



A Comparative Clinical Study of Er:YAG Laser and Hand Instruments in the Treatment of Moderate Chronic Periodontitis

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Abstract

Introduction: Moderate chronic periodontitis is the most common periodontal disease. The treatment of this condition should aim at achieving a biocompatible root surface and decontamination of the pocket, thereby restoring the health status.

Aim: In the present study, the aim was to examine the clinical effectiveness of fibreless Er:YAG laser used for scaling and root planing and to compare it with a conventional treatment with Gracey curettes.

Materials and methods: The study included 909 periodontal pockets which were treated in a split-mouth design with either Gracey curettes or with Er:YAG laser (1.5 W). Probing pocket depth (PPD), gingival recession (GR), clinical attachment level (CAL), bleeding on probing (BoP), and plaque index were recorded.

Results: There was a considerable decrease of PPD, CAL, BoP, and plaque presence values at 1 and 3 months after therapy in both treatment groups. Sites treated with Er:YAG laser demonstrated mean CAL gain of about 1.00 mm and 0.44 mm at the first and third month, respectively. In the control group, there was also significant gain of CAL of about 1.33 mm at the first and 0.30 mm at the third month. Significant difference was observed in all parameters between both groups in favour of the laser treatment.

Conclusions: The results of the present study suggest that the Er:YAG laser shows clinical effectiveness in the treatment of moderate chronic periodontitis. It can be used as a single treatment modality for subgingival scaling and root planing resulting in greater improvements in all recorded data in contrast to conventional treatment.

Keywords

clinical effectiveness, Er:YAG, laser, scaling and root planing, periodontitis

INTRODUCTION

Conservative therapy of chronic periodontal disease consists of mechanical supra- and subgingival tooth debridement, combined with patient's oral care measures. Understanding the etiology and pathogenesis of plaque-induced

periodontitis, the main goal of periodontal therapy is to reduce the bacterial load and change the microbial complex in the biofilm towards a flora more associated with health.¹

The reduction of subgingival bacteria usually leads to reduction of inflammation and relative stability of the periodontal attachment levels. The removal of calculus and contaminated root cementum and creation of a clean,

smooth and biologically compatible root surface is the most important condition for the treatment outcome. The golden standard of care in root surface debridement is scaling and root planing (SRP) using hand instruments, though with some limitations.² Subgingival SRP performed with hand instruments is a difficult and time-consuming procedure. The clinical effectiveness decreases with increasing probing depth, especially when probing depth exceeds 5 mm.^{3,4} Ultrasonic scaling creates deep grooves on the cementum surface which enables faster recolonization by subgingival bacteria.^{5,6} Despite the instrument choice (hand or power-driven), some areas are difficult to reach and debride properly – inter-proximal areas, cementum-enamel junction, root concavities and furcation areas. The plaque and calculus left there compromise the treatment outcome. In addition, some patients do not feel comfortable with the mechanical procedure, the need of anesthesia, the noise or vibrations of the ultrasonic devices.⁷

With the introduction of lasers in dentistry, the laser-supported periodontal therapy became an alternative or an adjunctive therapy to mechanical SRP. Many lasers have been demonstrated to have a beneficial effect in the periodontal treatment. The adjunct use of diode or Nd:YAG lasers show significant improvement in clinical and microbiological parameters compared to SRP alone.⁸⁻¹⁰ Erbium lasers – Er:YAG (2940 nm) and Er;Cr:YSGG (2780 nm) are likely the most suitable lasers for periodontal therapy.^{11,12} They can be used both on hard and soft tissues, with minimal heat-related side effects. An Er:YAG laser has the ability to remove subgingival calculus with minimal removal of root substance^{13,14} and without thermal alteration^{15,16}. The laser beam can easily reach areas difficult to scale, because the access is not mechanically limited in the pocket. A high bactericidal effect of Er:YAG laser against periodontopathic bacteria was reported by Ando et al.¹⁷, as well as the effective ability to remove cementum bound endotoxin, an important factor in the pathogenesis of periodontal disease¹⁸. Removal of epithelium lining and granulation tissue from pockets, faster healing response, decreased pain, and increased patient acceptance are other advantages of Er:YAG lasers.

Some clinical trials evaluate the effectiveness of laser treatment alone or as an adjunct to SRP, regarding changes in clinical parameters. Schwarz et al. reported significant improvement in clinical attachment level, pocket depth reduction, bleeding on probing, plaque index (Silness-Loe) and gingival index (Loe-Silness) within groups, as well as significant differences between the groups for all clinical parameters at short-¹⁹ and long-term intervals²⁰. However, three studies did not report a significant difference between Er:YAG laser and SRP groups in CAL gain, PD reduction, or GR changes.²¹⁻²³

Soo et al.²⁴ also reported statistically significant improvement in clinical parameters after SRP carried out with ultrasonic scaler and Gracey curettes, compared to Er:YAG laser treatment.

The conclusion of the systematic review and meta-anal-

ysis, published by Sgolastra et al. and Cobb^{25,26}, did not find evidence for the greater effectiveness of Er:YAG laser compared to SRP in chronic periodontitis treatment, but as the authors, the results should be interpreted with caution and future clinical trials are needed to assess the scientific evidence of Er:YAG laser effectiveness.

AIM

The aim of the present study was to investigate and compare the clinical effectiveness of a fibreless Er:YAG laser with the conventional scaling and root planing with hand instruments.

MATERIALS AND METHODS

This was a single-blinded, randomized, controlled, split-mouth clinical trial. Patients were recruited from those admitted for periodontal treatment in the Department of Periodontology and Oral Diseases in the Faculty of Dental Medicine at the Medical University of Plovdiv, Bulgaria from November 2011 to May 2012. Ethical approval was obtained from the Ethical Committee of the Medical University (No 3/2011). Each patient signed an informed consent prior to their entering the study.

Inclusion criteria

All participants were diagnosed as having moderate chronic periodontitis defined as a probing depth of up to 6 mm, attachment loss of up to 4 mm, bleeding on probing, and radiographic evidence of bone loss.¹

Exclusion criteria

Patients were excluded from the study if they had a systemic disease that could potentially influence the outcome of the therapy; if they were taking antibiotics or steroids at least 6 months prior to the treatment; had any periodontal treatment in the last 6 months or were pregnant. Smoking patients were included in the study as the statistical analysis revealed that there is no correlation between clinical parameters and smoking in the present investigation.

Oral hygiene program

Each patient received individual oral hygiene instructions according to their requirements at the beginning and at every treatment visit.

Prior to scaling and root planing, supragingival cleaning of plaque and calculus was performed with an ultrasonic system (Piezon Master 400, EMS, Nyon, Switzerland) with a tip A for supragingival cleaning and polishing with rubber cups and brushes.

Treatments

Twenty patients (6 men and 14 women), aged 47.4 ± 8.65 years, with a total of 366 teeth and 909 sites were included in the study.

Using a split-mouth design, 2 quadrants (one quadrant from each jaw) were randomly allocated into the test group (TG) or the control group (CG). The test quadrants received laser treatment with Er:YAG laser, whereas the control quadrants received SRP with an ultrasonic scaler and hand cures. All procedures were performed without local anesthesia.

Test quadrants (TG)

Teeth in the test quadrants were debrided using a calibrated Er:YAG laser (Lite Touch, Light Instruments Ltd, Yokneam, Israel) emitting light with a wavelength of 2940 nm. The laser parameters were set according to the manufacturer's instructions: 1.5 W energy, chisel tip for scaling and root planing (100 mJ and 15 Hz) and a sapphire tip 0.6 mm for pocket debridement (50 mJ and 30 Hz). The chisel tip used in the contact mode was inserted in the pocket at an angle of 10-15 degrees to the root surface, always in motion, with coronal to apical movements until the bottom of the pocket was reached. Scaling and root planing ended when the operator felt a smooth root surface. Pocket debridement was performed after scaling and root planing with a tip 0.6 mm in diameter and a length of 17 mm, working in a non-contact mode, around the root surface.

Control quadrants (CG)

Subgingival SRP was performed with a set of 7 new Gracey cures (Hu-Friedy, USA). The endpoint was the feeling of a clean, hard, smooth root surface, using a periodontal explorer.

Periodontal pockets were rinsed at the end of the session with 0.9% NaCl solution only.

Clinical assessments

Clinical data, including plaque index (PI), bleeding on probing (BoP), pocket depth (PD), gingival recession (GR), and clinical attachment level (CAL) score were collected before treatment (at baseline) and at follow-up examinations 1 and 3 months after the treatment. All clinical measurements were performed with a Florida Probe and entered directly into an electronic periodontal chart (Florida Probe[®], Florida Probe Corporation, Gainesville, USA).

The variables were recorded as follows:

PI – presence or absence of plaque in 4 points around the tooth – mesial, vestibular, distal, and lingual;

BoP – presence or absence of bleeding on probing in 6 points around the tooth – disto-vestibular, mid-vestibular, mesio-vestibular, mesio-lingual, mid-lingual, disto-lingual;

PDD – the distance in millimetres from the gingival

margin to the bottom of the pocket was taken at six points around each tooth like BI;

GR – the distance in millimetres from cementum-enamel junction to the gingival margin in millimetres like BoP and PPD;

CAL – the distance in millimetres from cementum-enamel junction to the bottom of the pocket in six points like BI, PPD and GR.

Statistical analysis

Statistical analysis was performed with SPSS for Windows, version 17 (SPSS Inc., Chicago, IL, USA). Data were presented as mean \pm Sx (SD). ANOVA and Independent Samples t tests were used to compare clinical variables (PPD, GR, CAL) in and between both groups before and after the treatment at the first and third month. Chi-square test was used to compare variables for bleeding on probing and plaque presence. Differences were considered statistically significant when the P value was <0.05 .

RESULTS

The study investigated 20 patients with moderate chronic periodontitis; a total of 366 teeth (both single and multi-rooted) and 909 sites were included in the study. They were treated in a split mouth design where 176 teeth (437 sites) were allocated to the control group, and 190 teeth (472 sites) – to the test group. Variations in the clinical scores are presented hereafter.

Changes in PPD, CAL, and GR

The mean values of the basic clinical parameters and their changes at 1 and 3 months are presented in **Table 1**.

There was statistically significant reduction in the PPD after the treatment both in control and test quadrants. PPD reduction between measurements at baseline and after 3 months was 1.77 mm for the laser group and 1.71 mm for the conventional treatment group. The difference between the groups was small, but it was statistically significant ($p < 0.05$).

Mean GR at 1 month was significantly increased after conventional instrumentation, if compared with the baseline values. The position of the gingival margin in CG was at the same level, while in TG it was found out an additional increase of 0.05 mm.

Both treatment modalities resulted in a significant reduction of mean CAL. One month after treatment CAL reduction between groups was not statistically significant, while at the visit at 3 months, the parameter had a statistically significant reduction in the laser group.

Changes in BoP

Both treatment methods lead to a reduction in the percentage of sites with BoP (**Table 2**).

Table 1. Comparative analysis for GR, PPD and CAL values at baseline, 1 month and 3 months after treatment in both groups

Examination	GR			PPD			CAL		
	Curette n=437	Laser n=472	p**	Curette n=437	Laser n=472	p**	Curette n=437	Laser n=472	p**
Baseline (mean±SD)	0.09±0.01	0.13±0.02	0.004	4.61±0.03	4.57±0.03	0.761	4.70±0.03	4.70±0.03	0.432
1 month (mean±SD)	0.22±0.02	0.18±0.02	0.042	3.38±0.05	3.14±0.05	0.450	3.60±0.05	3.33±0.05	0.124
p*	0.001	0.249		0.000	0.000		0.000	0.000	
3 months (mean±SD)	0.22±0.03	0.23±0.03	0.664	2.90±0.05	2.80±0.04	0.006*	3.13±0.06	3.03±0.06	0.035*
p*	1.000	0.495		0.000	0.000		0.000	0.001	

*statistically significant difference between different examinations (at baseline, at 1 and 3 months) in one group; **statistically significant difference between both groups (control and test treatment) in one examination

Table 2. Comparative analysis for sites with bleeding on probing at baseline, 1 and 3 months after treatment

Examination	Bleeding on probing						χ ²	p**
	Curette			Laser				
	No	Yes	Total	No	Yes	Total		
Baseline	57	380	437	75	394	472	1.580	0.209
	13.0	87.0	100.00	16.0	84.0	100.0		
1 month	290	141	437	343	118	472	5.477	0.019
	67.3	32.7	100.00	74.4	25.6	100.00		
3 months	313	124	437	385	86	472	13.048	0.00
	71.6	28.4	100.0	81.7	18.3	100.00		
p*	0.00			0.00				

*statistically significant difference between different examinations (at baseline, at 1 and 3 months) in one group; **statistically significant difference between both groups (control and test treatment) in one examination

At baseline, 87% of the sites in the control group showed bleeding on probing and in the test group the percentage was 84% – the results were strictly comparable. Bleeding decreased significantly 1 month after treatment to 32.7% in the control and 25.6% in the test group, as the reduction in the laser group was significantly higher compared to that in the control group ($p < 0.05$). Three months after treatment, there was bleeding only in 18% of the sites, treated with the laser while in the control group the bleeding was 28%.

Changes in the plaque index

Plaque scores for both TG and CG decreased significantly

over the study period (Table 3). There was no statistically significant difference between the two groups in plaque reduction.

DISCUSSION

The present study found that conservative treatment of periodontally diseased teeth is effective with both treatment modalities – hand instrumentation and laser debridement. Both methods lead to statistically significant reduction of the main clinical parameters – PPD, GR, CAL, and BoP. However, there is a small but statistically significant

Table 3. Comparative analysis for sites with plaque at baseline, 1 and 3 months after treatment

Examination	Plaque presence						χ ²	p**
	Curette			Laser				
	No	Yes	Total	No	Yes	Total		
Baseline	180	524	704	190	569	759	1.580	0.209
	25.6	74.4	100.00	25.0	75.0	100.00		
1 month	419	275	704	476	273	759	5.477	0.019
	60.4	39.6	100.00	63.6	36.4	100.00		
3 months	466	237	704	534	226	759	13.048	0.00
	66.3	33.7	100.0	70.3	29.7	100.00		
p*	0.00			0.00				

*statistically significant difference between different examinations (at baseline, at 1 and 3 months) in one group; **statistically significant difference between both groups (control and test treatment) in one examination

icant greater reduction of those parameters in the group treated by the Er:YAG laser. Following laser treatment, we observed higher reduction of PPD and CAL 3 months after treatment than the reduction achieved by hand instrumentation which is considered as clinically insignificant. In contrast, the reduction in BoP in the test group at 3 months was greater by 10% than that in the control group (18.3 % in the Er:YAG laser group vs. 28.4% in the hand instruments group). Our results are consistent with the results from clinical studies published before.^{19-23,26} Schwarz et al.¹⁹ and Crespi et al.²⁷ found that laser treatment provides greater reduction in BoP, PPD and greater gain in CAL compared with mechanical treatment. Nonhoof et al.²⁸ also found that after 3 months laser treatment lead to a greater CAL gain compared with the sonic, ultrasonic and hand instrumentation. Our results differ from the results reported by Soo et al.²⁴ who found a greater improvement in clinical parameters following SRP with hand instruments over 12 weeks. Rotundo et al.²¹ also was not able to find additional benefits of the Er:YAG laser in periodontal treatment.

To verify the long-term results from the instrumentation in the present clinical trial, the patients were followed up for 1 year and the results will be further presented. The results of many laboratory and clinical trials demonstrate that the laser scaling and root planing can be an effective alternative or adjunctive nonsurgical periodontal treatment. The Er:YAG laser is the only one who can ablate both soft and hard tissues, so this laser system can be used for calculus removal, scaling and root planing²⁹, etching of the root surface³⁰ and better healing³¹. Our results were consistent with these data. They suggest good clinical effectiveness of the Er:YAG laser, even better than that achieved by hand instruments.

Current concept for periodontitis treatment is elimination of infection, because periodontitis is an infectious disease.² Mechanical therapy is a gold standard in periodontitis treatment. However, hand instruments are time-consuming, require good experience, and are not preferred by patients.⁷ Conventional periodontal treatment aims at calculus removal, creating smooth root surface, bacterial decontamination and removal of diseased tissues.² All these goals of periodontal therapy could be achieved with Er:YAG laser.

Our study demonstrated a significant reduction of PPD in the test group from 4.57 ± 0.03 mm to 3.14 ± 0.05 mm and to 2.80 ± 0.04 mm in one and three months, respectively (Table 1). The gain in the CAL is 1.67 ± 0.00 mm, and the decrease in BoP is from 84% to 18.3%, which are also statistically significant. In the control group there is also a significant decrease in PPD from 4.61 ± 0.03 mm to 3.38 ± 0.05 mm at the first and to 2.90 ± 0.05 mm at the third month. The gain in CAL in the test group is 1.57 ± 0.00 mm and the decrease in BoP is from 87% to 28.4%.

A sustained stability in the treatment outcome is demonstrated both for the curette group and for the laser group. Moreover, the active inflammation in the test group is less pronounced (BoP 18.4%), which proved the stability of the

periodontal health in the Er:YAG laser treated group.³²

Although the improvement in all parameters is significant in the control group too, there is significant difference between both treatment groups ($p < 0.05$). This may be the result of the greater antibacterial effectiveness of the Er:YAG laser in contrast to hand instrumentation³³⁻³⁵, better morphology of the root surface³⁶, and better wound healing³¹. Moreover, although not tested in the present study, it seems that the Er:YAG laser periodontal treatment is perceived better from the patients as they experience less pain in comparison to the traditional SRP.³⁷

CONCLUSIONS

The results of the present study indicate sustained stability in the Er:YAG laser treated group with greater reduction of the inflammation in comparison with the conventional treatment of moderate chronic periodontitis with hand instruments. This allows the use of fibreless Er:YAG laser treatment as effective alternative nonsurgical periodontal treatment of the most common periodontal disease – the moderate chronic periodontitis.

REFERENCES

1. Parameter on chronic periodontitis with slight to moderate loss of periodontal support. American Academy of Periodontology. J Periodontol 2000; 71(5 Suppl):853-5.
2. Research, Science, and Therapy Committee of the American Academy of Pediatric Dentistry. Treatment of plaque-induced gingivitis, chronic periodontitis, and other clinical conditions. J Periodontol 2001; 72(12):1790-800.
3. Cobb CM. Non-surgical pocket therapy: mechanical. Ann Periodontol 1996; 1(1):443-90.
4. Miremadi SR, De Bruyn H, Steyaert H, et al. A randomized controlled trial comparing surgical and non-surgical periodontal therapy: a 3-year clinical and cost-effectiveness analysis. J Clin Periodontol 2015; 42(8):748-55.
5. Casarin RCV, Pinto FR, Sallum AW, et al. Assessment of ultrasonic root surface scaling with different power settings. Roughness evaluation. Braz Journal of Oral Sci 2006; 17:996-1000.
6. Kumar P, DaS SJ, Sonowal ST, et al. Comparison of root surface roughness produced by hand instruments and ultrasonic scalers: an in vitro study. JCDR 2015; 9(11):56.
7. Yukna RA, Scott JB, Aichelmann-Reidy ME, et al. Clinical evaluation of the speed and effectiveness of subgingival calculus removal on single-rooted teeth with diamond-coated ultrasonic tips. J Periodontol 1997; 68(5): 436-42.
8. Kamma JJ, Vasdekis VG, Romanos GE. The effect of diode laser (980 nm) treatment on aggressive periodontitis: evaluation of microbial and clinical parameters. Photomed Laser Surg 2009; 27(1):11-9.
9. Qadri T, Javed F, Poddani P, et al. Long-term effects of a single application of a water-cooled pulsed Nd:YAG laser in supplement to scaling and root planing in patients with periodontal inflammation. Lasers Med Sci 2011; 26(6): 763-6.

10. Gündoğar H, Şenyurt SZ, Erciyas K, et al. The effect of low-level laser therapy on non-surgical periodontal treatment: a randomized controlled, single-blind, split-mouth clinical trial. *Lasers in Medical Science* 2016; 31(9):1767–73.
11. Aoki A, Sasaki KM, Watanabe H, et al. Lasers in nonsurgical periodontal therapy. *Periodontol 2000* 2004; 36:59–97.
12. Parker S, Cronshaw M, Anagnostaki E, et al. Laser essentials for the dental practitioner: foundation knowledge – construction, modes of operation and safety. *EC Dent Sci* 2019; 18:2020–202.
13. Eberhard J, Ehlers H, Falk W, et al. Efficacy of subgingival calculus removal with Er:YAG laser compared to mechanical debridement: an in situ study. *J Clin Periodontol* 2003; 30(6):511–8.
14. Schwarz F, Bieling K, Venghaus S, et al. Influence of fluorescence-controlled Er:YAG laser radiation, the Vector system and hand instruments on periodontally diseased root surfaces in vivo. *J Clin Periodontol* 2006; 33(3):200–8.
15. Keller U, Stock K, Hibst R. Morphology of Er:YAG-laser-treated root surfaces. In: *Medical Applications of Lasers in Dermatology, Ophthalmology, Dentistry, and Endoscopy*. International Society for Optics and Photonics 1997; 3192:24–31.
16. Yaneva BK, Zagorchev PI, Firkova EI, et al. In vitro study of temperature changes in pulp chamber during root planing procedure using Er:YAG laser. *Folia Med (Plovdiv)* 2016; 58(3):206–10.
17. Ando Y, Aoki A, Watanabe H, et al. Bactericidal effect of erbium YAG laser on periodontopathic bacteria. *Lasers Surg Med* 1996; 19(2):190–200.
18. Yamaguchi H, Kobayashi K, Osada R, et al. Effects of irradiation of an erbium:YAG laser on root surfaces. *J Periodontol* 1997; 68(12):1151–5.
19. Schwarz F, Sculean A, Georg T, et al. Periodontal treatment with an Er: YAG laser compared to scaling and root planing. A controlled clinical study. *J Periodontol* 2001; 72(3):361–7.
20. Schwarz F, Sculean A, Berakdar M, et al. Periodontal treatment with an Er:YAG laser or scaling and root planing. A 2-year follow-up split-mouth study. *J Periodontol* 2003; 74(5):590–6.
21. Rotundo R, Nieri M, Cairo F, et al. Lack of adjunctive benefit of Er:YAG laser in non-surgical periodontal treatment: a randomized split-mouth clinical trial. *J Clin Periodontol* 2010; 37(6):526–33.
22. Sculean A, Schwarz F, Berakdar M, et al. Periodontal treatment with an Er:YAG laser compared to ultrasonic instrumentation: a pilot study. *J Periodontol* 2004; 75(7):966–973.
23. Lopes BM, Theodoro LH, Melo RF, et al. Clinical and microbiologic follow-up evaluations after non-surgical periodontal treatment with erbium:YAG laser and scaling and root planing. *J Periodontol* 2010; 81(5):682–91.
24. Soo L, Leichter JW, Windle J, et al. A comparison of Er:YAG laser and mechanical debridement for the non-surgical treatment of chronic periodontitis: a randomized, prospective clinical study. *J Clin Periodontol* 2012; 39(6):537–45.
25. Sgolastra F, Petrucci A, Gatto R, et al. Efficacy of Er:YAG laser in the treatment of chronic periodontitis: systematic review and meta-analysis. *Lasers Med Sci* 2012; 27(3):661–73.
26. Cobb CM. Lasers and the treatment of periodontitis: the essence and the noise. *Periodontol 2000* 2017; 75(1):205–95.
27. Crespi R, Cappare P, Toscanelli I, et al. Effects of Er:YAG laser compared to ultrasonic scaler in periodontal treatment: a 2-year follow-up split-mouth clinical study. *J Periodontol* 2007; 78(7):1195–200.
28. Nonhoff J, Derdilopoulou F, Neumann K, et al. [A quadrant-design trial of four therapeutic modalities in chronic moderate periodontitis.] *Schweiz Monatsschr Zahnmed* 2006; 116(5):484–92. [Article in German]
29. Aoki A, Ando Y, Watanabe H, et al. In vitro studies on laser scaling of subgingival calculus with an erbium:YAG laser. *J Periodontol* 1994; 65(12):1097–106.
30. Theodoro LH, Zezell DM, Garcia VG, et al. Comparative analysis of root surface smear layer removal by different etching modalities or erbium:yttrium-aluminum-garnet laser irradiation. A scanning electron microscopy study. *Lasers Med Sci* 2010; 25(4):485–91.
31. Pourzarandian A, Watanabe H, Ruwanpura SM, et al. Effect of low-level Er:YAG laser irradiation on cultured human gingival fibroblasts. *J Periodontol* 2005; 76(2):187–93.
32. Loos BG, Needleman I. Endpoints of active periodontal therapy. *J Clin Periodontol* 2020; 47(Suppl 22):61–71.
33. Yaneva B, Firkova E, Karaslavova E, et al. Bactericidal effects of using a fiber-less Er:YAG laser system for treatment of moderate chronic periodontitis: preliminary results. *Quintessence Int* 2014; 45(6):489–97.
34. Tomasi C, Schander K, Dahlén G, et al. Short-term clinical and microbiologic effects of pocket debridement with an Er:YAG laser during periodontal maintenance. *J Periodontol* 2006; 77(1):111–8.
35. Milne TJ, Coates DE, Leichter JW, et al. Periodontopathogen levels following the use of an Er: YAG laser in the treatment of chronic periodontitis. *Aust Dent J* 2016; 61(1):35–44.
36. Crespi R, Barone A, Covani U. Effect of Er:YAG laser on diseased root surfaces: an in vivo study. *J Periodontol* 2005; 76(8):1386–90.
37. Ma L, Zhang X, Ma Z, et al. Clinical effectiveness of Er:YAG lasers adjunct to scaling and root planing in non-surgical treatment of chronic periodontitis: a meta-analysis of randomized controlled trials. *Med Sci Monit* 2018; 24:7090–9.

Сравнительное клиническое исследование Er:YAG-лазера и ручных инструментов в лечении хронического пародонтита средней степени тяжести

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Резюме

Введение: Хронический пародонтит средней степени тяжести – наиболее распространённое заболевание пародонта. Лечение этого состояния должно быть направлено на достижение биосовместимости поверхности корня и обеззараживание стенок парадонтального кармана, таким образом восстанавливая состояние здоровья.

Цель: Целью настоящего исследования было оценить клиническую эффективность оптического Er:YAG-лазера, используемого для удаления зубного камня и выравнивания корней, и сравнить его с традиционным лечением кюретами Грейси.

Материалы и методы: В исследование было включено 909 пародонтальных карманов, которые были обработаны по методу „split-mouth design“ либо кюретами Грейси, либо лазером Er:YAG (1.5 W). Были измерены глубина кармана при зондировании (ГКЗ), рецессия десны (РД), клинический уровень прикрепления (КУП), кровотечение при зондировании (КЗ) и индекс налёта.

Результаты: В обеих группах лечения было обнаружено значительное снижение значений ГКЗ, КУП, КЗ и наличия бляшек через 1 и 3 месяца после терапии. Участки, обработанные лазером Er:YAG, показали последующее увеличение КУП на 1.00 мм и 0.44 мм в первый и третий месяц, соответственно. В контрольной группе также было значительное увеличение примерно на 1.33 мм в первый месяц и на 0.30 мм в третий месяц. Значительная разница наблюдалась по всем параметрам между двумя группами в пользу лазерного лечения.

Заключение: Результаты настоящего исследования показывают, что лазеры Er:YAG обладают клинической эффективностью при лечении хронического пародонтита средней степени тяжести. Его можно использовать как самостоятельный метод лечения для удаления поддесневого камня и выравнивания корней и приводит к большему улучшению всех показателей, чем традиционное лечение.

Ключевые слова

клиническая эффективность, Er:YAG лазер, удаление зубного камня и выравнивание корня, пародонтит
