Efficiency of Laser Therapy Applied in Labial Traumatism of Patients with Spastic Cerebral Palsy

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The aim of this study was to report the effectiveness of laser therapy applied to traumatic labial injury of patients with spastic cerebral palsy. We report two cases of patients with internal mucosa and lower lip traumatism caused by oral reflex automatism with spastic tonic bite and lower lip interposition. One patient presented extensive lower lip ulceration, loss of tissue, crusty and hemorrhagic areas, with increasing pain and spasticity. The other patient presented local congestion signs, extremely enlarged tissue growth and increased labial volume. Laser therapy was applied to all injured areas, with a low-potency diode InGaAlP laser [685 nm Quasar® (DentoFlex), 190 J/cm², with a 24-h interval between the first and second administration, and a 7-day interval between the two subsequent ones. At first re-evaluation, 24 h later, there was a striking reduction in inflammation, a decrease in vascular congestion, and a reduction of the ulcerated area with spasticity and pain reduction. At the 14-day re-evaluation, significant clinical differences in the advanced healing process were seen. Low-intensity laser showed to be effective in traumatic soft tissue treatment in cerebral palsy patients by accelerating the healing process, reducing secondary contamination, promoting analgesia; thus, it can be an important tool in the treatment of these patients.

Keys Words: cerebral palsy, muscle spasticity, automatism, laser therapy.

INTRODUCTION

Cerebral palsy belongs to a heterogeneous group of non-progressive motor disorders caused by chronic cerebral lesion that may originate in the prenatal or perinatal periods or in the first years of life. The four main subtypes of cerebral palsy are spastic, athetoid, ataxic and mixed; the spastic subtype is the most common. The motor disorder may vary from light difficulties in motor control to severe spasticity in all limbs, manifesting by coordination deficiencies of muscular actions and sensation deficiency, which is responsible for traumatism in soft tissues (1).

There are several secondary diagnoses associated with cerebral palsy: epilepsy (25-33%), mental deficiency (50%), delay in the acquisition of speech, hearing loss and behavioral disorders. The high frequency of convulsions and cognitive and sensorial perception deficiencies among patients with cerebral palsy suggests that these disorders have a common origin or are related (2).

The persistence of primitive oral reflexes, considered pathological after 6 months of age, has a pathological value and generally results from cerebral lesions (3). The pathological bite reflex prevents the development of elaborated mandibular, labial and tongue movements (4).

Spasticity is a frequent disorder in congenital or acquired central nervous system lesions and affects millions of people worldwide (5). It could be the single cause of incapacity, affecting the musculoskeletal system and limiting normal motor function. It initially hinders the comfortable positioning of the individual and impairs daily tasks such as eating, locomotion,
transfer and hygiene. When not treated, it causes contractions, rigidity, luxation, pain and deformities (6-8).

Laser energy, when deposited on tissues, causes reactions of a physiological nature. In the organism, the interaction of low-intensity radiation constitutes the energetic incorporation contained in the laser light beam on the radiated tissues. The consequences of these interactions are 1) primary effects, subdivided into biochemical, bioelectrical and bioenergetic; 2) secondary effects that stimulate the microcirculation and cellular trophism; 3) therapeutic effects, with analgesic, anti-edematous and healing results (9).

The therapeutic action of the low-intensity laser resides in the granulation action of the mast cells and increase in histamine quality, causing local changes represented by vasodilatation and increase in vascular permeability, acting on prostaglandins, inhibiting and blocking the action of the cyclooxygenase enzyme, thus, having an anti-inflammatory action. Simultaneously, it promotes bio-stimulation of the tissues through the increase of the cellular energy upon the increase of ATP production (9).

This report describes the oral findings of two children with a diagnosis of spastic cerebral palsy treated in the Discipline for Patients with Special Needs of the Dentistry Course of the University of Cruzeiro do Sul.

CASE REPORT

The patients LRS (patient 1), female, leukodermic, five years and 11 months old, and K POT (patient 2), male, leukodermic, two years and four months old, both with a diagnosis of severe spastic cerebral tetraparesis palsy, were referred to the Dental Clinic for Patients with Special Needs of the University of Cruzeiro do Sul, presenting traumatic lesion in the lower-lip region, but with different clinical aspects.

This study was approved by the Research Ethical Committee of the University of Cruzeiro do Sul and informed written consent for participation in the study was obtained from those responsible.

In the physical examination of patient 1, the presence of a nasogastric tube and lower-lip parafunctional bite habits were observed. As a result of frequent traumatism, the lip presented extensive ulceration, with loss of substance, crusty and hemorrhagic areas, internally surrounded by hyperkeratotic plaque (Figure 1). This leads to pain and a consequent increase of the spasticity, in addition to the risk of local and/or disseminated infection.

Due to the severe neurological state, the extraction of the deciduous maxillary incisors was chosen (Figure 2), followed by a laser therapy protocol.

In the physical examination of patient 2, microcephaly, absence of cervical control, low weight/stature development, severe spasticity, retardation in the neuropsychomotor development without steadying the look or reacting to sounds, severe respiratory discomfort, presence of important snoring, the use of nocturnal oxygen supplementation and gastromatization were observed (Figure 3). His previous medical history included emergency c-section birth, with parturient in
cardio-respiratory arrest due to eclampsia. He received Apgar 0/2/3, evolving with severe asphyxia, and was intubated for 2 months. During the hospital stay, he presented pneumonia, septicemia and convulsive syndrome with difficult control. At that time, a gastronomy was performed.

In the specific clinical examination, severe respiratory discomfort was observed, responsible for the labial traumatism, since during the respiratory movements, the child made friction movements with the tongue against the maxillary incisors and suction of the lower lip, in addition to the oral automatism of a reflexive nature with a tonic bite and inter-positioning of the lower lip between the incisive surfaces. There were signs of local congestion, exuberant tissue growth, and increase in labial volume, which further favored local traumatism (Figure 4). Extraction of the four central deciduous incisors was chosen.

Laser therapy was applied on the injured location for both patients, with InGaAlP low-intensity laser (Quasar®, Dentoflex, São Paulo, SP, Brazil), energetic power and deposition density of 190 J/cm² in sweep, with a 24-hour interval between the first two applications and a 7-day interval for the other two applications (Figure 5).
RESULTS

In the first re-evaluation, 24 h later, clear regression of the inflammatory process with a reduction of the ulcerated area, now covered by fibrous pseudomembrane, was observed in patient 1 (Figure 6). The caretakers reported a reduction in spasticity and pain, as well as improvement of the clinical condition. For patient 2, a significant reduction in the inflammatory process, reduction of vascular congestion, translated by the pinkish coloring of the circum-neighboring tissue, and facilitated breathing due to the reduction of the labial volume was observed (Figure 7). The caretakers mentioned that the child had a 12-h revitalizing sleep without crying episodes.

DISCUSSION

The multi-professional treatment of individuals with cerebral palsy includes professionals from all health areas, including the dentist, with the main objective of rehabilitating these patients. Many times, the indicated therapeutical treatment is concentrated on the quality of life.

For patients with a diagnosis of severe spastic cerebral tetraparesia palsy, the rehabilitation team acts...
to minimize the deleterious effects of the severe neurological injury by means of physiatric, physiotherapeutic, speech therapy, acupuncture, and medication treatments, among others.

It is up to the dentist to promote adequate dental treatment for extremely painful situations such as traumatic soft tissue lesions in the oral cavity resulting from the presence of primitive pathological reflexes, as described by Schuberth (3).

Spasticity interferes in eating and hygiene (5), and promotes pain in the involved musculature (6). One of the treatment possibilities for spasticity in the mastication musculature is the chemical block with botulin toxin (7), but this therapeutic resource is not accessible to all spastic patients due to its high cost.

Frequently, the result of the association of the neurological lesion, spasticity and the presence of pathological reflexes is the traumatism of the oral tissues. A new therapeutic alternative for these patients is laser therapy. The therapeutic property of the low-intensity laser involves analgesic, anti-inflammatory and bio-stimulating actions considering the increase of the activity in the radiated tissues. According to Genovese (9), the bio-stimulating effect is the result of the increase in fibroblasts, vascular regeneration, increase in re-epithelization due to the increase in the rhythm of cellular division. We were able to detect a clear regression of the inflammatory process, with a reduction of the ulcerated area and reduction of the vascular congestion within a short period, certainly due to the anti-inflammatory and bio-stimulating effect of the laser.

Since the objectives of modern dentistry are to re-establish contour, function, and comfort, regardless of the atrophy, disease or lesion the individual presents, several techniques had to be developed to reach this objective. These patients presented a loss of tissue substance, severe pain, and risk of infection, factors that are sufficient to increase spasticity, allowing for the maintenance of the vicious circle of pain/spasticity/inflammation/infectious process.

Which alternative treatment can be used for the traumatic soft tissue ulcers in neurologically compromised patients incapable of responding to verbal commands and consequently with complete absence of cooperation? It is up to the dentist to choose the adequate treatment of traumatic lesions present in patients with neurological sequelae.

We conclude that the low-power laser is efficient in the treatment of soft tissue traumatism in patients with neurological sequelae, due to the acceleration of the repair process, reducing secondary contamination, pain and discomfort, thus, constituting an important tool in the treatment of individuals who do not possess motor coordination, contributing to improvement of their quality of life.

REFERENCES