Methods for the effective treatment of animal burns

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Abstract. Burns (combustio) - tissue damage arising from thermal, chemical, electrical or radiation exposure. Burn disease – a complex violation of the organs and systems, developing due to extensive burns. The cause of burn disease is the loss of all types of the skin functions, loss of plasma, the collapse of red blood cells, as well as metabolic disorders. The probability of development, severity, and prognosis in this pathology are determined by the age of the patient, the General condition of his body and some other factors, but the leading role is played by the area of the lesion. 500 thousand animals are burned according to statistics in Russia for the year, and as a rule, mortality among burned animals is more than 11%. Treatment includes antibiotic therapy, infusion, and detoxification therapy, correction of all organs and systems. Treatment of burns of the first and second degree is most often limited to the local use of drugs that reduce pain sensitivity, promote faster tissue regeneration and help prevent infection, which leads to lengthening of healing processes and other complications. In the case of third and fourth-degree burns, regular thorough cleaning of the affected areas is also necessary, sometimes surgical intervention is required. Today, burns are widespread, so the search for effective treatments remains relevant. In this paper, we describe the etiology, pathogenesis of burns of small pets, the definition of the most effective and cost-effective method of treatment. The task of the research was also to determine the degree of burns and diagnosis of burns.

1. Introduction

Burn - damage to body tissues caused by the action of high temperature or the action of certain chemicals (alkalis, acids, salts of heavy metals).

The sudden formation of extensive burns causes the release of a large number of toxins and elements of decaying cells into blood. The blood levels of prostaglandins, serotonin, histamine, sodium, potassium and proteolytic enzymes increase dramatically. This leads to increased capillary permeability. Plasma comes out of the vascular bed, accumulates in the tissues, as a result, the exchange of circulating blood is significantly reduced. In response, the body emits hormones into bloodstream that cause vasoconstriction – noradrenaline, adrenaline, and catecholamines.

The mechanism of blood circulation centralization starts. Peripheral parts of the body, and then the internal organs begin to suffer from a lack of blood? which leads to the development of hypovolemic shock. Along with this, there is a thickening of blood and disorders of water-salt metabolism. All of the above leads to malfunctions of various organs. Oligoanuria develops. Subsequently, pathological changes are exacerbated by the depletion of the immune and endocrine systems, as well as the toxic effect of tissue breakdown products on the internal organs. Degenerative changes occur in heart and
liver, ulcers are formed in the gastrointestinal tract, possible intestinal paresis, embolism, and thrombosis of mesenteric vessels, and pneumonia is detected in the lungs.

In the first 24-72 hours after the burn, the number of red blood cells increases to 10-15 million in 1 mm³, leukocytes – up to 20-30 thousand, the hemoglobin content increases to 120-130%. Metabolic disorders are characterized by dehydration, acidosis, low chloride content in the blood and a disorder of oxidative processes. Thickening of blood with extensive burns is explained by a significant loss of the liquid part of blood (plasma) and enhanced regeneration of red blood cells, resulting from irritation of the bone marrow protein breakdown products. In the future, the condensed blood gradually begins to change in the direction of liquefaction, and 1-2 weeks after the burn, anemia develops, which is associated with the intoxication of the body and a large loss of protein through the burnt surface.

Reflex processes in the pathogenesis of burns are crucial ones. Excessive thermal stimulus, acting on the receptor apparatus of the skin and other tissues, at the time of burn injury causes a huge flow of pain impulses to the central nervous system, the functional change of which determines the nature of the clinical picture of burn disease. It should be noted that the flow of pain impulses into the central nervous system does not stop with the elimination of the high temperature action on the tissue, it is supported by squeezing the inflammatory-swollen tissues of peripheral nerves and their endings, irritation with their products of tissue decay and toxins of microbes.

The burn is not only local tissue damage but also a serious general disease of the body (burn disease). By localization they are divided into burns of the skin; eye burns; inhalation injuries and burns of the respiratory tract.

The severity of the burn, the prognosis and the choice of therapeutic measures depend not only on the depth but also on the area of the burn surfaces. When calculating the area of burns, the «rule of nines» is used.

In accordance with the «rule of nines»: the area of the neck and head is 9% of the entire body surface; chest – 9%; abdomen – 9%; back surface of the trunk – 18%; one upper limb – 9%; one thigh – 9%; one shin along with the foot – 9%; external genitals and perineum – 1%.

There are 4 degrees of burn: 1 - redness of the skin, 2 - blistering, 3 - necrosis of the entire thickness of the skin, 4 - charring of tissues.

The severity of the burn is determined by the size of the area and depth of tissue damage. The larger the area and the deeper the tissue damage, the more severe the burn injury. With a burn that occupies 10% or more of the body surface, there are significant changes in the composition of blood, it is noticeably thickened, metabolism is disturbed. Metabolic disorders are characterized by dehydration, acidosis, low chloride content in the blood and a disorder of oxidative processes

First aid for burns is to halt the impact of external factors and the treatment of the wound.

Burns can develop due to the following reasons: thermal effects; chemical effects; electrical effects; radiation exposure.

A thermal burn is caused by the action of high temperature in fires, ignition of the gasoline, as well as from the impact on the tissue of boiling water and hot steam.

The fire is a red-hot gaseous medium consisting largely of partially ionized particles, in which chemical interaction and physicochemical transformations of the particles of fuel, oxidizer, impurity particles occur, accompanied by «glow» and heat release. The area of the burn is relatively large, the depth is mainly of the 2nd degree. The primary treatment of the wound represents the complexity of the charred wool residues removal and can subsequently serve as foci of infection. The organs of vision and upper respiratory tract may be affected [1, 2].

Boiling water - water kept to the boiling point, that is, reached the boiling point (100 degrees). The area of the burn is relatively small but relatively deep, mainly that of 2-3 degrees.

Steam. When exposed to steam, a skin-deep tissue lesion and affection of the upper respiratory tract happen in most cases.

Hot items. When skin contacts with hot objects, a clear boundary of the object remains in the place of exposure. These burns are deep and are characterized by the second or fourth degree of damage.
Additional injuries may occur when you remove the object that caused the injury. There is a detachment of the affected skin layers.

The degree of skin damage during thermal exposure depends on the following factors: the temperature of influence (the higher the temperature, the stronger the lesion); the duration of exposure to the skin (the longer the contact time, the heavier the degree of burn); thermal conductivity (the higher it is, the stronger the degree of damage); skin condition and health of the sufferer. Animals often have thermal burns that occur in fires in livestock buildings, railway cars, vehicles, forests, peat bogs, etc. Burns in different animals is manifested differently, this factor depends on the structure of the skin. The most sensitive to burn injury are sheep and cattle, less - horses and pigs. Young animals endure burns worse than adult animals. The reaction to the burn is much stronger, and the course of the disease is more severe in those who have undergone any disease, had injuries with significant loss of blood or are in the last stage of pregnancy.

Burns in the head, groin, genitals, udders, and limbs are the most dangerous and severe. So, in case of head burns and inhalation of hot air, suffocation (asphyxia) occurs due to edema of the mucous membrane of the larynx and trachea or subsequently complications occur in the form of purulent necrotic inflammation of the trachea, bronchi or bronchopneumonia. Lesions in the groin and genitals are accompanied by shock, a disorder of urination, and in the udder – deep cracks, suppuration, mastitis, general blood infection (sepsis) [3, 4].

The burnt areas of the extremities are polluted, suppressed, in the subsequent development of contraction, the impossibility of extension in the joints (contracture), partial or complete loss of function. Extensive and deep burns of chest are complicated by purulent inflammation of the pleura and lungs (pleurisy and pneumonia).

Chemical burns occur as a result of the action on the tissue of strong acids, alkalis, salts of heavy metals, quicklime, phosphorus. In animals there are chemical burns of the skin of the mucous membrane of the mouth, esophagus, and stomach; this happens due to careless storage and use of chemicals and fertilizers. When exposed to strong acids and salts of heavy metals, coagulation necrosis of skin, mucous membranes, and underlying tissues occur. A thick fabric scab, that quite quickly forms on the place of impact of such chemicals, prevents further penetration of them to the tissue depth. Alkali and other similar chemical compounds, dissolving proteins and saponifying fats cause tissue necrosis colliquation. As a result, alkali burns are deep; necrotic tissue at the site of the burn turns into a soft scab usually white. When healing chemical, especially alkaline, burns, usually formed powerful deep scars. Chemical burns are sluggish, without a florid inflammatory reaction; cleansing from dead tissues is slower than in case of thermal burns; changes in the general condition of a body are absent or weakly expressed, arise as a result of contact with the skin of aggressive chemicals (for example, acids, alkalis).

The degree of damage depends on its concentration and duration of contact with the skin. The influence of acids on the surface of the skin causes superficial lesions. A burn crust, which prevents further penetration of acids into the skin, forms after exposure to the affected area in a short time. Skin is deeply penetrated due to the influence of caustic alkali on the surface. Salts of some heavy metals (e.g. silver nitrate, zinc chloride) cause surface burns in most cases.

Electrical burns occur in contact with a conductive material. Trauma is associated with technical electric current or lightning coming through a body. The electric current spreads through the tissues with high electrical conductivity through the blood, cerebrospinal fluid, muscles, to a lesser extent - through the skin, bones or adipose tissue.

There is always a current mark (point of entry and exit) in case of electric shock on the body of the victim. Burns of this type are characterized by a small area of the lesion, but they are deep. They can be caused by non-insulated wiring, therefore rodents and rabbits are more likely to suffer from such injuries.

Burns due to radiation exposure can be caused by ultraviolet radiation, ionizing radiation, infrared radiation.
Ultraviolet skin lesions mainly occur in summer period. Burns, in this case, are shallow, but characterized by a large area of damage. When exposed to ultraviolet light, surface burns of the first or second degree often occur. Ionizing radiation causes damage not only to the skin but also to nearby organs and tissues. Burns in such case are characterized by a shallow form of the lesion. Burns are usually shallow, but their treatment is difficult due to the damaging effects of radiation on the underlying organs and tissues. Vascular fragility and bleeding increase but ability to regenerate reduce. Infrared radiation can cause damage to the eyes, mainly the retina and cornea, as well as the skin. The degree of damage, in this case, will depend on the intensity of the radiation, as well as on the duration of exposure.

Depending on the strength and duration of the cause of the burn, as well as local and general changes in the body, there are four degrees of burn. Uncomplicated burns with an area of up to 5% of the body surface do not greatly affect the overall condition of a body. Burns of the second, third and fourth degree, exceeding 5% of the skin area, proceed as a serious disease, and the second and third degree, affecting more than 10% of the skin area, are accompanied by nervous reactions (shock) and can result in the death of animals.

A first-degree burn: the affected area of light skin is red or pink (hyperemia), slightly compacted, sensitive to external irritations; slight swelling (swelling) of skin, the hair is tousled; in case of thermal burns, not completely burnt hair is visible; pain is expressed slightly. The animal sometimes licks the injured part of the body or rubs it on objects.

A second-degree burn: The skin is compact, sometimes sedentary; touching with fingers and prick with a needle is painful; spilled swelling of the skin and subcutaneous tissue. The greatest development is reached in 24-48 h after the heat injury. Extensive edema falls on the breastbone, lower part of the chest, abdomen, and limbs. Serous exudate in the form of yellowish-pink droplets sweats out on the borders of the burn, which, drying up, form loose crusts; on the tender areas of the skin, bubbles with pinkish transparent content and necrosis of the surface layers of the skin can form; the wool in the affected area is scorched, in places charred hair awns are visible. The surface layer of cells exfoliates in pigs in the first minutes after the injury from the burned surface, hanging in the form of dirty rags. The skin in these places has a wet, contaminated surface. The hurt animal worries, falls to the ground, rubs with a damaged surface on objects. These characteristics are especially strong in dogs and horses.

Third degree burn: it is characterized by necrosis of skin and deep-lying tissues. Skin is compact, immobile, insensitive to pain stimuli (touching, feeling the prick of the needle) when the patient is in the move, it gets pleated – «goffer skin». Pressing your finger in the burn area is painful. After 15-40 minutes after the burn, subcutaneous tissue in the area of the lesion and in the circumference swells, and the swelling falls on the underlying parts of the body by 3-4 day. Dead skin areas begin to reject, cracks appear on the 7th-15th day from which serious, then purulent drainage is pouring out. As a result of healing, large scars are formed. Long-term exposure to concentrated acids leads to the formation of a dense crust – scab of dead tissue. Concentrated alkalis melt tissues often to the bone and, unlike acids, cause very deep burn lesions. General changes in third-degree burns are more significant than in second-degree burns. The stage of excitation of burn shock can last for 3-6 hours. The animal lies down, jumps to feet, makes finical movements, staggers. The animal has increased sweating, muscles are trembling, it has frequent urination, defecation. Dogs and pigs are aggressive at this time. They have increased body temperature, increased heart rate, and breathing; blood pressure briefly increases. Then the stage of oppression comes: all reflexes are weakened, the animal refuses to eat, it is thirsty, movements are uncoordinated, blood pressure is decreased. The oppression develops in sheep and cattle in the fastest way.

After 6-12 hours after the burn organism is getting intoxicated with products of protein decomposition, the activity of all systems and organs are impaired. These signs may occur with extensive burns of the second and third degree.

Fourth degree burn: occur from prolonged exposure to high temperature and leads to the charring of a body part or organ. The skin and deep-lying tissues are wrinkled, dry, very compact, completely
insensitive to external stimuli crust. Deep cracks are formed in some places, from which bloody fat-like liquid often flows.

Significant in width and depth burns, starting from the 4-8 day, can be complicated by general blood infection and intoxication (toxemia) due to the development of pyogenic infection. The condition of the hurt animal deteriorates. Periods of elevated temperature alternate with periods of normal temperature (intermittent fever), cardiac activity is weakened, there are deep metabolic disorders of all kinds. This condition often ends with the death of the hurt animal.

When determining the severity of the burned condition, factors such as depth, breadth (area of injury) and localization of the burn, as well as the age, type and initial state of the animal are taken into account.

The size of the burning surface is not difficult to identify, but to determine the depth of the lesion, particularly with burns II and III degree, is possible only on the 5-8-th day, when there will be a delimitation of the necrotic tissue and start of their rejection. Therefore, when determining the degree of burn in the first hours, the following indicators are taken into account.

In case of the I-st degree burns, wool is ablaze not on the entire length, skin is slightly compacted and becomes very sensitive to the outside stimuli. Severe hyperemia develops on depigmented areas and there is a slight swelling of the skin.

In case of the II-nd degree burns, skin becomes compact, sometimes inactive, with a needle and palpation, pain is expressed. At the edge of the burn, there are drops of serous fluid. Bubbles may form in areas with delicate skin. Edema develops in the area of burn in the first hours.

In case of the III-rd degree burns skin becomes very dense, motionless and insensitive to external stimuli (palpation, needle angle). When moving, the skin gets pleated -«corrugations». Large swelling is developing in the area of burn and its circumference.

In case of the IV-th degree burns, charring of the affected area and even the organ occurs. Skin and underlying tissues become very dense, immobile and completely insensitive to external stimuli. In some affected areas, deep cracks are formed, of which there is often a bloody fat-like effusion.

Based on the fact that the treatment of burns requires a lot of time and a lot of work of veterinary workers, as well as certain material costs, which with extensive burns do not always pay off, we believe that the following animals should get treatment: animals which got burns of I and partially II degree; animals that got deep burns on the area up to 5% of the body surface and in some cases (highly productive and breeding cattle) animals with deep burns on the area up to 10% of the body surface can be treated.

Treating animals with more extensive and deep burns is not economically feasible. Such animals should, if possible, be butchered, and their meat must be used for other purposes. In determining the severity of injuries and deciding the treatment of the animal it is necessary to consider the localization of the burn.

Treatment of animal burns is one of the most difficult and less developed problems in veterinary surgery.

Determining the essence of burns, many authors have been considering this type of injury as a local process up to the present time. Thus, Fabritius Gilden in his book, published in 1607, wrote the following: «Burn is a violation of the integrity of the epidermis, skin, and muscle meat, veins, arteries, nerves caused by the power of fire.» I. G. Rufanov says that a burn is tissue damage caused by the action of high temperature (thermal burns) or the action of chemicals (chemical burns).

First aid for burns is very important. It includes prevention of shock; fight against dehydration, blood thickening, and intoxication; primary treatment of the burned area; prevention of infection.

In order to prevent shock, novocaine was administered intravenously in a dose of 1 ml of 0.25% or 0.5% solution per 1 kg of animal weight, or a paraneaphral blockade was carried out. In addition to anti-shock action, novocaine eliminates increased capillary permeability and thereby reduced blood plasma loss. To prevent dehydration, blood thickening and intoxication the following is recommended: abundant introduction of water into the body (through the mouth, with enemas, subcutaneously), transfusion of large doses of blood (3-5 liters for cattle and horses), intravenous isotonic sodium
chloride solution (1-2 liters for injection for cattle and horses). As an alkalizing agent for acidosis, a 5% solution of sodium bicarbonate (400-600 ml for horse and cattle) is used. To combat burn intoxication, in addition, it is recommended to use serum from animals that have previously suffered a burn.

The nature of the primary treatment of the burnt surface depends on what method of treatment is chosen. There are open, closed and mixed methods of treatment. In veterinary practice, the most common was an open method of treatment in combination with the use of tanning, fixing and coagulating substances (2-3% solution of potassium permanganate, 5% alcohol solution of tannin, 1-2% solutions of methylene blue or diamond green, 5% or 10% solution of silver nitrate, 5% or 10% alcohol solution of iodine). When processing (lubrication) with these solutions, the burnt surface is covered with a solid crust, which prevents the loss of plasma and protects the damaged tissues from infection.

With a closed method of treating burns, bandages with antiseptic agents are used: Vishnevsky emulsion (tar – 1 part of benzocaine and the xeroform 3 parts castor oil – 100 parts), sintomitsinovoy and streptocide emulsions. In recent years, in the treatment of burns includes covering of a burnt surface with fibrin and plastic films that protect damaged tissues from the impact of the external environment and infection.

The prevention and control of microflora in case of burns should be started as soon as possible. A common antiseptic therapy should be applied with this purpose in conjunction with the local application of the above-mentioned means.

The basic principles of burns subsequent treatment are as follows:

1) treatment of infected burn wounds is similar to that of conventional purulent wounds. In this case, use the same tools and methods as in the treatment of wounds. It should be noted that antibiotics are effective only during the first decade. By the end of this period, their appointment is impractical, since the microflora of the burned surface already becomes insensitive to antibiotics;

2) in the treatment of burns methods of epidermization (ultraviolet radiation, tissue therapy, etc.) stimulation are of particular importance. The transplantation of free flaps is the only technique for saving the life of an animal in case of the extensive burn;

3) in relation to the high protein loss through the wound surface and the development of post-burn anemia, it is important to provide sick animals with full and fortified food in a timely manner, to perform a blood transfusion, apply the blood plasma hydrolysate and other substitutes.

At the time of the burn, it is necessary to stop the exposure to high temperature as soon as possible. The burnt surface is carefully cleaned of burnt wool, hay particles, sawdust, chips, earth and washed with water. To reduce pain and limit inflammation, use cold or lotions with alcohol, cologne, 1% solutions of methylene blue or diamond green, 5% or 10% solution of silver nitrate, 5% or 10% alcohol solution of iodine. When processing (lubrication) with these solutions, the burnt surface is covered with a solid crust, which prevents the loss of plasma and protects the damaged tissues from infection.

As for chemical burns, the surface is poured first with a large amount of water for 30 minutes, then acids are neutralized with 1-2% alkaline solutions (soap, soda water) or sprinkle with chalk and magnesium when burns with strong acids. In case of a burn with alkalis, the burned place is poured with 1-2% solution of acetic or citric acid. The burn caused by quicklime is treated by milk. Burns with phosphorus, where the chemical effect is combined with thermal, are abundantly washed with water and lotion of 5% copper sulfate is applied to them. Pieces of phosphorus are removed from the skin.

A doctor or paramedic renders urgent complex medical care to the patient performing local and general treatment of organism. Good results in burns of any localization are obtained from intravenous administration of 0.5% solution of novocaine (0.2 g of novocaine per 100 kg of animal weight). Neuroleptic and ganglionic drugs are successfully used: aminazine (subcutaneously large animals 0.5-1 mg, small 2.5 mg per 1 kg of their weight), dimedrol (subcutaneously large animals 0.3-0.5 mg, small 0.02-0.03 mg per 1 kg of weight). It is better to use 2% solution of promedol (large animals 0.1 g, small 0.2 mg per 1 kg of weight) subcutaneously for cattle and horses. Post-burn excitation is more quickly removed as a result of the combined use of Novocain with aminazine, dimedrol, promedol [5].
In subsequent days novocaine anesthesia can be combined with sleeping pills (sodium bromide 0.02-0.05 g per 1 kg of animal weight 2 times a day). Polyglucin (1.5-2 l for large animals and 100-500 ml for small animals), etc is injected intravenously as antishock fluids.

It is advisable to treat animals only with burns of the first and partly second degree, but not with burns of the third and fourth degree, affecting 5-10% of the body area. Such animals are used on meat in the first 1-2 days after burn and only on medical conclusion.

In the modern world people in their home conditions often manage a wide variety of pets, whose main function is animal therapy. But often animals are not adapted to the conditions offered by a man. Animals are exposed to various hazards, including being exposed to burns.

The aim of the research was to develop an effective and cost-effective method of treating burns of small rodents, managed in the home conditions.

2. Material and methods

Experimental work was carried out in the veterinary clinic «4 paws» Novocheboksarsk City, Chuvash Republic and at the Department of Morphology, Obstetrics and Therapy of the Federal State Budgetary Educational Institution of Higher Education, the Chuvash State Agricultural Academy.

The task of our research was:

Conducting experiments to determine the effective method of treatment of burns of small animals;
Control over the effectiveness of the method according to the following indicators:
- duration of treatment;
- economic costs;
- the outcome of the disease.

Djungarian hamsters of the same age and sex were selected as the material for research. Animals were kept in the same conditions (cell content, nutrition, and exercise), they were the same in weight, sex, age. Physiology of hamsters was determined in the normal range: body temperature 37.5-38.5°C respiration rate 33-127 movements per minute, pulse 280-412 beats per minute. Deviations in development and in health were not observed. All hamsters were 2 months old, male. They were kept in three cages in groups. The filler in the cages is sawdust. Hamsters had free access to water and food «Little One». The water in the drinking bowl was changed every two days, food - every day. There was a wheel in each cage where hamsters actively run.

Research methods. The animals were divided into three groups of 3 hamsters in each group. Wool sized 2*2 cm was shaved on the dorsal part of the hamster's body (dorsal portion). Burn of the exposed skin surface was carried out by chemical means (peroxide solution with a 5% alcohol solution of iodine). Gauze swab moistened in a burn solution was used to treat the prepared skin of the animal's back. The resulting solution was applied to the shaved area of the hamsters' body by gauze swab. First, they wiped, then they pressed the swab to the skin for a few seconds. Immediately after applying the solution to the skin changes in its color were not noticeable. After several hours the characteristic features of first-degree burn (swelling skin) was clearly visible in animals.

Animals were taken under observation and we assigned the treatment of each experimental group in different ways.

The first method of treatment was to treat the edges of the affected area with wild camomile, the burn wound itself was treated with sea buckthorn oil. Such treatment was repeated in the morning and in the evening for five days.

Wild camomile preparations have anti-inflammatory, antispasmodic, moderate antimicrobial, diaphoretic, carminative, soothing, analgesic properties, reduce the fermentation process, increase the secretion of digestive glands, accelerate the regeneration of the epithelium in ulcers.

Sea buckthorn oil has an anti-inflammatory effect, accelerates wound healing and acts as an analgesic, increases immunity, has a healing effect on vision, improves skin condition, rejuvenates, restores the hormonal balance, reduces cholesterol and blood sugar, improves blood circulation and strengthens the walls of blood vessels, is a laxative.
The second method of treatment was the use of novocainic and 3% tetracycline ointment. In the morning the wound was treated with novocaine ointment, and in the evening with tetracycline ointment, for five days.

Novocainic 5% ointment has a local anesthetic and anti-arrhythmic effect. It blocks sensitive nerve fibers and endings, causing their anesthesia, has a wide breadth of therapeutic properties. When absorbed and when directly injected into the bloodstream, novocaine has a general effect on the body, reduces the formation of acetylcholine and reduces the excitability of peripheral cholinceptive systems, has a blocking effect on the autonomic ganglia, reduces spasms of smooth muscles, reduces the excitability of muscles and excitability of the motor areas of the cerebral cortex, but causes excitement in toxic doses, then paralysis of the central nervous system [6].

Tetracycline ointment is a bacteriostatic antibiotic that stops the reproduction of pathogenic microorganisms with the suppression of their vital activity at the protein level. The drug has a broad spectrum of action. It perfectly copes with staphylococcal, streptococcal, gonorrheal, chlamydial, salmonella, and other bacterial infections. Tetracycline antibiotic is used in the treatment of a wide range of diseases, but in the form of ointment, its use is limited. The drug is prescribed for the treatment of two types of diseases: inflammation in the eye area and infectious skin pathologies [7, 8].

As for the third method of treatment, procaine block with 0.25% solution of novocaine (diffuse blockade) was applied – once a day and the burn wound were treated with Levomekol ointment. The ointment was applied twice a day. Treatment also was continued for five days.

A short procaine block is a local anesthetic with moderate anesthetic activity and a large breadth of therapeutic action especially in the acuity. The essence of the block lies in the fact that the solution of novocaïne is injected around the lesion and under its base, on the border of healthy and diseased tissues. It is necessary to avoid strong pressure and the application of unnecessarily large volumes of solution at the time of the injection of the solution, since this may cause even greater squeezing of blood vessels and tissues. Novocain solution reduces the excitability of the motor areas of the cerebral cortex, myocardium and peripheral cholinergic system, ganglioplegic action, including antispasmodic on smooth muscles. Used to treat wounds, ulcers, fistula, myositis, papillomatosis (intradermally or intravenously).

Levomekol ointment is used as an antimicrobial, anti-inflammatory and regenerating agent. Levomekol ointment is used externally for the treatment of a number of pathologies: sores and skin ulcers, infected with pathogenic microflora; surgical wounds; traumatic injuries of the skin; burns second and third degree; trophic ulcers, furuncles, carbuncles, abscesses, pimples, calluses, sores, eczema and dry oozing, necrosis, frostbite, diaper rash, prickly heat and other.

A first-degree burn was performed in our experiment and we treated it in three different ways. The first method of treatment consisted in treating the edges with wild camomile extract, the wound itself was treated with sea buckthorn oil. This treatment was repeated in the morning and evening for five days. The second method of treatment was the use of novocainic and 3% tetracycline ointment. The burn wound was treated with novocainic ointment in the morning, and with tetracycline ointment in the evening, for five days as well. In the third treatment method, procaine block with a 0.25% solution of novocaine (short procaine block) was applied once a day and the burn wound were treated with levomekol ointment. Ointment was applied twice a day. The treatment lasted for the same period of time.

3. Research result

We observed a painful response to the application of therapeutic drugs at the beginning of treatment of animals of the first group. The body temperature was slightly increased from the physiological norm, from 39.0 to 39.30 °C, the pulse and respiration rates were also slightly, but higher than the norm. On the second day of treatment, the affected area had redness, painful on palpation. Hamsters behaved inactive, most of the time they were in the sleep phase, the appetite was absent. On the fourth day of treatment, the animals of this group had almost no redness in the burn area, the pain persisted, and the appetite was weak. One of the hamsters was trying to walk on the gym wheel. Other rodents led an
inactive lifestyle most of the day. The seventh day of treatment was characterized by the recovery of experimental animals: temperature, pulse and respiration were normal. The appetite was good, the fur on the side of the burn wound was growing, the hamsters were active.

In the second method of treating rodents, the first three days did not differ much from the previous group, but the appetite and activity in this group of experimental animals came one day earlier, the burn wound was not so clearly expressed, the wound itself had all the signs of regenerative healing.

The animals getting the third method of treatment, namely the use of procaine block and ointment levomekol, on the third day of the treatment procedures had a less reddened area of the burn wound, although there was still pain, but the hamsters actively ran in the wheel, actively ate food and drank water. The skin on the affected area also had a denser character than in animals of the compared groups.

The results of the studies made it possible to conclude about the effectiveness of the treatment of burn wounds by the third method of treatment when we used procaine block and Levomekol ointment. So, the pulse, breathing, and temperature on the second day of treatment were normalized using this method. We noticed improvement in the burn wound on the third day of treatment. There was no swelling or pain response. Animals showed less concern, had a good appetite, actively played and ran in the wheel.

With regard to the economic component of treatment, the clinical examination, consultation, preparation of the animal for the procedures (shaving, sanitary and hygienic processing), the use of gauze tampons, stationary maintenance of sick animals, the cost of consumables (gloves) had the same cost for all methods of treating animals. Drugs used in the treatment had a distinctive cost. For example, with the first method of treatment, that is, with the use of wild camomile decoction and sea buckthorn oil, the economic costs amounted to 175 rubles. In the second method - the use of novocaine and tetracycline ointment amounted to 148 rubles, and the third treatment option - the use of the short procaine and levomekol ointment - 85 rubles.

Economic costs of the first method was 2025 rubles, the second one - 2008 rubles and the third one - 1960 rubles. The third method of treatment, where the amount was 1960 rubles, is the most cost-effective option [9, 10].

As a result of our studies to determine the most effective method of treatment of burns of the first degree of small rodents, it was found that the use of medicinal ointment «Levomekol», two times per day, and the short procaine block allowed to achieve recovery in 100% of rodents within five days with the disappearance of clinical signs of burn. Hair grew on the skin of all the hamsters a month after the application of a chemical burn.

As prevention of this disease, we recommend keeping rodents in the room where all electrical wires are isolated, not available for gnawing. Animals are protected from the effects of hot sources, open fire and chemicals of various applications (household, agricultural and others).

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