



Photobiomodulation in the Treatment of Chemotherapy-Induced Oral Mucositis: A Case Report

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Abstract

The oral mucositis is an acute inflammation extremely symptomatic that affects patients undergoing antineoplastic treatment, including chemotherapy and radiotherapy in the head and neck region. Photobiomodulation by means of low intensity laser has been widely employed as an effective therapy in the prevention and treatment of mucositis induced by radiotherapy and chemotherapy. The purpose of this article is to present the case of a patient with oral mucositis under chemotherapy treatment for acute myeloid leukemia. Applications of low intensity laser photobiomodulation were performed with remission of the oral mucositis and an increase in the quality of life of the patient.

Keywords: Acute Myeloid Leukemia; Chemotherapy; Mucositis; Photobiomodulation; Low Intensity Laser Therapy

Introduction

Chemotherapy and radiotherapy in the head and neck region have side effects that affect the quality of life of patients undergoing cancer treatment [1-4]. Among the main side effects, mucositis impacts the quality of life of patients by affecting the functions of the oral cavity and stomatognathic system. Mucositis is defined as a series of inflammatory and/or ulcerative lesions of the oral and/or gastrointestinal tract, resulting in severe discomfort that can impair ability to chew, swallow, and speak of the patients [1-10]. In addition to these changes, it can also cause xerostomia, which in turn predisposes to opportunistic infections, particularly those caused by fungi. Taste alterations can also be caused, leading to low water and food intake, dehydration, and malnutrition [2,11]. Additionally, painful symptomatology arising from the functions

of the stomatognathic system is observed, since the inflammatory process can occur throughout the digestive tract, as well as increased risk of local and systemic infection [2,3,5,11].

Mucositis is classified into four evolutionary stages. The first stage is erythema of the mucosa. The second stage involves the appearance of white flaking plaques. The third stage involves the appearance of epithelial crusts and fibrinous exudate leading to the formation of pseudomembranes and ulcerations. In the fourth stage, there is exposure of the underlying connective tissue stroma [2,3,12-14]. Approximately 85% of cancer patients have some degree of oral mucositis [2,9,10,12,13,15].

The treatment of oral mucositis is palliative. There is still no consensus on the best therapeutic approach for oral mucositis. The

treatments are diversified and aim to attenuate the painful symptomatology of the lesions or to prevent them. Cryotherapy, low power laser, antimicrobial, anti-inflammatory, cytoprotective, local anesthetics, granulocyte, macrophage and keratinocyte growth factors are cited as prophylactic and/or therapeutic agents for oral mucositis [1,6,12,16,17].

Purpose of the Study

The purpose of this article is to present the case of a patient with oral mucositis under chemotherapy treatment for acute myeloid leukemia. Applications of low intensity laser photobiomodulation were performed with remission of the oral mucositis and an increase in the quality of life of the patient.

Case Report

A Caucasian male patient, 23-years-old, was admitted to the inpatient unit of the Hospital de Aeronáutica de São Paulo due to systemic complications from chemotherapy for acute myeloid leukemia.

Clinically, the patient presented erythematous areas and ulcerations of the labial, jugal and lingual mucosa, characteristic of mucositis (Figure 1-4), after 5 days of intravenous chemotherapy administration of methotrexate. Secondarily, an accumulation of dental biofilm was observed due to the difficulty in performing oral hygiene, generated by the painful symptomatology.



Figure 1: Ulcerated lesions on the labial mucosa and crusts on the lips. Accumulation of dental biofilm is observed due to difficult oral hygiene.

The mucositis was clinically characterized as grade 3. It was proposed photobiomodulation using low power laser with daily applications. Concomitantly to the applications, the patient was oriented about oral hygiene and the use of daily mouthrinses with



Figure 2: Ulcerated areas on the lingual mucosa.



Figure 3: Labial mucosa with ulcerated lesions.

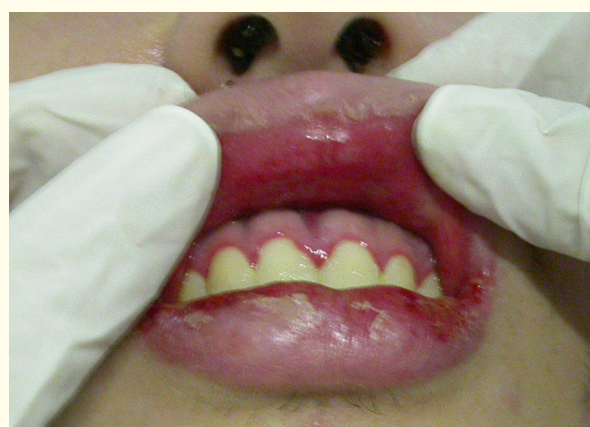


Figure 4: Upper lip mucosa with ulcerated lesions.

0.12% chlorhexidine. For the applications we used the low power diode laser Brightness™ (Kondortech, São Carlos, Brazil) with a beam area of approximately 0.01 cm², using the parameters of wavelength of 660 nm, power of 100 mW and energy of 4 J (Figure 5). The biosafety procedures for the use of low power laser were followed, with the use of safety goggles for the patient and the professional (Figure 6).



Figure 5: Low power diode laser used.



Figure 6: Procedures of biosafety of the use of low power laser during the applications (A); Application in the oral cavity of the patient (B).

After 11 days of hospitalization and daily applications of low power laser, a clinical improvement of the inflammatory process and mucositis was observed, the patient was discharged. However, he was instructed to return and be admitted again if the symptoms and needs recurred.

Discussion

The patient with oral mucositis should be thoroughly evaluated for classification of the degree of toxicity and the appropri-

ate therapy. The most widely used scales for evaluating the clinical manifestations of oral mucositis are the National Cancer Institute (NCI) and the Radiation Therapy Oncology Group (RTOG). They were developed to broadly assess the stomatotoxicity of various cancer treatments and are derived from the World Health Organization (WHO) scale [6,11,12,18].

Several studies have shown the benefits of photobiomodulation by the use of low intensity laser in the treatment of lesions and control of painful symptoms resulting from oral mucositis. Tissue photobiomodulation using low intensity laser causes tissue damage reduction, tissue repair and analgesic effect [2,4,6,9-11,15,16].

The severity of grades 3 and 4 oral mucositis can interfere with the outcome and even continuity of cancer treatment. Severe oral mucositis is related to worsening disease prognosis, and may increase the frequency of hospitalizations, risk of infections, increased days with parenteral nutrition, and overall cost of treatment [4-6,8,15,19].

The cells respond to irradiation with the monochromatic light generated by lasers and LEDs, modifying their metabolism. Mitochondria are generally the starting point for light action, and the enzyme cytochrome-C-oxidase is the main chromophore [10,15-17,20]. Additionally, low intensity laser promotes fibroblast proliferation, and subsequently increases collagen production and organization. It also reduces COX-2, IL-1B, TNF- α and neutrophilic infiltration, increases angiogenesis and acts on the nuclear factor Kappa B (NFkB) pathway, favoring tissue repair [4,9-11,15,17,20,21].

In this perspective, intraoral photobiomodulation with low intensity laser stands out as an effective alternative in the prevention and treatment of oral mucositis and painful symptomatology, presenting satisfactory results, moderate cost and above all not being traumatic [4,6,18,20,22-24].

The success of antineoplastic treatment requires therapeutic protocols to prevent and treat possible side effects. The dental surgeon can help the multidisciplinary team in oncological treatment, whether derived from chemotherapy or radiotherapy, in the prevention, diagnosis or treatment of oral complications [6,15,19,21].

Conclusion

The photobiomodulation using low intensity laser was efficient in the treatment and prevention of oral mucositis, by reducing the

painful symptoms and promoting the process of repair of the lesions that affected the oral cavity of the patient who underwent chemotherapy, improving the quality of life.

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