

THE ACHIEVEMENTS OF MODERN MEDICINE IN SYSTEMIC HIRUDOTHERAPY

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Abstract: The paper represents an overview of the current state of the art in hirudotherapy which is a modern branch of medicine. Physicians have been using the leech (*Hirudo Medicinalis*) for more than 2500 years, but now there is a resurgence of interest to leeches. In the paper, the following advantages of leech therapy are described: 1) possibility to avoid side-effects and complications of pharmacotherapy; 2) possibility of polyphactorial local and common effects; 3) painlessness and analgesic properties of leeching; 4) high curative effectiveness which permits to reduce the rates of treatment and prolong the time of remissions; 5) possibility of using the procedure in curative, prophylactic or diagnostic regimens; 6) universality of the method, its wide medicinal diapason; 7) limited number of contraindications for the method and complications after it; 8) simplicity of the method, exception of using special expensive apparatus. Moreover the peculiarities of treatment of different diseases are also discussed.

Key words: hirudotherapy, medical treatment, leeches, peculiarities of treatment of different diseases

Physicians have been using the leech (*Hirudo Medicinalis*) for more than 2500 years [4,13,16,24]. Leeching is an art dating back at least to ancient Egypt where Pharaohs' tombs were decorated with leech-like images. Similar images have been created in ancient India, Greece and Rome. In works of the distinguished classics of antique medicine such as Galen and Aeticii, mentions were made of the leech's curative effects [4,8].

In Russia hirudotherapy reached its zenith in the late 18th and early 19th centuries and was applied by scores of physicians, including such eminent ones as M. Mudrov, G. Zakharyin, F. Pasternatsky and N. Pirogov. It was the period of intensive employment of the leeches as a remedy of blood-letting in multitude of maladies, the leeches being usually used in huge numbers. For example, in 1850 alone, France imported 100.000.000 leeches from Russia.

At the end of XIXth and during the first half of the XXth centuries Russian medicine had found new approaches to treatment and the progress of microbiology, pharmacology, the creation of a great number of synthetic drugs had considerably decreased the interest of physicians to the leech therapy.

According to philosophic laws the social being is developing by spirals. In recent two decades, there has been resurgence of interest to leeches among Russian physicians, biologists, ecologists. It can be explained by the progress of Russian hirudology and connected with the names of doctors I. Bascova, G. Niconov, K. Seleznev [1,2,19,20] and others who proved anti-thrombal, thrombolytic, anti-aggregate, hypotensive, anti-inflammatory, bacteriostatic and analgesic properties of leech's saliva and, thus, explained numerous curative effects of leech therapy.

Let us briefly describe the mechanisms of systemic and local effects of hirudotherapy. Hirudotherapy is considered to be a good blood-letting procedure. Really, the procedure of

leeching can drain up to 20-30 ml of blood at the period of feeding and an additional amount via slow but continuous flow after the feeding. So, during the course of treatment in answer to the decreasing of the blood mass the erythropoiesis and leukopoiesis are compensatively increased, the blood pressure is reduced and some rheological parameters of the blood are improved.

One must take into account the real possibility of neuroreflex or viscerodermal affects of the leech therapy, especially in non-aspirative regimen. It is apparent that focal dermal reaction on leeching speeds up local blood flow, improves blood supply and may be considered to be so called «distracted» therapy. Today there is no doubt that all variety of leech's effects is determined by their saliva, which is secreted into human body by means of sucking during the blood drainage session. Leech's salivary secret contains many biological active substances which are currently being investigated [1,2,19,20].

The anti-thrombotic quality of leech's saliva is provided by hirudin - the best studied component of leech's saliva, a highly specific inhibitor of the thrombin enzyme [13,17]. The destabilized enzyme takes part in high-specific proteolysis and also possesses thrombolytic activity, which develops slowly and goes on during 50-100 hours [1]. The leeches produce specific and non-specific inhibitors of platelet aggregation, the anti-kallecrein components, which intensify anti-procoagulative potential of leech's saliva and provide analgesic properties of procedure [20]. Leech's saliva has been found to contain some anti-phlogistic ingredients that inhibit trypsin's, himotrypsin's and other protease's activities, collagenase enzyme and hialuronidase that promotes the local spread of the other salivary secretions into the wound or bite [2].

In our recent experimental studies [12], we evaluated an anti-inflammatory, in particular anti-exudative effect of aspirative hirudotherapy using the model of agarinic inflammation (the injection of 0.1 ml of 1% agar's solution under the plantar aponeurosis of rat V-line). The results of oncometria (Fig. 1) indicate the reduce of inflammatory edema after leeching aspiration at the 3rd hour after administration of agar on $30.0 \pm 4.1\%$, at the 6th hour after model of inflammation - on $17.0 \pm 2.3\%$. And in 24 hours, when the inflammation is still present, but going to calm down, the use of leeches promotes the involution of edema size on $16.0 \pm 3.0\%$. Thus, the results testify an anti-exudative effect of leeching at the earliest stages of the inflammation.

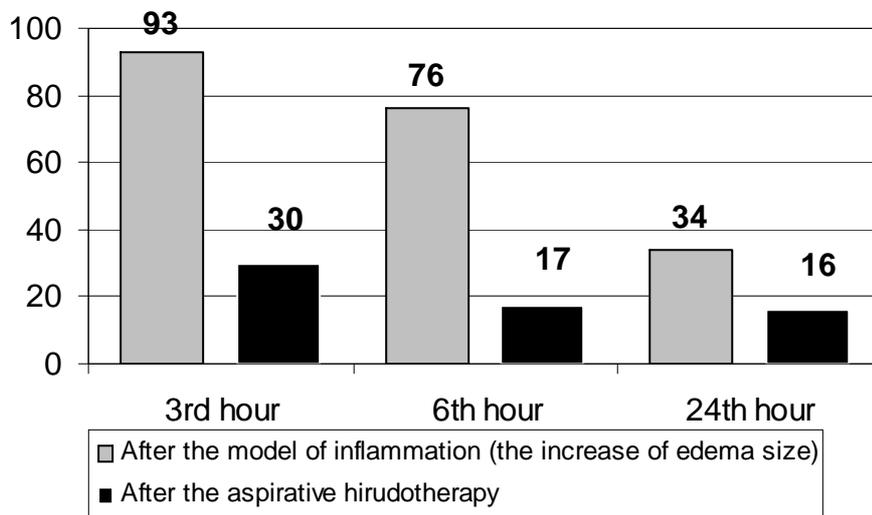


Fig. 1. The dynamics of oncometria parameters.

To prescribe the hirudotherapy to the patient the doctor must be informed on a wide spectrum of biological activity of this method of the treatment. Nowadays the medical use of leeches becomes more widespread in hospitals and polyclinics as well as in health resorts [23].

Leech therapy may be used alone or in addition to the main treatment as adjunctive therapy. *Hirudo Medicinalis* is the commonly used species of leech in Russia, and is reared on special biofactories (in Moscow Region, St.-Petersburg Region).

The contraindications for hirudotherapy are well known. The absolute ones are hemophilia, hemorrhagic diathesis, expressed and firm hypotension, expressed and firm anemia, sepsis. We also must take into account individual intolerance to leeches. We should be very careful to prescribe leech therapy during anticoagulant treatment and in pregnancy.

Hirudotherapy has provided efficiency in cardiological practice during treatment of patients with myocardial ischemia (stenocardia in stable and non-stable forms), hypertension and its complications (cerebral vascular crises, thrombosis and embolism of cerebral vessels, ischemic insultus, hypertensive encephalopathy), acute myocardial infarction, pre-infarction, post-infarction, cardiosclerosis [9,23,28].

In spite of very specific mechanisms of the development of above-mentioned cardiopathology, the most common pathogenetic links for most of them may be as follows: angiospasm, the violation of blood circulation, the activation of thrombocytic link of homeostasis, the inhibition of prostacycline, hypercoagulation, the activation of kallecrein - kinin's system. So, the use of leech therapy that provides anti-thrombal, anti-aggregative, thrombolytic, anti-inflammatory, anti-ischemic, analgetic, vasodilatative and hypotensive effects pathogenetically is well founded.

In cases of myocardial ischemia, the leeches (in number 5 to 10) are applied on parastemum with maximal haemoextraction, courses being 5-7 sittings. In patients with decompensatory circulation, in addition, the same number of leeches are applied to the region of the right hypochondrium. In most cases, the procedures provide the improvement of self-feeling, appetite and sleep, the decrease and the cupping of heart pain, headache, dyspnea and vertigo. Finally, at the end of curative course the necessity in analgetics considerably reduces.

Leeching is an excellent method of treatment of hypertension, this fact is well known historically [11]. Traditionally the leeches are applied retroauricular, in the region of processus mastoideus. The course of hirudotherapy in hypertension consists of 5 or 7 sittings, everyone with maximal haemoextraction. During the treatment the level of arterial pressure in patients rapidly reduced on 20-40 mm, with the most expressed reduction during the first 2 hours of leeching.

In some clinical cases of hypertension, we use the surface of oral mucosa as an alternative region for leeching [11,12]. It helps us, firstly, to avoid the special nursing of on-dermal wound after the blood session; secondly, to avoid some cosmetic problems; thirdly, it shortens the time of maximal haemoextraction more than twice; fourthly, and the most importantly, the hypotensive effect of hirudotherapy in leech on-mucosal applying is got more rapidly and remains more stable.

The clinical effects of hirudotherapy in patients with hypertension are accompanied by the improvement of homeostasis. The results of our investigations on coagulation blood system in patients with hypertension in 1 and 2 stage (Fig. 2) pointed out that after the course of the treatment we observed the reliable increase of autocoagulative test ACT on the 4th minute (an average of 31%) parallel to the decrease of protrombine index (PI on 21% in the average); index PLIS (plasma lysis) is induced by streptase (on 15% in the average); index of spontaneous thrombocytes aggregation (SAT, on 37% in the average); index of induced (by adenosindiphosphate) aggregation (on 19% in the average).

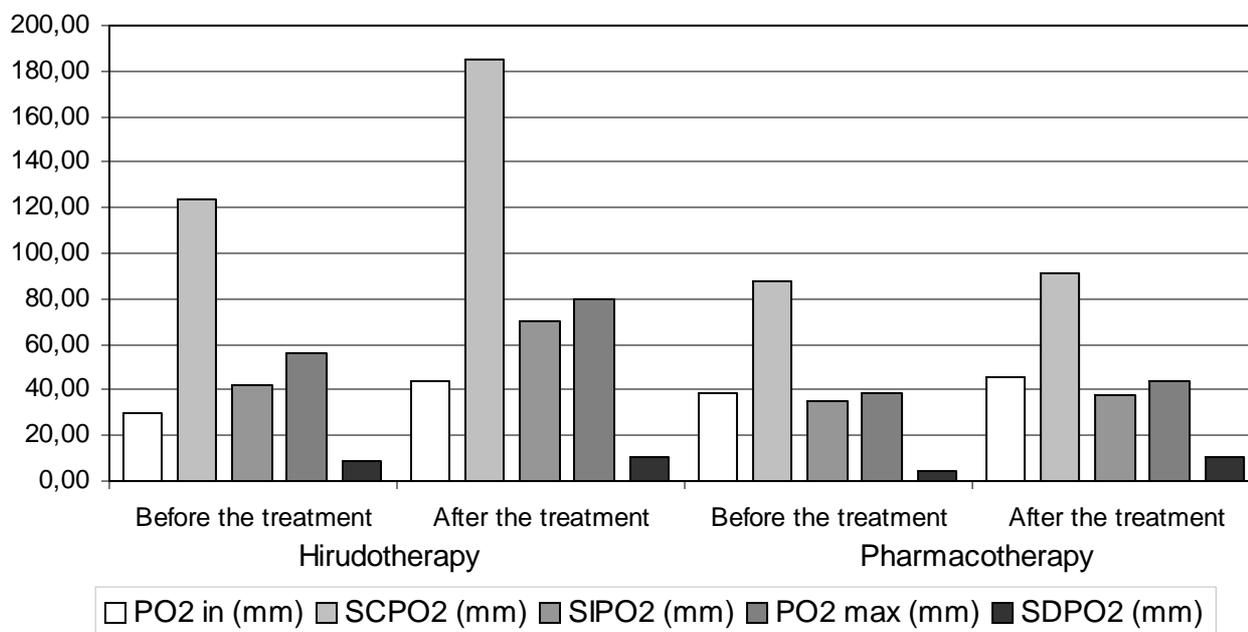


Fig. 2. The dynamics of coagulation parameters in patients with hypertension.

This findings may be completely explained by hypocoagulative, anti-aggregative and fibrinolytic properties of leech's saliva and in accordance with them hirudotherapy may be recommended as a pathogenetic method in treatment of many cardiovascular diseases.

The leech therapy is used as an element of emergency medical service in patients with ischemic insult in acute phase and during the period of rehabilitation. In such clinical situations, we usually use non-aspirative type of hirudotherapy, when the zones of putting the leeches coincide with biologically active points of acupuncture. The course of treatment consists of 5-7 procedures, up to 10 leeches in sitting.

Just after the first procedure the patients note the improvement of self-feeling, the diminish of deafening, sleepiness and disorientation. In the following days, positive dynamics (decrease of pareses, paralysis of extremities, n. facialis, n. hypoglossus, n. oculomotorius) is observed. As a rule, the subjective improvement correlates with objective data of haemodynamic and haemorheological changes. On the whole, the combination of leeching and reflexotherapy in patients with ischemic insult considerably decreases the risk of serious complications.

Hirudo Medicinalis is an important adjunct in treatment of phlebopathy: acute, subacute and chronic thrombophlebitis, varicosis, complicated by phlebitis, thrombosis and trophic ulser [3,23]. The experiments have demonstrated the use of leeches leads to full dissolution of the thrombus at the end of 2 weeks period after its organization. According to some observations just over 48 hours after the procedure the haemorheological parameters start to change.

In the clinical cases of phlebopathy, aspirative type of hirudotherapy is often used. The leeches (in number of 5-12) are applied in parallel to inflammatory vein in chess plane, step back 1 cm from the vein's border. The leeches are used on the average for 7 days. Clinically the efficiency of hirudotherapy in patients with thrombophlebitis manifests dissolution of infiltrates and thrombus, vein's falling down, the recovery of derma's colour.

Leech therapy is recommended to be used in the practice of neuropathologists: in patients with different forms of ischialgia the leeches (average number 5-15 ones) apply in direction of nervous roots, the procedures are made with maximal haemoextraction. The course of treatment consists of 5-10 sittings in a day. Hirudotherapy is considered to be an

effective method of treatment of n. facialis's neuritis and n. trigeminalis neuralgia. In such patients, the leeches are applied in the region of processus mastoideus with maximal haemoextraction. Their common number for course is 30-35 ones.

We evaluate optimistically the possibility of hirudotherapy in the treatment of infantile cerebral paralysis. 3-5 months courses of leeching promote the diminish of muscle's spasticity, the possibility of movement on lower extremities by means of hand's supportment, the improvement of psychoemotional condition and speech of the child. Of course, this clinical findings can be explained by anti-inflammatory, anti-ischemic, immunomodulative, regenerative properties of hirudotherapy, but may be due to the effect of a special neurotrophical factor that has been discovered in *Hirudo Medicinalis* recently.

Modern medicine has cumulated a good experience in the treatment of different forms of ophthalmopathy with leeches [18]. In curative purposes, they are used in many branches of practical ophthalmology: ophthalmosurgery, ophthalmooncology, urgent ophthalmology and so on. The indications to use hirudotherapy in ophthalmology are inflammatory diseases of eyes (keratitis, iridocyclitis, uveitis and so on), traumatic injuries and vascular pathology of organ of vision, cataract, glaucoma and so on. We have recommended to prescribe hirudotherapy in all stages and in all forms of glaucoma. To cut off the acute attack of glaucoma 2 or 3 *Hirudo Medicinalis* are settled down on temporal region. The time of haemoextraction does not limited. So, the leeches form an important element of urgent service in patients with glaucoma. Moreover, in terminal glaucoma, when almost all therapeutic and surgical methods of treatment are futile, the leeches form the only mean to save the blind eye as an organ.

In ophthalmosurgery, the leeches are used in order to prevent postoperative complications including postophthalmooncological operations.

The ophthalmologists also use *Hirudo Medicinalis* in diagnostic purpose, for example to diagnose the mucular edema (Irving-Gass's syndrome). It was established that the formation of cataract is associated with the hyperproduction of specific isopeptidic bonds in proteins. It is important that only the leech's saliva can promote a very specific isopeptidic effect by the destabilasens enzyme. So, there are real perspectives to successful cataract's treatment with the help of the leeches.

There is less information on the effectiveness of hirudotherapy of dermatological diseases [21]. The leeches promote some positive results in the complex treatment of scleroderma, some forms of dermatosis. In such clinical cases, non-aspirative hirudotherapy includes the applying of leeches without haemoextraction being used. The course of treatment is 5 sittings daily or in a day.

The indications for using the leeches in gynecology are as follows: postlabor's endometritis, parametritis, mastitis and all forms (acute, subacute and chronic) of adnexitis. The points of applying the leeches depend upon form, stage and localization of pathological process. As a rule, it is full-aspirative hirudotherapy from lumbosacrul region, from the vaginal mucosa, from the focus of lesion of mammary glands.

Curative effects of leeching is well demonstrated in patients with otorhinolaringopathology [7,22]. Acute neuritis and otic murmur in chronic neuritis of auricular nerves, othitis media and otitis external, frontitis, maxillary sinusitis, the furunculi of nose and external acoustic meatus - all these LOR-diseases are well tolerated to hirudotherapy. Regimen of the treatment, points of application of the leeches depend upon character of the pathology, its localization. In cases of above-mentioned furunculi, 1 or 2 leeches are applied on tragus with 5 or 10 minutes of haemoextraction. In patients straggled on auricular neuritis, 2-4 *Hirudo Medicinalis* are applied traditionally - to the region of processus mastoideus with unlimited in time exposition. In cases of above-mentioned sinusitis, 1 or 2 leeches are pointed to the entrance of neuros supraorbitalis or (and) n. infraorbitalis, the

time of haemoextraction is limited up to 5 minutes. The courses of treatment consist of 3-5-7 sessions in a day. It is also recommended the supplementary applying leeches (without haemoextraction in non-aspirative regimen) on the biologically active points of the face.

During the treatment with leeches the patients testify the progressive diminishing and vanishing of pain, edema and perifocal inflammation. The results of polarographic studies demonstrate statistically reliable increase of oxygen saturation in tissues and the improvement of audiometric parameters during the courses of hirudotherapy.

Today the leech actually has a real and valuable purpose in medicine as a useful adjunct for the plastic surgeons at many micro-surgical centers and departments [5,6,10,14,15]. It is well known that venous congestion after micro-surgical operations still remains a formidable problem even under ideal circumstances. So, in microsurgery *Hirudo Medicinalis* is used first of all because of their super decongestant properties to treat venous in congestion skin flaps and tissue replants. The specialists understand well that the replantation of small pieces of facial tissue because of the extremely small size of arteries, a lack of suitable veins for drainage and cosmetic problems is considered to be a real surgical art. The experience of plastic maxillofacial surgeons using leeches can give successfully results in more tissue preservation, in rapidly and excellent functional recovery, in rare postoperative complications and better cosmetic outcomes [14]. Moreover multifunctional therapeutic potential of leech's saliva, especially its immunomodulative capacity permits to use hirudotherapy in reconstructive surgery of the face in immunocompromised patients, for example with maxillofacial oncopathology [22], after the X-ray therapy, when deep immunosuppression of organism considerably prevents from regeneration and revascularization of the face replants. So, in those cases the surgeons recommend to use combined hirudotherapy: before the operation 3-5 *Hirudo Medicinalis* are placed without aspiration to the donor's region and the focus of future plastics. The procedure is repeated three times in a day. Just after the end of operation, on the operative table leech session is repeated, but with maximal haemoextraction already. The leeches in average number 5 are applied to the zone of dismicrocirculation. The statistic data confirm better tissue surviving and better distant outcomes in comparison with any other reconstructive procedures.

There are also good results of leech therapy in cupping a torment phantom limb pain after the amputation of extremities [5]. In such clinical situations, it is recommended to combine hirudotherapy with manual therapy. Besides, the surgeons often use the leeches for resolving postoperative infiltrates and cicatricial keloids.

Recently [12] we have fully investigated the effectiveness of hirudotherapy in patients with dental pathology: glossalgia and glossodynia. It is considered now that the main pathogenetic links of these phenomena are connected with the pathology of vegetative nervous system and gastro-duodenal tract, endocrine disorders, especially if they are developed in climacterium. The polymorphal symptomatology of glossalgia and glossodynia consists of heavy pain, disarthralgic, paresthetic, kcerostomic and neurodystrophic symptoms. Taking into account the use of leech therapy that provides analgetic, anti-ischemic, anti-edematic, reflex feedback mechanisms, it must be considered as a method of pathogenetic influence.

In patients suffered from glossalgia, the leeches in number 1-2 are applied to the pain's zone of oral mucosa (more often it is a lingua or radix of lingua). The time of haemoextraction is unlimited. The therapeutic course consists of 5-7 sessions in a day. In patients with combined somatic pathology, we recommended the additional on-dermal leeching to the epigastric and paraumbilicalis zones. The rapid cupping of algetic symptom starts just from the first leech's session, later the decrease of xerostomia and the recovery of salivation and taste manifest themselves. During the leech therapy the patients usually note

the improvement of self-feeling, the normalization of appetite and sleep, cupping of headache, «hot flush» (in climacterium), the restoration of working capacity.

There are many pathogenetic reasons to prescribe hirudotherapy for patients with oral lichen planus that is due to some systemic factors: immunosuppression, hypertonia, the pathology of endocrine system (especially in climacterium) and gastro-duodenal tract (Fig. 3).

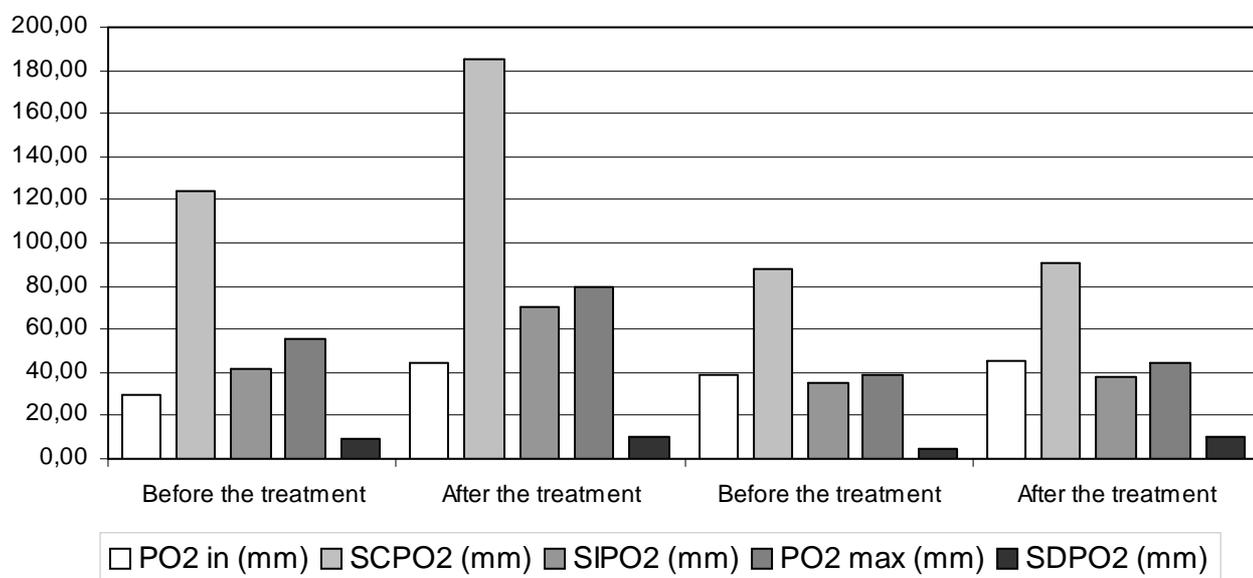
Oral lesions in ruber planus vary from the appearance of white papules, edema to severe ulceration that usually causes burning sensation, pain, interfering with eating, swallowing and speaking. According to our present functional investigations in compromised oral mucosa the circulatory hypoxia, multitude dysfunctions of micro-circulation are developing. In patients with oral lichen planus, we usually use aspirative hirudotherapy, applying the leeches to the points of severe edema (exudative form of lesion) or around the ulcerative focus of lesion (ulcerative and erosive forms of rubes lichen planus). The time of haemoextraction varies from 25 to 20 minutes. Therapeutic sessions are carried out in a day up to achievement of clinical effect. The results demonstrate objective and subjective improvement just after 1-2 procedures: anesthetic effect - the diminishing of pain, anti-phlogistic effect - the diminishing of edema, pain and perifocal inflammation, the decrease of the papules number and their capacity, hydratative effect - the decrease of xerostomia and recovery of salivation, and regenerative effect of leeching - the increase of healing's rate of ulcers. The positive therapeutic effect has been established in 82% patients that received hirudotherapy, on the contrary - in control observations (where traditional pharmacotherapy was used) this figure have reached only 59 %.

The results of polarographic investigations of oxygen regimen produced on the 7th day of hirudotherapy demonstrated statistically reliable increase of initial oxygen saturation (up to 45% in compare with the beginning of the curative course), of maximal oxygen saturation (up to 49.5%), of the rate of increase of oxygen saturation (up to 43%). In control observations, the changes were not statistically improved. The complex of rheological analysis, vital capillaroscopy have also demonstrated the improvement of microcirculation in oral mucosa during the treatment with leeches.

The effective treatment of another serious pathology of oral mucosa - recurrent aphthous stomatitis represents complex unsolvable problem of oral medicine, although it is a frequent finding in stomatologic practice. In is also the pathology depending upon the condition of gastroduodenal tract and immune system (on the whole) and local immunity of the oral cavity (in particular).

In clinical cases of aphthous stomatitis, we use aspirative hirudotherapy in accordance to localization of aphthous lesions. The leeches are mostly fixed directly on the focus of lesion. The curative course consists of 3-4 sessions in a day. In patients with combined gastro-duodenal pathology, we recommend alternate local applying with on-dermal putting the leeches on epigastric and paraumbilicalis zones. On the whole, the treatment has improved epithelization of the oral mucosa. The positive therapeutic effectiveness has been determined in 73% patients treated with leech therapy. The period of whole healing has been shortened twice in comparison with control findings without using the leeches. Our clinical observation have showed tissue decongestion after the procedure of hirudotherapy is precise, immediate, the session itself is painless and well tolerated by the patients. The damage of normal tissue is absent, without any tendency to scar formation, even in scarring forms of stomatitis (Setton's symptom). Moreover the leech therapy, providing collagenolytic effect of collagenase enzyme of the leech's saliva, is especially recommended in patients with scarring form of aphthous stomatitis.

Leeching is also a good adjunct to conventional treatment of parodontitis, edematous form of hypertrophic gingivitis, pumlent forms of glandular chilitis. The leeches have a bright



Tab. 3. The dynamics of polarographic parameters in patients with oral lichen planus.

prospect in maxillofacial surgery, and not only in the plane of above-mentioned reconstructive surgery.

The clinical data indicate the effectiveness of leech therapy in the complex treatment of maxillofacial odontogenous phlegmons, facial furunculi and periostitis. In such clinical cases, 2 or 3 *Hirudo Medicinalis* are placed on the infiltrated boards of the wound. The curative course is about 3-5 days, the sessions are held in a day, with maximal haemoextraction. In phlebitis symptoms, 1-2 leeches are applied additionally in parallel with infiltrated vein.

Thus, the clinical and experimental experience, the results of practical work of many physicians permit to conclude that hirudotherapy as a method of polyphactoral influence may be effectively used for pathogenetic correction of different diseases, disorders and pathological conditions, dealt with haemorheological, micro- and macrocirculative processes, immunosuppression, inflammation and congestion.

So, in conclusion we must note the following advantages of leech therapy in comparison with other methods of treatment:

- 1) the possibility to avoid side-effects and complications of pharmacotherapy;
- 2) the possibility of polyphactorial local and common effects;
- 3) painlessness and analgesic properties of leeching;
- 4) high curative effectiveness which permits to reduce the rates of treatment and prolong the time of remissions;
- 5) the possibility of using the procedure in curative, prophylactic or diagnostic regimens;
- 6) the universality of the method, its wide medicinal diapason;
- 7) a limited number of contraindications for the method and complications after it;
- 8) the simplicity of the method, the exception of using special expensive apparatus.

References

1. BASKOVA I., NICONOV G. Destabilase, the novel isopeptidase with thrombolytic activity. **Blood Coagul Fibrinolysis**, 2: 167-172, 1991.
2. BASKOVA I., NICONOV G. CHERKESOVA D. Antithrombin, antitrypsin and antichymotrypsin activities of the salivary gland secretion and intestinal chyme of medicinal leeches. **Folia haemat (Lpz.)**, 111: 831-837, 1984.
3. BATCHELOV A.G. The salvage of congested skin flaps by the application of leech. **Br J Plast Surg**, 3: 358-360, 1984.
4. BATES M., KNEER K., LOGAN C. Medicinal leech therapy: an overview. **Orthop-Nurs**, 2: 12-17, 1989.
5. BAUDET J. The use of leeches in distal digital replantation. **Blood Coagul Fibrinolysis**, 1: 193-196, 1991.
6. BUNKER T.D. The contemporary use of the medicinal leech. **Injury**, 12: 430-432, 1981.
7. FEIDMANN H. True and artificial leeches and their use in otology. **Laryngorhinootologie**, 10: 551-555, 1994.
8. FIELDS W.S. The history of leeching and hirudin. **Homeostasis**, 1: 3-10, 1991.
9. GIACOMETTI L. Leeching in the twentieth century. **Amer J Cardiol**, 60(13): 1128-1131, 1987.
10. GILHOOLY M.G. McLOUGHLIN P.M., PHILLIPS J.G. Salvage of a microvascular scalp reconstruction with *Hirudo Medicinalis*. **J Oral Maxillofac Surg**, 51(10): 1150-1152, 1993.
11. GILYOVA O. Leech therapy in hypertension in UST. 4th Int. Bioth. Conf. Bridging the Millenia. Porthcawl, South Wales, UK, 31-31, 1999.
12. GILYOVA O., ANTIPINA N. A stomatologic approach to leech therapy. 3rd Int. Conf. on Biotherapy, Jerusalem, Israel, 16-17, 1998.
13. HENRIOT J.M., CHAILLOT B., ROCHETTE L. The medicinal leech *Hirudo Medicinalis*: clinical use of the animal and therapeutic prospects in hirudin. **J Pharm Belg**, 45(3): 207-218, 1990.
14. HIRASE I., KOJIMA T., HAYASHI J., NAKANO M. Successful upper labial replantation after 17 hours of ischemia. **J Reconstr Microsurg**, 9(5): 327-329, 1993.
15. KRAEMER B.A., KORBER K.E., AQUINO I.I., ENGLEMAN A. Use of leeches in plastic and reconstructive surgery: a review. **J Reconstr Microsurg**, 4(5): 381-386, 1988.
16. LENT C.M. New medicinal and scientific uses of the leech. **Nature**, 323: 494, 1986.
17. MARKWARDT F. Hirudin: the famous anticoagulant agent. **Adv Exp Med Biol**, 340: 191-211, 1993.
18. MENAGE M.J., WRIGHT G. Use of leeches in a case of severe periorbital haematoma. **Br J Ophthalmol**, 75(12): 755-756, 1991.
19. NIKONOV G., BASKOVA I. Antihemostatic, thrombolytic and antiatherosclerotic properties of the medicinal leech saliva. Abst. Book III Int. Cong. Leech Sci. Israel, 45-45, 1990.
20. RIGBI M. The antihemostatic armamentarium of leech saliva and its therapeutic potential. 3rd Int. Conf. on Biotherapy. Jerusalem, Israel, 28-29, 1998.
21. ROSS M.S. The leech of dermatologic interest. **Arch Derm**, 119: 276-277, 1983.
22. SELEZNEV K. The use of leeches and bioactive substances produced by leeches for stimulation of microcirculation in plastic surgery. 3rd Int. Conf. on Biotherapy. Jerusalem, Israel, 33-33, 1998.
23. SIDOROV V., GILYOVA O., KORBEINICOVA G. Studies on Leech Therapy in the Health Resort Conditions of Ust-Kachka. 3rd Int. Conf. on Biotherapy. Jerusalem, Israel, 37-37, 1998.
24. WADE J.W., BRABHAM R.F., ALLEN R.J. Medicinal leeches: once again at the forefront of medicine. **South Med J**, 83(10): 1168-1173, 1990.
25. WEINBERG S.L. President's page: new medicine from old – hirudin and the leech (news). **J Am Coll Cardiol**, 23(2): 544-545, 1994.

ДОСТИЖЕНИЯ СОВРЕМЕННОЙ МЕДИЦИНЫ В СИСТЕМНОЙ ГИРУДОТЕРАПИИ

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Статья представляет обзор современного состояния гирудотерапии как современной отрасли медицины. Врачи используют лечение пиявками (*Hirudo Medicinalis*) уже более 2500 лет, но сейчас наблюдается новый интерес к этому методу лечения. В статье описываются достоинства лечения пиявками: 1) возможность обойти побочные эффекты и осложнения лечения лекарствами; 2) возможность многофакторного и общего лечения; 3) высокая лечебная эффективность, которая позволяет сократить время лечения и удлинить срок ремиссии; 4) обезболивающие и безболезненные свойства лечения пиявками; 5) возможность использования процедуры в лечебном, профилактическом и диагностическом режимах; 6) универсальность метода, его широкий лечебный диапазон; 7) ограниченное число противопоказаний метода и осложнений после него; 8) простота метода, отсутствие необходимости использования дорогостоящей аппаратуры. В статье обсуждаются особенности лечения различных заболеваний с помощью гирудотерапии. Библ. 25.

Ключевые слова: гирудотерапия, медицинское лечение, пиявки, особенности лечения различных заболеваний

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