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Laser therapy in the treatment of necrotizing fasciitis – a case report.

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ABSTRACT

The aim of this report is to highlight the benefits of the MLS® laser system in the management of necrotizing fasciitis (NF).

A 6-year old, cross-bred bitch, presenting necrotizing fasciitis in the perineal region and hindquarters, is admitted with septic shock and remains in intensive care for three days. The necrotic tissue is cleaned out, wet dressings are applied together with the use of a MPHI Multiwave Locked System (MLS®) laser. After necrotic tissue has been completely removed, skin resurfacing and regrowth of hair were achieved in 45 days, and the resulting scars are small and supple.

The results establish that the application of MLS® therapy in the treatment of necrotizing fasciitis helps to reduce drug therapies and recovery times.

INTRODUCTION

Nectrotizing Fasciitis (NF) is often associated with systemic signs of sepsis and septic shock, which arise as a consequence of the release of bacterial toxins and a systemic inflammatory response.

In veterinary medicine, beta-hemolitic Streptococcus is the microorganism which is most frequently involved. When the skin barrier is broken through puncture wounds, micro-organisms reach the subcutaneous tissue and fasciae. Once the subcutaneous space is reached, the tissue is destroyed locally as a consequence of the production of exotoxins and bacterial proteases. The toxins cause necrosis, and necrotic tissue serves as a locus for bacterial proliferation and so forth. The progression can be very quick and septic shock and organ failure can occur within hours.

MATERIALS AND METHODS

The case concerns a 6-year-old, cross-bred, sterilised bitch of medium size, 12 kg in weight. It was admitted to the emergency room with septic shock. The owner reported that the animal had been missing for 24 hours. It presented two puncture wounds in the perianal region, which appeared extremely painful, hot and show local inflammation.

After 24 hours the perineal region, both cranial and distal, became greyish, with necrotic tissue and absence of bleeding, with exudative and odorous fluid in the thickened subcutaneous area Fig.1.

Figure 1 - Necrotic tissue affecting the skin, subcutaneous tissue and fasciae.

Figure 2 - Appearance of the lesions on day 20.

The infectious nature was determined by means of cytology of the exudates, and it was possible to observe degenerated neutrophils and abundant coccoid bacteria arranged in rows. In the analytical study it was possible to observe leucopenia, thrombocytopenia (due to consumption and activation of the coagulation), hypoalbuminemia, hypoglycemia, and elevated liver enzymes. Through the use of ultrasound, fluid and gas were visible between the subcutaneous region and fascial planes, in a fuzzy manner. There were no foreign materials and an abscess was ruled out. On the basis of the physical examination and the outcome of the tests, the clinical diagnosis of NF was made. The patient was admitted to the intensive care unit and provided with treatment for shock in order to hemodynamically stabilize it. Antibiotic coverage was provided with ampicillin 30-50 mg/kg/8h, IV (Ampicillin® 500 mg, Biosano) and amikacin 10 mg/kg/24h, IV (Amikacin® 250 mg, Normon). Pain was controlled with methadone 0.4 mg/kg/4h SC (Metasedin® 10 mg, Esteve) and an infusion of ketamine (Imalgene®, Merial) during the first 24 hours. In less than 24 hours, the subcutaneous tissue and deep fasciae were easily separated and an aggressive surgical debridement of the infected necrotic tissues was carried out. These debridement procedures were repeated 3 times, at 3-day intervals.

After the first surgery the general state of the patient evolved favourably.

In addition to the surgical management, wet dressings were applied with honey, and Balsam Peru and Castor oil (Linitul®, Alfasigma) every three to four days until complete re-epithelialization was achieved.

The treatment protocol included 10 sessions of laser therapy throughout the affected area. Mphi Vet Orange equipment was used with two sources of wavelength. A diode laser that emits at 905 nm wavelength, 1-2000 Hz and a peak power of 25W and another diode laser with a wavelength of 808 nm, which may be continuous (1.1W peak power) or frequenced (1-200 Hz, 550 mW). A duty cycle of 50% was selected. It was used in sweep mode over an area of 150 cm^2 (including 3 cm of the healthy edges) and modifying the total area depending on the surface to be treated. Before the first surgical cleaning, the protocol for acute inflammation (3 sessions: 0, 12 and 36 hours) was used. In the successive sessions, the infected wound protocol was used and subsequently the one for non-infected wound was used. Treatment schedule is reported in Table I. Lesion appearance after 20 days is shown in Fig.2.

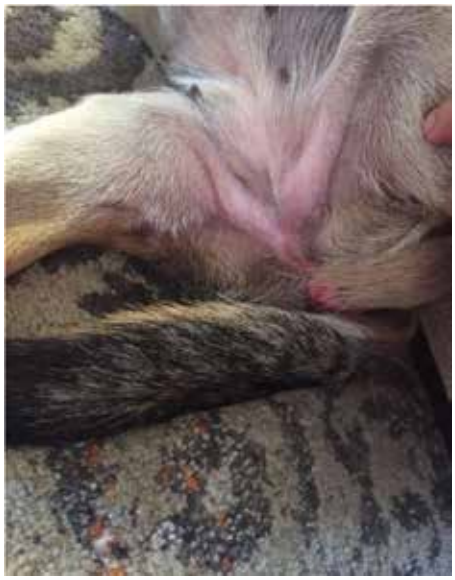

Figure 3 - Scar tissue.

RESULTS

After 20 days, laser therapy has been suspended but the patient was still monitored to control lesion healing. Full recovery was attained after 45 days of treatment (Fig.3). The lesion showed gradual and progressive improvement from the first treatment session, thus speeding up the repair of damaged tissues. The infectious process is stopped and grayish and cornered necrotic tissues are removed in the first days. The extensive affected surface soon appears covered by reddish granulation tissue and a bright appearance. The margins of the lesion are contracting at a speed greater than expected and it is also noticeable the regrowth of the hair at the edges of the scar tissue.

DISCUSSION

When the patient was admitted, it was possible to observe two puncture wounds. In the beginning, the lesions observed did not seem to correspond with the gravity of the general state of the patient. NF is an underdiagnosed pathology and the definitive diagnosis is made by means of culture and histopathology. The rapid progression and threat to life of the patient justify the fact that therapeutic decisions are made on the basis of presumptive diagnosis, as was done in this case. The aggressiveness and timeliness of the surgical debridement are the only predictive variables of successful progress [1,2].

Treatment is based on the stabilisation of the patient, pain management, antibiotherapy and cleaning out of the affected tissue. The use of fluoroquinolones is not recommended because they can induce bacteriophage encoders of super-antigen genes that can lead to increased bacterial virulence in these patients. The use of NSAIDS is not recommended either because of the potential negative effect on the immune system, facilitating the spread of infection [3].

In this case report photobiomodulation was used, with excellent results. The speed of wound healing was higher than expected, and it was not necessary to perform reconstructive plastic surgery. Scar tissue was flexible and not painful, consistent with results described in the

literature [4].

The application of laser therapy significantly reduced the length of the first phase of debridement and infection control. The application of the described clinical protocol allowed the tissues to heal faster. Laser can help tissue stimulation, therefore decreasing the time needed for wound healing.

The final result is that due to the application of laser therapy, the necrosis stage is controlled much more quickly and tissue damage is reduced, healing is accelerated and a complete regeneration of tissues is achieved, without the need to resort to reconstructive surgery. In addition, this reduces the time and amount of medication that needs to be administered to the patient, with the consequent benefits for the patient, with a decrease in the emergence of bacterial resistance and savings for the owner.

The author finds that this technique is a useful tool as an adjunct to other treatments, improving the effectiveness of those treatments, with no observed adverse effects, and providing added quality.

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Table I - Treatment schedule.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 10	Day 13	Day 16	Day 20	Day 20-40
Lasertherapy MLS®	√ √	√		√		√		√	√	√	√	√
Amikacin/24 h Ampicillin/24 h	√	√	√	√	√	√	√					
MLA Infusion	√											
Carprofen			√	√	√	√	√	√				
Buprenorphine Patch		√			√							
Wet dressings				√		√		√	√	√	√	√