

## **Laseracupuncture in Post-Operative Fields in Veterinary Medicine**

Uwe Peterman, DVM

### **Summary**

In this study the effect of laseracupuncture in prevention of post operative complications is documented by a lot of scientific investigations. The results of the most important investigations of laseracupuncture in intra and post operative fields are summarized and the findings of a long-standing personal experience in this field are reported.

Key-words: Laseracupuncture, Veterinary-medicine, postoperative treatment

### **Introduction**

In post operative fields often complications take place in primary infected wounds following injuries and by intra-operative hospital infection. In many cases these infections prevent operation success and often worsen the pre operative state of the patient. Laseracupuncture is introduced as a helpful treatment to avoid and to treat these complications.

### **Why laser -acupuncture?**

Laser -acupuncture is a very effective combination of two treatments which are very effective each on its own especially in wound healing. Laser radiation as a proper method to accelerate wound healing was first described by Mester in early 1969 and will be explained as a local treatment in the further lecture (Petermann U. 1998). Acupuncture is setting the cybernetic regulation in motion again not only for the local affected area but also for the whole body by regulating Chi- flow that is mostly stagnated or disturbed in wounds coming from accidents or operation, because of interruption of tissue. Or the

western point of view it restores disturbed vegetative regulation, what is the reason for long standing pain, inflammation, poor blood circulation, muscle contraction as we know from segment regulation complex by Bergsmann and Eder (1977). As ultimately all body functions, from coughing to the repair and healing of wounds, are controlled by such vegetative, nervous and hormonal regulation, it is easy to understand that acupuncture can have such a regulatory effect in treating so many types of disease.

### **Physiological basis of laser effects**

Research by Popp (1984) which established that biophotons play a fundamental role in cell communication by means of so-called "ultra-weak cell radiation" is one of the most important pieces of primary research into laser effects. This involves coherent, in other words, laser light. The DNA in the cell nucleus can be established as the source of the radiation. Warnke (1987) has specifically made exploratory studies of the infra-red laser. According to these absorption is by means of a so-called "antenna pigment" in the flavoprotein-metal-redox system, especially the FMN sulphur- iron- system in the first complex of the respiratory chain within the mitochondria. Here, absorbed laser photons are transformed directly into cellular energy. Phosphorylation from ADP to ATP increases up to 150% measured in standardized yeast- cell- cultures. Nearly the same photobiological effect is described by Karu (1987) and Smith (1991). This is particularly beneficial for unhealthy cells, cells in tissue modified by illness and cells working in wound repair, which have a particularly high energy requirement to perform their functions. The laser may play a decisive role by providing the necessary energy. Equally, an intense energy pulse in the nerve cells of the acupuncture points can lead to hyperpolarisation and thus to unblocking of irritations; whereby the demonstrable pain reduction can be attributed to the laser as well as it stimulates acupuncture points in the same way as needles. The healing of wounds and repair of damaged ligaments are processes requiring high energy inputs. With laser light, the energy required for the breakdown of waste building blocks and the synthesis of new building blocks for wound closure can be provided more quickly and ligament or

wound repair accelerated. These processes are very helpful in post-operative wound healing as well. Important investigations have been made by the pioneer of LLLT, E. Mester, on this topic, which demonstrated as early as 1969, that the proliferation of collagen threads and a marked increase in cell activity after 1-3 laser irradiation of wounds. The results justify the assumption that even in the area not directly irradiated, healing is significantly improved due to the increased diffusion of bioactive substances. In the meantime hundreds of scientific publications verify the effects of LLLT. I would like to select some investigations about confirmed laser therapeutic- and laseracupuncture -effects in human wound healing:

- 1.) wound healing (Mester E. et al. 1969)
- 2.) improved capillary circulation in micro circulatory conditions (Skobelkin O. et al. 1990)
- 3.) in infected abdominal wounds after surgery (Palmgren N. et al. 1991)
- 4.) skin-transplant surgery and plastic surgery (Ginsbach G. 1990)
- 5.) regeneration of nerve lesions and inhibited nervous functioning. (Midamba E.D. 1993, Rochkind S. 1988)
- 6.) tissue metabolism (Abergel P. et al. 1984)
- 7.) intra operative use in spinal cord operation (Rochkind S. 1991)
- 8.) in haemorrhagic effects on synovial membrane (Calderhead R.G. et al. 1992)

It was also established that the rate of increase was dependent on the pulse frequency of the laser radiation, the wavelength of the laser light used and the irradiation dosage (Fig. 2). Several investigations confirm a relation between dosage and effect to the extent that too small irradiation dosages have no positive effect, but then with increasing dosages an increased effect up to a maximum can be achieved. If the dosage is increased further, the stimulating effect is reduced until the previous, non-irradiated condition is reached again. Further studies show that a negative, destructive effect cannot be demonstrated, even with prolonged irradiation (30 minutes).

In the following I will introduce some investigations about lasertherapy and laseracupuncture supporting operations, accelerating wound healing and treating post operative complications especially made in veterinary medicine:

- 1.) Lasertherapy in treating equine injuries (Kerns T. 1986)
- 2.) Lasertherapy in general (Basko I. 1983)
- 3.) Laser- effects in soft tissue in veterinary medicine (Lloyd et al. 1991)
- 4.) A study of the effects of lasering on chronic bowed tendons. (McKibbin L. and Paraschak D. 1983)
- 5.) Laseracupuncture in postoperative infected tendovaginitis and joints in horses. (Petermann 1999)

Despite these intensive studies, the optimal laser power to be used for therapy and the length of treatment can still not be clearly established, since there is naturally a considerable difference between the shaved skin of the laboratory rat and the hairy skin of a dog or horse. On the basis of my own experience, one can presume an optimal effect on surface structures in veterinary medicine for laser output of 50-100 mW (continuous beam) or 50 - 100 W peak pulse power (pulse lasers) over an irradiation time of approx. 20 - 40 sec. For deeper structures, articular cartilage in post minimal invasive surgery, ligaments, fistulae, post or intra operative radiation of deeper wounds, the treatment duration must be increased to approx. 2-3 min. per point.

A very important theme we have to speak about it is not only energy input into tissue by laser but also Impulse frequencies in Pulse-lasers and modulated frequencies in cw-lasers. When these laser- frequencies (not wavelength or frequency of the laser light) are in resonance with the radiated structures of the body, we have very much better results than with every other frequency, that is not in resonance. This is common knowledge of day to day use for more than 20000 doctors which are members of the European Academy for Acupuncture and Auricular- Medicine and the members of the French Nogier- school, which use the Bahr- and Nogier- frequencies.

The foregoing summary of the current state of knowledge in laseracupuncture in post operative fields shows unambiguously that the laser may be used effectively for the re establishing of traumatised tissue as well as for acupuncture treatment. Optimal post operative treatment for individual patients thus involves local laser irradiation in combination with appropriate acupuncture points. The points which are suggested in the following are very helpful but can only be meant as cook- book -points and of course should be complemented by individually indicated points.

### **Healing of wounds**

The most simple but nevertheless very effective indication for laseracupuncture is the encouragement of wound healing after trauma or operations, in particular when a rapid resilience of the wound closure should be achieved or the wound is located in an area which is difficult to immobilise, such as joints. Even in many cases of infected wounds, where normally long-term drainage would be required after surgical intervention, per primam healing can often be expected after laseracupuncture and suture dehiscence can be avoided. With wounds with larger loss of skin surface or after the removal of larger areas of hypergranulation tissue wound closure normally occurs very quickly and without complications. Laseracupuncture proved effective in the following trauma-related inflammatory conditions: acute distortion, capsule tearing, pulled muscles and haematoma. All these conditions we find normally after operations. Following acupuncture points are indicated in general: Liv 3, Sp 2 and of course the ting -point of the affected channel.

### **Primary or secondary infected wounds**

Even when wound inflammation has taken place in primary or also secondary infected wounds the treatment is also very effective in acute and chronic inflammation of the pastern and of acute and chronic infected tendovaginitis and joints. A markedly more rapid and complete reduction of accompanying tissue swelling and other symptoms of inflammation such as pain and heat also occurs.

As one sees laseracupuncture is also exceptionally useful in infectious local inflammations. In very many cases of post operative phlegmonic processes, e.g. from wound infection, can be cured when previous treatment with antibiotics have proved ineffective and, much easier, can be avoided when carried out before infection had taken place . Laser irradiation also has an outstanding effect on the maturation and demarcation of suppurative tissue. Purulent, acute and chronic sinusitis in dogs and even in horses can usually be effectively treated with laseracupuncture, after tooth extraction or trephination of the maxillar sinus, whereby normaly when laseracupuncture has been done first, the affected tooth mostly does not have to be extracted and the maxillary sinus does not have to be trephined. With fistula formation and disturbance to the wound demarcation and above all for deep wounds, laseracupuncture is to be highly recommended. There have even been cases of old scars in which the demarcation had clearly not been closed, opening again after 1-2 laser treatments, cleaning themselves and finally closing up again. Lastly, I would like to cite the highly effective option of treating infected joint and tendon sheath inflammations. At commensurate cost, in most cases excellent treatment success can be expected here. Two of these patients I will introduce as case studies in the further lecture.

When the wound before or while operation has become infected you need for demarcation: Th5, Sp 4, Gb 41, Ki3 .

### **Eye conditions**

With regard to eye conditions laseracupuncture is indicated to avoid postoperative complications after eye surgery as corneal injuries, ulcer corneae, and panophthalmia. In the eye laser irradiation is to apply strictly tangential to avoid retina irritation..

Acupuncturepoints are St 1, Th 23, Bl 1. Liv 3, Sp 2 and Gb1. In panophthalmia You can complete with Gb 41 and Th 5.

### ***Castration wounds***

After castration above all in stallions laseracupuncture is a very good method to prevent secretion congestion and inflammation with big swellings of the scrotum.

Intra operative radiation with frequency b from Nogier is to combine with acupuncturepoints Bl 23 and CV 3. When the wound is still infected you can apply local radiation with frequency A from Nogier and give Ki 3 and Th 5.

### **Postoperative prevention in disturbing foci**

At last I we have to speak about a very important preventive therapy after operation. I mean therapy of disturbing foci as scars. I know it is not really accepted by the whole scientific community, but I saw in much more than thousand cases how it immediately can work in chronic pain and allergy e.g. To take care for these problems laseracupuncture can set demarcation of tissue in motion and prevent the wound becoming a disturbing focus. You also can treat old scars that have already been established as disturbing focus with local fr. A and Ki 3 and Th 5.

### **Patients of this study**

All patients of this study had very serious problems with infections after operations, which have had not been cured by normal treatment for a long standing time. One infection in the shoulder joint of a horse was caused by a sharp wooden post which had broken through. Post operative drainage and douche could not stop secretion, suppuration and suture dehiscence. In another patient a postoperative infected tarsitis followed a chip operation (in a clinically completely healthy horse), and in another one a postoperative infection of the digital synovial sheath of the fetlock resulted following an operation on the palmar annular ligament of the fetlock. Four stallions had fistulas of the funiculus testis and chronic swellings with lameness after castration. One dog and one horse had persistent purulent sinusitis after trephination and tooth- extraction. One dog had a fistula and extreme lameness after 3 operations from elbow-osteocondrosis dissecans. One horse had extreme pain in the operation- area after kissing spines-operation for several months. One horse developed a necrotic laminitis of both hindlegs after castration.

Prior to the start of laser acupuncture treatment, all of the patients had exhausted all conventional medical therapies over a long period of time, some of them in several clinics. The prognosis in most cases was either unfavourable or it had been suggested that the animal should be put to sleep. All of the animals were given anywhere from 9 to 20 laseracupuncture- treatments with individually selected acupuncture points. Treatment was carried out with an impulse laser (60 watts and 90 watts pulse peak power, 200 nsec pulse width, from Reimers und Janssen, Berlin). Following laseracupuncture all of the patients had succeeded in getting a very much better state and after a convalescence period it was possible to work again with all of the horses.

### **Case study 1**

A chip in the right ankle joint was noticed during a preventive X-ray examination of a two-year-old crossbred stallion. Following an endoscopic removal of the fragment, an infectious tarsitis developed. This was first treated by the clinic where the operation had taken place. Intensive treatment followed at three other clinics. 6 months after the operation, I examined the horse. The horse did not set the diseased limb down and only with great effort could it move forward with three legs. The circumference of the joint was 61 cm (a normal tarsal joint measures 42 cm). (Picture . 1 + 2). After fourteen days or seven treatments, the circumference of the joint had been reduced to 47 cm, and the horse could be walked and also be exercised at a trot (Picture 3 + 4) for about 5 minutes. After trotting for approximately one minute, the horse was able to move without a limp. After the third day of exercise, a new feverish inflammation of the joint appeared spontaneously, with over 41°C body temperature and pronounced swelling of the joint. During the acute phase, the inflammation was treated with antibiotics (parenteral and not intra-articular). After approximately four weeks with twelve additional treatments, the patient was released and gradually began training to full capacity at home in the following 3 months.



### **Case study 2**

Following a routine endoscopy of the digital synovial sheath of the fetlock in a six-year-old crossbred gelding, which took place within the scope of an operation on the palmar annular ligament of the fetlock, the healing of the wound was disturbed by a continuous discharge of synovia. Despite intensive therapy by the clinic where the operation had been performed, there was at first an infection of the tendon sheath and a necrotizing inflammation in the area where the operation took place. Six weeks after the operation, the clinic decided to suggest euthanasia to the owner, as continued deterioration of the horse's condition seemed definite and the infection of the tendon sheath could not be controlled. However, the owner decided to try acupuncture treatment for the horse, a decision which was strongly opposed by the clinic. These were the findings: approximately 6 areas about 2 cm large wounds with synovial tissue and fluid, and a necrotic centre. (Picture 5). A brisk walk was indeed possible, but only with a high degree of lameness. The foot was set down only at the tip of the toe. Due to the adhesions of the tendon sheath, it was not possible to use the fetlock joint to press down. The circumference of the fetlock joint was 49 cm (a healthy joint measures 43 cm). After two treatments (two days, see Picture 6), no further secretion from the tendon sheath could be determined. A marked necrotic area of approximately 1 cm in diameter was considerably reduced (circumference still 46 cm). After five days (five treatments), the wound was completely dry and had shrunk to half its original size. After ten days the wound had almost completely closed (Picture 7); there was now only a slight lameness when walking, which gradually disappeared. Even in trotting, only a slight to medium limp was noted. After a total of fourteen days of treatment, the patient was released, where it was receiving additional daily laseracupuncture treatments on scissors -marked points from its owner. The horse is gradually increasing its walking and trotting in order to further loosen the adhesions and to continue reducing the tendon's contraction.

### **Case study 3**

A 3 year old gelding had a very serious post operative fistulation of the funiculus testis with a durable big swelling and stiffness of the hind limb. After 3 month period of therapy with several antibiotics by two different clinics and a second operation the gelding had a serious lost of weight and the fistulation had not been stopped. Laserpuncturetherapy consisted of 7 treatments with 5 minutes local laser-radiation frequency A from Nogier of the funiculus and laseracupuncture of the points Bl 23, Ki3, 3H5 and Sp 4 were carried out with an interim of 3- 4 days. At the end of the therapy the fistula had been closed and the stiffness of the hind limb had disappeared.

### **Case study 4**

A 5 -year old Collie had 3 re-operations after a osteochondrois dissecans operation in the left elbow joint, because of fistulation of the wound. In spite of this and ongoing treatment with antibiotics and anti -inflammatory drugs, drainage and douches, now, more than 1 year after the first operation the dog still had fistulation and very serious pain, without any function of this leg. Four sessions with laseracupuncture with an interim of one week were carried out. Between the sessions the dog received the daily local laser -radiation on the fistula and the elbow joint by ist owner for 15-20 minutes. The acupuncture was carried out as follows: locus dolendi treatment of the fistula (frequency A) and the shoulder joint (frequency C from Nogier)with 50 Watt impulse -laser. Acupuncture points were found by controlled acupuncture: Li1, Sp2, Ki3, 3H5, Bl11, Gb41. Not any other treatment was done during acupuncture. When the dog came to the 4<sup>th</sup> treatment, the fistula had closed and the leg was in function again, but with a residual of lameness. The rest of the lameness disappeared in the next 4 weeks without further treatment.

### **Case study 5**

A 9 year aged dachshund had a sinusitis maxillaris with evil stinking green pus coming out of the nose. In the time before he came to acupuncture a long standing

therapy was applied and at its end two molars had been extracted to overcome the chronic purulent sinusitis, but nothing happened until 2 month after extraction when acupuncture was started. Three treatments with laseracupuncture were carried out. Local treatment of the operation area (tooth extraction) with frequency A and the sinusitis area (frequency 7 from Bahr) was combined with acupuncture of Ki3 and 3H5 (both frequency 5 from Bahr). When the dog came to 2<sup>nd</sup> acupuncture treatment one week later the purulent secretion had nearly stopped and the extraction wound started to heal. One week later, before the third acupuncture session there was no more pus coming out of the nose and no more sneezing, the dog had very much better appetite and was in good state.

#### **Case study 6**

A very good competition horse (jumper) had had a very serious pain still 10 weeks after kissing spine -operation on Th7th/Th8th. The pain was so hard, that the horse was extremely anxious to be touched in the operated area, when it came for acupuncture. The operation wound had closed and showed no sign of inflammation. During the previous treatment antiphlogistics, cortisone and for 2 weeks antibiotics had been given. The very valuable horse was in danger of being euthanized. The following acupuncture treatment was carried out: local treatment of Th7th/Th8th with frequency A (anti inflammatory frequency) and frequency E (frequency for the spinal cord). With RAC/VAS- control Gb41 (prostaglandinE1-point) and Th 5 (corresponding cardinal-point to Gb41 and thymus -point of the ear-acupuncture and so main -point against chronic inflammation). Emmediately after the first treatment the pain in the operation field had completely disappeared, even when strong pressure was applied. Five treatments, one a week, were necessary for complete restoring of the horse. After the 2<sup>nd</sup> treatment the horse could be started with training and after 8 weeks was placed in a „S“ (difficult) jumping tournament.

### **Case study 7**

An 8 year old Arabian stallion got 3 days after castration a serious necrotic laminitis on both hind legs by nearly complete stagnation of liver and kidney energy -flow. He came to me nearly standing only on his front legs. In spite of the very hard pain and the very bad prognosis we wanted to give him a chance for two days. We decided to put him to sleep, when pain did not get better after this time. Because of his very bad conditions of the liver and the 3 day former given necrosis we tried to remove the hoof-horn with nerve block and neurolept- analgesia. A complete digital nerve anaesthesia was not able to remove the pain. Even fibularis- and tibularis- nerve anaesthesia had no good result. After surgery we saw large areas of necrotic laminitis on both hoofs (picture 8 and 9)). The daily treatment was local laser radiation of the hoof and the castration wound with fr. A from Nogier. We made daily new bandages with mild antiseptic fluids with homeopathic dilution of Calendula, Echinacea and Arnika . Acupuncturepoints found by RAC were given all 2 days: Bl 23, Bl 18, Liv 13, CV 3(area), Liv 3 as tonifying point and Ki 3 as source point. Two days later we observed a clear reduction of pain and after further 2 days we saw a very good demarcation of the necrotic areas (pictur 10 and 11). After 3 weeks we had completely closed dry hoof horn and gave him back home to his owners. 1 month later he jumped over his pasture fence and made an excursion into the nearby wood.

### **Discussion**

In all the patients, it could be seen that laser acupuncture had a rapid influence on demarcation and inflammation. On the other hand, restitution of the degenerative consequences of the inflammation, including adhesions, defects in the cartilage and similar problems presented considerably greater difficulty and required far more time. Nonetheless, healing was achieved in all cases. These cases clearly demonstrate how it is possible to expand the limits of therapy with the help of laser acupuncture. There should also be said, that many operations can be avoided, if acupuncture would be tried as therapy before (without castration). Anyway, laseracupuncture is shown as a

very good method to reduce post operative pain and to accelerate wound healing. And also in many cases, when an operation has not had the beneficial effect that was intended because of complications after the operation. But even in such cases, when the operation has worsened the former state of the patient, laseracupuncture is a possible way to help in many of them.

### References

- 1 Basko I. (1983). A New Frontier: Laser Therapy. Calif Veterinarian.; 10: 17.
- 2 Bergsmann, O. (1977) : Die biokybernetische Wirkung der Akupunktur im klinischen Versuch. Dtsch. Ztschr. f. Akup. 5, 131ff
- 3 Calderhead R.G. et al. (1992) A Study on the Possible Haemorrhagic Effect of Extended Infrared Diode Laser Irradiation on Encapsulated and Exposed Synovial Membrane Articular Tissue in the Rat. LLLT-Reports, 1992, 65-69
- 4 Ginsbach G. (1990) Laser Biostimulation in Plastic Surgery. Laser Therapy, 1993, 169-173
- 5 Karu T.I. (1987) Photobiological Fundamentals of Low-Power Laser Therapy. IEEE Journal of Quantum Electronics QE-23, 1703-1717
- 6 Karu T. et al. (1993) Suppression of human blood chemiluminescence by diode laser irradiation. Laser Therapy 5, 103-109
- 9 Kerns T: HeNe Lasers Show Promise in Treating Equine Injuries. Lasers & Applications. 1986; Dec: 39.
- 7 Maeda T. (1989) Morphological Demonstration of Low Reactive Laser Therapeutic Pain Attenuation Effect of GaAlAs Diode Laser. LLLT-Reports, 1989, 23-31
- 8 McKibbin L. and Paraschak D. (1983): A Study of the Effects of Lasering on Chronic Bowed Tendons at Whitney Hall Farm Limited, Canada, January, Lasers in Surgery and Medicine. 1983; 3: 55.
- 9 Mester E. et al. (1969) Experimentelle Untersuchungen über die Wirkung von Laserstrahlen auf die Wundheilung. Z. Exper. Chirurgie 2, 94-101
- 10 Midamba E.D. (1993) Low Reactive-Level 830nm GaAlAs Diode Laser Therapy Successfully Accelerates Regeneration of Peripheral Nerves in Human. Laser Therapy 1993, 5, 125-129

- 11 Oshiro, T., Maeda, T. (1993) Application of 830nm Diode Laser LLLT as Successful Adjunktive Therapy of Hypertrophic Scars and Keloids. Laser Therapy 1993 155-166
- 12 Palmgren N. et al. Low Level Laser Therapy of infected abdominal wounds after surgery. Lasers Surg Med. 1991; Suppl 3:11.
- 13 Petermann, U. (1998) Lasertherapie in der Veterinärmedizin. Vet Impulse 24, 12-13
- 14 Petermann, U. (1999) Laserakupunktur bei infizierter Tendinitis des Pferdes. Prakt. Tierarzt 1/1999
- 15 Popp, F.-A. (1984) Biologie des Lichtes, Paul Parey, Berlin/Hamburg
- 16 Rochkind S. et al. (1991) Intraoperative Clinical Use of LLLT Following Surgical Treatment of the Tethered Spinal Cord. LLLT-Reports, 1991, 113-117
- 17 Smith, K.C. (1991) The photobiological Basis of Low Level Laser Radiation Therapy. Laser Therapy, 19-24
- 18 Skobelkin O.K. et al. (1990) Blood Microcirculation under Laser Physio-and Reflexotherapy in Patients with lesions in Vessels of Low Extremities. LLLT-Reports 1990, 69-77
- 19 Warnke, U. (1987) Wie Licht-Energie zu Zell-Energie wird. Ärztliche Praxis Jahrg. 97, 3039-3040