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Case Report

"The Use of the Low-Intensity Laser Therapy (LLLT) Technique for Face Burning"

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Abstract

This work describes a case report by the Hospital Dentistry team of the Beneficent Association of Campo Grande Santa Casa MS, where a patient presented with a burn caused by the explosion of the carbon dioxide gas (Co2) through the inhalation of the vapor with acute physical changes, which resulted in burns that reached approximately 10% of the anterior area of the skull with involvement of the cervical and pharyngeal region. Admitted under Orotracheal Intubation, he was treated using the LLLT technique with the use of the InGaAIP low intensity laser on the injured tissues. Through a multi professional approach, using the Low Level Laser Therapy (LLLT) technique as a therapeutic alternative for the treatment of burn injuries of the periorbital region, lips and oral cavity, with the daily monitoring of the patient and regular on-site applications of laser therapy, there was a significant improvement in the injured region, and healing with rapid evolution, in addition to analgesia with reduced bleeding and site inflammation.

Keywords: LLLT, L asertherapy, laser, stomatology, burns, dentistry, intensivist

Introduction

Burn victims are responsible for approximately 27,500 hospitalizations per year in Brazil, according to the Brazilian Burns Society (SBQ), with more than half of them male, with an average age of 24 years [1]. Such a problem causes a substantial observational impact since the time required for these patients' recovery is long, which implies expensive hospitalization periods, significantly to minimize the possible sequelae attributed to burning wounds [2].

A better understanding of burn injuries is necessary due to the severity and complexity inherent in each case. Therefore, such injuries can trigger both local and systemic responses, leading to exacerbated inflammatory processes, which would lead to organ failure, sepsis, and impairment, of the nervous system [3]. The increase in capillary permeability and the reduction of intracellular volume resulting from burn injuries can lead to cardiogenic shock. The protein loss to the interstitium could also incur hypovolemia, hemoconcentration, cardiovascular dysfunction, oliguria, and edema. Some authors emphasize the importance of water resuscitation protocols and strict infection control as a therapeutic process for the recovery of burn patients [4].

Given the above, dentistry at the hospital level presents itself through therapeutic proposals of less invasiveness as an intervention alternative for burn victims. From this perspective, the LLLT has been consolidating itself as a highly viable alternative, considering its anti-inflammatory effects, analgesics, microcirculation activators, growth stimuli, and repair at the cellular level. These facts together reiterate the medical sciences' interest in the applicability of Laser Therapy [5].

Case Report

Fifty-eight years old, male, admitted to the Beneficent Association of Campo Grande Santa Casa - MS, in the CTI sector, a victim of burn by an explosion of Co2 gas with high-temperature vapor inhalation, which resulted in extensive epidermal lesions in the facial region, with oropharynx and cervical involvement. The patient was admitted under orotracheal intubation, with subsequent installation of a nasoenteral probe. Under the pharmacological prescription of amitriptyline associated

with aldol and alprazolam; low dose tazocin, lacrimaplus, moxifloxacin, dexamethasone, vitamin c, and regencel. Intensive care nursing used the protocol for burned patients, with topical management of silver sulfadiazine together with topical collagenase and debridement of lesions routinely. A clinical evaluation was requested from the hospital Dentistry team (Fig.1), considering a multidisciplinary approach for individualized case planning.

Figure 1: Initial stage.

The initial diagnosis showed a large damaged area with bleeding ulcers in the upper and lower lips and left lip commissure, biofilm accumulation on dental surfaces, and tongue coating. With discussion with the medical team, started treatment was involving the LLLT technique's daily applications using the 660 nm Red wavelength laser (Table 1), performed by the dental surgeon operator qualified to repair compromised tissues. The power used by the LLLT technique was 3 J (Joules), equivalent to the time of 30 seconds and irradiance of 33 J / cm2, through transverse sweeping movements, without direct contact with the traumatized injuries. At the end of the sessions, each session performed at a 24-hour interval was hydrated the lips and perilabial region with collagenase ointment. On the second day, observed a decrease in exudate and bleeding from the wounds, evidenced by the reduction of the inflammatory process and pain during manipulation of the region (Fig.2). There was a repeat dose of the LLLT technique, repeating the 3J power.

Irradiation Parameters	Unit of measurement	Description
Wavelength	nm	It is the laser emission characteristic defined by different colours of the visible (400 to 700 nm) and invisible spectrum
Fluence	J/cm ^{2}	Fluency or dose is a description of the energy flow divided by the area of the laser emitter tip
Energy	Joule	Energy is represented by the power of the equipment multiplied by the treatment time

Table 1: LLLT parameters (According to laser manufacturer's manual recommendations)

Figure 2: second day.

As the days went by, there were necrotic desquamating tissue neoformations, already with no bleeding with the maintenance of the same LLLT application technique. Irradiation was 2 to 3 minutes per region, with power reduction to 2J, without direct contact with the injuries. Patient responding favorably in the recovery of labial and perilabial tissues (Fig.3).

Figure 3: Evolution of the favorable situation.

Patient with SNE feeding, already starting oral feeding without complaints of pain, only manipulates the site. Debridement was done in all sessions before applying the LLLT technique (Fig.4).

Figure 4: patient with more excellent responsiveness to the treatment of laser therapy.

The last session of laser therapy showed equalized results without complaints of pain with good mouth opening; using the power of 2J with tissue already in the process of recovery, the patient continued to moisturize the lips and face only (Fig.5). He was discharged from the ICU, admitted to the burn sector, and discharged from the hospital after two days.

Figure 5: Cell tissue in the advanced recovery process.

Follow up

Considering the wide range of aggravating situations and comorbidities resulting from burn injuries, often preventing the burned individual from resuming their daily activities, health professionals should pay attention to proposals and behaviors capable of minimizing or preventing the installation of such processes [6]. With this perspective, therapeutic protocols on burns should be initiated to control bacterial growth, stimulating epithelialization as soon as possible. Widely documented in the literature, silver sulfadiazine is considered standard treatment. The literature also mentions some associations with promising results, such as Lidocaine 1% and Vitamin A, which contribute to obtaining a more favorable prognosis. [7, 8 and 9]

LLLT is being used a lot in the health area nowadays due to its anti-inflammatory, analgesic, and tissue stimulator action, corroborating the consolidation of Laser therapy as a safe treatment and without side effects. It can be effective as a therapy of choice or supporting treatment for oral and intra-oral injuries [10]. Which would justify, for example, its large-scale use in cancer patients who develop oral mucositis, significant improvement in symptoms, reduction of the installed pain, reduction of the inflammatory process, and the favoring of tissue repair. It has guided the choice of laser therapy for these already vulnerable patients to improve their quality of life [11].

The adoption of Laser as a therapeutic approach also helps in replacing or reducing analgesic medication and steroidal anti-inflammatory drugs in the treatment of traumatic ulcers and optimizing the healing time of wounds [12].

In this context, laboratory studies on animal models have shown the proliferative stimulation of epithelial tissue, together with local neovascularization, increased fibroblast activity, and high collagen deposition. Which in turn resulted in the reduction of the inflammatory response in loco, accelerating the healing process of the lesions [13].

Due to the positive interaction with the epithelial tissue, LLLT is also used as an alternative to improve the prognosis of skin graft surgeries. It is also

adopted as a preventive approach to reduce dehiscence in patients with and 3rd-degree burns [14].

Aiming precisely at tissue repair in the face of severe inflammatory processes, LLLT was also used with a therapeutic proposal for patients with oral and labial manifestations due to Stevens-Johnson Syndrome (SJS). There was also a significant improvement in the 24-hour interval from the first laser application, with a substantial reduction of local edema and reduced pain sensation with subsequent stabilization and improved inflamed epithelium [15].

Following the literature that mentions the burn treatments, LLLT stands out for demonstrating more significant results in a short time, the visible improvement of the tissues involved due to a more harmonious healing process, better in patients. Some authors describe as positive the association of Laser therapy with low-intensity ultrasound since both methods present positive and satisfactory results. The LLLT reflects on the potential improvement of coagulation and increases blood flow in the initial phase. Flexibility and vascularization are improved by ultrasound, remembering that both positively affect pain relief [16].

The tissue repair process that leads to healing is multifactorial and is affected by the biological profile of each individual and the degree of response to the therapy used. There is a significant amount of scientific production attesting to the applicability of LLLT in burns, pressure injuries, and chronic wounds. However, there is still a lack of information regarding the standardization of techniques to ensure more excellent safety for patients and professionals during clinical practice [16, 17 and 18].

Conclusion

Based on the consulted literature and in possession of the results obtained, we can consider LLLT an effective therapeutic proposal in the treatment of burn injuries on the face. Its potential to stimulate tissue regeneration, its analgesic, and hemostatic effect act considerably in the increment of healing and, consequently, improves the quality of life of treated patients.

References

1. Brazilian Ministry of Health, Health Care Department and Specialized Care Department. (2012). Emergency Treatment for Burns Manual.
2. Santos, J. V, Souza, J, Amarante, J, & Freitas, A. (2017). Burden of burns in Brazil from 2000 to 2014: a nationwide hospital-based study. *World journal of surgery*, 41(8), 2006-2012.
3. Ruiz-Castilla, M, Roca, O, Masclans, J. R, & Barret, J. P. (2016). Recent advances in biomarkers in severe burns. Shock: Injury, Inflammation, and Sepsis: Laboratory and Clinical Approaches, 45(2), 117-125.
4. Snell, J. A, Loh, N. H. W, Mahambrey, T, & Shokrollahi, K. (2013). Clinical review: the critical care management of the burn patient. *Critical Care*; 17(5), 1-10.
5. Cavalcanti, T. M, Almeida-Barros, R. Q. D, Catão, M. H. C. D. V, Feitosa, A. P. A, & Lins, R. D. A. U. (2011). Conhecimento das propriedades físicas e da interação do laser com os tecidos biológicos na odontologia. *Anais Brasileiros de Dermatologia*; 86(5), 955-960.
6. Albuquerque, A. G, & de Lima, C. F. (2010). Efeitos do laser terapêutico no processo de cicatrização das queimaduras: uma revisão bibliográfica. Revista Brasileira de Queimaduras, 9(1), 21-30.
7. Peripato, A. P. B. S. O., & Albregard, L. (2017). A cobertura ideal para tratamento em paciente queimado: uma revisão integrativa da literatura. *Revista Brasileira de Queimaduras*; 16(3), 188-193.
8. Bolgiani AN, Serra MCVF. (2010). Atualização no tratamento local das queimaduras. *Rev Bras Queimaduras*;9(2):38-44.
9. Rocha, N. M, da Silva, E. Â, da Silva, E. M., de Melo, C. J. R., & de Melo Mota, L. (2020). Atendimento inicial às vítimas de queimaduras: uma revisão integrativa. *Caderno de Graduação-Ciências Biológicas e da Saúde-UNIT-ALAGOAS*, 6(1), 11.
10. Oliveira, F. A. M. D., Martins, M. T., Ribeiro, M. A., Mota, P. H. A. D., & Paula, M. V. Q. D. (2018). Indicações e tratamentos da laserterapia de baixa intensidade na odontologia: uma revisão sistemática da literatura. *HU rev*, 85-96.
11. Moura, L. A. S., & do Nascimento, J. D. S. (2020). Eficácia do Laser de Baixa Intensidade no Tratamento da Mucosite oral em Pacientes Oncológicos/Effecacy of Low-level Laser in Treatment of Oral Mucositis in Cancer Patients. *ID on line REVISTA DE PSICOLOGIA*, 14(52), 991-1002.
12. Valle, L. A., Karam, P. S. B. H., Rezende, M. L. R., Zangrando, M. S. R., & Damante, C. A. (2017). Laser de baixa intensidade no tratamento de úlceras traumáticas e queilite angular: relatos de casos. *Rev. Assoc. Paul. Cir. Dent*, 30-34.
13. Gupta, A., Keshri, G. K., Yadav, A., Gola, S et al. (2014) Superpulsed (Ga-As, 904 nm) low-level laser therapy (LLLT) attenuates inflammatory response and enhances healing of burn wounds. *Journal of Biophotonics*, 1–13.
14. Kazemikhoo, N., Vaghardoost, R., Dahmardehei, M., Mokmeli, S., Momeni, M., et al. (2018). Evaluation of the effects of low level laser therapy on the healing process after skin graft surgery in burned patients (a randomized clinical trial). *Journal of lasers in medical sciences*, 9(2), 139.
15. Raffaele, R. M., de Oliveira, R. L., Baldo, M. E., Santana, G. U., & Pacheco, J. A. (2020). Treatment of Low Level Laser Therapy in the Oral Manifestations of Steven Johnson Syndrome. *J Intern Med Emerg Res*, 1(3), 1-8.
16. Dantas, A. B. M., da Fonseca, A. C. T., Passos, J. L. C., Silva, J. A. A., Agra, J. P., et al. (2019). Comparação da resposta terapêutico-Laser e ultrassom em pacientes queimados: Revisão Sistemática. *Anais da Mostra Acadêmica do Curso de Fisioterapia*, 7(2), 124-130.
17. Silva, E. N., Pedrosa, M. J., Junior, P. C. D. S. N., Nakajima, R. D. O. B., & de Sousa, S. R. (2020). Vantagens e desvantagens da aplicabilidade do laser de baixa intensidade no reparo tecidual. *Epitaya E-books*, 1(1), 33-40.
18. Pacheco, J. A. (2020). Topical and Systemic Photobiomodulator Treatment of Lingual Paresthesia Caused by Prolonged Use of Tamoxifen in a Patient with Breast Cancer. *EC Emergency Medicine and Critical Care*, 4, 41-51.