MLS® Laser Therapy in a dog with a recalcitrant wound suspected of being caused by a spider bite

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ABSTRACT

Poisonous arachnids may be present in some European countries and live in uncultivated lands or damp meadows or in general, can be found among the blades of grass and twigs of the bushes. [1,2] In Italy, there are several spider species as Yellow Sack spider (*Cheiracanthium punctorium*), Violin spider (*Loxosceles Rufescens*) or *Tegenaria Agrestis*, which possess dermonecrotic venom. [3] However, spider bites have only rarely been reported in veterinary medicine, mostly because, due to their secretive behavior, it is difficult to confirm their involvement in skin lesions. This case report describes the application of MLS® Laser Therapy in the management of an extended necrotic lesion in the left forelimb of an adult dog, presumably bitten by a spider in the countryside.

CASE REPORT

A 6,5 years old, neutered male Golden Retriever was presented to the emergency department of Istituto Veterinario di Novara (NO)- Italy, for the complaint of a painful and erythematous swelling of the left forelimb paw which was causing a severe lameness. The owner reported that the patient was running in the countryside and suddenly, he started yelping and then limping on the anterior limb. The initial condition was an edematous and painful distal extremity where no wound was instead detected. The patient was hospitalized and several bloodwork including a coagulation profile, pre-anaesthetic echocardiography and a CT scan were performed. No foreign bodies or bone alterations were observed, and not severe changes were revealed in the blood analysis other than those due to the ongoing inflammatory process as leukocytosis, increment of creatine kinase, c-reactive protein, and mild increase of total proteins. Despite a proper care of the patient and antibiotic therapy with a broad-spectrum antibiotic, a rapid worsening of skin conditions with ulceration and tissue necrosis spreading through the subcutaneous tissue until the scapular area was observed.

A second opinion was requested to the dermatology service that performed microscopic examination of cytologic cutaneous preparations together with microbiological cultures and multiple skin biopsies. In the meantime, a surgical debridement was carried out. Amorphous debris, neutrophils, and macrophages with a variable number of lymphocytes and plasma cells were detected together with few coccoid bacteria in cytological samples. A coagulase-negative staphylococcus was isolated from the sample, and according to the sensitivity test results under CLSI VET standards, the systemic antibiotic previously chosen was maintained. Dermatopathological findings revealed severe and deep necrosis, edema, intense mixed inflammation, both neutrophilic and macrophagic, and fibrin accumulation. All these findings supported the hypothesis of a bite, presumably due to a spider. However, the wound became difficult to manage and hard to heal and while predicting walking ability following the possibility of the forelimb's amputation, MLS® Laser Therapy (MLS® Multiwave Locked System) as a non-surgical option for accelerating the wound healing procedure and relief pain was

Figure 1

Figure 2

proposed by the dermatological service. The device used was a Class IV therapeutic laser diode device (MPHI Vet Orange, ASA Laser, Arcugnano – Italy), with the following technical features: power up to 1.2 W, Peak Power 75 W, pulse characteristics: Multiwave Locked System (MLS®) (808 nm and 905 nm-wavelength continuous and pulsed, synchronized and combined emissions), Figure 1 shows the left forelimb at time 0. Treatment duration per session was adapted to the normal clinical setting and programmed in a every other day basis. The ongoing treatment protocol was then adjusted based on several factors mostly related to the skin wound healing progression, patient's clinical status and owner's compliance. During the first two weeks, the combination and synchronization of the specific continuous and pulsed emissions of the instrument allowed to irradiate the exposed wound both in the center and then along the margins according to the infected wound protocol (Freq: CW, 100% intensity, 1,95J/cm^2). After these weeks, the protocol non-infected wound was used (Freq:584Hz, 100% intensity, 2J/cm^2). Before each laser therapy treatment, the lesion was rinsed and cleaned with sterile saline solution to remove debris from the skin and then the lesion was dried with sterile gauze to avoid excessive moisture. After each session, a soft non-woven sodium carboxymethylcellulose fibers moist-retention dressing was used. The systemic antibiotic was stopped at 30th day after starting laser therapy. The laser sessions were stopped at 120th day when almost all of the lesion was re-epithelialized (Figure 2).

METHODS

Relatively little evidence is available regarding spider bites. In the present case report a spider bite was suspected because of significant data gathered through medical history, skin lesion progression and dermatopathological findings. Other insects or reptiles such as snakes, could have been the cause of the lesion since the owners did not see what animal bit the patient. However, although in Europe and in Italy, two types of venomous Viper are found, the most common associated clinical signs are represented by variable severity of local swelling at the bite area, mental depression of short duration in most dogs, with some dogs also having transient clinical signs that could be indicative of cardiac injury and/or transient biochemical signs of liver injury. [4] In this case, our patient did not develop systemic clinical signs, nor the fangs mark could be found in the paw at the time of the clinical presentation, therefore suggesting that no snakebite occurred. The application of laser therapy helped to stop the necrosis progression and reduced the need of further surgical reconstruction and systemic antibiotics during all the wound healing process. The outcome was the preservation of the limb from any amputation with a high quality of the motility of the affected leg. Several in vitro and in vivo studies confirm that laser therapy helps to restore the biological functions of injured cells [5,6] It is observed an increased activation and production of growth factors which stimulate angiogenesis. These processes together with increased blood flow because of the vasodilatory effects of nitric oxide, may rise the oxygen supply to the wound. This enhances fibroblast proliferation and increases the granulation tissue. [6] Even there is a lack of well-designed clinical trials and studies on the use of MLS® laser therapy also in veterinary medicine, in this report there is enough evidence to justify its use in daily practice by trained clinicians.

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