Er-Yag laser for dental roots decontamination to treat multiple gingival recessions. Case report

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Abstract
Multiple gingival recessions may cause mainly dentinary sensibility and aesthetic alterations. The subepithelial graft is a mucogingival technique which can be used to treat multiple gingival recessions. In this case report the Erbium YAG laser was applied to promote radicular surface decontamination, an important step to reach reinsertion of the gingival tissues on exposed radicular surface. Our clinical findings suggest that this technique may be a predictable procedure to treat gingival recession and promote root decontamination.

Keywords: Gingival recession, Surgery, Bucal, Laser therapy.

Introduction
Gingival recessions are a sequelae of the periodontal disease, characterized by loss of periodontal tissues as alveolar bone, dental cementum, periodontal ligament, with migration of junctional epithelium to apical. Usually are predominant by vestibular, without periodontal pocket development, frequently without characteristic clinical signs of inflammation in the gingival margin and without a significant quantity and quality of bacterial plaque accumulation, which can be considered as a non-inflammatory periodontal disease.[1-4] As all periodontal disease it is considered as having a multifactorial etiology.[5] The dental biofilm is considered the main etiologic factor however, always needs to be associated with predisposing risk factors such as: occlusal trauma, absence of inserted keratinized gingiva, anatomical features related to the positioning of teeth in the dental arch, large root diameter dental and iatrogenic factors, to cause gingival recession.[1-13] Gingival recession may be unitary or multiple, causing dentin sensitivity, propensity to root caries and aesthetic changes.[1-4] The key method for treating any disease is to diagnose and eradicate and / or establish a control and / or increase host resistance at levels above of the pathological capacity of the etiological agent. Subsequently, will be possible applying therapeutic surgical techniques to treat the sequelae developed during disease progression.[12-14] The gingival recession a sequelae of periodontal disease, has been treated with a variety of techniques depending upon whether the recession was generalized or on an isolated tooth. Langer and Langer in 1985[13] described the procedure of subepithelial connective graft as a donor source of root coverage specifically for the wide multiple recessions. They advocate success of these grafts due to the double-blood supply at the recipient site from the underlying connective tissue base and the overlying recipient flap. Nevertheless, mucogingival reconstructive therapy requires root surface treatment by using physical and or chemical methods to eliminate calculus, bacteria and theirs noxious products. Chemical methods as citric acid and tetracycline acid application over exposed dental roots before mucogingival grafts procedures have been suggested that demineralization of root surfaces may stimulate cementogenesis and may result in an increased number of binding sites for fibronectin which may increase the possibility of the root coverage.[15-20] The present clinical trial was designed to clinically evaluate the potential of the Er-YAG laser to pre-treat multiple root surfaces to be covered by using the subepithelial connective tissue graft technique.[15-24]

Case description and results
A 33 year-old female patient sought the Private Periodontology Clinic, in March 2017 complaining of pain in several teeth with gingival recessions. Clinical examination showed loss of alveolar bone and marginal gingival soft tissue in various teeth in her mouth (Fig. 1). The patient reported anxiety and constant emotional stress. She also perceived per several times, an unconscious centric bruxism occurring during the daytime and, that after sleeping time, she felt pain around his temporo-mandibular joint, mainly, when she was under stress. The patient had no other significant medical history or known allergies and was not currently receiving any medication. The patient was advised to seek psychological treatments, so that she could be able to control his emotional disorder. At the clinical examination loss of insertion was observed in most teeth, around 4 mm, especially in the upper arch in the canines to the molars (Fig. 1). The patient presented a satisfactory oral hygiene, no apparent detectable bacterial plaque, calculus, and periodontal inflammation. It was noticed the presence of teeth with high and pointed cusps. Despite the recessions there was an amount of the 1 to 2 mm of the keratinized inserted gingiva in the teeth with gingival recessions. At the radiographic examination no significant bone changes were detected in the interproximal space, due the bone loss was concentrated per vestibular side. It was planned to perform the root recovering by using the technique of subepithelial graft with alterations in the technique to harvest the connective tissue graft and to promote physical decontamination of the exposed roots surfaces.[15-24] A flap involving periosteum and connective tissue was created with two vertical incisions, extended apically beyond the mucogingival junction placed at least one-half to one tooth

wider mesiodistally than the area of gingival recession. A horizontal sulcular incision was made to preserve all existing radicular gingiva, linking the two relaxing incisions. All the interproximal papillae are left intact. The flap was elevated by using a periosteal elevator (Fig. 2). The soft tissues were cureted. The involved teeth were submitted to methods of the scalling and root planning until their surfaces became smooth and hard. Er-YAG laser (Kavo Key Laser) was then applied to their surfaces to promote root biomodification.[21-24] The laser light delivery system was performed with the use of an appropriate surgical laser pen, which provided greater energy due to the convergence of the light[24]. Was used: 1.2W of power, with a wavelength of the 2,940nm, 10Hz frequency, with constant focal length of the 2.5 cm, obtaining 0.28 cm^2 irradiated area, with a time of irradiation between 15 and 20 seconds.[24] (Fig. 3,4,5) A free gingival graft of 2 millimeters thickness was harvested from the hard palate from between mesial area of first pre molar to the mid palatal of first molar with the dimensions of the free gingival graft being determined by the combinations of the width of the teeth to be covered. After collection of the free gingival graft, its epithelium was eliminated through the action of Erbium YAG, under the same conditions as those applied to decontaminate the exposed roots surface, however, with a longer distance from the delivery instrument (laser pen) to the target which determined an out of focus light but sufficient to eliminate epithelial tissue from the free gingival graft (Fig. 6). The graft was placed in the previously treated recipient site in order to completely cover the surface of the exposed root. The subepithelial gingival graft was firmly sutured onto the exposed surface of the roots (Fig. 7). The flap was positioned coronally to cover as much of the graft as possible and sutured in this position to promote maximum adaptation to ensure better healing, with a lower chance of wound dehiscence (Fig. 8). The donor site and recipient site was covered with surgical dressing and the patient was instructed in post-surgical management. The patient was treated with acetaminophen 3 times daily for 3 days. The patient returned on the 7th postoperative day to remove the surgical dressing and sutures (Fig. 9). No additional dressing was necessary, and normal plaque control techniques were resumed. After 12 months of the healing the patient was kept under regularly control, once a month. A favorable evolution was noted without any tissue sequelae but rather with the obtention of a symmetrical and homogeneous architecture of the healing gingiva (Fig. 10).

Fig. 1

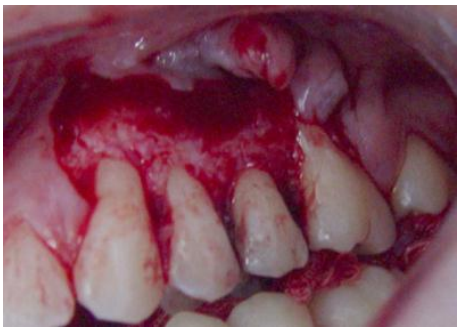

Fig. 2

Fig. 3

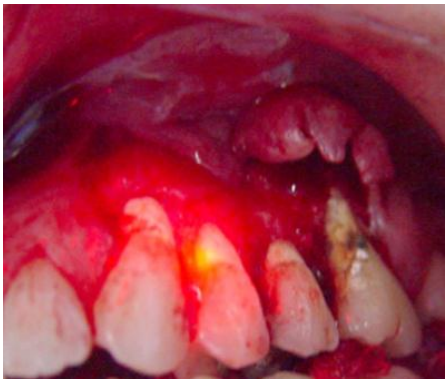

Fig. 4

Fig. 5

Fig. 6

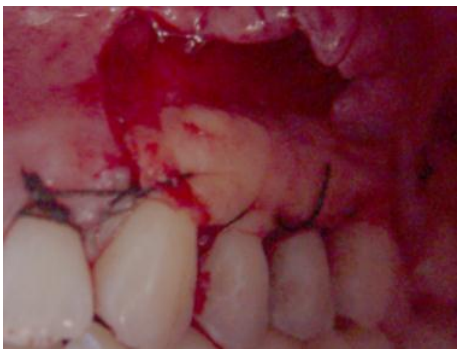

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Discussion

Gingival recession is a sequel of the periodontal disease, which present multifactorial etiology.[4] Its main etiologic factor are bacteria which always needs to be associated with predisposing local and/or general risk factors as behavioral risks factors, emotional stress, dental trauma, dental positioning at the base of the alveolar bone, dental root diameter, alveolar bone dimension, quality and quantity of mucogingival tissues and the occlusal plane.[1-13] Some etiological predisposing risk factors such as anatomical and behavioral factors, due to their inherent characteristics, become impossible to eliminate or even establish a predictable control over them.[1,3,4] To treat any disease it is imperative to diagnose all the etiological factors involved in its onset and progression, eliminating them and / or establishing a control over them at lower levels, to achieve a period of homeostasis and / or to increase local and / or general resistance of the individual to protect him against the action of the etiological agents in such a way that they do not cause disease.[25] In the treatment of the gingival recessions, a sequel to the periodontal disease oftentimes is impossible eliminating all etiologic agents involved in its determination.[3,4] At most often time a control is established over bacterial biofilm, the local predisposing risk factors may be attenuated, but mainly, local area resistance may be increased through mucogingival surgery of the root covering, which always promotes an increase in the quantity and quality of the ceratinized, inserted gingiva, an important factor in the defense of the marginal gingiva.[1,3,4,11,14,15] In this clinical case, the etiological factors diagnosed were bacterial plaque, the occlusal relationship of high and pointed dental cusps associated with the patient's constant emotional stress.[1,3,4,12,13,26,27] The stress is an emotional predisposing risk factor, inherent to each individual, which interfere with the physical aspects and in the chemical response of the individual[4,25-27]. The emotional stress which may ascend due to innumerable situations or thoughts, attacking at various levels of aggressiveness, which may appear or disappear at several moments, interfering with the defense mechanism of the individual and significantly in their stomatognathic system, may be one of the etiologic predisposing risk factors to initiate periodontal tissue destruction, associated with bacteria.[4,25-27] Regarding variables of the anatomical occlusals patterns, during the mastigatory process, the opposing teeth do not establish

effective contacts between them, however, during some times of the day and especially during sleeping time, the individual under emotional stress may develop centric or eccentric bruxism, where the opposing teeth establish effective contact between them, causing excessive eccentric forces in the periodontal tissues.[4,28,29]

Thus, the stress associated with anatomic variable as high and pointed cusps, a predisposing risk factor for centric bruxism, may induce exaggerated forces to be dissipated in the periodontium, especially on the vestibular side, which usually has a thinner alveolar bone, less bone marrow, with less irrigation and therefore, more difficult to resist and recover from aggressions.[4,30-32] Then bacteria associated with anatomic variable as high and pointed cusps and emotional stress may be the etiologic factors determining gingival recession.[4] However, in order to establish the treatment of all etiological factors which lead to gingival recession does not seem to be very simple. To establish a low level of bacteria that may not cause gingival recession, despite the predisposing risk factors which would be able to decrease the host defense seems impossible to be determined.[4,25] To treat emotional stress that appears and disappears spontaneously in specific moments, also does not seem to be easy, as well as to treat unfavorable anatomical variables inherent to each individual are procedures difficult to be applied.[4,26,27] Therefore, treating gingival recession through a mucogingival surgery that cover the exposed root surface and in addition to recovering aesthetically the area, reinforce its resistance by increase the extension of inserted ceratinized gingiva, still remains fundamental in periodontal therapy.[11,14,15,16] Thus, in this case, due to the multiple gingival recessions, mucogingival surgery was the subepithelial graft with some technical modifications.[15] To harvest gingival graft from the palatine region, the technique applied was the free gingival graft technique.[14] The free gingival graft epithelium was removed by Er-YAG laser action to obtain only connective tissue graft. This technique allowed obtaining a subepithelial graft in quantity and quality, with adequate size, large, regular in height, width and thickness, without adipose and glandular tissue. The quality and quantity of the subepithelial graft obtained, allowed it to be positioned on the receiving bed in such a way that the majority was deposited in the tissue and periosteum of the periodontium not on the avascularized root surface. Thus, it was possible to obtain an initial stability of the subephitelial graft, fundamental for its adequate revascularization, inducing root recover, increasing the amount of inserted ceratinized gingiva to protect gingival sulcus.[11,15]

However, this subepithelial graft harvesting procedure, determined in the donor area a wide and sensitive second intention cicatrization. Regarding the physical treatment of decontamination of the root surface with the Erbium YAG laser, the use of high-power lasers has been widely studied in periodontics and could be used as a coadjuvant or even as a substitute for conventional periodontal therapy, since this type of laser has a debridement action and can remove dental calculus, establishing microorganism control inside of the periodontal pockets and also can promote a conditioning and decontamination of the dental root surface.[21-24] The disadvantage of using surgical laser is that light does not make curves which makes impossible for the light emitted by the laser of reaching determinated inside tooth walls of the periodontal pocket.[22,24] However, the delivery of the light can be made through of flexible optical fibers which could improve the reach of the light to be delivered in some difficult access areas, nevertheless, the laser do not reach all anatomical surfaces and anatomical root accidents. In addition the laser is not delivered with the same energy in the area to be treated, due to the divergence of the light in its final delivery.[24] Moreover, the cost of the device may make it unfeasible in the routine of the most professionals.

Conclusions

With the clinical results obtained, we conclude that the techniques proposed in this study although were efficient, also presented disadvantages.

Conflict of Interest: None.

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