

THE TREATMENT OF GINGIVAL HYPERPLASIA IN ORTHODONTIC PATIENTS: A COMPARISON OF SURGICAL LASERS.

ABSTRACT

The advent of new technologies has changed the approach to dental treatment, offering patients less invasive techniques, among them the laser is an instrument which is most frequently offered to dentists, because of its well known properties of decontamination and biostimulation offering significant opportunities within the periodontal and oral reconstructive surgery.

Also in orthodontics can take advantage of some peculiarities, such as in surgical orthodontic treatment "Minor", with the current research aimed to test its effectiveness in order to accelerate tooth movement.

The purpose of this study is to validate the laser as a tool of choice for the resolution of gingival hyperplasia resulting from fixed orthodontic treatment.

KEY WORDS

Gingival hyperplasia, laser Nd:YAG, laser diode, laser CO₂, orthodontic patients.

INTRODUCTION

In patients undergoing fixed orthodontic treatment is likely to appear as complications of periodontal defects and gingival muco-dependent inflammatory lesions of the gingiva and periodontium, caused by a buildup of plaque.

Gingivitis develops within 2-4 days after the beginning of the accumulation of plaque, when it will be enough to enable microbial products to initiate an acute inflammatory response.¹

The lesion is localized in tissues around the base of the histologic sulcus (which is the virtual space, the depth of about 0.5 mm, between enamel epithelium and sulcus free surface of the junctional epithelium) and affects the part of the sulcus and junctional epithelium and microscopic area of tissue below.² From a clinical point of view, gingivitis is difficult to assess and is manifested by

gingival redness, swelling and increased bleeding tendency of the soft tissues after a light poll. These clinical signs are reversible if we proceed with the removal of microbial plaque with effective measures to control it: good oral hygiene and home care professional sessions with the hygienist during and after orthodontic treatment. Where the causal therapy is not effective you must take action to gingivectomy, which aims to reshape the abnormal gingival contour, so that this initial injury from turning into a more severe. In 1977 and Zachrisson Monefeldt^{3,4} gingivectomy described a technique for increasing the height of the clinical crown to improve the aesthetic orthodontic results in specific situations. Hence the need to adopt a minimally invasive technique that sees the use of laser (Light Amplification by Stimulated Emission of Radiation) instrument of choice. The healing and regeneration of the gums do not present complications, provided an excellent oral hygiene is maintained for 2 months in the surgical wound. The result can be explained by one or more factors: proper effect of gingivectomy, removal of the accumulation of the gingiva, often in association with fixed orthodontic treatment, elimination of a deep pocket is normally present.

LASER TECHNIQUE

The laser is an instrument capable of emitting a beam of light consisting of amplified microwaves, arising from the stimulated radiation by molecules of certain substances, solid, liquid or gaseous, subjected to electric shock. Although Einstein⁵ was the first to talk about laser technology, it was only in the second half of the 80 that the laser was introduced in dentistry.

TYPES OF LASERS IN DENTISTRY

There are several types of lasers are classified based on the active element (Nd: YAG, CO₂ and diode) that can be used to perform a gingivectomy.

1. The Nd: YAG (Yttrium, Aluminium, Garnet) is a solid laser with a wavelength of

1064 nm used in the vaporization of soft tissue, blood clotting (hemostasis effective: bloodless surgical field) in the decontamination of dentin and bone in biostimulation (healing by secondary intention and remodeling).⁶ The emission of Nd: YAG laser are dispersed within the soft tissues, with a penetration depth of 2 +-1mm. It 's the laser of choice in small gingival surgery.^{7,8}

2. The laser diode is a semiconductor. Generally, they are laser and aluminum gallium arsenide, which emits a wavelength of 810-980 nm and has a radius that is well absorbed by hemoglobin and melanin. Its penetration in soft tissues is 3-4 mm, with the power from 1 to 10 watts and can have frequencies in the pulse mode up to 10,000 hertz.

3. The CO₂ laser⁹ is a type of gas laser with a wavelength of 9600-10600 nm, used in oral surgery and for his ability in the haemostatic pulpotomia (amputation of the pulp chamber). This type of laser produces a thermal effect, to seal blood vessels and lymphatic vessels of small size (0.3-0.5 mm in diameter), creating an excellent coagulant effect.^{10,11,12}

OBJECTIVE OF THE STUDY

Objectives of the study is to test what type of laser is the most indicated for the treatment of gingival hyperplasia in patients undergoing fixed orthodontic treatment between the Nd: YAG, the diode laser and the CO₂.

MATERIALS AND METHODS:

SELECTION OF THE SAMPLE

A sample of 40 orthodontic patients with specific requirements has been selected.

1. aged between 12 and 18;
2. fixed orthodontic treatment in at least one year;
3. with gingival hyperplasia: bleeding on probing, measurements of pocket depth and attachment level and x-rays indicated no loss of supporting tissues, but the presence of pseudotasche;

4. often with gingival biotype;
5. not subjected to any form of drug treatment.

All patients before beginning orthodontic treatment, have been educated to good oral hygiene at home and are part of a program that provided professional meetings every two months.

RECORDING

During orthodontic treatment for each site, presenting signs of papillary hypertrophy were considered:

1. the probing depth, PPD (> 3 mm);
2. clinical attachment loss (CAL);
3. the bleeding on probing (BOP).

STUDY DESIGN

The sample of 40 orthodontic patients has been divided into four groups according to the type of laser treatment to which they are subjected. Of these:

- The 1st group consists of 10 patients treated with Nd: YAG, conveyed by an optical fiber in contact than 300 microns; Energy: 40 mJ; Frequency: 80 Hz; Power: 3.2 watt; Pulse Duration: 300 milliseconds.
- The 2nd group consists of 10 patients treated with diode laser 980 nm;
- The 3rd group consists of 10 patients treated with CO₂ laser;
- The 4th group is composed of the remaining 10 patients not treated with any type of laser.

The laser gingivectomy for all 3 groups of patients was made before sbandaggio at the end of orthodontic treatment. For each patient during treatment and then after one year, was compiled a very thorough periodontal folder: periodontal probing with a calibrated periodontal probe,

operator-independent (Florida Probe®) and X-ray examinations showed that the absence of severe periodontal lesions.

All patients were educated to good oral hygiene and were advised to brush their teeth at least once a day, preferably in the evening with a mixture of baking soda and hydrogen peroxide (10 volumes) to be used in place of toothpaste generally used. This procedure finds its reason in the activity of hydrogen peroxide bactericidal to bacteria and activity parodontopaten neutralizing acids produced by the decomposition of the plaque by the baking soda, being a product that has an alkaline pH of 9 . In addition, the baking soda reduces the possibility of bacterial growth and toxin production.^{13,14}

RESULTS

This study included treatment of all the maxillary and mandibular buccal sites, with gingival hyperplasia, 30 of 40 patients undergoing fixed orthodontic treatment. All patients treated within the 1st-2nd and 3rd group, albeit with different types of lasers, showed significant improvement:

- Bleeding in the survey decreased significantly from 100% to 20% of sites bleeding;
- The pseudo pockets present, have suffered a decrease in average of 2 mm;
- There has been no loss of clinical attachment level.

The 10 untreated patients, unlike the previous ones, showed, after 7 months of the end of orthodontic treatment, a worsening of periodontal disease, with:

- Increase in probing depth of 0.5 mm on average;
- Bleeding on probing at all sites examined;
- Loss of clinical attachment in 35% of papillary sites, with the transformation of the pockets in pseudo real periodontal pockets.

DISCUSSION

All patients underwent laser gingivectomy showed significant clinical improvement, with the elimination of gingival hypertrophy, regardless of the type of laser used. The differences in the course of treatment consists in the fact that the Nd: YAG laser has a cutting action is very precise and clear and do not require anesthesia, minor postoperative complications, even though these hemostatic action too slow and light. The CO₂ laser coagulation with high capacity, highly precise incision, improved

healing, reduced edema and post-operative pains, rapid execution, not require contact with the tissues. The disadvantages are that there is not possibility of damage to underlying structures if not using the correct parameters, ineffectiveness in the presence of liquid pathophysiology on the surgical field and the cost of the equipment.

Statistical analysis (T-student) carried out between the study group, consisting of patients who gingivectomy was carried out with various types of laser (Nd: YAG, diode and CO₂), and the control group, consisting of patients treated, shows that there is a statistically significant P-level. This suggests that laser therapy results in a significant reduction pseudotasche in treated patients, while a deterioration if not treated an average of 0.5 mm.

Comparing the results between the various types of laser, the Nd: YAG laser appears to be the one that leads to the best result, but the T-student pair analysis showed a P-level meaning to our not. On the basis of information obtained from this study, we conclude that treating patients with hypertrophy gngivali thing in orthodontic treatment with a laser surgery that we examined (Nd: YAG, diode, CO₂), leads to a statistically significant reductions listed these pseudo-pockets, but there is equal certainty in assessing the efficiency of a laser over another. The choice of the type of laser used will therefore be influenced by other factors such as the learning curve, the practicality, the cost and versatility of a laser rather than another part of daily dental practice.

We reserve the right to obtain a next job, the most significant data to determine more accurately what the laser of choice for service to gingivectomy.

CONCLUSIONS

The use of lasers in general dentistry, especially in orthodontics, is still viewed with suspicion by many professionals. What is important to emphasize is that such an instrument can, if used in a correct way, be a valuable aid in daily practice, not only for the well known clinical benefits (such as decontamination and reduction of healing time), but also for its easy and safe to use, with good patient satisfaction. Is

the set of all these factors that led us over the years and motivated to use the laser gingivectomy, unlike the classical surgical procedure as a method less invasive, painless and requires less recovery time, reducing the discomfort and the painful symptoms of the patient. These considerations are of paramount importance if we consider that this type of surgery is performed on young patients aged between 12 and 18, who would never undergo surgery, but for which the treatment is necessary in order to prevent the pseudotasche untreated periodontal pockets can become real.

The benefits of laser gingivectomy include a reduction of bleeding during treatment with consequent reduction in treatment time and the same post-operative haemostasis, eliminating the need for suturing. The laser in the field of orthodontics can also be used to make frenulectomy in a simple, painless and without bleeding and in case of aphthous and herpetic lesions. Another important aspect to be considered in patients undergoing orthodontic treatment is aesthetics. Almost always those approaches to orthodontic treatment, wants to improve their smile and not always the orthodontist is able to obtain an aesthetically proper gingival contour without resorting to surgery. So the laser could be considered by orthodontists for the remodeling of the gingival contours altered, often present problems in orthodontic treatment of adults and adolescents.

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