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Clinical evaluation of the Er:YAG laser in combination with an enamel matrix protein derivative for the treatment of intrabony periodontal defects: a pilot study

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Abstract

Objectives: The aim of the present study was to compare the combination therapy of deep intrabony periodontal defects using an Er:YAG laser (ERL) and enamel matrix protein derivative (EMD) to scaling and root planing+ ethylenediaminetetraacetic acid (EDTA)+EMD.

Material and Methods: Twenty-two patients with chronic periodontitis, each of whom displayed 1 intrabony defect, were randomly treated with access flap surgery and defect debridement with an Er:YAG (160 mJ/pulse, 10 Hz) plus EMD (test) or with access flap surgery followed by scaling and root planing (SRP) with hand instruments plus EDTA and EMD (control). The following clinical parameters were recorded at baseline and at 6 months: plaque index, gingival index, bleeding on probing (BOP), probing depth (PD), gingival recession, and clinical attachment level (CAL). No differences in any of the investigated parameters were observed at baseline between the two groups.

Results: Healing was uneventful in all patients. At 6 months after therapy, the sites treated with ERL and EMD showed a reduction in mean PD from 8.6 ± 1.2 mm to 4.6 ± 0.8 mm and a change in mean CAL from 10.7 ± 1.3 mm to 7.5 ± 1.4 mm ($p < 0.001$). In the group treated with SRP+EDTA+EMD, the mean PD was reduced from 8.1 ± 0.8 mm to 4.0 ± 0.5 mm and the mean CAL changed from 10.4 ± 1.1 mm to 7.1 ± 1.2 mm ($p < 0.001$). No statistically significant differences in any of the investigated parameters were observed between the test and control group.

Conclusion: Within the limits of the present study, it may be concluded that both therapies led to short-term improvements of the investigated clinical parameters, and the combination of ERL and EMD does not seem to improve the clinical outcome of the therapy additionally compared to SRP+EDTA+EMD.

Key words: clinical trial; enamel proteins; intrabony defects; lasers/therapeutic use; periodontal regeneration

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Periodontitis is an inflammatory disease caused by opportunistic bacteria residing in the oral cavity, leading to a loss of the supporting tissues of the teeth (i.e. periodontal ligament and alveolar bone) (O'Leary 1986). According to the cause-related concept of periodontal therapy, the main objective of treatment is to control infection and thereby arrest disease progression. Ideally, periodontal therapy does not only include arresting the disease but also regeneration of the tissues that have been lost due to disease (O'Leary 1986). This includes de novo formation of connective tissue attachment and the regrowth of alveolar bone (Caton & Greenstein 1993). Several treatment modalities, such as the use of different types of bone grafts, root surface demineralization, guided tissue regeneration (GTR), or the application of growth factors have been employed with varying degrees of success predictably in order to accomplish this goal (Bowers et al. 1989, Lynch et al. 1989, Brunsvold & Mellonig 1993, Lowenguth & Blieden 1993, Karring et al. 1997). An enamel matrix derivative (EMD) has been introduced as a new modality in regenerative periodontal treatment (Hammarström 1997). Histologic findings from animals (Hammarström et al. 1997) and humans (Mellonig 1999, Sculean et al. 1999, Yukna & Mellonig 2000) have shown that the application of EMD onto a debrided root surface may also promote periodontal regeneration. Furthermore, the results from controlled clinical trials have shown that treatment of intrabony defects with EMD may result in comparable clinical outcomes to those following GTR therapy (Silvestri et al. 2000, Sculean et al. 2001). Furthermore, clinical trials have reported improved gains in clinical attachment levels (CALs) with respect to access flap surgery alone (Heijl et al. 1997, Pontoriero et al. 1999, Silvestri et al. 2000). Usually the debridement of periodontally diseased root surfaces is accomplished using hand instruments. However, the formation of a smear layer after mechanical scaling and root planing has been reported to be detrimental to periodontal tissue healing as it may inhibit reattachment of cells to the root surface (Blomlöf & Lindskog 1995, Blomlöf et al. 1997). In order to improve the biocompatibility, root surface conditioning with various substances such as ethylenediaminetetraacetic acid (EDTA) gel at neutral pH, citric- and ortho-phosphoric acids has been proposed (Polson et al. 1984, Blomlöf & Lindskog 1995, Blomlöf et al. 1996, 1997). Such treatment was effective in removing the root-surface-associated smear layer and exposing the collagenous matrix of dentin (Blomlöf et al. 1996, 1997). Furthermore, the exposure of a collagenous matrix may also be favorable for retention of biologically active substances, such as EMD (Gestrelius et al. 1997). In addition to these conventional tools, the use of lasers has been reported as an alternative therapy for root surface debridement (Aoki et al. 1994, Israel et al. 1997). Among all lasers used in the field of dentistry, which include CO_2 (carbon dioxide), the Nd:YAG laser (neodymium-doped: yttrium, aluminium and garnet) and diode lasers, the Er:YAG laser (ERL) has been reported to be the most promising laser for periodontal treatment. Its excellent ability to ablate dental calculus effectively without producing major thermal side-effects to adjacent tissue has been demonstrated in numerous studies (Aoki et al. 1994, Israel et al. 1997, Schwarz et al. 2001a). Controlled clinical trials and case reports have also indicated that nonsurgical periodontal treatment with an ERL leads to significant gain of clinical attachment (Watanabe et al. 1996, Schwarz et al. 2000, 2001b, 2003a), even over a 2-year period (Schwarz et al. 2003b). Furthermore, several studies reported antimicrobial effects against periodontopathic bacteria and the reduction of endotoxins by ERL radiation (Ando et al. 1996, Yamaguchi et al. 1997, Sugi et al. 1998, Folwaczny et al. 2002). The results from recent in vitro studies showed that the surface structure of previously diseased roots after ERL laser irradiation seem to offer better conditions for the adherence of periodontal ligament (PDL) fibroblasts than scaling and root planing with hand instruments (Rossa et al. 2002, Schoop et al. 2002). These findings suggest that root surface debridement and detoxification with an ERL may also facilitate a precipitation of enamel matrix protein. However, no investigations are yet available evaluating the combination of an ERL laser and EMD for the treatment of intrabony defects. Therefore, the aim of the present study was to compare the combination therapy of deep intrabony periodontal defects using an ERL and EMD to scaling and root planing (SRP)+EDTA+EMD.

Material and Methods

Study population

Twenty-two patients with chronic periodontitis were included in this parallel-design study (11 patients in each group) based on signed informed consent. The patient population comprised 12 men and 10 women, aged from 32 to 61 years. The criteria needed for inclusion were: (1) no systemic diseases that could influence the outcome of the therapy; (2) a good level of oral hygiene (plaque index (PI) <1 (Löe 1967)); (3) compliance with the maintenance program; and (4) presence of 1 intrabony defect with a probing depth $\geqslant 6$ mm and an intrabony component of $\geqslant 3$ mm as detected on radiographs. The following clinical parameters were assessed 1 week prior and 6 months after the surgical procedure using a periodontal probe (PCP 12, Hu-Friedy, Chicago, IL, USA): PI (Löe 1967), gingival index (GI) (Löe 1967), bleeding on probing (BOP), probing depth (PD), gingival recession (GR), and CAL. The measurements were made at six aspects per tooth: mesiovestibular (mv), mid-vestibular (v), distovestibular (dv), mesiolingual (ml), midlingual (l), and distolingual (dl) by one blinded and calibrated investigator. Five patients, each showing two pairs of contralateral teeth (single- and multi-rooted) with probing depths $\geqslant 6$ mm on at least one aspect of each tooth, were used to calibrate the examiner. The examiner evaluated the patients on two separate occasions, 48 h apart. Calibration was accepted if measurements at baseline and at 48 h were within a millimeter at $\geqslant 90\%$ of the time. The cemento-enamel junction (CEJ) was used as the reference point. In cases where the CEJ was not visible, a restoration margin was used for these measurements. The study reports only measurements at the same deepest point of the selected defect. Prior to surgery and 6 months after surgery, periapical radiographs were taken using the long-cone parallel technique. Before surgery, the defects were randomly assigned to the two treatment groups after controlling for the depth of the intrabony component and CAL. The depth of the intrabony component was estimated before surgery on radiographs. Patients who smoked more than 10 cigarettes/day were defined as smokers (Tonetti et al. 1995).

Surgical procedure

All operative procedures were performed under local anesthesia. Following intracrevicular incisions, full-thickness mucoperiosteal flaps were raised vestibularly and orally. In the test group, all granulation tissue was removed from the defects and the root surfaces using an ERL (KEY2®, KaVo, Biberach, Germany) device emitting a pulsed infrared radiation at a wavelength of 2.94 μm. Laser parameters were set at 160 mJ/pulse and 10 pulses/s, and pulse energy at the tip (size 0.5×1.65 mm) was approximately 120 mJ/pulse (Schwarz et al. 2001b, 2003a, b). The laser beam was guided onto the root surfaces under water irrigation with a specially designed periodontal handpiece and a chisel-shaped glass fiber tip (2061, KaVo, Biberach, Germany). The treatment was performed from coronal to apical in parallel paths with an inclination of the fiber tip of 15–20° (Folwaczny et al. 2001) to the root surface. In the control group, all granulation tissue was removed from the defects and the roots were thoroughly scaled and planed using hand instruments (Hu-Friedy Co., Chicago, IL, USA). After defect debridement, the root surfaces adjacent to the defects were conditioned for 2 min with 24% EDTA gel (pH 6.7) (PrefGel®, Biora AB, Malmö, Sweden) to remove the smear layer and expose collagen fibrils (Blomlöf et al. 1996). The defects and the adjacent mucoperiosteal flaps were then thoroughly rinsed with sterile saline to remove all EDTA residues. In both groups, EMD (Emdogain®, Biora AB) was applied onto the root surfaces and into the defects according to the instructions given by the manufacturer. Finally, the flaps were repositioned coronally and closed with vertical or horizontal mattress sutures. During surgery, the following measurements were made: distance from the CEJ to the bottom of the defect (CEJ-BD) and distance from the CEJ to the most coronal extension of the alveolar bone crest (CEJ-BC). The intrabony component (INTRA) of the defects was defined as (CEJ-BD) – (CEJ-BC).

Postoperative care

The postoperative care consisted of 0.2% chlorhexidine rinses twice a day for 4 weeks. The sutures were removed 10 days after the surgery. Recall appointments were scheduled every second week during the first 2 months after surgery and once a month during the rest of the observation period. Neither probing nor subgingival instrumentation was performed during the first 6 months after surgery.

Statistical analysis

A software package (SPSS 11.0, SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. The primary outcome variable was CAL. In the calculations, only the deepest site per tooth was included. For the statistical evaluation of the changes from baseline to 6 months, the paired *t* test was used. For the comparisons between groups, the unpaired *t* test was used. For the given input values (CAL and SD of both groups, a level of significance of $\alpha = 0.05$ and a sample size of 11), a power $(1-\beta)$ of 0.83 was computed for two-sided null hypothesis H_0.

Results

At the baseline examination, there were no statistically significant differences in any of the investigated parameters. The depth of the intrabony component as measured during surgery is presented in Table 1. The configuration of the defects is shown in Table 2. The postoperative healing was uneventful in all cases. No complications such as allergic reactions, abscesses, or infections were observed throughout the study period. The PI, GI, and BOP for both treatment groups at baseline and after 6 months are summarized in Table 3. GI and BOP improved statistically significantly compared to baseline, but no statistically significant differences were found between the two groups. At baseline, the mean PD was 8.6 ± 1.2 mm in the ERL+EMD group and 8.1 ± 0.8 mm in the SRP+EDTA+EMD group. No statistically significant difference was found. At 6 months, the mean PD was 4.6 ± 0.8 mm in the ERL+EMD group and 4.0 ± 0.5 mm in the SRP+EDTA+EMD group (Table 4). Thus, the PD decreased significantly in both groups compared to the baseline data ($p < 0.001$). No significant difference between the groups was found. At baseline, the mean GR was 2.1 ± 0.9 mm in the ERL+EMD group and 2.3 ± 0.9 mm in the SRP+EDTA+EMD group, with no statistically significant difference (Table 4). At 6 months, the mean GR was 2.9 ± 1.0 mm in the ERL+EMD group and 3.1 ± 1.0 mm in the SRP+EDTA+EMD group. The increase in GR was statistically significant for both groups ($p < 0.001$), but no difference between the groups was observed. At baseline, the mean CAL was 10.7 ± 1.3 mm in the ERL+EMD group and 10.4 ± 1.1 mm in the SRP+EDTA+

Table 1. Soft and hard tissue measurements in both groups: mean scores (± SD, $n = 22$ patients) at baseline

Treatment	PD	GR	CAL	CEJ-BD	CEJ-BC	INTRA
ERL+EMD ($n = 11$)	8.6 ± 1.2	2.1 ± 0.9	10.7 ± 1.3	12.1 ± 1.2	8.1 ± 1.1	4.0 ± 0.6
SRP+EDTA+EMD ($n = 11$)	8.1 ± 0.8	2.3 ± 0.9	10.4 ± 1.1	12.5 ± 1.4	8.7 ± 1.6	3.8 ± 0.9

Table 2. Distribution of bone defects

Wall	ERL+EMD ($n = 11$)	SRP+EDTA+EMD ($n = 11$)
1–2	3	4
2	6	4
3	2	3

Table 3. Plaque index (PI), gingival index (GI), and bleeding on probing (BOP): mean scores (± SD, $n = 22$ patients) at baseline and 6 months

Index/treatment	Baseline (± SD)	6 months (± SD)	*p*-value
PI			
ERL+EMD	0.9 ± 0.7	0.8 ± 0.4	NS
SRP+EDTA+EMD	1.0 ± 0.6	0.7 ± 0.5	NS
p-value	NS	NS	
GI			
ERL+EMD	2.1 ± 0.7	0.9 ± 0.6	$p < 0.001$
SRP+EDTA+EMD	2.2 ± 0.8	1.1 ± 0.7	$p < 0.001$
p-value	NS	NS	
BOP			
ERL+EMD	65%	30%	$p < 0.001$
SRP+EDTA+EMD	57%	31%	$p < 0.001$
p-value	NS	NS	

NS = nonsignificant.

Table 4. Probing depth (PD), gingival recession (GR), and clinical attachment level (CAL): mean scores ($\pm$SD, $n = 22$ patients) at baseline and 6 months

Index/treatment	Baseline ($\pm$SD)	6 months ($\pm$SD)	*p*-value
PD			
ERL+EMD	8.6 ± 1.2	4.6 ± 0.8	$p < 0.001$
SRP+EDTA+EMD	8.1 ± 0.8	4.0 ± 0.5	$p < 0.001$
p-value	NS	NS	
GR			
ERL+EMD	2.1 ± 0.9	2.9 ± 1.0	$p < 0.001$
SRP+EDTA+EMD	2.3 ± 0.9	3.1 ± 1.0	$p < 0.001$
p-value	NS	NS	
CAL			
ERL+EMD	10.7 ± 1.3	7.5 ± 1.4	$p < 0.001$
SRP+EDTA+EMD	10.4 ± 1.1	7.1 ± 1.2	$p < 0.001$
p-value	NS	NS	

NS = nonsignificant.

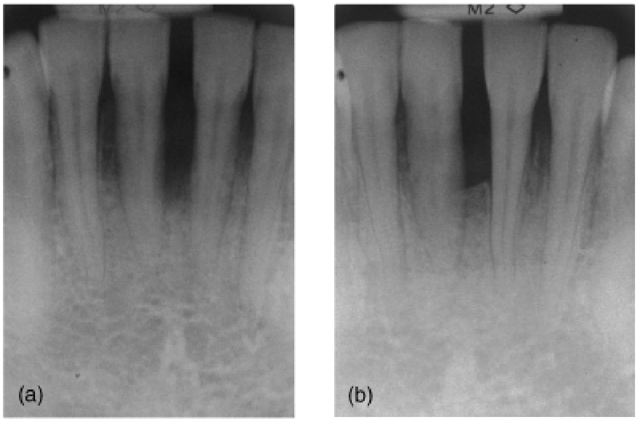

Fig. 1. (a) Preoperative radiograph of the treated ERL+EMD site. (b) Postoperative radiograph at 6 months.

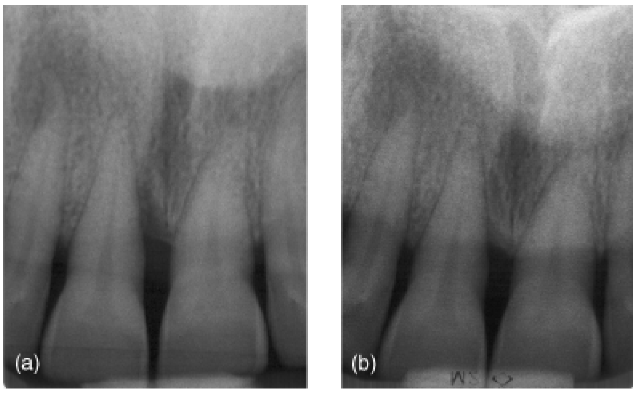

Fig. 2. (a) Preoperative radiograph of the treated SRP+EDTA+EMD site. (b) Postoperative radiograph at 6 months.

EMD group. No statistically significant difference was found between the groups. At 6 months, the mean CAL was 7.5 ± 1.4 mm in the ERL+EMD group and 7.1 ± 1.2 mm in the SRP+EDTA+EMD group. In both groups, the CAL improved significantly compared to baseline ($p < 0.001$). However, no statistically significant difference was observed between the two groups. Pre- and postoperative radiographs at 6 months of both groups are presented in Figs. 1a, b and 2a, b. There were six smokers in the ERL+EMD group and 5 in the SRP+EDTA+EMD group. The sample size was too small to draw any conclusions regarding the effects of smoking on clinical outcomes.

Discussion

The results of the present study indicate that treatment of deep intrabony periodontal defects with both the combination of ERL+EMD and SRP+EDTA+EMD may lead to clinically important and statistically significant PD reduction and CAL gain. The fact that all defects treated in this study healed uneventfully suggests that both treatment modalities were well tolerated. However, no statistically significant and clinically important differences in any of the investigated parameters were observed between both treatment modalities. On the other hand, it should be pointed out that the sample size of this study was relatively small, and does not allow for definitive conclusions to be drawn. These data may serve as a basis to design a clinical trial aimed at showing statistical equivalence between both treatment modalities as suggested by (Gunsolley et al. 1998). The mean gain of attachment 6 months postoperatively was 3.2 mm for test sites (ERL+EMD) and 3.3 mm for control sites (SRP+EDTA+EMD). The gain of attachment in the present study could be compared to previously published clinical data on EMD. Eight months after EMD therapy, Heijl et al. (1997) reported 2.1 mm CAL gain and 2.3 mm 16 months postoperatively (baseline CAL: 9.4 mm; INTRA: 4.8 mm). There was a statistically significant difference between EMD- and placebo-treated sites. Pontoriero et al. (1999) in a controlled study reported a mean CAL gain of 2.9 mm for EMD-treated sites after 1 year with a statistically significant difference between EMD- and placebo-treated sites (baseline CAL: 9.1 mm; INTRA: 4.2 mm); Froum et al. (2001) reported 4.26 mm CAL gain (baseline CAL: not reported; INTRA: 5.63 mm); and Sculean et al. (2001) reported 3.4 mm CAL gain (baseline CAL: 10.6; INTRA 3.8 mm), respectively. This is in accordance with the results of EMD-treated sites in the present study. Because no previously published data on the combination therapy ERL+EMD are available, the present results cannot readily be compared with those of other studies. However, a common problem after mechanical defect and root surface debridement with hand instruments is the formation of a smear layer, which has been reported to be detrimental to periodontal tissue healing as it may inhibit cell migration and attachment (Blomlöf & Lindskog 1995, Blomlöf et al. 1997). Additional root surface conditioning with various substances such as EDTA at neutral pH, citric- and ortho-phosphoric acids has been shown to be effective in removing the smear layer and exposing the collagenous matrix of dentin (Blomlöf et al. 1996, 1997). Furthermore, the exposure of a collagenous matrix may also be favorable for retention of biologically active substances, such as EMD. Enamel matrix derivative is shown to adsorb to hydroxyapatite, collagen, and denuded root surfaces and may promote repopulation of fibroblast-like cells during the first weeks after application (Gestrelius et al. 1997). The results from a recent study have also shown for the first time in humans that EMD is present on treated root surfaces for up to 4 weeks following periodontal surgery (Sculean et al. 2002). Recently, the use of different laser systems has been proposed, in order to improve the biocompatibility of previously diseased root surfaces (Aoki et al. 1994, Ando et al. 1996, Folwaczny et al. 2002). As mentioned above, the ERL has been reported to be the most promising laser for periodontal treatment. Its excellent ability to ablate hard tissue and dental calculus effectively without producing major thermal side-effects to adjacent tissue has been demonstrated in numerous studies (Aoki et al. 1994, Israel et al. 1997, Folwaczny et al. 2000, Schwarz et al. 2001a). In contrast, the use of a CO_2 and Nd:YAG laser for root surface debridement resulted in extensive damages in the root cementum and dentin, such as carbonization and melting (Trylovich et al. 1992, Spencer et al. 1996, Israel et al. 1997). Controlled clinical trials and case reports have also indicated that nonsurgical periodontal treatment with an ERL leads to significant gain of clinical attachment (Watanabe et al. 1996, Schwarz et al. 2000, 2001b, 2003a, b). Preliminary clinical results have also indicated that this minimally invasive device may allow instrumentation of very deep and narrow pockets without leading to major trauma of the hard and soft tissues; i.e. removal of tooth substance and increase in gingival recession (Schwarz et al. 2001b, 2003a, b). Further in vitro studies on the antimicrobial effects of the ERL radiation provided clear evidence for bactericidal effects against periodontopathic bacteria (Ando et al. 1996; Folwaczny et al. 2002). Moreover, the removal of bacteria-derived endotoxin was reported for ERL radiation (Yamaguchi et al. 1997, Sugi et al. 1998). These findings coupled with the results from recent in vitro studies, which have shown that the surface structure of previously diseased roots after ERL irradiation seems to offer better conditions for the adherence of PDL fibroblasts than scaling and root planing with hand instruments (Rossa et al. 2002, Schoop et al. 2002), suggest that root surface debridement and detoxification with an ERL may also be favorable for retention of biologically active substances, such as EMD. However, the results of the present study have indicated that the combination of ERL and EMD does not seem to improve the clinical outcome of the therapy additionally compared to SRP+EDTA+EMD. In this context, it must be pointed out that true periodontal regeneration can only be evaluated histologically. Histological data from animal (Hammarström et al. 1997) and human (Mellonig 1999, Sculean et al. 1999, Yukna & Mellonig 2000) studies provide clear evidence that root surface conditioning with various substances (EDTA, citric- and ortho-phosphoric acids) and the application of EMD results in the formation of a new layer of cellular and acellular cementum with inserting collagen fibers and the formation of a new alveolar bone. Therefore, the predictability of the combination therapy ERL+EMD to promote true periodontal regeneration remains questionable until histologic evidence is available. In conclusion, the preliminary findings of this study suggest that both therapies led to short-term improvements of the investigated clinical parameters, and the combination of ERL and EMD does not seem to improve the clinical outcome of the therapy additionally compared to SRP+EDTA+EMD.

Zusammenfassung

Klinische Überprüfung der Er:YAG Laser in Kombination mit Schmelzmatrixderivaten für die Behandlung von intraalveolären parodontalen defekten: Eine Pilotstudie

Hintergründe: Das Ziel der vorliegenden Studie war der Vergleich einer Kombinationstherapie von tiefen intraalveolären parodontalen Defekten unter Nutzung eines Er:YAG Laser (ERL) und Schmelzmatrixderivaten (EMD) zu Wurzelreinigung und –glättung+EDTA+EMD.

Material und Methoden: 22 Patienten mit chronischer Parodontitis, jeder von ihnen hatte einen intraalveolären Defekt, wurden zufällig mit einer Lappenoperation und einer Defektreinigung mit einem Er:YAG Laser (160 mJ/pulse, 10 Hz) behandelt plus EMD (Test) oder mit einer Zugangsoperation und folgender Wurzelreinigung und – glättung (SRP) mit Handinstrumenten plus EDTA und EMD (Kontrollen). Die folgenden klinischen Parameter wurden zur Basis und 6 Monate danach aufgezeichnet: Plaqueindex (PI), Gingivaindex (GI), Provokationsblutung (BOP), Sondierungstiefe (PD), gingivale Rezession (GR) und klinisches Stützgewebeniveau (CAL). Es gab keine Differenzen in irgendeinem untersuchten Parameter zur Basis zwischen den beiden Gruppen.

Ergebnisse: Die Heilung war komplikationslos bei allen Patienten. 6 Monate nach der Therapie zeigten die Flächen, die mit ERL und EMD behandelt worden waren, eine Reduktion bei der mittleren Sondierungstiefe (PD) von 8.6 ± 1.2 mm zu 4.6 ± 0.8 mm und eine Veränderung des mittleren klinischen Stützgewebeniveaus (CAL) von 10.7 ± 1.3 mm zu 7.5 ± 1.4 mm ($p < 0.001$). In der Gruppe, die mit SRP+EDTA+EMD behandelt worden war, reduzierte sich die mittlere PD von 8.1 ± 0.8 mm zu 4.0 ± 0.5 mm und das mittlere CAL veränderte sich von 10.4 ± 1.1 mm zu 7.1 ± 1.2 mm ($p < 0.001$). Es gab keine statistisch signifikante Differenzen bei irgendeinem untersuchten Parameter zwischen Test- und Kontrollgruppe.

Schlussfolgerung: Innerhalb der Limitationen der vorliegenden Studie kann geschlossen werden, dass beide Therapiemethoden zu kurzzeitigen Verbesserungen der untersuchten klinischen Parameter führen. Die Kombination von ERL und EMD scheint nicht zu zusätzlichen Verbesserungen des klinischen Ergebnisses der Therapie verglichen mit SRP+EDTA+EMD zu führen.

Résumé

Evaluation clinique d'un laser Er:YAG en association avec un dérivé protéique de la matrice amélaire pour le traitement de lésions parodontales intraosseuses: une étude pilote

Le but de l'étude présente a été de comparer le traitement de lésions parodontales intraosseuses profondes par laser Er:YAG (ERL) plus un dérivé protéique de la matrice amélaire (EMD) au détartrage et surfaçage radiculaire+EDTA+EMD. Vingt-deux patients avec une parodontite chronique, ayant chacun une lésion intraosseuse, ont été traités au hasard avec un lambeau d'accès et un curetage sous-gingival par un laser ERL (160 mJ/pulsion, 10 Hz) plus EMD (test) ou un lambeau d'accès suivi de détartrage et surfaçage (SRP) avec des instruments à main plus EDTA et EMD (contrôle). Les paramètres cliniques suivants ont été enregistrés lors de l'examen initial et après six mois: indice de plaque (PlI) indice gingival

(GI), saignement au sondage (BOP), profondeur de poche (PD), récession gingivale (GR) et niveau d'attache clinique (CAL). Aucune différence dans aucun des paramètres enregistrés n'a été observée lors de l'examen de départ entre les deux groupes. La guérison a été bonne chez tous les patients. Six mois après le traitement, les sites traités par ERL et EMD ont montré une réduction de profondeur de poche au sondage (une réduction de PD) de 8.6 ± 1.2 mm à 4.6 ± 0.8 mm et un changement dans le CAL de 10.7 ± 1.3 mm à 7.5 ± 1.4 mm ($p < 0.001$). Dans le groupe traité avec SRP+EDTA+EMD, la PD moyenne était réduite de 8.1 ± 0.8 mm à 4.0 ± 0.5 mm et le CAL moyen diminuait de 10.4 ± 1.1 à 7.1 ± 1.2 mm ($p < 0.001$). Aucune différence statistique dans aucun des paramètres enregistrés n'a été observée entre les deux groupes. Dans les limites de l'étude présente, les deux thérapies amènent donc une amélioration à court terme des paramètres cliniques investigués et l'association de ERL et EMD ne semble pas une améliorer le traitement comparé à SRP+EDTA+EMD.

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