MODERN AND DOMESTIC METHODS OF SYSTEMIC AND REGIONAL LYMPHOTROPIC THERAPY IN RESUSCITATION CASES

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The publication of the article is devoted to the review of literature data on the use of clinical lymphology methods in resuscitation cases. Its first part defines the main concepts and terms related to the general relationships of the lymphatic and lymphoid systems of the human body with the methods of influencing them with drugs and physical technologies to achieve the effect of lymphosanitation (lymphostimulation, lymphocorrection, lymphoprotection, lymphosuppression). Modern definitions of the concept of "lymphatic region" and its main links are given, the features of various methods of lymphotropic therapy are shown. The second part presents specific results of the use of lymphotropic therapy in various forms of acute and chronic inflammatory pathology and trauma of the pharynx, nose and paranasal sinuses, larynx, ear, as well as for preventive purposes, to reduce the frequency and severity of post-intubation laryngeal complications in young children and in adults with prolonged tracheal intubation. A conclusion is made about the prevalence of studies aimed at developing methods of regional lymphotropic (indirect) therapy. At present, they are considered as effective methods of stopping various forms of inflammatory pathology of the paranasal, oral and upper respiratory tract. Methods of systemic (direct lymphotropic) therapy in intensive care are not yet widely used, are used much less frequently and in a small number of patients. Both directions require further research and technical developments, since today the potential of the intensive care state, where they could find their application, is far from exhausted.

Keywords:lymphology, lymphatic system, lymphoid system, lymphatic region, lymphotropic therapy, lymphosanitation, resuscitation, critical condition.

Modern lymphology is an integrated medical science, which simultaneously examines two interconnected systems of the human body – the lymphatic and lymphoid systems, containing lymph, lymphatic vessels, organized lymphoid structures and cells.

The lymphatic system, as a subsystem of the cardiovascular system, includes the lymphatic bed (lymphatic capillaries, vessels, trunks, right lymphatic and thoracic ducts), including the lymph flow pathways within the lymph nodes, and the lymph itself with its cellular contents.

The lymphoid system is largely associated with the immune system, which includes such organs as the red bone marrow and thymus (primary lymphoid organs), spleen, tonsils, lymphoid parenchyma of the lymph nodes, single and group clusters of lymphoid tissue, as well as individual lymphoid cells in tissues and organs (secondary lymphoid organs). Both groups of organs are subordinated. The morphofunctional argument for the conjugacy of the lymphatic and lymphoid systems are the lymph nodes, which allowed Yu. I. Borodin (1993) to call the lymph node a marker of environmental pressure and a regulator of regional hemo- and lymphodynamics. The anatomical space where the main transport and metabolic processes occur, the first structural and functional disorders are recorded, on the one hand, and the processes of natural intracorporeal lymphodetoxification are carried out, on the other hand, is the lymphatic region.

The lymphatic region includes three main links: 1 - non-vascular microcirculation pathways in the interstitium, where accumulation and transport of mobile tissue fluid occurs in the direction of the roots of the lymphatic system, lymphatic capillaries; 2 - formed vascular lymphatic structures (lymphatic capillaries, vessels), which form and transport lymph; 3 - regional lymph nodes, as well as single or group accumulations of lymphoid tissue involved in the transport of lymph and its detoxification. All elements of the lymphatic region, functioning synchronously and interconnectedly, form a structural and functional unit that ensures drainage and detoxification of cells, pericellular space, tissue as a whole. Disturbances in interstitial transport and lymphatic drainage play not only an important role in the pathogenesis of inflammatory processes, but are also taken into account in the treatment of these disorders. The above facts served as the basis for developing a program of endoecological rehabilitation, a system for restoring endoecological (pericellular, interstitial) homeostasis by influencing interstitial humoral transport, lymphatic drainage and lymph detoxification. Effective organ

rehabilitation can only be achieved with morphofunctional adequacy of these processes.

The effects on the lymphatic and lymphoid systems using drugs, medical, mechanical and physical technologies have improved the treatment results of many surgical, cardiological, traumatological, gynecological, infectious and other diseases. At present, they are united in the concept of "clinical lymphology", which relates to virtually all medical specialties and areas.

There are two groups of methods of therapeutic effect of drugs on the lymphatic system - direct and indirect. Direct (endolymphatic) methods include cannulation of the main or peripheral lymphatic vessels, lymph nodes, thoracic duct, which involves the creation of a high and long-term concentration of the drug in the lymphatic system with a single administration of an official single dose from 1 to 3 days. However, from the point of view of Yu. M. Levin (1986), this is not always possible, since in the central lymph and individual lymph nodes, which are the transport continuation of the lymphatic vessel used for puncture, a high concentration of drugs is created, and in others, including those involved in the pathological process, the content of drugs may be very small or absent altogether. In addition, catheterization of lymphatic vessels is a labor-intensive and traumatic manipulation, which requires special instruments, an equipped operating room and the necessary surgical skills of the doctor. Taking these circumstances into account, a number of specialists have proposed a non-surgical method of administering drugs (subcutaneously or intramuscularly, retroperitoneal administration, submucosal injections) depending on the regionality of lymph outflow. Substances are delivered by injection into the area of the greatest representation of lymphatic capillaries while creating conditions for their increased flow into the lymphatic system. This method is called indirect endolymphatic administration or regional lymphotropic therapy. It allows for a high concentration of the drug in the lymphatic region and directly in the pathological focus, but at the same time significantly simplifies the method of administration. It eliminates a number of serious complications associated with surgical manipulations, makes regional lymphotropic therapy more accessible not only to surgeons, but also to other specialists, including those working in the field of outpatient and polyclinic services.

Based on the nature of the resulting effect, all methods of influencing the lymphatic region can be conditionally divided into lymphatic stimulation, lymphatic correction, lymphatic protection and lymphatic suppression.

The most famous and most frequently used of them is the method of lymphatic stimulation, the purpose of which is to increase the volume and speed

of lymph outflow from organs. Any muscle and water load (both with internal water consumption and with all kinds of water procedures) gives a significant lymphatic stimulating effect on the body. In medical practice, numerous physiotherapeutic and medicinal means are used as methods of lymphatic stimulation. They change the osmotic pressure in tissues, increasing the permeability of the vascular wall of blood and lymphatic microvessels, promote the disaggregation of megamolecules in the interstitium with the release of free water from them. Various cocktails are most widely used here, including glucose, lidocaine, dicaine, lidase, dexamethasone and a number of other drugs. Of the physical methods of influence, low-intensity laser and ultrasound have the best lymphatic stimulating effect.

Lymphatic stimulation can include two types – dynamic and metabolic. The purpose of dynamic lymphatic stimulation is to increase the volume and linear velocity of lymphatic outflow in the vessels of an organ or body part. The lymphatic stimulator increases the mass of free (mobile), not bound to protein molecules, tissue fluid in the interstitium. In this case, the intra-tissue pressure increases, the fibrous connective tissue framework stretches, the lymphatic capillaries increase in diameter, interendothelial contacts become open, intravascular pressure drops, tissue fluid resorption in the capillaries increases, the mass of newly formed lymph increases, and lymphatic flow intensifies. Metabolic lymphatic stimulation is aimed at improving the cellular composition and morphofunctional state of cells in lymphoid organs and tissues. By using drugs that affect the cells of lymphoid organs for therapeutic and prophylactic purposes, we can talk about their lymphatic correction and lymphoprotection (unloading), which can be considered as options for metabolic lymphatic stimulation.

The method of lymphosuppression or lymphodepression is used, mostly, oncology to block the spread of cancer cells through the lymphatic pathways in conditions of tumor expansion.

In otolaryngology, due to the specificity of the manifestations of inflammatory processes in the ENT organs and the reaction of regional lymph nodes, regional lymphotropic methods are mostly used therapy. Their development began about 20 years ago, in the late 90s of the 20th century.

M V. Maltsev (2000) proposed using regional lymphotropic antibiotic therapy as part of a comprehensive conservative treatment of patients with decompensated chronic tonsillitis. The essence of the method is to administer an antibiotic into the lymphatic region of the palatine tonsils - the area of the digastric-jugular node, the "sentinel" for the tonsils. The antibiotic solution is

administered subcutaneously at the border of the upper and middle thirds of the sternocleidomastoid muscle along its anterior edge,
c both sides. In parallel, in order to stimulate regional lymph flow, ultrasound is applied to this area. The course of treatment is 5-7 procedures. Subsequently, taking into account the opinion of colleagues about the possibility of inflammatory reactions and swelling of soft tissues, the author abandoned injections and proposed a more gentle method, which included only phonophoresis of an antibacterial drug on an ointment basis. Analysis of the treatment results did not reveal any significant differences between purely phonophoretic and injection-phonophoretic methods.

A. V. Golovnev (2000) used the drug T-activin for regional lymphotropic therapy of chronic tonsillitis, proving in an animal experiment its more pronounced effect against the background of radon water balneotherapy procedures.

E. G. Shakhova, S. E. Kozlovskaya (2005) used phonophoresis to introduce an aqueous solution of polycatan diluted 1:20 into the area of regional lymph nodes of the palatine tonsils for 2 minutes. The procedure was performed in combination with ultrasonic vacuum lavage of the tonsillar lacunae. Bacteriological analysis of microbial contamination and morphological examination of the tonsils revealed the effectiveness of the method in 60% of patients compared to traditional therapy.

To assess the effectiveness of regional lymphotropic therapy in the treatment of patients with chronic tonsillitis, R. O. Stanishevsky (2013) conducted a study of the pro- and antioxidant activity of the blood serum of patients with this disease. Before and during treatment, the content of proinflammatory (IL-1B; TNF-a) and anti-inflammatory (IL-4) cytokines was determined in the blood serum and secretions of the lacunae using the enzyme immunoassay method. It was proven that lymphotropic therapy normalizes the systemic reaction, the content of IL-4 and TGF-B1 by 7.1 and 16.8%, respectively.

In rhinology, the first clinical studies on the use of lymphological methods were conducted by V. Yu. Andronnikov, M. Ya. Kozlov, E. A. Tsvetkov (1995) in children with rhinosinusogenic orbital complications. The authors used the method of endolymphatic (direct) administration of an antibiotic through a lymphatic vessel catheterized on the foot. The technique is recognized as effective and recommended for use as part of the algorithm for the treatment of severe forms of chronic rhinosinusitis and rhinogenic orbital complications. K. Kasimov et al. (2018) experimentally and clinically showed the advantage of

using regional lymphotropic therapy in comparison with traditional therapy in the treatment of inflammatory diseases of the paranasal sinuses. They conducted a comparative analysis of the treatment of patients with inflammatory diseases of the paranasal sinuses, using the introduction of ampicillin into their cavities and lymphotropically into the zone of the lymphatic region. During lymphotropic treatment, drugs were administered through the subcutaneous tissue of the submandibular region, in the projection of the submandibular lymph nodes. Clinical recovery among patients with acute purulent maxillary sinusitis was 72.5% with traditional therapy and 94.4% after lymphotropic therapy. In the work of O. E. Malysheva (2011), a comparative analysis of traditional treatment and lymphotropic antibacterial therapy in combination with ozone in patients with chronic maxillary sinusitis was carried out. Ozonation of sterile isotonic sodium chloride solution was carried out using the Medozons BM 01 ozonizer. The resulting solution with an ozone concentration of 4-6 mg / l was used to rinse the maxillary sinus through a catheter. The procedure was performed once a day.

B First-generation cephalosporins were used as an antibacterial drug for lymphotropic therapy. The effectiveness of this method was confirmed by a microbiological study of the maxillary sinus discharge. In the group where lymphotropic therapy was used, complete decontamination of the sinuses was achieved in 71.9% of cases, while in patients receiving traditional therapy it was only 54.8%. In addition to endolymphatic administration of antibiotics, D. V. Kravchenko (1997) proposed regional immunostimulating lymphotropic therapy for inflammatory diseases of the nose and paranasal sinuses accompanied by various types of immunodeficiency states. He injected the immunomodulator T-activin into the submandibular region on the affected side (the lymphatic region of the sinuses), achieving a more pronounced effect compared to traditional treatment.

The first studies of the effectiveness of regional lymphotropic therapy in otology were conducted by H. E. Shaikhova et al. (1999). They studied the morphology lymphatic region of the middle ear in chinchilla rabbits with experimental acute otitis media. A solution of antibiotic and lasix was used as a lymphotropic drug, which were injected subperiosteally into the mastoid process area of the diseased ear. A decrease in the inflammatory process was noted due to stimulation of the drainage function of the regional lymph nodes.

D.V. Kravchenko (2002) used lymphotropic administration of the immunomodulator "Tamerit" (100 mg) to correct immune disorders in patients with acute otitis media by preliminary infiltration of the retroauricular area with lidase (12 U) in 0.5% novocaine solution. The positive effect of this procedure on the course of the purulent-inflammatory process and the state of the immune system in this category of patients has been proven.

S. Yu. Krotov (2013) studied the morphology of the lymphatic region of the middle ear in more detail, noting that it includes 3 groups of lymph nodes - postauricular, anterior parotid and submandibular. Each of these groups has certain functions in terms of lymphatic drainage, lymphatic correction and lymphoprotection. He also proposed an important improvement in the technique of lymphotropic therapy in the form of introducing a mixture of drugs into the tissue using low-frequency ultrasound (ultraphonophoresis) on each of the regional lymphatic zones. The developed method is non-invasive, does not cause complications and side effects, has no age restrictions, and can be successfully implemented in ENT hospitals and outpatient clinics. It has been proven that low-frequency ultrasound does not change the molecular composition of drugs administered lymphotropically and promotes their penetration into the tympanic cavity through an intact eardrum. These features served as the basis the use of this technology in the treatment of protracted forms of exudative otitis media.

The combination of regional lymphotropic therapy and ultrasound technologies has also found application in patients with chronic purulent otitis media, both as independent methods of conservative treatment and in combination with surgery in the treatment of diseases of the operated ear.

V. A. Nasyrov et al. (2014) have experience using lymphotropic therapy in the treatment of patients with otogenic intracranial complications. The technique involves the introduction of a medicinal mixture consisting of lidase, hydrocortisone, 0.5% novocaine solution, lasix and an antibacterial drug into the interspinous spaces of the cervical and upper thoracic regions spine, which, in combination with surgery, allows for improving its outcome while reducing the time required for postoperative treatment.

In laryngeal diseases, regional lymphotropic therapy as an independent method of conservative treatment in otolaryngology is still rarely used. However, the significant positive results of clinical developments in this area include the use of regional lymphotropic therapy for prophylactic purposes. The method is used to reduce the frequency and severity of post-intubation laryngeal complications in young children with prolonged tracheal intubation.

Starting from the first day of intubation, daily for 5-6 days, using the method of low-frequency ultraphonophoresis, an aqueous solution of tienam (imipenem/sodium cylastine) and 32 U of lidase in 0.25% novocaine is introduced into the projection area of the larynx and its regional lymph nodes along the anterior edge of the upper and middle thirds of the sternocleidomastoid muscles. The use of the developed method of laryngeal protection allowed the author to reduce the incidence by 3 times and shorten the duration of acute post-intubation laryngitis by half, and reduce the likelihood of chronic post-intubation stenosis of the larynx.

Conclusion. From the presented information it follows that the issues of treating patients by influencing the lymphatic system or through it, on tissues and organs

в resuscitation methods have been developed gradually over the past 30 years. Research aimed at developing regional lymphotropic therapy methods prevails. At present, they are considered as effective methods for stopping various forms of inflammatory pathology of the paranasal, oral region and upper respiratory tract. Endolymphatic (systemic) therapy methods are not yet widely used, they are used much less frequently and in a small number of patients. Both directions require further research and the search for new technical developments, since today the potential for resuscitation cases where they could find application is far from exhausted.

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