

TREATMENT OF ASEPTIC DISEASES OF LIMB DISTAL PART JOINTS IN UZBEK SPORT HORSES

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ABSTRACT

In this study a treatment was prescribed for the horses with the diagnosis of chronic aseptic synovitis and periarticular fibrosis. For all experimental groups (n=3) there was used the traditional method of treatment with only one difference, that for animals of the 1st group additionally auto-blood therapy processed with laser was used. For the animals of the second group there was injection auto-blood intramuscularly 0.5 ml.kg⁻¹ of body mass of an animal and the preparation "Hondralon" in the doze of 2 ml intra-joint which strengthens the regeneration of cartilage tissue. And animals of the 3rd experimental group were treated only with traditional method. On the base of clinical observations, morphological, biochemical and immunological indexes of blood the most effective method of treatment of joint diseases of horse limb distal part was proved- application of parenteral injection of auto-blood and specific preparation "Hondralon" together with traditional methods of treatment and the period of treatment was reduced to 5 days in average.

Keywords: Chronic synovitis, periarticular fibrosis, joints, therapy, blood analysis, treatment

INTRODUCTION

It was convincingly proved in the theories of leading classics of veterinary medicine (Pavlov and his followers) that the unity of an organism and outward environment essentially influences on all the vitally important functions of organism by the central nervous system. According to this theory all the pathological processes in the organism of animal are accompanied with continuous stimulation and overstimulation of cortex of big cerebral hemispheres of brain with the following lowering of its coordinating functions (Rebesco and Miller 2011). It leads to the breach of protective-adaptive processes, and later painful processes can be developed. The deep functional breaches take place in organs, tissues, and systems of an organism. In the cortex of big cerebral hemispheres of brain there are formed stable centers of overstimulation, and then inhibition, which in its turn, lead to regeneration of under cortex centers and are characterized by the formation of functional breaches. In peripheral organs these breaches are mainly connected with application of horses in sport contests and national games: kupkari, olomon poyga, kiz kuv and others (Dolzhenko, 1977). It is necessary to mark, that these contests are often held not on specially prepared places, but on uneven ground of foothill zones with stony soil, which leads to the breaches of the function of locomotor apparatus of horses and, especially of distal section of limbs, where the join of simple and complex joints of skeletal limbs of an animal takes place anatomically – topographically. It is necessary to indicate that these contests consists of the set of movements, which are not characteristic for a horse, that is why these animals are subjected to different traumas and, particularly to joint diseases. That is why the traumas are reasons of these diseases in pathogenesis (Bayer and Fröhner, 1908; Shakalov, 1952; Catcoot and Smithcors, 1972; Upson, 1993; Grinaf et al. 1997). However, the analysis literature shows that at the beginning of arthrological pathology the conditions of keeping and feeding animals, for example clogging the grains with poisonous plants are of important significance (Ibragimov and Tovmasyan, 1973; Plakhotin et al. 1981; Boymuradov et al., 1986; Norboyev, 1990; Davlatov, 1993; Gurevitch, 2000; Livanova, 2000). The reason of arthropathies of domestic animals can be diseases of joints with toxic of allergic origin. Besides, the sharp change for the worse of ecological region state leads to lowering of the resistance of animal organisms, which can also be the reason joint diseases. All this needs a new approach to the solution of the problems related to etiopathogenesis, modern methods of diagnostics, treatment and elaboration of preventive measures of the joint of distal part of limbs of horses, mainly used in sport purposes and for national competitions.

MATERIAL AND METHODS

Horses (n=15) belonging to OAS "Tur Orient", situated in the territory of Samarkand district of Samarkand region, participating in national games were the objects of the investigation. Animals were chosen according to the principle of pairs – analogues: 5 – 7 year old stallions of Karabair breed with the diagnosis of aseptic fibrosis and synovitis of crowning joint of distal limb part. The selected animals were distributed into 3 equal groups and kept in the stable racecourse. Every horse was kept in separate place. All experimental animals were under equal conditions of keeping and feeding according to the ration, which was made by the farm.

The horses of the first experimental group were treated with traditional method of treatment and also auto-blood (0.5 ml.kg⁻¹ body mass) processed with low-frequency laser. The horses of the second group were also treated with traditional method, but the difference is, that additionally auto-blood and "Hondralon" (Chondrolonum®; http://www.rlsnet.ru/tn_index_id_6222.htm) were used. Auto-blood, processed by low-frequency laser were injected intramuscularly 0.5 ml.kg⁻¹ of body mass of an animal gave an effect of stimulation, and the preparation "Hondralon", which has a power of function recovery of cartilage tissue and has an effect to stimulate additionally the joint anatomical element, was injected intra-articular (2 ml). The horses of the 3rd experimental group with the diagnosis of aseptic synovitis and periarticular fibrosis of joints were treated by massage with dioxide of mercury ointment during 12 – 15 minutes in the region of the joint. Then there was applied a compress therapy with ethyl spirit. This treatment was conducted in every 48 hours during the experiment up to full recovery.

For carrying out the set tasks the irradiation of auto-blood obtained from experimental animals was conducted. For this purpose there was used low-energetic helium-neon laser apparatus of "Shifo" type with the power of 15 mV and the length of waves of 632.8 nm. The irradiation of blood was conducted by the method elaborated by the members of the chair of Samarkand Agricultural Institute as follows: for irradiation there were necessary 2 medical bottles with 250 ml capacity, one of which is filled with stabilized 5% solution of sodium citrate in blood at the rate 1:20. For intravenous injection there was inserted a clear tube made of quartz glass into the aperiogenous system, observing the hermetic ness of the device. The irradiation of blood was conducted by pouring the blood from one bottle into another, turning the ray to the quartz tube. The speed of pouring the blood were regulated by the tab, included into the system, adhering the speed of running of blood, set for laser irradiation, correspondingly 0.33 ml.sec⁻¹. For the study of the system it was necessary to insert the medical needle into both bottles for passing the air and creation the needed pressure inside the blood, colored by method of Giemsa-Romanovski. The content of hemoglobin was determined by haemometer Sali (Kudravnsev et al. 1969); the

general protein – refractometrically with the help of refractometer (IRF-22), the protein fractions by express nephelometric method of Olla–Mocord in the modification, the percent number of T-lymphocytes (E-POK) and B-lymphocytes (EAC – POK) in peripheral blood with the following summing up their absolute number and content of immunoglobulins of A, M, G class in the serum of blood by method of PHD on methodic recommendations, elaborated at AUSRIH and AUSRI.

The obtained results were processed in figures by method of student and Fisher test with summing the average – arithmetic size (m), average – arithmetic mistake ($\pm m$) the percent correlation (%) and the degree of authenticity of differences (P) with the application of computer Microsoft Excel.

RESULTS AND DISCUSSION

On the base of anamnesis, clinic, morphological, morphometric, regenerative and degenerative symptoms of the current of pathological process by general and special methods there was diagnosis of chronic synovitis and periarticular fibrosis of distal limb part of experimental horses. It was ascertained that exactly this part is the least protected with surrounding periarticular tissues. Besides, first of all outer factors from dorsal sides and namely foreign traumatic objects influence this part. For more exact diagnostics of experimental animals there was determined the placement of pathological process in the chest and pelvis limbs, which is very important for the diagnostic and prognosis point of view. Thus, on the base of thorough analysis the animals were distributed in the following way. At the experimental horses of the 1st group had the diagnosis fibrinous synovitis of embarras joint and 3 animals had the diagnosis of periarticular fibrosis of jumping and put joint.

Three animals of the first group had diagnosis of chronic synovitis of carpal and metacarpal joints and at other heads – periarticular fibrosis of carpal joint. Data show that in the 1st experimental group in 2 cases they were located in the zone of distal joint. In the experimental horses of the 2nd group 2 cases in the carpal and one case in the metacarpal joint and in experimental animals of the third group the diagnosis of chronic synovitis in tarsal and metatarsal joint was detected. In the 3rd experimental group at 3 of animals had diagnosis of periarticular fibrosis of carpal and metacarpal joints and 2 showed chronic synovitis of distal joint. For searching for the placement of chronic synovitis there was revealed, that mainly they are placed in the joint of distal part of the limb.

It is necessary to mark that clinical symptoms of chronic synovitis in all the experimental groups were identical and characterized in the following way – at the immobility state the affected limb was kept in half–bent position in the hoof–joint, slightly leaning the grapping part of the hoof against the soil. The main weight of the body was transferred to the healthy, not injured limb.

During the animal locomotion the dependence of the degree of pathological process was observed and the lameness of slight and average degree was marked. Besides, there was marked infiltration and a slight increase of the configuration of the joint. The reaction of the joint to the outer irritation was preserved. Palpation of the joint marked the raise of the local temperature and painfulness, sensibility of the skin was slightly lowered, infiltrated and a less elastic. In the crown joint a slight deformation was found. The joint was enlarged and the diverticles were tense. The skin of the joint was elastic, mobile and sensitive.

For chronic synovitis the tense of the joint capsule with the loss of elasticity was detected and the amount of synovial liquid was reduced. At the deep palpation an increase of the amount of fibrin was marked. At the passive joint motion the pain and limitation of the joint function was found. It should be indicated, that the revealed clinical symptoms of chronic fibrous synovitis were of the same type. However, the degree of acuteness of clinical symptoms depended on the heaviness of pathological process, and also on the amount of fibrous tissue.

The examination of the location of periarticular fibrosis revealed that they are mainly located in the joints of distal limb part. The analysis of obtained data showed that the most frequently periarticular fibrosis is found in the chest limbs, and concretely in the carpal and metacarpal joints.

After treatment of affected horses by traditional method of treatment they were injected auto-blood (0.5 ml.kg⁻¹ body mass) which was processed with low-frequent laser. Regenerative processes after the first 24 hours after injection of auto-blood showed not significant changes in clinical indexes.

In the course of observation of the clinic status of animals in the first group in the process of treatment there were marked the following changes – during the first 48 hours after injection of auto-blood a slight increase of the body temperature, the pulse frequency pulse and breathing was observed. In animals with fibrous synovitis the local temperature raised and hyperemia was found on non-pigment parts of the skin next day after rubbing the irritating ointment and application of spirit-drying compress. The skin in the place of dorsal part of the joint was tense, hypodermic and synovial bursae of the joint were well palpated. The bounds of the joint were pronounced and in tendon-joint apparatus at deeper palpation a pain was marked.

During the motion the lameness of medium degree of the leaning limb was marked. After clinical examination in the first group after 7-10 days the configuration of the joint showed no difference from the joint of opposite limb, the tension of joint capsule was lower and the state of vascularization of unpigmented parts of the joint was also reduced. In 10 days the clinical indexes

in the 1-st group were in physiological range. It should be marked that the treatment of chronic synovitis with application of auto-blood processed with low-frequent laser and traditional methods of treatment for 14 days showed that the clinic-morphological and functional data of distal limb joints parts of sport horses did not differ from the same joints of healthy animals. Palpation of the joint showed marked increase of local temperature and painful reaction. On the day 5 – 6 of the experiment changes were vividly pronounced and showed the response reaction to the application of local medicinal means. On the day 10 – 12 there was a gradual rehabilitation of the elasticity of derma around the joint and diminishing of periarticular tissues. For passive joint motion a slight lameness was discovered. On the day 18 day observations showed that animals were clinically healthy.

In our experiments with treatment of chronic fibrous synovitis and periarticular fibrosis in the second experimental group with injection of auto-blood processed with low-frequent laser in the dose of 0.5 ml.kg⁻¹ of body mass, traditional method of treatment and intra-joint application of the “Hondrolon” for the regeneration and normalization of cartilage tissue was used. After 48 hours after the treatment marked increase of local temperature, the joint reddening and better of vascularization was found. The raise of body temperature was detected in most experimental animals. On the day 7 – 8 decrease of inflammation in periarticular tissues and compression of synovial formations were found. The full recovery of animals with diagnosis of periarticular fibrosis was observed after day 16.

The treatment of experimental animals of the 3rd group was conducted by traditional method. After 48 hours any significant differences were found. At passive and active motion the lameness of the injured limb was marked. On day 11 – 14 decreased painfulness was detected, the joint capsule and diverticules of the joint were compressed and reduced in size. At day 18 the rehabilitation was marked and the duration of the treatment of chronic synovitis lasted 18 days.

It is necessary to mark that the degree of acuteness of clinical–morphological, protective–adaptation and regenerative functions depended on the method of application of physical–chemical influences on the organism, and also the application of medicinal remedies, which were reflected on the hematological indexes.

The changes of in hematological indexes at different methods of treatment of chronic synovitis and periarticular fibrosis are listed in Table 1. In the first group the amount of erythrocytes increased and the amount of lymphocytes increased. In the second experimental group in the blood the amount of erythrocytes raised and the amount of leucocytes correspondingly increased. The change in the third experimental group on the 15th day of examination detected increase of the number of erythrocytes. Other parameters also increase, but the differences were not significant. Data show weakly the protective–adaptable and regenerative processes after application of traditional method of treatment.

Table 1 Changes of hematological indexes in experimental groups

Parameter	Before treatment	After treatment
Experimental group 1		
Erythrocytes (10 ⁹ .μl ⁻¹)	5.90 ± 0.11	7.00 ± 0.10
Lymphocytes (10 ⁶ .μl ⁻¹)	6.40 ± 0.26	8.30 ± 0.24
Hemoglobin (g.l ⁻¹)	97.00 ± 3.84	130.00 ± 1.19
Lymphocytes (%)	29.00 ± 0.79	36.00 ± 0.61
Experimental group 2		
Erythrocytes (10 ⁹ .μl ⁻¹)	6.30 ± 0.22	7.30 ± 0.14
Lymphocytes (10 ⁶ .μl ⁻¹)	7.10 ± 0.15	9.40 ± 0.22
Hemoglobin (g.l ⁻¹)	100.60 ± 2.56	166.60 ± 1.09
Lymphocytes (%)	30.00 ± 0.79	38.00 ± 1.69
Experimental group 3		
Erythrocytes (10 ⁹ .μl ⁻¹)	6.40 ± 0.23	6.50 ± 0.14
Lymphocytes (10 ⁶ .μl ⁻¹)	6.70 ± 0.14	7.20 ± 0.19
Hemoglobin (g.l ⁻¹)	99.00 ± 1.45	102.00 ± 0.93
Lymphocytes (%)	32.00 ± 0.79	33.60 ± 1.03

In the serum of the first experimental group at the end of observation the amount of general protein increased from 59.00±0.11 g.l⁻¹ to 70.00±0.77 g.l⁻¹ and alfa globulins from 18.10±0.48% to 18.40±0.42% (Table 2). The content of gamma globulins increased from 20.40±0.80% to 25.20±1.07%. The content of albumin decreased as well as the amount of beta globulins. The examination of proteins and protein fractions of blood serum showed, that considerable changes take place in the second experimental group. The amount of general protein increased in comparison with indexes before the beginning of the experiment. Also the amount of albumins and alfa globulins decreased. At the same time there was marked increase of the amount of beta globulins and the content of gamma globulins increased from 17.90±0.83% to 23.60±1.07% in comparison with initial data. For the experimental animals of the 3-rd group before and at the end of the experiment there was marked a slight increase of general protein, the amount of albumins decreased and there was a marked increase of alfa globulins. The content of gamma globulin increased from 20.80±0.67% to 23.60±0.87% (Table 2).

Table 2 Biochemical parameters blood in experimental animals

Indexes	Before treatment	After treatment
Experimental group 1		
Proteins (g.l ⁻¹)	59.00 ± 0.11	70.00 ± 0.77
Alpha globulins (%)	18.10 ± 0.48	18.40 ± 0.42
Gamma globulins (%)	20.40 ± 0.80	25.20 ± 1.07
Albumin (%)	41.30 ± 0.57	37.70 ± 0.95
Beta globulins (%)	20.20 ± 0.32	18.70 ± 0.22
Experimental group 2		
Proteins (g.l ⁻¹)	61.00 ± 1.45	73.00 ± 0.79
Alpha globulins (%)	42.50 ± 1.64	37.20 ± 0.51
Gamma globulins (%)	18.90 ± 0.38	16.30 ± 0.47
Albumin (%)	20.60 ± 0.31	22.90 ± 0.71
Beta globulins (%)	17.90 ± 0.83	23.60 ± 1.07
Experimental group 3		
Proteins (g.l ⁻¹)	62.00 ± 0.79	64.00 ± 1.36
Alpha globulins (%)	40.70 ± 0.54	37.80 ± 0.94
Gamma globulins (%)	17.90 ± 0.62	16.60 ± 0.29
Albumin (%)	20.80 ± 0.67	23.60 ± 0.87

For immune biological index the most evident changes were obtained in experimental groups 1 and 2, where auto blood processed with laser was used (Table 3). The immune biological indexes of blood of the experimental group 1 showed that the relative content of T-lymphocytes increased. Also the amount of B lymphocytes increased from 21.60±0.44% to 27.60±0.90%. The most acute changes were observed on the day 10 of the 2-nd group and were characterized by increase of the amount of relative number of T lymphocytes, absolute number of T lymphocytes, relative number of B lymphocytes and also the amount of absolute number of B lymphocytes. The examination of the blood serum of the 3-rd group showed less evident changes (Table 3).

The injection of auto-blood processed with laser together with pronounced stimulating action favorably influences on the physiological function of the connective tissues, and “Hondralon” improves the regenerative function of intra joint cartilage. It is important to mark for this method of treatment the recovery takes place without any post effects, the duration of the disease shortens and the main thing is that the expenditures for treatment of sick horses are reduced (Frisbie et al., 2015). Arthroscopy and microscopy indicated that defects in the autologous cell group had significantly better repair tissue compared with defects in the fibrin-only and control groups. Repair tissue quality in the allogenic cell group was not superior to that in the fibrin-only group with the exception of the percentage of type-II collagen, which was greater.

Almost 15% of animals taking part in sport competitions and 22% of horses participating in kupkari games meets joint diseases. Lately in the world practice it is recommended to use methods of stimulating therapy (tissue therapy) for treatment of chronic processes of distal part of limbs. The employment of stimulating pharmacological remedies widely applied in veterinary medicine influence local and central nerve system and stimulates vitally important organs and also regulates locally the regenerative–rehabilitative processes. It is ascertained that the stimulating therapy, influencing through the central nerve system exercises the pathologic and stimulating influence. Thus, the methods of treatment are directed to the intensification of proliferative occurrence (Gurevitch, 2000). They improve the blood and lymph circulation and resolve the fibrin formations. This leads to intensification of fibrin–plastic processes, which contribute to dilution of fibrin formations and prevent the formation of scars in the connective tissues which leads to the breach of the function of joints. For treatment of these diseases there are widely used different methods as radiation therapy (ultra–violet, infra–red, ultra–sound radio waves with high frequency and many other. Also the electric–quantum energy is used for therapeutic purpose (Farrelly and McEntee, 2014). In the last years laser rays were widely used with stimulating influence. The low–frequent laser ray has a special pathogenic influence. There is also ascertain favorable influence of laser rays on blood producing organs, saturation of erythrocytes and positive influence on immunocompetent organs. That is the reason of the treatment (especially joint diseases) with low–frequent laser rays (Zubrod et al., 2005; Scruton et al., 2005).

Table 3 Immune biological index in experimental animals

Indexes	Before treatment	After treatment
Experimental group 1		
T-lymphocytes (%)	47.00±1.45	57.00±0.79
B lymphocytes (%)	21.60±0.44	27.60±0.90
A immunoglobulins (mg.ml ⁻¹)	1.40±0.05	2.60±0.07
M immunoglobulins (mg.ml ⁻¹)	1.10±0.03	1.90±0.07
G immunoglobulins (mg.ml ⁻¹)	12.60±0.24	18.10±0.58
Experimental group 2		
T-lymphocytes (%)	49.00±1.11	56.20±1.14
B lymphocytes (%)	20.00±0.79	27.00±0.79
A immunoglobulins (mg.ml ⁻¹)	1.30±0.05	1.90 ±0.07
M immunoglobulins (mg.ml ⁻¹)	1.00±0.03	1.40±0.05
G immunoglobulins (mg.ml ⁻¹)	14.10±0.35	20.10±0.51
Experimental group 3		
T-lymphocytes (%)	51.00±1.00	52.20±0.74
B lymphocytes (%)	21.40±0.67	22.80±0.65
A immunoglobulins (mg.ml ⁻¹)	1.20±0.03	
M immunoglobulins (mg.ml ⁻¹)	13.70±0.60	13.80±0.45
G immunoglobulins (mg.ml ⁻¹)	1.30±0.05	1.20±0.03

The joint diseases of animals have some regional peculiarities, connected with upkeep, feeding and exploitation. Thus, in most cases the reason of arthropathy of cattle and sheep is connected with application of cotton–plant fodders, containing poisonous polyphenol gossypol (Ibragimov and Tovmasyan, 1973; Boymuradov et al., 1986; Norboyev, 1990; Davlatov, 1993). The beginning of the joint diseases depends on the peculiarities of their exploitation. If in most countries of the world horses are used in classic kind of sports, in our region they are widely used in national games: olmon poyga, kiz – kuv, kupkari and others, which are extremely popular in the Republics of Central Asia. These contests are held in all celebrities and cultural – mass measures (Brubaker and Coss, 2015). It should be marked, that national games are held not always in specially equipped grounds. Very often they are held in the field conditions on the hard and stony ground. Besides these games consist of complex of complicated, hardly performed elements that is the reason why under such trauma – dangerous conditions the joint diseases of distal part of limbs of horses often appear (Shakalov, 1952; Kuznetsov, 1980; Kalashnik and Peredara, 1988; Plakhotin et al., 1991).

The traumas are often complicated by affection of deep structures of the joint, sometimes with purulent inflammation, which leads to incurable processes. In horses participating in sport and national games synovitis and periarticular fibrosis of joints of distal part of limbs are often diagnosed. One of unspecific influences on the organism is the application of the ray energy UVR, quantum, ultra–sound and especially low–frequent helium–neon laser rays (Xu, 1985; Kana et al., 1981; Mikaelyan, 1985; Izdepskiy and Rubenko 1987, 1989; Imanbayev and Nametov, 1992;). At present auto-blood processed by laser for stimulation and treatment of the organism is injection by 3 methods – the external usage, internal application and extra carpal or parenteral injection. This method, besides stimulating influence has prolonged effect (Xu, 1985; Skorina et al., 1988; Izdepskiy and Rubenko 1989) with data correlating to results found in this study. Injection of the auto-blood processed with laser was previously recommended (Bessis and Ter-Pogossian, 1965; Rouns et al., 1965). Results are also well related to our data. It has been established that laser rays with the length of wave 632.8 nm have the most stimulating ability.

Results of this study in relation to used methods have scientific, practical and theoretical significance. Our clinical observations shown that 15% of animals taking part in classic and sport games and 22% of horses taking part in national sport games have limb diseases and especially of distal part. Besides, in the course of our researches there was ascertained, that the main reason of joint diseases are traumas, and that is why the chronic synovitis and periarticular fibrosis are more frequently developed. So our research was directed to the treatment of exact diseases. For the solution of this task for the first time we used methods of pathogenic therapy (pathogenic influence of laser rays) together with traditional methods, and also the specific preparation with mainly local influence. Clinical observations, morphological, biochemical, and also immunological indexes of blood we proved that the most effective method of treatment of joint diseases of distal part of limbs of horses with chronic synovitis and periarticular fibrosis is the application of parenteral injection of auto-blood, together with traditional methods and the application of “Hondralon” (2 ml intra articular) shortening the treatment to 5 days.

CONCLUSION

On the base of our experiments on elaboration the effective methods of treatment of aseptic forms of distal limb part inflammation in horses it can be concluded, that together with traditional method of treatment it is possible to use additionally effective pathogenic methods – to use auto-blood, processed with laser and also together with traditional method of treatment, auto-blood and administration of “Hondralon”.

Together with clinical–morphological changes there were evident authentic changes of morphological, biochemical and immunological indexes, and also the pronounced immune stimulating influence of auto-blood, processed with laser and a positive influence of “Hondralon” on the physiological function of cartilage tissue was marked. On the base of conducted experiments there was ascertained that the most effective method of treatment of sport horses with the diagnosis of aseptic inflammation of distal limb part is the application of auto-blood processed with laser and “Hondralon” (2 ml intra jointly)

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