobin [9]. The process of CO₂ and O₂ gas exchange occurs both in lungs, kidneys, uterus, and in the prostate gland [10]. The effectiveness of binding hemoglobin to carbon dioxide (with formation of carboxihemoglobin) is inversely related to binding to oxygen. In tissues the part of the excessive CO₂ binds to hemoglobin, and it promotes the release of oxygen and tissue oxygenation.

All cells of the body (neurons, hepatocytes, cardiomyocytes, epitheliocytes, etc.), release CO₂ as a product of vital activity and the final product of biochemical reactions. The process of CO₂ elimination from the body through the lungs increases the tissue oxygenation. One part of CO₂ increases the concentration of oxygen in tissues more than 3 times. Consequently, when tissues are saturated with oxygen, its release from tissues decreases and it causes vasoconstriction with a decrease in the local blood circulation. The excess of CO₂ (hypercapnia) dilates blood vessels, increases delivery of oxygen and nutrients to tissues [7].

Being a powerful natural vasodilator CO₂ reduces the basal tone of the arterioles and promotes the increased blood circulation. The body interprets the procedure of carboxytherapy as oxygen deficiency and reacts by increasing the blood circulation and VEGF (vascular endothelial growth factor), which stimulates neoangiogenesis. Thus, in perspective, carboxytherapy improves the blood circulation in the pelvic organs due to appearance of new vessels and the arterial blood influx to the penis and other organs [10].

Other modern mechanisms of the carboxytherapy action for pelvic organs are also associated with physiological properties of CO₂. Invasive introduction of CO₂ (carboxytherapy) causes imbalance of the physiological correlation between CO₂ and O₂ volumes in tissues. The increased content of CO₂ in tissues causes stress in the body, and the body copes it with the help of the own reserves. Due to the action of CO₂ in the body the main mechanisms of homeostasis adaptation start; they are a neurohumoral reaction that involves the hypothalamic-pituitary system of the endogenous pain regulation, optimization of the antinociceptive self-regulation (stimulation of the endogenous synthesis of endorphines that provide the analgesic effect). Pomerants B. also stated that the analgesic effect of carbon dioxide injections is associated with the endorphine synthesis [10]. The placebo effect also has no small share: release of endorphines and the placebo effect are in close synergy when conducting carboxytherapy.

Invasive carboxytherapy has been used for a long time as an auxiliary treatment for diseases of the urogenital system. It slows down the signs of sexual aging, treats cervical erosion, leukoplakia; polycystosis, endometriosis, menopause, vulvovaginal atrophy, amenorrhea and oligomenorrhea, the initial stages of the stress urinary incontinence; it is also used in medical and diagnostic laparoscopy. Vaginal rejuvenation with the help of carboxytherapy occurs due to the increased blood supply to pelvic organs and normalization of the vaginal flora. It also eliminates the symptom of dryness of the vaginal mucosa [9, 11]. Carboxytherapy acts on the level of microcirculation of arterioles and precapillary sphincters by increasing the rate of the blood flow in tissues, as well as by improving lymphatic drainage. These mechanisms of the CO₂ action are
widely used in inflammatory diseases of the urogenital system accompanied with hypoxia, edema [10, 20].

At the site of CO₂ injection the nerve endings sensitivity changes, muscle fibers relax (these changes contribute to the analgesic effect of CO₂), the tissue trophism and the local protective processes improve. In addition, the body's resistance to unfavorable environmental factors increases due to the pronounced antioxidant effect of CO₂ [7].

Invasive carboxytherapy in gynecology is used for the treatment of pain in the lower abdomen (painful menstruation, conditions after operations – adhesions). The pressure of CO₂ at the injection site causes the flow of impulses from baroreceptors, while rapid pH change to alkali (alkalosis) at the site of CO₂ injection affects chemoreceptors, and it contributes to the analgesic and spasmolytic effects [7]. In addition, relaxation of the muscle fibers of the vessels is due to a decrease in the amount of Ca²⁺ calcium ions (formation of calcium bicarbonate during dissociation of carbonic acid), and it leads to local vasodilation and acceleration of microcirculation [10].

In 1981, Dr. Kovarzhik developed and patented the method of CO₂ medical commercial use called “Bioterik”. For this purpose special hygienic and harmless polyethylene bags with CO₂ are used. Taking into account the peculiarities of this procedure a patient does not inhale CO₂ during carboxytherapy (the CO₂ concentration in the bag is almost 100 %). This procedure is used in women as an analgesic therapy in painful menstruation and during the menopause [4, 14].

Thus, carboxytherapy is an auxiliary and alternative therapy with a successful positive result for improving the circulation of the pelvic organs with the gynecological, andrological and nephrologic dysfunction.

This innovative technology is designed to improve the local blood circulation which is achieved by subcutaneous administration of CO₂ in pelvic organs. In order to improve blood circulation in this area the action similar to shock wave therapy is used. It has the anti-inflammatory, analgesic, anti-hypoxic, vasodilating, angio-stimulating and antioxidant action. The fibroblast activation and collagen synthesis occur, and carboxytherapy provides faster recovery of the pH level and normalization of the vaginal mucosa [21, 22].

Carbon dioxide is also used as an alternative contrast substance for diagnosis in diseases of urogenital system. From economic point of view, the use of CO₂ significantly reduces the cost of diagnostic procedures in the peripheral angiography, diagnosing bleeding in patients with renal insufficiency or examining of the fallopian tubes [9]. Thus, carbon dioxide due to its antibacterial properties (for the aerobic microflora) and the absence of side effects is an important component of diagnostic procedures for diseases of the urogenital system.

The purpose of non-invasive carboxytherapy (carbon dioxide baths) is to mobilize the body’s defenses, restore the balance of the nervous processes, increase the oxygen content in the arterial blood and improve all metabolic (carbohydrate, fatty, protein) processes in the body [4]. Carbonic baths have the vasodilating, analgesic, bactericidal and spasmolytic effects and also cause oxygenation appearing from dilation of arteries and capillaries. Carbonic mineral baths are used in pathologies of the urogenital, endocrine and immune systems as they improve the blood supply of the body and accelerate removal of toxic substances from it, reduce pain due to their analgesic, reparative-regenerative, spasmolytic and anti-inflammatory properties [4].

“Dry” CO₂ baths help to reduce toxic symptoms after chemotherapy; increase the physical and sexual activity of men and women, reduce menopausal symptoms; they are used in inflammation of the bladder and other organs of the small pelvis, as well as in the treatment of infertility.

In balneology CO₂ baths are recommended for the following diseases of the sexual system: impotence, chronic inflammatory diseases of female genital organs in remission (adnexitis, salpingoophoritis, menopause), ovarian dysfunction [20].

Thus, in clinical practice various variants of carboxytherapy are used to obtain the antihypoxic, reparative-regenerative, spasmolytic, anti-inflammatory, analgesic and antioxidant effects. As a result, patients with pathologies of various organs of the urogenital system note improvement in functioning of urogenital organs, release of pain, decrease in inflammation, mood stability, and good mental and physical performance. Therefore, the quality of life has been improved.

Contraindications of carboxytherapy are nephritis and nephrosis. In case of these diseases the treatment using this method should be withheld.

At present, carboxytherapy is widely used in all areas of medical practice as it is a highly effective and safe method of treating many diseases. This method of treatment has been used for 70 years in the world medical practice and more than 50 years in aesthetic medicine. Thus, it is possible to consider CO₂ to be a unique drug, and carboxytherapy to be an alternative method in off-label therapy for many diseases.

Conflict of interests: authors have no conflict of interests to declare.
References


References


