



LASERS IN DENTISTRY: OUR APPROACH TO SEVERE LINGUAL ULCER IN FELINE CHRONIC GINGIVOSTOMATITIS ASSOCIATED TO FELINE CALICIVIRUS

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Summary

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Lasers' utility is extending more and more nowadays, coming up to support conservative treatments. Even more, pathological entities for which conservative treatments have produced uncertain, poor or less repetitive results may find their key to success with the help of diode lasers. Feline calicivirus is an infectious agent that commonly affects cats. Various theories regarding the eventual link between feline chronic gingivostomatitis and feline calicivirus are available, but with no certain results. Druet & Hennet (2017) stated the correlation between the high viral load of Feline calicivirus and the presence of lingual ulcers. This case report was conducted to see whether the use of diode lasers in healing lingual ulcer associated to Feline calicivirus would decrease the healing time without dental extraction. The reported healing time, with no repeatable treatment, but with dental extractions had an average of 33.5 days. A 2 years old domestic short haired cat, neutered, male with gingivostomatitis associated to Feline calicivirus was presented to us as for the late 6 month the lingual ulcer would not heal. The cat was feeding itself with difficulty, swallowing unchewed food. It lost 800 g in the last month. We decided to treat it with a diode laser with a wavelength of 940 nm, power: 1W, pulse mode: continuous, irradiation time: 1 sec/every touch, tip diameter: 300 µm. Spectacular results were obtained as at 96 h from our first laser session, complete and final healing of the lingual ulcer, without dental extraction was achieved. It became energetic, the overall tone was significantly improved as reported by the owners. In the present case report, we demonstrated that the innovative technology of diode lasers may be a reliable alternative to conservative treatments in lingual ulcers in veterinary dentistry.

Key words: diode lasers, Feline calicivirus, lingual ulcer

Feline calicivirus (FCV) is an infectious agent that causes upper respiratory tract disease (URD) and oral ulceration and sometimes febrile lameness or subclinical infection. (Gaskell *et al.* 2004). There are several theories about the link between

feline chronic gingivostomatitis and feline calicivirus, but none of them with certain results. It was stated in 2017 that there is a correlation between the high viral load of Feline calicivirus and the presence of lingual ulcers, reporting a healing time, as-

sociated with dental extraction, in various types of a median time of 33.5 days (range 14, 189 days; mean 63.3 ± 53.8 days) (Druet & Hennet, 2017). A repeatable treatment with reproducible healing time prediction does not exist at this time, so, all those facing up this situation have an acute frustration, trying to find the perfect recipe. Medicine will seek for answers, doctors will try innovative treatments in order to reduce the suffering time and pain intensity for their patients. As we all know, the first step when facing up this pathological entity is to increase immunity, decrease the oral inflammation, remove the irritating local factors, like dental plaque, and of course to reduce the existing local pain. Dental extractions will solve part of these problems, but, there is a percentage of cases that do not improve significantly, even if dental extractions are performed (Druet & Hennet, 2017).

Medical lasers are expanding more and more in dentistry, offering alternatives in treating complex cases. Understanding their action mechanism and their interaction with the tissues will tell us where, how and how long should we use them.

Case presentation

A 2 years old, domestic short-haired, neutered, male cat was presented to our office. For the late 6 months it has visited several specialists in order to manage the oral pathology. The patient was feeding itself with difficulty, only dry food which was swallowed unchewed. Episodes of pain, expressed by yawning were present. Our patient lost 800 g weight.

Diagnosis of Feline calicivirus was based, in the very beginning on the typically clinical symptomatology: upper respiratory tract disease (sneezing, presence of abundant nasal and ocular secretions), lingual ulcer, caudal stomatitis, hair loss.

FIV, FeLV tests were negative. Our previous colleagues managed to treat the upper respiratory tract disease, but the oral cavity problems persisted despite topical applications of various substances.

Oral examination under general anesthesia revealed:

- extensive caudal stomatitis with moderate inflammation, without spontaneous or induced bleeding, without any proliferation or ulceration.
- on the dorsal side, in the caudal region, the tongue presented a bleeding lingual ulcer: 3 cm length/0.5 cm wide/4 mm depth (Fig. 1).
- alveolar gingivitis with average severity.
- no teeth mobility.
- absence of upper and lower incisors.

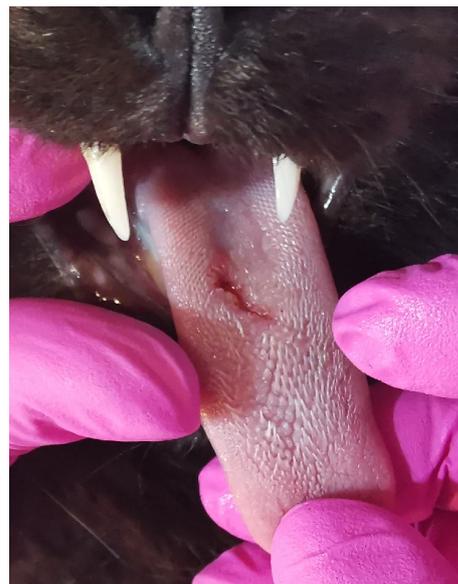


Fig. 1. Image of the lingual ulcer at the first appointment.

Considering that every treatment was tried on this patient, less than dental extractions, our possibilities for conservative treatment were greatly restrained. Thus,

we proposed subtotal mouth extractions, based on a cone beam computed tomography (CBCT) exam, but in a subsequent session, after epithelisation of the lingual ulcer. Opening other bleeding wounds would have decreased the healing chances, and increased local pain.

CBCT revealed us the cause for alveolar gingivitis as the vestibular alveolar bone of the premolars and molars was resorbed (Fig. 2).



Fig. 2. Cranial reconstruction, left side of the head, based upon CBCT images, where the lack of the alveolar bone in the lateral part can be seen.



Fig. 3. Clinical intraoral view, left side.

We decided to use a diode laser based on our experience with it in human oral pathology. Thus, the parameters used were:

- Wavelength: 940 nm.
- Power: 1 W.
- Pulse mode: continuous.
- Irradiation time: 1 sec/ every touch.
- Tip diameter: 300 μ m.

Results were spectacular compared to all previous treatment protocols. We achieved complete and final healing in 96 hours (Fig. 4). The cat started to eat wet food from the second day of laser treatment, became lively and full of energy, the overall tone being significantly improved as reported by the owners. Moreover, as they were living in a town located 150 km from our practice, we kindly asked them to take pictures of the tongue at 96 h from the first laser session.



Fig. 4. Image of the lingual ulcer 96 hours after the laser session.

At 2 weeks check up we performed subtotal mouth surgical extractions in order to achieve the healing of alveolar gingivitis (Fig. 5).

Our case, hopefully the first in a series of cases that will follow, confirmed us that everything that was studied and implemented in the human dentistry on lasers

may also be applied to our patients in veterinary dentistry. This, gives us hopes of shortening the healing time of the pathological conditions that are so painful and difficult to approach through conservative treatment methods.



Fig. 5. Image of the healed lingual ulcer two weeks after the laser session.

These results, were, however predictable, explained by the following actions of the diode lasers with 940 nm wavelength:

- absorption of the laser wave in the haemoglobin present at the surface of the ulceration (Rey *et al.*, 2004)
- bacterial effect of the lasers through the processes of photooxidation and production of O₂ singlet, known as a powerful bactericide (Rey & Missika, 2010)
- coagulation of the bleeding areas, thus resulting an eschar layer (Rey *et al.*, 2004)
- Sealing of the small vascular and lymphatic vessels that maintained the bleeding on the ulceration's surface (Rey *et al.*, 2004)
- welding of the collagen fibres and proteins, that all together with the eschar formed the protective biological membrane (Rey & Missika, 2010).

- the sensitive nervous fibres were sealed, cutting off the pain (Rey & Missika, 2010).
- A diode laser has a penetration of the soft tissues up to 10 mm under the ulceration, so, a low-level therapy effect of biomodulation occurred. This effect activates cell' mitochondria, thus increasing the ATP production, accelerating the cellular metabolism leading to release of growth factors. Growth factors increase the collagen production, angiogenesis and nervous regeneration, having direct results of re-epithelisation, and much faster healing. Increasing the ATP production releases the mediators of inflammation, reducing the oedema and the local pain. (Pandey, 2018). The results were stable and repeatable in other cases.

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