Use of laser therapy in the postoperative period of colocephalectomy in dogs

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ABSTRACT

For a better postoperative rehabilitation of colocephalectomy in dogs, laser therapy has been shown to be an alternative modality that is being considered efficient because it is safe, painless, regenerative and improves animal welfare. This therapy uses low-level laser that positively assists in the healing process, presenting analgesic, anti-inflammatory, healing and circulatory effects. The laser used is therapeutic, being a coherent, monochromatic and collimated light source, for this reason it does not present side effects when used at the correct power. Hip dysplasia is described as an impairment of the hip joint, and is considered one of the most important orthopedic dysfunctions in large and giant dogs, and can present in different degrees and different forms of joint degeneration. It manifests itself through specific clinical signs, which contribute to a conclusive diagnosis. The treatment of hip dysplasia has as its main objective pain control, its indication is variable according to factors related to each patient, and can be conservative or surgical, as is the case with colocephalectomy.

Keywords: Hip Dysplasia, Laser Therapy, Orthopedics, Rehabilitation.

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INTRODUCTION

Laser therapy is used in post-surgical veterinary rehabilitation because it promotes pain control, helps in bone strengthening, treatment of peripheral nerve injuries and edema and especially in wound healing, and can thus be used to accelerate the post-surgical recovery process from colocephalectomy (DINIZ, 2019). Low-power Light Amplification by Stimulated Emission of Radiation is a great alternative to assist in the treatment of chronic and acute pain in animals with hip dysplasia (RYCHEL, 2010).

Classified as an anomaly in the development of the hip joint, hip dysplasia especially affects large dogs due to the inconsistency of the hip joint, causing the dragging of the acetabulum and changes in the head and neck of the femur, resulting in secondary degenerative joint disease (DASSLER, 2007). Common clinical signs of hip dysplasia are unilateral or bilateral claudication, arched back, limb rotations, and reduced hip range of motion. These clinical manifestations may not be compatible with the radiological findings (BRASS, 1989).

Among the therapeutic recommendations for hip dysplasia are conservative therapies, such as the use of chondroprotective drugs and physical therapy, which help relieve pain in acute cases or when the patient cannot perform the surgical procedure (PERRUPATO, QUIRINO, 2014), and also surgical intervention, for example, colocephalectomy. Factors such as the clinical condition and age of the animal influence the preference for treatment (ANDERSON, 2011).

Collocephalectomy is an excisional arthroplasty indicated for surgical correction of hip dysplasia, but it is also a procedure that can be performed when there is a fracture of the femoral head or acetabulum (DEJARDIN, 2007). The postoperative rehabilitation time for colocephalectomy considered adequate without the aid of alternative therapies is 43.2 months (BARBOSA et al, 2012), and the total recovery from the procedure associated with the use of different physiotherapeutic techniques is only one month, and a decrease in clinical manifestations can be observed (MARTINNS and ROCHA, 2022), thus, physiotherapy has proven to be very efficient, especially when used in postoperative recovery, especially in the locomotor system, or even in cases where the treatment is conservative (RIVIÈRE et al., 2005). Although the branch of physiotherapy in human medicine has its rehabilitation techniques recognized as essential in postoperative care, in veterinary medicine it is still expanding, supported by studies adapted for use in animals (VICENTE, 2019).

This study aims to encourage the postoperative period of colocephalectomy in dogs through the approach of physiotherapy techniques, especially laser therapy, for the patient's recovery.

DEVELOPMENT

Laser therapy (Light Amplification by Stimulated Emission of Radiation) is used at a low power, where it emits radiation in a photon flux, thus generating the biological effect through

artificial light. There is no tissue heating, however, the energy that is produced by the equipment has biostimulant effects, which has a very low percentage of side effects. The laser light is absorbed by induction into the cell, evaluated directly in chronic or acute pain, in order to accelerate the process of tissue repair, bone repair, wound healing, and other processes in order to accelerate the body in the healing process (LUZ, 2018).

Studies carried out by Ozawa (1998) prove that the effect of laser irradiation at a low intensity stimulates bone formation when applied to bone cell cultures in rats, which can also be verified in tissues of veterinary patients.

Hip dysplasia, also known as CFD, is an orthopedic disease that affects the canine species (ROCHA et al. 2013), more frequently in large animals (MINTO et al. 2012). DCF is defined as an alteration in the formation of the hip joints, which can be unilateral or bilateral (SOMMER, 1998). That is, when unilateral, one of the joints is normal and the other affected, and bilateral in both limbs, with different degrees (MORGAN, 1986).

This alteration has different degrees of sub-luxation and degenerative joint alteration (MINTO et al. 2012), where it has a predominance in soft tissues and local instability (ROCHA et al. 2013). Therefore, limb instability is directly linked to joint effusion, elongation of the joint capsule and weakening of the round ligament, resulting in subluxation of the femoral head and bone deficiency (SANTANA et al., 2010).

Joint instability is one of the first clinical signs that can be observed before the first year of life. (RISER, 1975). The other manifestations reported are subluxation or total dislocation of the femoral head, unilateral or bilateral lameness, in addition to rotation of the limbs and a perceptible crack when the animal moves (DASSLER, 2007). The diagnosis of hip dysplasia in dogs is made mainly through anamnesis, physical examination and radiographic alterations identified through ventrodorsal projection with the pelvic limbs stretched, collateral to the pelvis, the spine and each other, and rotated medially (FOSSUM, 2014).

The treatment for hip dysplasia aims to control pain, inflammation and reduce degenerative changes to improve animal welfare. Conservative therapy is used in acute cases through the administration of chondroprotectors, physiotherapy and analgesics, (PERRUPATO, 2014). In chronic cases, supportive treatment is not efficient, and it is necessary to define the surgical procedure as a protocol (ALBUQUERQUE, 2017).

Approximately 75% of the animals with mild hip dysplasia manifest clinical improvement with conservative treatment administered in a palliative manner. In the remaining cases, in which the form is more severe, surgical treatment is indicated (HUMMEL; VICENTE, 2019).

Colocephalectomy, also known as ostectomy of the femoral head and neck, is a procedure that consists of extracting the femoral head and neck, in order to reduce the impact between the

femur and provide the formation of a pseudoarthrosis, made by the fibrous tissue (SCHULZ, 2014). Postoperative care is based on the analgesic therapy protocol to reduce discomfort. It is advisable to perform physiotherapy to stimulate muscle mass and movement capacity (DEJARDIN, 2007), restore and promote an improvement in function, focusing on quality of life (LEVINE et al, 2008). Several studies carried out by Oliveira (2018) showed a significant evolution after the seventh day in healing factors and bone neoformation with the use of laser therapy applied to wistar rats.

The use of techniques such as laser therapy can be employed in these cases to reduce edema, relieve pain, assist in osteoarticular conditions and peripheral nerve injury (HUMMEL, 2019). The laser is characterized as a booster of electromagnetic radiation, as described in 1960 by Theodore Maiman (VINCK et al., 2003). In the use of therapeutic laser, it is applied at low power, especially gallium or aluminum arsenic aluminum (VENANCIO et al., 2002).

The laser therapy applied in colocephalectomy should be applied to the skin perpendicular to the affected region, in this case the hip joint, with a distance of one centimeter from the stitches, as in figure 1. Its application is through the emission of a laser beam, where the head comes into contact with the area slowly. The laser therapy protocol is performed through the pen in a prepared area, and can be performed from 12 to 25 sessions, daily or at an interval of 48 hours. The area of application intended for therapy should be in a radius of incidence of 15 to 40 seconds perpendicular (LAMAS, 1999). The suggested dose of laser for pain control is 2 and 6 J/cm2. Similarly, for anti-inflammatory effects, 4 to 8 J/cm2 (MILLIS; SAUNDERS, 2014).

Figure 1: Patient with hip disease receiving treatment with laser therapy

Source: The author.

The use of laser therapy is not recommended for pregnant female animals, laser over tumor sites, periocular regions and carotid sinuses. Likewise, it should not be applied to open molera, growth plates and coagulation disorder (IOLANDA, 2017).

The expected effects of the laser are diverse, some of them are: analgesia, where the stimulation of the increase in serotonin, beta endorphins and nitric oxide, which causes the

normalization of ion channels, in addition to increasing the action potential of nerve cells, which occurs by blocking and depolarizing the afferent nerves of fiber C. That is, in pain control, the laser stimulates the production of endogenous peptides and changes in cellular electrical interference, analgesic effect occurs through the repolarizing inhibitor. Likewise, it has anti-inflammatory action, where the process that decreases the synthesis of inflammatory prostaglandins and the level of C-reactive protein occurs, reduction of interleukin-1, accelerating leukocyte activity, to increase angiogenesis (MIKAIL, 2009).

CONCLUSION

We conclude that laser therapy has been shown to be an adjuvant technique with promising results in the post-surgical treatment of colocephalectomized patients.

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