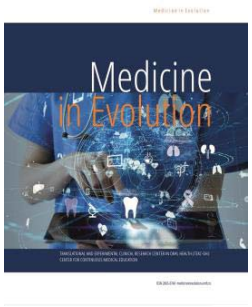
Laser diode applications in pre-prosthetic periodontal treatment – clinical case



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Abstract

Aim and objectives: The purpose of pre-prosthetic periodontal treatment using laser diode is to stop the inflammatory process by reducing microorganisms. In this study, we aimed to evaluate the effect of diode laser treatment on a patient with gingivitis.

Materials and methods: Clinical case presented is of a female patient who addressed the dental service for a total prosthetic rehabilitation. At the upper jaw, the patient had generalized gingivitis at the abutment teeth. After SRP, non-surgical periodontal instrumentation was applied, with the adjuvant use of diode laser, with a wavelength of 980 nm.

Results: Two weeks after starting the treatment, the gingival index (GI) was evaluated, and it was decided that the prosthetic treatment itself could be started, the gingival inflammatory phenomena being remitted.

Conclusions: The 980 nm laser diode can be used as an adjunctive therapy to cure gingivitis.

Keywords: diode laser, gingivitis, pre-prosthetic periodontal treatment

INTRODUCTION

Periodontitis is a chronic inflammatory disease caused by a bacterial infection [1]. It is manifested in the supporting tissues of the tooth on the arch: gum, periodontal ligament, alveolar bone [1,2]. Gingivitis is a common and mild form of gum disease (periodontal disease) that causes irritation, redness and swelling (inflammation) of gingiva around the base of the teeth. The main goal of periodontal therapy is the elimination of bacterial deposits and periodontal pockets by removing the supragingival and subgingival biofilm [3]. Scaling and root planning (SRP) is the common approach in the control of inflammation in non-surgical treatment modality, but conventional treatment fails in many situations especially in severe cases [4,5].

Every specialty area of dentistry is utilizing the powers of laser energy for therapeutic purposes. The diode laser, with wavelengths ranging from 810 to 980 nm in a continuous or pulsed mode, is the most popular soft tissue laser and commonly used in dentistry [6-9]. The diode laser has become an important tool in dentistry due to its ease of use and affordability. It has advantages with regard to periodontal treatment [10,11]. It is well absorbed by melanin, haemoglobin, and other chromophores that are present in periodontal disease [12].

The diode laser acts on unhealthy gingival tissue. The laser energy is transmitted through a thin fiber (300-400 μm diameters) that can easily penetrate into deep periodontal pockets to deliver its therapeutic effects. Laser applications in periodontology are: soft tissue surgical applications; bacterial reduction; removal of the pocket epithelium; laser root conditioning; implant therapy.

The use of diode laser in the treatment of chronic periodontitis is based on the benefits of subgingival curettage, the new laser-induced attachment by regenerating the cementum, periodontal ligament and supporting the alveolar bone. By using it, a significant reduction in the number of subgingival pathogenic bacteria is obtained [13-15].

Aim and objectives

The purpose of pre-prosthetic periodontal treatment using laser diode is to stop the inflammatory process by reducing microorganisms. In this study, we aimed to evaluate the effect of diode laser treatment on a patient with gingivitis.

MATERIAL AND METHODS

Clinical case presented here is of a female patient who addressed the dental service for a total prosthetic rehabilitation. After clinical and radiological examination (Figure 1), we obtained the patient's informed consent to the treatment plan. In the first step of treatment, we decided to extract all mandibular teeth (Figure 2). At the upper jaw, the patient had generalized gingivitis at the abutment teeth (Figure 3).

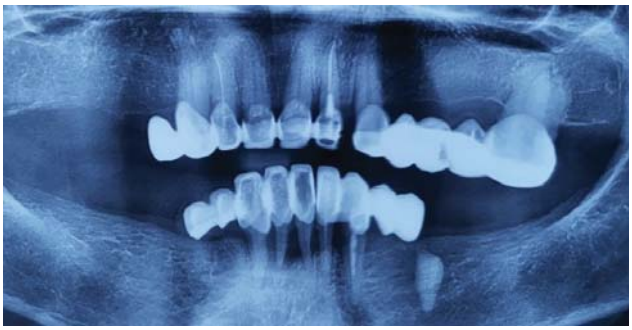

Figure 1. Orthopantomography of the patient

Figure 2. Initial clinical appearance in the upper jaw

Figure 3. Clinical appearance after removal of the fixed prosthesis from the upper jaw, with generalized gingivitis at the abutment teeth

After removing the fixed maxillary prosthesis, we evaluated the teeth in terms of periodontal support, and it was decided to extract the tooth 27. The final prosthetic treatment will consist of a mobilizable prosthesis at the level of the maxilla and a mobile prosthesis at the level of the mandible.

Prior to fixed maxillary prosthetic treatment, the periodontal inflammation index must be reduced. A non-surgical periodontal treatment protocol was adopted (NSPTP) consisting of three meetings within a week (on the first, fourth and seventh day). After scaling and root planning (SRP) non-surgical periodontal instrumentation was applied, with the adjuvant use of diode laser, with a wavelength of 980 nm. The gingival groove was irrigated with Glucosite gel and Methyl blue, and sulcular debridement was performed (Figure 4), followed by biostimulation using diode laser (Figure 5).

Each treatment session ended with adhesive periodontal dressing based on cellulose, Reso-pac (Figure 6). This keeps out bacteria and assists the healing process. The patient was explained the importance of maintaining rigorous hygiene.

Figure 4. Irrigation of the gingival groove with Glucosite gel and Methyl blue; and diode laser sulcular debridement

Figure 5. Biostimulation using diode laser

Figure 6. Treatment with adhesive periodontal dressing based on cellulose, Reso-pac

RESULTS

Two weeks after starting the treatment, the gingival index (GI) was evaluated, and it was decided that the prosthetic treatment itself could be started, the gingival inflammatory phenomena being remitted (Figure 7).

Figure 7. Clinical appearance two weeks after starting the treatment for gingival inflammation

DISCUSSIONS

There are numerous studies on the effect of diode laser therapy on periodontal pockets in terms of its bactericidal effect and the improvement of periodontal condition.

In a study conducted by Assaf et al. using a diode laser in combination with ultrasonic scaling for the treatment of gingivitis, the authors demonstrated a significantly lower incidence of bacteremia in the diode + ultrasonic group (36%) compared to the ultrasonic only group (68%). They also suggested that diode lasers may be used to prevent bacteremia, especially in immunocompromised patients [16].

Kamma et al. studied the effect of using 980 nm diode laser in the treatment of aggressive periodontitis, demonstrating that it is possible to reduce the bacterial load in pockets without use of any systemic antibiotic therapy [17].

Some studies in patients divided into groups (laser and control group) showed that bacterial reduction with laser diode therapy was significantly better [18,19], others showed that laser therapy does not have a significant effect on the manifestation of inflammation in marginal external surface of the gum [20,21].

CONCLUSIONS

Laser diode therapy, in combination with SRP, supports the reduction of gingival inflammation by eliminating bacteria.

Although there is controversy about the efficiency and cost-benefit of using lasers, there are substantial benefits of using a diode laser, such as reduced pain, hemostasis, and improved patient comfort. Thus, diode lasers can rather be considered an advantage in periodontal treatments.

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