

The Use of Leeches in Veterinary Medicine

Michael Aurich, Anke Henne

Introduction

The use of leeches as a highly efficient natural medicine treatment has experienced a resurgence in human therapy, particularly in German speaking countries and the US. The number of leech treatments in Germany has amounted to about 100.000 per year. In addition to the return of diverse applications of medicinal leeches for human treatment, the leech (*Hirudo medicinalis/verbana/orientalis*) has captured also the veterinary application field with substantial growth rates. The growing importance of alternative veterinary medicine as a professional branch plays a major role in this context. According to the estimates of Biebertaler Blutegelzucht GmbH, about 20.000 to 25.000 annual leech treatments are performed on animals.

The use of leeches requires a specific qualification as animal therapist, to be acquired by training as veterinarian or alternative veterinarian, or by obtaining certificates of veterinary leech therapy seminars (e.g. www.leech.de "seminars").



• Leeches in a glass receptacle © Anke Henne

To perform a safe and successful leech therapy, the following basic knowledge is an essential requirement:

- Biological features of leeches (Why and when do leeches bite properly or poorly?)
- Quality assurance of leech production
- Quality assurance of veterinary practice management
- Adherence to legal regulations
- Mode of action, indications, contra-indications, adverse reactions, place-

ment and number of leeches, wound care

Biological Features of Leeches

Medicinal leeches are a very ancient animal species in natural history. They have maintained their ground in evolution over millions of years. Due to their medicinal efficiency, they have established a kind of symbiosis with their hosts when suffering from certain frequent mammalian diseases. According to several reports, sick hoofed animals go



Leeches in a glass receptacle © Anke Henne

intuitively into leech waters in search for "therapy". The medicinal leech is equipped with thermo receptors leading the leech to the caloric areas of the host. This is the place where leeches prefer to bite. These areas are well supplied with blood or might be inflamed, and are well suited for the induction of local therapeutic effects in the host animal. This behaviour of medicinal leeches is used by some therapists by leaving the search for the concrete therapy areas to the leeches themselves. This procedure should only be applied by therapists with good knowledge about the behaviour of leeches.

Leeches are poikilothermic animals breathing the water solved or atmospheric oxygen with their complete skin surface. The needs for oxygen supply are minimal. Leeches do not suffocate even in nearly completely closed receptacles. Hazardous substances like chlorine, frequently found in tap water, even at low doses cause a rapid death of the leeches. If the animal patients have been treated with drugs or ointments attained in the blood of these hosts, the leeches tend not to bite or suck. In these cases, the medication has to be discontinued and the leech

therapy ought to be delayed for several days.

Leeches secrete a mucous layer over their skin in case of unfavourable environmental conditions or stress situations. For example, leeches do not tend to bite in thundery conditions. Slimy skin on leeches should always be a reason for inspection of the keeping and therapy conditions. In case of thundery atmosphere or noisy vibrations (e.g. construction works) the treatment date or place might have to be altered.

Leeches can survive within a temperature range of close to freezing (0 °C) up to temperatures exceeding 30 °C. However, a rapid change of temperature might stress the animals to death and has to be avoided. The loss rate of the leeches (deaths, refusal to bite or suck) is affected by temperature and their reproduction biology. In summer months, between June and August, this loss rate is significantly higher compared to the other seasons of the year. In winter months treatment of horses in stables or outside areas might result in less sufficient biting and sucking of the leeches.

Quality Assurance in Leech Production

The adherence to a quality assurance management system for the producer of medicinal leeches used in human therapy has been mandatory in Germany since October 2007. The German Health Authority (Bundesinstitut für Arzneimittel und Medizinprodukte BfArM, s. www.bfarm.de) in cooperation with Biebertaler Blutegelzucht GmbH has compiled guidelines for the quality management system. These published guidelines contain the following requirements (in excerpts):

- Quarantine (32 weeks) following the import of leeches or the feeding of bred and imported leeches
- Periodic microbiological quality inspections of the leeches and the water as well as prior to the batch approval (fixing limit values of the batch approval)
- Virological examinations of the feeding blood
- Tracing by batch documentation
- Optical selective quality inspection before dispatch
- Documentation liability of adverse events
- Package insert according to § 11 AMG (German Drug Law)
- Prohibition of repeated use of leeches, even with the same patient

- Disinfection requirements with documentation
- of storage in drug wholesale and pharmacies
- Prohibition of returning used leeches in a “retirement pond”

No quality management guidelines for the veterinary use of leeches have been issued so far by the Health Authorities. However, the company Biebertaler Blutegelzucht GmbH has implemented the entire package of quality assurance measures for human use into the veterinary use of leeches.



Leeches in a glass receptacle © Anke Henne

Quality Assurance in the Practice of Veterinary Therapy

The responsibility of the therapist working with living leeches is exceptional in view of monitoring the leech quality on the way from the producer, wholesaler or pharmacist to the therapeutic application. To comply with these requirements, the first step of the therapist should be synchronizing the time schedule of ordering and therapy. It is recommended to order leeches in time to make sure they arrive about two days before the scheduled therapy.

The leeches are delivered to the therapist in an optimised transport packing not suited for a temporary storage of several days. On arrival, the leeches should be unpacked and transferred into a suitable interim habitat.

The next step should be the inspection of leech quality. The leech quality has been inspected and ensured by Biebertaler Blutegelzucht GmbH in the course of its delivery exit check. However, leeches can suffer damage in some individual cases due to transport conditions (e.g. extremely high temperatures, previously imperceptible sick-

ness). Leeches should only be used when they look healthy. Normally they are vital and do not exhibit injuries or stranglings. Indicators of leech diseases could be:

Blood trail, musty odour, limp or flabby consistency, pale or yellowish skin colour, oily looking body segments, hard sites, lumps, strangling, swollen head, ulcers, pustules, reddened lips of the anterior sucker cup, and slime-covered skin.

A recommended interim habitat is a sufficiently large glass jar, well locked and half-filled with water. Some small holes in the lid (diameter no more than 1 mm) ensure the oxygen supply even under adverse conditions. A large cucumber jar can easily be used as a habitat for leeches. Since the leeches excrete metabolic products leading to contamination of the water and accumulation of bacteria, no more than 5 to 10 leeches should be kept per one litre of water. To keep the receptacle clean and to avoid the accumulation of germs on the skin of the leeches, the water has to be changed twice weekly. There are some special ornamental leech receptacles available. The water has to comply with the following requirements:

- No chlorine!
- pH value 5.5 to 7.0
- Water hardness limits 1 to 2 (below 12 dHg)
- Ammonium < 0.5 mg/L
- Nitrate < 25 mg/L
- Nitrite < 0.4 mg/L
- O²: 5 to 8 mg/L

Distilled water is recommended for the leech habitat to be obligatory charged with 0.5 to 1.0 g/L sea salt (1 to 2 pinches). Distilled water can be purchased as battery water rather inexpensively. With the compliance to the above mentioned requirements of water chemistry, no specific water tests are needed. In addition, spring water, still mineral water, or tap water if the chemical water values comply with the above mentioned requirements, is also suitable.

Some sharp-edged stones in the receptacle (no calciferous chalks) help leeches with their once or twice weekly skinnings. Non-toxic aquatic plants (e.g. the Canadian waterweed *Elodea Canadensis*) are used by leeches for an undisturbed rest in a shady place. The jar should not be exposed to direct sunlight because leeches prefer dark

places. The receptacle has to be monitored carefully since it might happen that one leech dies. In this case the dead leech must be disposed immediately, and receptacle, stones and aquatic plants must be cleaned thoroughly to avoid the germ formation in the jar or of the remaining leeches. To prepare the leeches for therapeutic use, the requested number (plus 2 to 3 leeches for replacement) has to be put into a small clean jar with cap, containing fresh water. For the return transport of the used leeches, a second jar is needed to separate these strictly from the other hungry leeches.

Compliance with Legal Regulations

The progressing legal regulation of leech therapy over the recent years has gained in importance also for the veterinary use. The performance of leech therapy in animals is governed by legal aspects concerning pharmaceuticals, nature, animal protection, and liability. The knowledge of the specific regulations is necessary to avoid statutory violations and liability consequences. The medicinal leeches are rated as pharmaceutical products in Germany and can only be placed on the market by the pharmaceutical producer obtaining the official manufacturing authorisation according to § 13 AMG (German Drug Law), or by the drug distributor with respective trade permission (§ 52 a AMG), or dispensed by the pharmacy. Other sources, e.g. withdrawal from nature impinge the law. No special permission is needed to exercise healing arts in animals. Surgical and painful interventions have to be performed or monitored by a veterinarian on anaesthetised animals. Leech therapy is permitted to be performed by veterinarians or properly trained animal therapists. If an animal suffers damage due to a mistreatment, the compensation claim of the animal owner is governed according to the civil rights law of property in Germany (BGB). Criminal sanctions are possible only in cases of intentional animal torture or deception of the animal owner. The animal protection regulations are valid for the treated animal (vertebrate or mammalian). Used leeches are subject to pharmaceutical law. No special regulations apply for invertebrate animals like leeches. A return of used leeches into open nature is prohibited for pharmaceutical and nature protection reasons. The return of used leeches into a "retirement pond" at Biebertaler Blutegelzucht GmbH with respect to animal protection aspects

has been prohibited by the German Health Authority (BfArM) in June 2006. The killing of the animals can be achieved either by freezing at -18 °C or by using high percentage alcohol (spirits).

The disposal should be done according to the EU Waste Code 18 01 02 "Body Parts and Organs including Blood Bags and Blood Preserves". If the therapist does not have access to appropriate commercial disposal, the leeches can be disposed in General Waste, placing the leeches in a watertight, unbreakable receptacle labelled "Waste of veterinary disposal".

In Germany, the requirements for technical regulations of biological working material (TRBA) in conjunction with the regulations on safety and health protection in contact with biological working material (biological working material regulations) have to be observed. TRBA regulations are published in the internet under www.baua.de.

Please observe the local regulations for waste disposal. If you have questions concerning disposal procedures, please contact your local waste disposal authority.

Mode of Action

The leech starts to release its saliva into the wound immediately after biting. As a result, the blood of the host animal gets strongly diluted and fluid. Blood coagulation is inhibited. The bite is experienced as slight pain, by human patients often compared with a stinging nettle touch. Shortly afterwards, the leech starts the sanguisuction process. The leech sucks mainly venous blood leading to the dissolution of congestions. In the course of the complete sanguisuction process, the leech releases saliva into the wound. The various ingredients of the leech saliva induce multifarious modes of action.

Anticoagulant Effects:

Hirudin is released and binds to thrombin inhibiting the coagulation capacity of the host blood. Calin or Saratin respectively prevents the collagen mediated platelet aggregation and the binding of thrombocytes to the vascular walls inhibiting the closing of the wound for about 12 hours.

Destabilase dissolves fibrin being effective as a thrombolytic agent. Another saliva ingredient (Factor Xa inhibitor) inhibits the activity of the coagulation factor Xa.

Anti-inflammatory Effects:

Bdellins and eglins exhibit anti-inflammatory effects.

Antibiosis:

Hyaluronidase increases the viscosity of the interstitial walls leading to antibiotic effects.

Stimulation of Blood Circulation:

The inhibitor substance carboxypeptidase A increases the influx of blood into the wound area. Acetylcholine causes a vasodilatation. LDTI (Leech-Derived Trypsin Inhibitor) inhibits the proteolytic enzymes of the mast cell of the host blood. This mechanism probably prevents an injury of the sensitive skin of the anterior sucker cup.

Analgesic Effects:

It is assumed that prior to the release of hirudin an analgesic secretion and a vasodilating substance emerge. These substances ensure that the leech bite is almost painless and the vessels are widened when the suction process is starting. Since these substances could only partly be determined (e.g. the inhibitor substance of carboxydase), the existence of the analgesic secretion can only be concluded from the patients reactions (The listing has been compiled from "Medicinal Leech Therapy", Michalsen/Roth/Dobos, Haug, Stuttgart 2007, p. 131-138).

In leech saliva further effective substances are suspected though such substances could not be detected or proved so far. Pharmaceutical research has isolated some saliva ingredients and worked up to medical drugs or ointments. Ahead of all, hirudin is used as injection in patients with clotting disorders or coronary diseases. Derived from expert knowledge, it is obvious that these isolated, synthetic or recombinant substances do not match the wide-ranging efficacy of the genuine leech bite. This might be related to the complex saliva composition or also to the skills of the leech to produce a need-based saliva composition.

Indications

Arthritis:

The application of leeches in animals has been proved in particular to be successful in arthritic changes: At the early stage the initiated cartilage degradation can be rejuvenate.

nated, at advanced stages the ossification is enhanced leading to a rapid loss of pain. In any case the blood circulation is improved, deposits are better removed and pain is reduced. At strong muscular joints an improved resilience and loading capacity can be reached by the muscular stabilisation. Michalsen et al. (2007) have described in clinical studies the strong pain relief by leeches in osteoarthritis of the knee and thumb, and in epicondylitis.

Wound Care:

Fresh wounds resolve faster and smoother after the leech bite, inflammations recede. Purulence is prevented or drains quickly. The healing process is fast and without complications. Aged scars form back completely or partly depending on size and depth. This might help to resolve therapy blockades in other areas.

Inflammations:

Inflammations of joints and connective tissue can be treated at high success rates. Sometimes a short flare of symptoms might occur followed by a much faster and long lasting regenerative process.

Characteristic Indications of Veterinary Medicine

Dogs:

Hip dysplasia, intervertebral disc disease, lick eczema, otitis, interdigital eczema, post-operative care (especially castration wounds), inflammation of teats, ophthalmitis, arthritis of small and large joints or spine, rest wounds

Cats:

Bite or scratch injuries, vertebral injuries, eczemas, otitis, post-operative care (especially castration wounds), inflammation of teats, ophthalmitis

Horses:

Periostitis, ankle arthritis and other arthritis forms, equine laminitis, equine podotrochlosis syndrome, eczemas, kicks or bite injuries, abscesses and boils, mastitis, inflammation of testicles and prepuce, inflammation of lymph nodes

Contra-Indications

Leeches must not be used in cases of blood coagulation diseases. This also refers to cases when anti-coagulant medication has been taken, e.g. coumarin containing medication or acetylsalicylic acid containing analgesics (e.g. Aspirin®), blood flow stimulating medication or other medication with blood clotting inhibiting properties. When in doubt, a simple blood coagulation test may be performed: filling of a syringe with 1 ml venous blood, adding 2 to 3 ml air into the syringe, and letting rest for about 10 minutes. If the blood forms a colloidal substance (wobbly jelly), the coagulation is regular. In case of greater parts of fluid remaining, the leech treatment should not be performed and temporised until the possible medication effect has ceased.

All forms of anaemia are contra-indicated, since it cannot be ascertained that sufficient fresh blood can be generated in time. Diabetes in general is seen as a relative contra-indication. However, successful leech therapies have been performed in individual diabetes cases. By all means the therapist should know and assess the patient very well. The therapist has to inform the animal owner carefully about all possible risks before coming to a mutual decision on a cautiously dosed treatment.

Side Effects

Leech therapy in general is characterised as an extremely safe treatment. This does not exclude the occurrence of side effects. In individual cases, allergic reactions might happen usually recognisable as strong swelling and heat on the placement areas. Furthermore cardiovascular disorders associated with tremor, mucous pallor, and shallow irregular breathing (dyspnoea) is suspected to have occurred in singular cases. These symptoms can be treated successfully with homoeopathic agents (e.g. cactus, arnica, apis) if recognised in time. If the reaction is too strong to achieve a quick regeneration, the veterinarian should help with an appropriate circulatory infusion.

If the leech was forced to vomit in the course of treatment, an infection with *Aeromonas hydrophila*, a leech specific intestinal symbiont, might occur. Such an infection shows symptoms of local inflammation: heat, swelling, reddening, blood congestion, with consecutive itching (pruritus). The homoeo-

pathic treatment can be performed with apis, urtica, arnica, thuja, or echinacea (purple coneflower). Further measures like auto-haemotherapy or auto-urine therapy compresses might help rather quickly. If an antibiotic intervention against an *Aeromonas* infection is necessary, 3rd generation cephalosporins or gyrase inhibitors should be administered. Immune depressed animal patients at increased risk of infection (e.g. enfeebled by preceding surgery or serious courses of diseases) might receive antibiotics ½ day before starting leech treatment and up to three consecutive days as prophylactic treatment.

Scar formation following wound healing strictly speaking must be considered also as an adverse reaction. On most animals hair will grow and cover these areas even not affecting the cosmetic appearance of exhibition animals. In individual cases, the animal owner must be aware that some unpleasant areas in the coat of hair might be visible for a short period. The surface scars induced by leeches are not a systemic interference.

Treatment

When performing leech therapy, it must be considered that the leech needs healthy environmental conditions as a prerequisite for successful work. Its aversion against strong odours is most relevant. As a consequence, the animal patient should not be washed with aromatic soaps or ointments. Repellents against parasites also keep the leech away. Essential oils like tea tree oil or peppermint oil obstruct the little helpers. It is indispensable that the animal owner arrives well informed for treatment.



Haematoma-Treatment © Anke Henne

Quiet surroundings as well as calmness of the animal owner and therapist are important

prerequisites of therapeutic success. No special tools are needed for the regular placement of leeches on the animal. The therapist puts on gloves as a hygienic measure against animal patient blood and as protection against unwanted leech bites.



Haematoma-Treatment © Anke Henne

To accomplish a precisely accurate placement, the leech can be placed in a truncated disposable syringe or small glass. It has been proved successful to let the leeches detect by themselves the proper areas of biting. In this case, they are placed simply in the affected area for an autonomous search. They usually bite into well circulated warm areas where they are most effective. They tend to suck until they fall off by themselves. A premature removal of the leech bears the risk of vomiting and infecting the bite area with the intestinal symbiont *Aeromonas hydrophila* or *Aeromonas sobria veronii*. It is known from experience that this also increases the subsequent itching.

The therapeutic effect is reduced in this case of premature termination, since the absorbed blood volume is smaller as well as the amount of saliva, and the secondary haemorrhage discontinues earlier. For the animal patients no particular wound care is necessary. The secondary haemorrhage cleans the wound sufficiently. After blood oozing, the wound immediately closes with a thin cuticle evolving rapidly to a crust. This keeps the wound clean. Sometimes it might be necessary in home living pets to protect the surroundings from leaking blood. In this case, a loose absorbent bandage should be applied. A baby's napkin or sanitary pad absorbing sufficient blood is well suited, while other bandages are too rapidly filled with blood. Compressing dressings stopping prematurely the bleeding must be avoided. This can lead to strong complaints due to

unpleasant vascular congestion similar to haematomas with substantial itching. Animal patients tolerate leeches very well, defence responses are rare. Hence, it is not necessary to keep the animals in a forced posture to ensure absolute rest. Horses can stand tied loosely or held by the animal owner on a long rope. Dogs and cats can move unrestrictedly in the room. They only must be monitored in view of the possibility to nibble or rub the bite area incited by the movement or fluid of the leech. Attention should be paid to larger dogs not to lay down on the treated side bruising the leeches.



Secondary Haemorrhage © Anke Henne

Animals have much less problems with after-effects compared to humans. The secondary haemorrhage does not frighten them. They simply lick off the dropping blood. No further unusual behaviour can be observed. They also show only rarely subsequent itching following the wound closure. Should this happen, the itching can easily be counteracted by anti-itching ointments or tea tree oil. If an infection with the intestinal leech *Aeromonas* bacteria is suspected, an antibiotic treatment is indicated. This infection is characterised by strong reddening, swelling, and itching. The secondary haemorrhage may last up to 24 hours. However, in animals the wound usually is closed much earlier. If the secondary haemorrhage lasts only for about 30 minutes, the efficacy of the leech treatment is still persistent since the saliva secretion has encouraged sustained metabolic removal processes. In cases of complaints in deeper compartments, in particular with equine laminitis, the treatment can be repeated after 1 or 2 days. This ensures the relief of the strain in these areas.

Example of Chronic Equine Laminitis Treatment

A nineteen years old pony mare had been suffering for about eighteen months from recurrent equine laminitis. The exacerbation episodes repeated at sporadic intervals with different manifestations. The relevant trigger could not always be recognised by the owner. However, each paddock change and extreme weather conditions were suspected as promotive factors. A rotation of the coffin bones was diagnosed by x-ray (12° or 15° respectively).



Equine Laminitis Treatment © Anke Henne

Renal and hepatic support (homoeopathic medication) had already been given by the veterinary alternative practitioner. In addition, the mare received anti-inflammatory drugs, anti-coagulants (Warfarin), and analgesics (Phenylbutazon/Equipalazone) in each exacerbation episode. The hooves were unshod because equine laminitis horse shoes had not been tolerated due to severe pain. The hoof shape had largely adapted to the natural form. Any outgrowing toes had been grated continuously over the last months. Nevertheless a distinct protrusion of the hoof sole (keratin formation, no regular coffin bone stretching) had developed over time. This protrusion had not further been grated by the blacksmith due to pain reactions.

Progress under subsequent leech therapy: The mare was treated for ten sessions with 2 to 4 leeches per leg. The supplementary treatment consisted of 15 ml NeyNerin no. 63 and twice daily Fega Coren no. 61 as oral drops in further support of the most vital detoxification functions. Short-term emerging distinct lameness was treated by Traumeel



Equine Laminitis Treatment © Anke Henne

tablets. Feeding procedures were changed: only muzzled grazing to prevent eating, furthermore mineral food with low protein content, stinging nettle and birch twigs, hay and wheat straw. The field shelter had been filled with plenty of sand to evenly strain the hoof soles. The intensified growth of the toes formed back within three months and the keratin growth improved substantially. As a hoof adjustment now was possible every four weeks the keratin formation of the hoof sole could now be removed step by step inducing the growth of hoofs in a healthy position. The rotated coffin bones seemed to be fixed again, since the mare then voluntarily trotted and galloped over the paddock. No more lameness was observed. The mare has been relapse-free for 15 months without any further therapies, while adhering to a strict diet sheet. The mare has been ridden now routinely for two years on all grounds and terrains, whenever possible at a gallop.



Summer Itch Treatment © Anke Henne

Authors:

Michael Aurich, MSc biol.
Production Manager,
Qualified Person for Pharmacovigilance,
Information Officer
Biebertaler Blutegelzucht GmbH / Germany
(e-mail: aurich@leech.de)

Anke Henne, alternative veterinarian /Germany
(e-mail: anke@tierheilpraxis-online.de)