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Dear Laser Users,

today, it is the second edition of our Laser-magazine that is reaching you. In times like this it is always a challenge to start a new activity such as a new Journal. So it is a great pleasure for me to inform you, that our new Laser-magazine, which is especially addressed to our WFLD-Members, has been highly accepted. The idea to have a Journal that connects all our Members in five Divisions, in all national societies and all individual members by sharing information of congresses, local meetings, education programmes, activities in private offices and news from the different manufacturers of Laser systems, was realised at the right time.

It depends now on all of you to provide us with any information you would like to communicate with your colleagues around the world—whether it is a preclinical or clinical study, whether it is a nice case report which you have done in your private praxis or during your treatment in the university, whether you have visited a congress and would like to share your impressions and pictures with other laser using friends. On the other hand we are also interested to publish your proposals or recommendations to improve the distribution of laser information to other societies you are a member of or are visiting.

I would like to make this magazine to be your platform to interact with all your friends and colleagues around the world.

Welcome to our LASER-Family.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Gutknecht', written in a cursive style.

Prof Dr Norbert Gutknecht
WFLD President and
Editor-in-Chief – Laser-magazine

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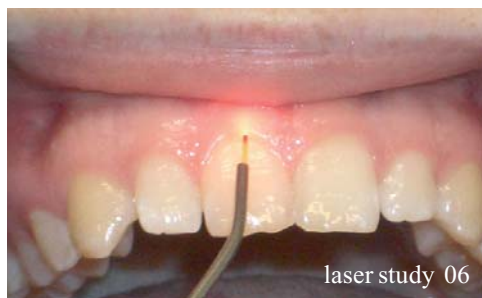
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Laser Supported **Reduction of Specific Microorganisms** in the Periodontal Pockets with the Aid of an Nd:YAG Laser

An in vivo Study

author_ Norbert Gutknecht, Parastoo Raoufi, René Franzen, Friedrich Lampert, Germany

Abstract

Objective: We investigated the application of the Nd:YAG laser as an adjuvant possibility of treating periodontitis compared to conventional treatment on its own. **Summary Background Data:** To free the subgingival surroundings from periodontopathogenic germs—an essential aim in the clinic for periodontology—the use of laser seems to be particularly suitable owing to its germ-reducing effect known especially from endodontics. Good results were achieved with the pulsed Nd:YAG laser. **Methods:** The clinical study we performed comprised twenty patients; the bacterial count serving as a microbiological and the probing depth, ie the haemorrhagic tendency, as the clinical examination parameter. Quantitative proof of three periodontopathogenic germs (actinobacillus actinomycetem-comitans, prevotella intermedia and porphyromonas gingivalis) was produced in each case with both a digoxigenin-marked 16S-rRNA probe and a genomic DNA probe. To determine the clinical parameter, a CPC 11 periodontal probe was applied. Three quadrants per patient and, in each quadrant, one periodontium in need of treatment were fixed as relevant to the study. In each case, one periodontium was left untreated as a control, a second one was treated with a conventional subgingival curettage only, whereas the third was treated both conventionally and with laser. All examination parameters were determined in each quadrant before and one, three and six months after the particular treatment. In addition, we determined a bacterial count one week after treatment. **Results:** We observed that the average values of the absolute bacterial count in the quadrant that had been treated with the adjuvant laser always lay below the values that corresponded to the quadrants that had only been treated conventionally. There were statistically significant differences in favour of the laser method especially during the measurements one week and one month after treatment. Also the clinical parameters, like the probing depth and the haemorrhagic tendency, had been positively influenced by the adju-

vant laser therapy. **Conclusion:** The effectiveness of a periodontitis treatment supported by laser was able to be demonstrated. With regard to the desired elimination of germs, the application of the Nd:YAG laser proves to be a sensible and complementary therapeutic measure.

Introduction

Inflammatory forms of periodontopathy are the most common disease of the periodontium and can lead to the loss of the affected tooth if left untreated. Inflammations of the periodontium are based on tissue reactions that are caused by localised supra- and subgingival microbial plaque. Regarding the composition of pathogenous plaque, the specific plaque hypothesis¹ has become more and more established in the last few years according to which only a few—20 at most—of over 300 different bacterial species which have so far been able to be isolated from plaque samples are associated with the destruction of periodontal tissue. Especially the black pigmented, gram-negative anaerobes porphyromonas gingivalis (P.g.) and prevotella intermedia (P.i.), and the facultative anaerobe actinobacillus actinomycetem-comitans (A.a.) seem to be the main pathogenic agents in progressing periodontitis in man. These bacteria have been detected again and again in a high bacterial count in the destructive forms of periodontitis, and they are considered to be the indicator organisms of this disease.^{2,3}

An important aim in the causal treatment of periodontitis consists therefore in the radical elimination of the pathogenic germs and preventing a subsequent recolonisation of the periodontal pockets. Seeming that the instrumental curettage still remains to be the indispensable method chosen, the application of laser is gaining more and more in importance as an adjuvant possibility of therapy. There have been repeated reports on the successful application of both the CO₂ and Nd:YAG lasers in the treatment of periodontitis—the clinical results having served as the



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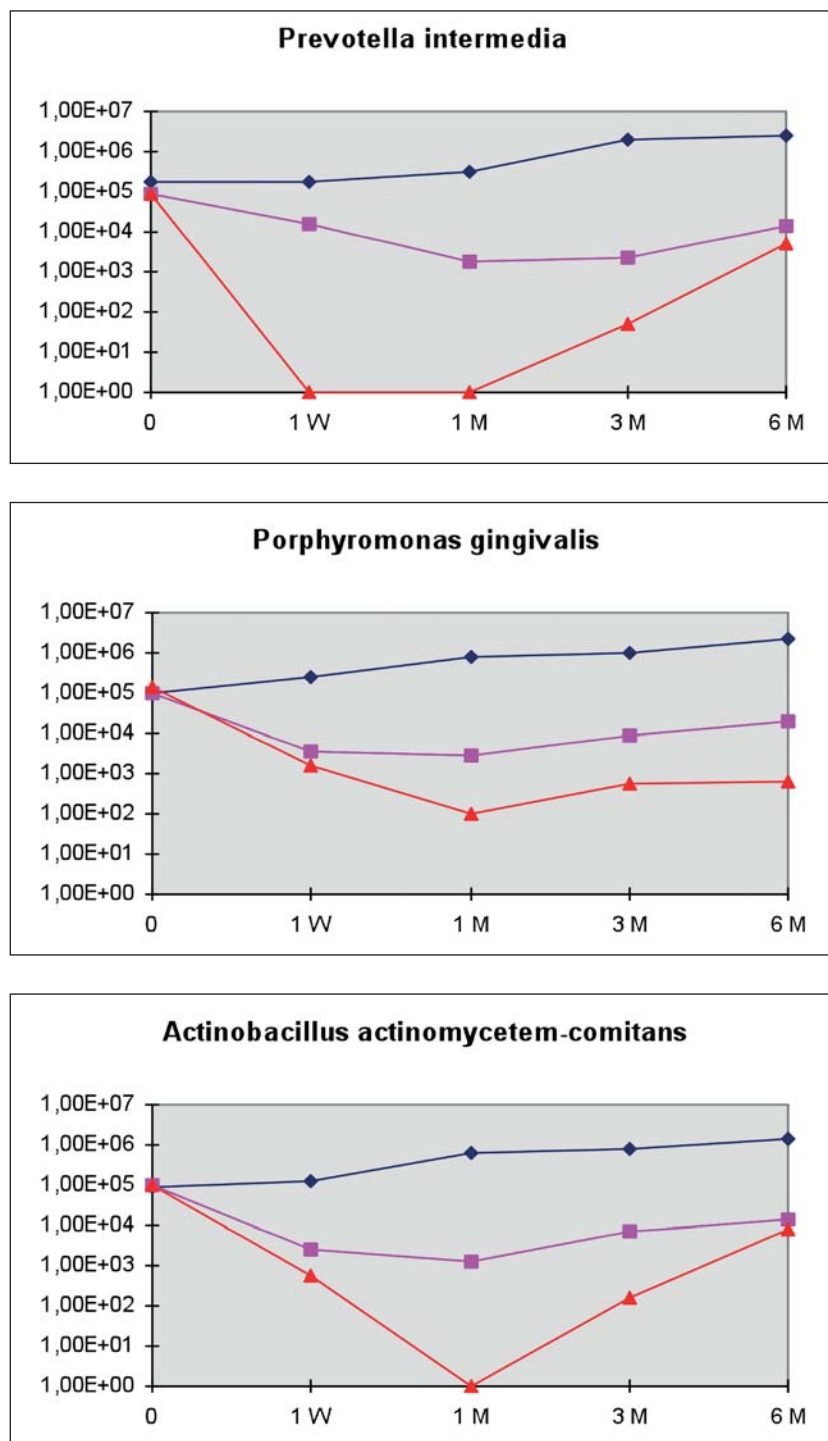


Diagram 1 The arithmetic means of the absolute bacterial count measured with the digoxigenin-marked 16S-rRNA probe in logarithmic scales before (0), ie one week (1 W), 1, 3 and 6 months (1 M, 3 M, 6 M) after the particular therapy. Conventional curettage (■), additional Nd:YAG laser treatment (▲), no treatment (◆).

main criteria in most cases.^{14,15} The aim of this in vivo study consisted in investigating the bactericidal effectiveness of the Nd:YAG laser on the pigmented germs P.i. and P.g., but also on the species A.a. which, to a certain extent, is considered to be a problematic germ. Our observations here were based on very sensitive and, at the same time, specific methods of germ detection. The decision in favour of the Nd:YAG laser was based on the by far greater experience with the same in endodontics and in the assumption of being able to apply the results especially regarding the elimination or reduction of germs.^{16, 17, 18}

Materials and Methods

In this study, twenty adult patients were taken in who showed periodontally affected teeth in at least three quadrants (one tooth at least with a pocket depth of 4-6 mm per quadrant). All such cases were excluded in which periodontal treatment and/or treatment with antibiotics had taken place not longer than three months earlier; furthermore, patients with contagious diseases, pregnant women and nursing mothers were also excluded.

For the subgingival curettage, conventional Gracey curettes were used and an Nd:YAG laser was applied in the laser treatment for which the following adjustments had been chosen: frequency: 20 Hz; energy: 100 mJ; average output: 2 W; pulse length: 100 μ s. With the aid of a 320 μ m thick quartz fibre, the bottom of the pocket was irradiated circularly for 40 seconds parallel to the surface of the root (energy density directly on the emission surface of the fibre: 124 J/cm²). This happened three times at an interval of one week each.

The detection of germs took place with both a digoxigenin-marked 16S-rRNA probe and a genomic DNA probe. Statements on the absolute cellular count cannot be made with this method, as the DNA probes are directed against 16S-rRNA, resulting in a variability of the RNA molecular count per bacterial cell dependent on its "physiological condition". The derivation of the cellular count from the 16S-rRNA detection is thus a semi-quantitative value.⁴

There is no significant deviation between the quantification with DNA probes and the culture technique. In a comparative investigation performed by CONRADS and BRAUNER (1993)⁵, it was discovered that there was a high conformity between the culture technique and the DNA probe detection if the samples were rapidly preserved at -20 °C and the preparation of the nucleic acid took place free of loss. In our study, we investigated the three species A.a., P.i. and P.g.

With each patient, three quadrants and, in each quadrant, a periodontium in need of treatment were fixed as relevant to the study. Always one periodontium was left untreated over the entire study as a control, another periodontium was only treated once with the conventional subgingival curettage, whereas the third periodontium—in addition to the conventional initial therapy—received laser treatment, consisting of three visits at one week intervals.

The microbiological parameters (determination the bacterial count for A.a., P.g. and P.i.) were determined both one week after treatment, and one, three and six months after having concluded each treatment. Determining the clinical parameters (haemorrhagic tendency and pocket depth) took place at the same time as determining the bacterial count through careful instrumental probing.

Parting from the rough data thus obtained, we first proved for every investigation parameter on the basis

of a monofactorial variance analysis that the gathered data in the untreated quadrant (control value) showed no statistically significant differences over the entire study period.

Afterwards, the post-therapeutically established data in each treated quadrant was checked with the initial data with the help of a paired t test for statistically significant differences. Finally, the data gathered in the quadrants that had been additionally treated with laser was compared with the data of the conventionally treated quadrant as part of an unpaired t test.

Results

Microbiological Parameters

1. *Prevotella intermedia*:

The investigations showed that the bacterial count after the adjuvant laser treatment decreased significantly and remained at a significantly low level over the entire observation period. After conventional treatment alone, both analyses first also showed a significant decrease in the bacterial count compared to the initial stadium. However, as from the third month in the genomic DNA analysis and as from the sixth month in the 16S-RNA analysis, the differences in the bacterial count were no longer statistically significant compared to the initial stadium. The differentiated statistical comparison between the conventional and the adjuvant laser method results in statistically significant differences in the bacterial count after one week, one month and three months in favour of the laser method (cf. Diagram 1a).

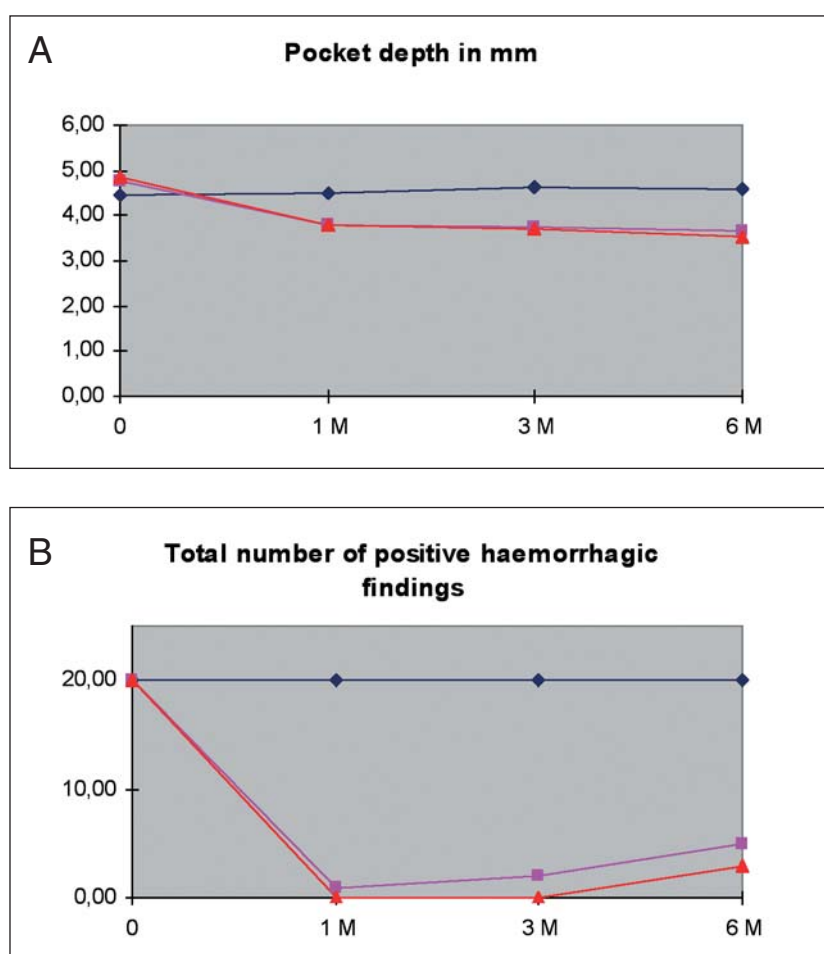
2. *Porphyromonas gingivalis*:

Both in the DNA and RNA analyses, a significant decrease in the bacterial count after both methods of treatment were able to be observed over the entire study period. The simple comparison of the average bacterial count showed, especially at first, a clearly stronger decrease after the adjuvant laser therapy than after the conventional method (see Diagram 1b). The statistical evaluation, however, showed no significant difference in the DNA analysis, whereas the measurings in the RNA analysis after one month and after six months were able to prove a significantly stronger decrease of the detectable bacterial count after the adjuvant laser therapy than after conventional treatment.

3. *Actinobacillus actinomycetem-comitans*:

Since A.a. was not able to be detected with the genomic DNA probes in any of the patients, the evaluations only refer to the bacterial count determined by the 16S-rRNA probes. (The manufacturer of the DNA probes was made aware of this phenomenon.)

A significant reduction in the bacterial count—compared to the initial stadium—is achieved both after conventional and the adjuvant laser treatment



over the entire period of observation. At first, the average bacterial count decreases strongly, especially after laser treatment, and then increases again from the third month onwards. The average bacterial counts with the laser method are always below the bacterial counts with the conventional method (see Diagram 1c). A statistically significant difference can be proved for measurings after one week to one month.

Clinical Parameters:

Concerning the parameter pocket depth, no significant difference could be established in the direct comparison of both methods of treatment (cf. Diagram 2a). Whereas the examined periodontal pocket in the untreated quadrant showed unchanged haemorrhaging after probing over the entire study period, the total number of positive haemorrhage findings clearly decreased in the quadrant that had been treated with laser than in the one that had been treated conventionally. However, it increased again as from the third month after treatment (cf. Diagram 2b).

Discussion

Microbiological Parameters:

The qualitative and quantitative proof of the periodontopathogenic germs P.i., P.g. and A.a. should be used, if possible, to establish a diagnosis, make a ther-

Diagram 2 Average measured depths of the periodontal pockets in mm (A) and number of such periodontal pockets examined here that haemorrhaged after probing (B) in the initial condition (0), i.e. 1, 3 and 6 months (1 M, 3 M, 6 M) after the particular therapy. Conventional curettage (■), additional Nd:YAG laser treatment (▲), no treatment (◆).



apeutic plan, control and fix the recall intervals. Numerous investigations have already shown that the detection of periodontopathogenic bacteria with DNA probes is superior to the other methods, like culture, antigen provocation tests or enzyme detection, regarding sensitivity and specificity.^{6,7,5}

In this study, bacterial detection was performed with the help of both genomic DNA probes (DMDx/PathoTek test) and 16S-rRNA probes.

Whilst both detection methods for P.i. and P.g. led to almost comparable results, A.a. was not able to be detected with genomic DNA probes in any treatment group, and was therefore determined with the 16S-rRNA probes only.

With all the three species that had been investigated here, the average values of the absolute bacterial count in the quadrants that had been treated with the adjuvant laser always lay below the corresponding values from the quadrants that had only been treated conventionally. There were statistically significant differences in favour of the laser method especially in the first measurements after treatment (after one week to one month).

The late recrudescence of the absolute bacterial counts through the recolonisation of the periodontal pockets was to be observed most clearly with A.a.—a pathogenic organism of which its refractory persistence against surgical and non-surgical attempts of elimination has been repeatedly reported about.⁸⁻¹¹ It proved to be a problematic germ in this study, too. According to this, a local elimination of A.a. only seems to persist over a period of about three months. After that, bacterial colonies are again formed, probably parting from other reservoirs in the oral cavity.^{12,13} For this reason, one must try to make a systematic change in the recall system, meaning that the patients come in for a follow-up examination after every three months and, in the event of positive findings, receive laser treatment again on the affected periodontium.

Concerning the potent periodontopathogenic P.g., the reduction of the absolute bacterial count by a factor 30 compared with both methods can probably be explained by the fact that an effective reduction of the bacterial count already takes place in conventional treatment. The sensitive reaction of this germ to conventional methods of treating periodontitis gives rise to the supposition that it has its ecological recess mainly in the plaque and that a colonisation of the tissue does not occur. To grow, it requires obligative anaerobe conditions and prevailing conditions which could be created with the help of a preceding colonisation of the pocket with P.i. The aim of treatment of systematic periodontal therapy should be the reduction of the P.g. titre to below the level of detection.

Clinical Parameters:

The positive influence of a mechanical-instrumental periodontitis therapy on the clinical parameter probing depth has already been sufficiently investigated and is considered as generally recognised. The fear expressed in some studies that an additional laser treatment could lead to damage of the root cement and to periodontium—something that would appear first in an enlargement of the probing depth—has proved to be unfounded based on the results of this study. Supporting laser therapy has absolutely no negative influence on the probing depth; on the contrary, it led to a reduction of the probing depths.

A sulcus haemorrhage may not have a very high specificity as an inflammation criterion; however, owing to its high sensitivity, it does have sufficient meaningfulness as the earliest clinical sign for an inflammation, and is therefore essential for the early indication of a requirement for treatment. The reduction of a haemorrhagic tendency here with the help of an Nd:YAG laser confirms the effectiveness of this measure of treatment.

Conclusion

The results of this study prove that the application of the Nd:YAG laser in the treatment of periodontitis is—owing to its high bactericidal potency—a sensible measure that complements conventional therapy to reduce germs and to prevent a quick recolonisation of the affected periodontal pockets. The clinical findings, too, are influenced positively by the adjuvant application of laser.

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Er,Cr:YSGG apical resection and microleakage evaluation

An in vitro Study

author_Rocca JP¹, France, Cianfrani C², Italy, Nammour S³, Belgium, Bertrand MF⁴, France

Periapical surgery is a common procedure used in endodontics to resolve treatment failures when root end access is impossible and apical resection may be approached using different methods. The aim of this study was to assess the root end cutting efficiency of an Er,Cr:YSGG laser, its capability to prepare a retrograde cavity and value the microleakage of the retro-filled cavities and to compare with conventional bur methodologies. 24 human single rooted teeth were endodontically prepared and root canals were filled with a warm gutta-percha technique. Samples were randomly divided into two groups and retrograde cavities were prepared as follows:

Group 1: Er,Cr:YSGG sapphire tip (diameter 0.6 mm), frequency 10 Hz, output power 300 mJ, air-water ratio 32 %/43 %, theoretical fluence 106 J/cm².

Group 2: micromotor handpiece plus burs and air-water coolant

Retrograde cavities were sealed with a ZOE modified cement and microleakage was assessed using a methylene blue dye penetration method and valued in millimetres. Microleakage values ranged from 1.05 to 2.85 mm for the group 1 (mean range 2.2 mm, standard deviation 0.79) and from 1.05 mm to 4.65 mm (mean range 2.45 mm, standard deviation 1.07) for the group 2. Statistical analysis of the results was performed using a Mann-Whitney U test for independent samples. No statistical significant differences were found ($p = 0.6999$).

Introduction

Periapical surgery is a common procedure used in

endodontics to solve treatment failure when root end access is impossible. Eliminating the periapical inflammatory tissues plus sealing the apical terminus of the root canal system are the main objectives. Moreover, root end preparation must preserve the morphology of the root canal and apical cavities may be shaped easily, precisely and safely. Generally these goals are reached by the way of mechanical instruments: root end cavities are prepared by means of small rounds or inverted cone burs in a micro hand-piece or more recently by ultrasonic retro-tips.

Clinically, healing process depends on multiple criteria and retro-filling materials takes part in the healing process particularly for what regards the marginal adaptation (microleakage problems) and the biological compatibility.

Er,Cr:YSGG laser demonstrated the capability to cut enamel, dentine and generally hard tissues, due to its high absorption level in water and hydroxyapatite. Not much is known for what regards its possible applications in apical surgery.

Subsequently, the aim of this study was to assess the root end cutting efficiency of this wavelength (2,780 nm), its capability to prepare an apical root end cavity and to value the microleakage of those filled cavities comparing those results with a conventional bur method.

Material and Methods

Twenty four human single rooted teeth, freshly extracted for orthodontic or periodontal reasons, presenting straight root canals, were selected and ran-

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domly assessed to two groups. Collecting these samples conformed to a protocol that satisfied the ethical standards as described by the "Centre Hospitalier Universitaire de Nice". Teeth were kept from patients who consented orally to their use for research purposes. Access cavities were conventionally prepared. The root canal length of each sample was determined by introducing a 10/100 K file until it slightly surpassed the apical foramen. The working length was corrected by pulling back while viewing the apical region under a stereo microscope (VMZ, Japan, original magnification x4). The length of the root canals ranged from 17 mm to 20 mm. Only root canals that were enlarged to a Master apical file of size #35 were used in this study. A continuous irrigation of 2.5% sodium hypochlorite was used during the enlarging procedure. A final irrigation of 11% citric acid was used before drying the root canals (sterile paper points). Root canal fillings were assessed using a warm gutta-percha technique (Obtura System, analytic technology, USA) plus a sealer (Pup canal sealer, Kerr). X-rays (mesio-distal plus vestibulo-buccal views) served to control the quality (density, marginal adaptation, length) of root canal fillings. Access cavities were filled using a ZOE modified cement (IRM, DeTrey, USA).

Samples were then randomly divided into two groups: the laser group and the mechanical bur group. In the laser group (group 1) root apices were resected using a Er,Cr:YSGG laser (Biolase, Waterlase, USA) plus copious air-water coolant (ratio: 32%/43%). The laser beam was collimated through a flat-end cylindrical tip (sapphire tip, diameter 0.6 mm, length 12 mm, surface 0.002826 cm², working distance 1.5 mm). Frequency was fixed to 10 Hz and the output power fixed to 300 mJ that corresponds to a theoretical fluence of 106 J/cm². Root apex cavities were prepared for the retrograde root canal filling using the Er,Cr:YSGG laser beam, eliminating the gutta-percha excess and finishing the dentine walls.

In the bur group (group 2), root apices were resected using a micromotor handpiece (WH 999A200) plus water-air spray as a coolant and a H-390-016 Komet bur (Komet, Germany). Root end cavities were prepared using a H-1008 bur (Komet, Germany) and filled in the same conditions as described for the group 1. All retro-cavities were filled with a ZOE modified cement (Super EBA cement®, Stailine, Staident Middlesex, UK).

Microleakage was assessed using a methylene blue dye penetration method. Each tooth was covered with two coats of an acid-resistant varnish (V33, Domblans, France) to within 0.5 mm of the apex. The root-ends were immersed in a 0.5% aqueous solution of methylene blue for 24 hours. They were then rinsed thoroughly in distilled water, the varnish was removed and the teeth were embedded in clear epoxide resin (Buehler® Ltd.). They were sectioned transversally from the apex to the crown (0.3 mm thick slices) with a slowly rotating diamond blade (0.3 mm thick-

ness) under running water (Isomet Low Speed Saw, Buehler® Ltd.). Digitalized images (Color video camera CCD-IRIS, Sony, Tokyo, Japan; Lens macro 50 mm, Olympus, Tokyo, Japan) of the slices were collected from an optical microscope (original magnification x 5) using an image analysis system (Visilog 5.3 program, Noesis Vision, St-Laurent, PQ, Canada) and the microleakage was observed on blind coded samples and quantified as follows. Each slice being 0.3 mm thickness, when the methylene blue is observed on the apical surface and becomes invisible on the coronal surface, the result is quantified at $0.3/2 = 0.15$ mm. If the methylene blue is visible on the coronal surface of one slice and becomes invisible on the apical surface of the successive slice, the methylene blue is considered to disappear in the thickness of the eliminated slice (diamond blade thickness). Then, a 0.15 mm value is attributed and added to the last visible valuation. Statistical analysis of the results was performed using the non-parametric Mann-Whitney U test for independent samples.

Results

They are expressed in table 1 and figure 1. In group 1 (laser) values ranged from 1.05 mm to 2.85 mm (mean range = 2.2 mm, standard deviation = 0.79 mm). In Group 2 (bur) values ranged from 1.05 mm to 4.65 mm (mean range = 2.45 mm, standard deviation = 1.07). Statistical expression of the results (Mann-Whitney U test) demonstrate there are no significant differences ($p = 0.6999$).

Discussion

Bacterial contamination of root canals is considered the main etiologic factor of periapical pathologies. The total elimination of debris and obtaining a sterile root canal system seems very difficult. Most of failures in root canal treatments are attributed to insufficient cleaning and bacterial decontamination. Some bacteria, such as *Enterococcus faecalis*¹ are isolated from leakages observed between the dentinal walls and root canal filling materials or inside the dentinal tubules. Retreatment is indicated once the endodontic treatment fails and is attributable to inadequacies in cleaning, shaping and obturating the root canal system. Re-infection may occur due to wrong fillings or iatrogenic events such as lost of coronal seal. But retreatment may be impossible due to specific conditions such as broken instruments and generally impossibility to reach the apical region of the root canal. Then, apical surgery is indicated when teeth respond poorly to re-treatment or when, generally, they cannot be treated appropriately by conventional means.

The first wavelength to be used in apical surgery (CO₂ laser) was performed in order to seal the apical foramen of extracted teeth.^{2,3} This wavelength was used also in order to improve haemostasis and visualize perfectly the operative field and, at the same

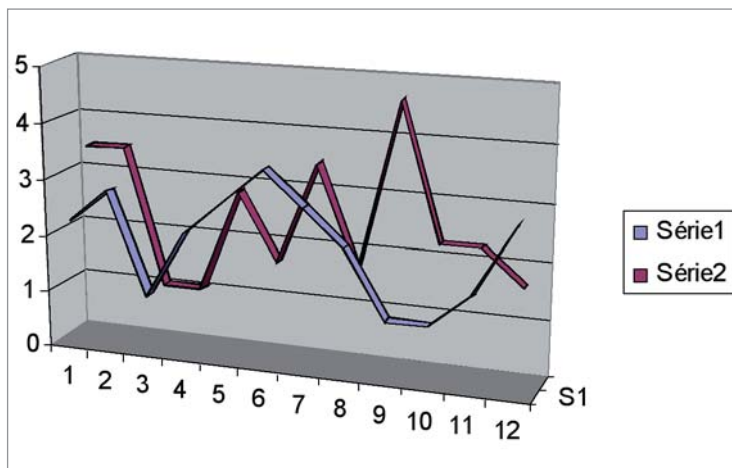


Table and figure1: Microleakage infiltration (in mm). (series 1 = Er,Cr:YSGG laser; series 2= bur)

Mean degree of pain over 6 months (n = 25)												
Laser	2.25	2.85	1.05	2.25	2.85	3.45	2.85	2.25	1.05	1.05	1.65	2.85
Bur	3.45	3.45	1.05	1.05	2.85	1.65	3.45	1.65	4.65	2.25	2.25	1.65

time, to decontaminate the root apex as well as to reduce the permeability of the root surface dentin.⁴ In an in vivo experiment on beagle dogs, some modifications (mini-contra-angle) did not enhance the quality of the result: the success rate following apicoectomies using this laser was not improved and failed to support the technique proposed by Miserendino.^{5,6} In contradiction with those remarks and in an vitro study, Esen et al.⁷ aimed to compare the degree of dye penetration (fushin) of root end cavities CO₂ laser, ultrasonic retrotips and rotary instruments prepared. For these authors, apical leakage in the CO₂ laser group was significantly less than in the other groups. In an interesting study Fayad et al.⁸ investigated the effect of CO₂ laser irradiation on periodontal cell fibroblasts to resected root ends. Considering that the goal of endodontic surgery is to achieve periapical regeneration by bone and cementum deposition, the healing process includes the attachment of PDL fibroblasts to the resected structure. This study demonstrates there were no PDL cells attached to the laser strike areas. This absence of attachment could be attributed to the morphological changes including charred, carbonized, craters formation and melting of the hard tissues involved (dentine, cementum, bone) with subsequent solidification and re-crystallisation. This could explain why, in a 4-years in vivo study, the CO₂ laser did not improve the healing process.⁹ This wavelength, today, is not so frequently used in apical surgery, in exception of the haemostatic effect that is yet appreciated by some dental practitioners.

Nd:YAG laser demonstrated to be effective in reducing the penetration of dyes or bacteria through re-

sected roots, but all observations demonstrated that the permeability of the dentin was not completely prevented.^{10, 11, 12} This could be linked to the fact Nd:YAG laser causes melting of dentinal surfaces resembling the appearance of glazed interconnected droplets. Resolidification and recrystallization of the melted area, appeared to be incomplete and discontinuous. Subsequently, it is possible to postulate why the permeability of the dentine was reduced even if not completely prevented. Preparing bacterial reservoirs in the access cavities and comparing the apical seals achieved using retrograde amalgam fillings or Nd:YAG laser without apical preparation, Wong et al.¹³ did not find any statistically significant differences in bacterial leakage between the laser-treated group and the retrograde amalgam group. This result could be identical as the above argumentation: N:YAG laser produces a

partially non homogeneous glazed surface and leakage becomes possible.

Er:YAG as well as Er,Cr:YSGG lasers, that are two narrow wavelengths, are both highly absorbed in water and hydroxyapatite and recognized as perfectly adapted for hard tissue ablation. Using an Er:YAG laser to prepare root end cavities, Ebihara et al.¹⁴ found no statistically significant differences in dye penetration between the laser-treated group and the ultrasonic group. These results, in accordance with our in vitro observations, are not surprising since Er:YAG or Er,Cr:YSGG lasers neither melt nor seal the dentinal tubules. Subsequently, any reduction in dentine permeability should not be expected. When using Er:YAG as well as Er,Cr:YSGG lasers, smooth and clean resected surfaces devoid of charring or glazing or melting are observed.^{15, 16} Using this wavelength and comparing with ultrasonic devices, Karlovic et al.¹⁷ founded lower values of microleakage when the root ends cavities were prepared with Er:YAG laser, whatever the sealing material used. Some authors¹⁸ tended to mix different wavelengths and in respect of the interaction laser-tissue, used an Er:YAG laser to perform osteotomy and root resection plus an Nd:YAG laser to seal the dentinal tubules and reduce the possible bacterial contamination. Moreover they applied low level laser therapy with a GaAlAs laser to enhance wound healing process. This approach is interesting and those authors observed that the clinical follow-up showed a significant decrease of radiolucent periapical lesions. No clinical signs and symptoms were reported by the patients. Effective dentine (as well as enamel and bone) cutting by means of an Er,Cr:YSGG was first demonstrated in the

middle nineties¹⁹ so that its possible use in apical resection is not a surprising application. The emitted energy may be delivered, in a first approach and clinically, in the root canal by a thin optical fiber. Thus, the potential bactericidal effect of laser irradiation (in synergy with sodium hypochlorite) may be used for disinfecting the root canal. Moreover, sapphire tips—as demonstrated in this in vitro study—are able to cut the apex and prepare the retrograde cavity to be filled.

The outcome of this in vitro study indicates that there are no statistically significant differences in the two groups in terms of microleakage. The root end resection as well as the retroapical cavities may be performed by Er,Cr:YSGG laser as a useful method. Laser apicoectomy has the potential to reduce the risk of bacterial contamination of the surgical wound and to eliminate the hazards associated with target tissues aerosols produced by rotary air driven instruments. Effectively, ablation of the tissues to be removed (dentine, cementum) is achieved by a thermo-mechanical mechanism. In this process light is absorbed by water molecules, rapidly heating a small volume. Water vaporization creates a strong subsurface pressure and leads to an explosive removal of the target tissue.²⁰ The explosive thermo-mechanical ablation occurs with wavelengths from 2.7 to 3 µm and leads to ejection of mineral particles with preserved mineral structure.²¹ Subsequently, heating the infected tissues decontaminates it. Mineral particles produced by burs and rotative instruments are not decontaminated and may fall down in the surgical periapical cavity, compromising the healing process. Moreover, micro-cracks, have never been observed nor reported.²² Further studies—long term and multicentric clinical investigations—should value and compare the healing process, comparing the mechanical and photo-thermo-mechanical efficiency.

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Acknowledgements

To Mr Jan De Vries (Dental impact Co, Biolase-France) who accepted, to lend a Biolase-Waterlase laser to the Laser Technology and Oral Environment Laboratory, Dental Faculty, University of Nice Sophia Antipolis and the Pôle Odontologique, University Hospital (CHU St Roch, 5 rue Pierre Dévoluy, 06300 Nice).

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Laser-assisted re-establishment of Canine Guidance:

Esthetic and Functional Reconstruction of Worn Canines

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Fig. 1 _Initial clinical status.

A _Right side view: Loss of canine guidance and presence of contacts on lateral incisors, pre-molars and disto-buccal cusp of the first molar.

B _Left side view: Loss of canine guidance and occlusal contacts on lateral incisors and pre-molars.

A diastema between the upper right canine and lateral incisor caused by the occlusal interference can be noticed.

Fig. 2 _Longitudinal crack in the upper canine caused by intense occlusal forces.

_Introduction

The frequent occurrence of teeth wear and the harmful consequences of tooth surface loss have turned to be one of the greatest concerns among current dentistry issues.¹ Teeth wear may have multiple causes and it is mainly related to the presence of parafunctional habits, such as bruxism.^{2,3}

Bruxism is considered a parafunctional activity that include clenching and grinding of teeth during the night or/and day.⁴ Clinically, severe tooth surface loss resultant from the attrition between teeth can have detrimental implications, including decreased vertical dimension of the occlusion, deficient masticatory function and loss of muscle tone. In addition, temporomandibular joint dysfunction and impaired esthetic appearance may be also observed.⁵

The treatment of worn dentition includes the esthetic and functional restoration of teeth. Recent de-

velopments in adhesive dentistry associated with new technology have enabled the achievement of clinical successful outcomes. Low and high power lasers have been increasingly used during prosthetic treatment. Er:YAG lasers are widely employed during restorative procedures, and its indications include microbial reduction, caries removal, enamel and dentin etching, ceramic conditioning and crown lengthening.^{6,7}

This clinical case illustrates the restoration of worn canines in a young bruxer patient with concern to harmonious esthetics and stable function. The re-establishment of the canine guidance with diagnostic waxing and the reconstruction with composite resin using a stent of polyvinyl siloxane is described, as well as the benefits of hard tissue etching with the Er:YAG laser.

_Case Description

A 25-year-old Caucasian woman was referred to

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our clinic presenting wear facets on the edges of the upper and lower canines (Fig. 1). The patient reported muscular fatigue in the morning and clenching during the day, and these symptoms were attributed to the patient's parafunctional bruxing habit. The canine guidance was no longer present, and the wear pattern indicated that jaw lateral excursive movements were predominant during bruxism episodes. This fact could also be attested by the presence of a diastema between the upper right canine and lateral incisor (Fig. 1B), as the patient reported that it first appeared after bruxism habit initiated. Since the canine edge was lost due to tooth wear, the canine guidance was substituted by group function guidance, and an intense contact between upper and lower lateral incisors during lateral excursive movements may have caused tooth movement and diastema appearance. The intense strength exerted on the canines during clenching and grinding resulted in the appearance of cracks (Fig. 2), as well as in the loss of tooth anatomy.

Based on clinical observations and considering anamnesis data, the treatment proposed was the recovery of esthetics and function by the direct restoration of canines' anatomy with composite resin and the re-establishment of canine guidance. A hard acrylic occlusal guard was also indicated after restoration phase to protect tooth and restoration surfaces, manage bruxing habit and stabilize occlusion.

Clinical Procedure

Before restoration procedures, impressions of both arches were taken. To determine the size and shape of the upper and lower canines and the exact amount of lost structure to be reconstructed, a diagnostic wax-up was fabricated (Fig. 3). After the teeth anatomy was rebuilt, the articulator was used to adjust the canine guidance and the correct lateral excursive jaw movements, and also to establish the ideal occlusal relation between both arches. The diagnostic wax-up enabled an ideal association of both esthetics and function.

Four silicone stents were fabricated (one for each canine) with heavy-bodied addition silicone impression material (Ivoclar Vivadent, Schaan, Liechtenstein). The silicone was positioned in the waxed cast, completely involving the canine without the use of impression trays. After material cure, the silicone was removed from the cast and its buccal portion was cut with a #15 blade in the mesiodistal direction and disposed. The incisal margin was preserved in the silicone matrix in order to guide the canine edge reconstruction.⁸ After this, the silicone stent was tested in the mouth and its adaptation was checked, as well as the amount of resin to be placed (Fig. 4). The tooth color selection was followed, and, as regarding previously bleached teeth, a composite resin for bleached teeth (Venus, Heraeus Kulzer, Armonk, NY, USA) was used.



Fig. 3 Diagnostic wax-up and reconstruction of upper and lower canines.

The enamel surface was etched with the Er:YAG laser (KEY Laser 2, KaVo, Biberach, Germany) emitting photons at a wavelength of 2.94 μm . The handpiece #2051 was used and parameters were set at 80 mJ, 4 Hz and focused mode (12 mm distance). The irradiation was conducted under water cooling (5 ml/min). The Er:YAG laser was also used to produce a small groove in the area of the canine edge with 120 mJ and 6 Hz in focused mode, so that the adhesion of the restoration to the tooth could be favored (Fig. 5). After laser-conditioning, enamel and dentin were further etched with a 37% phosphoric acid for 30 and 10 seconds, respectively (Fig. 6A). The acid was removed with abundant water irrigation during 30 seconds and the enamel was gently dried with absorbent paper. The adhesive system (Clearfil SE Bond, Kuraray, Tokyo, Japan) was applied according to manufacturer's instructions and photopolymerized (Fig. 6B).

Fig. 4 Stent of polyvinyl siloxane impression material in position.

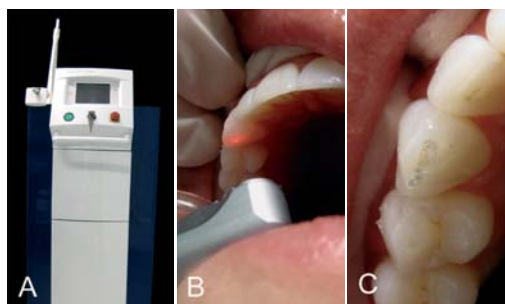


Fig. 5A Er:YAG laser (KEY Laser II, KaVo).

Fig. 5B Enamel conditioning of the right canine (Handpiece # 2051, 80 mJ, 4 Hz).

Fig. 5C Surface aspect after laser conditioning and groove preparation.

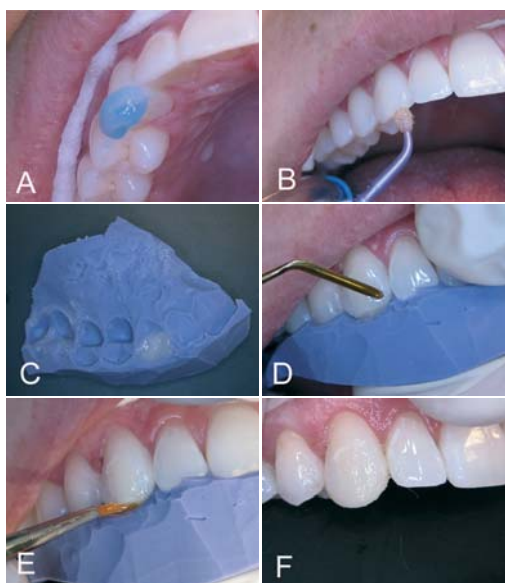


Fig. 6 Steps of restoration procedures.

A Acid etching of enamel with 37% phosphoric acid after Er:YAG conditioning.

B Application of the adhesive system (Primer and Bond).

C Longitudinal section of the polyvinyl siloxane stent and insertion of the translucent resin.

D Stent in position. Incremental insertion of resin.

E Placement of resin with a brush (Cosmedent).

F Restoration after stent removal, before finishing and polishing.

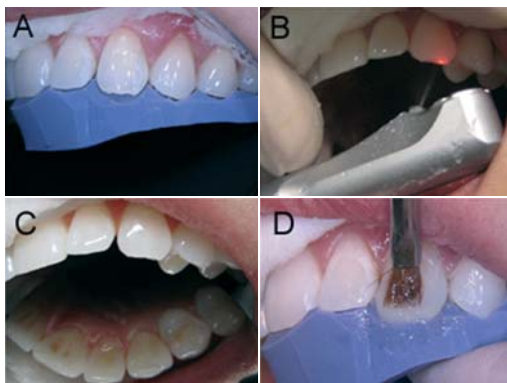
Fig. 7_Procedures repeated in the left side.

A_ Stent in position.

B_ Enamel conditioning with Er:YAG laser.

C_ Surface aspect after laser conditioning.

D_ Resin placement.



For teeth restoration, a thin layer of composite resin (T3, Venus, Heraeus Kulzer) was inserted in the silicone matrix, covering the whole palatal face of the restoration (Fig. 6C). The matrix was positioned in the mouth and the resin was polymerized for 20 seconds. This thin layer of translucent resin aimed to provide support for restoration building and initiate the construction of the translucent incisal edge. The reconstruction of the dentin portion (Fig. 6D) was followed with an opaque composite resin (SBO, Venus, Heraeus Kulzer), and the enamel portion was rebuilt (Fig. 6E) with a final layer of an enamel composite resin (A1, 4 Seasons, Ivoclar Vivadent). The same procedures were conducted for all upper and lower canines (Figs. 7 and 8).

The resin excesses of the cervical area were removed with a #12 blade. The occlusal contacts were adjusted, and the canine guidance was carefully re-established. Finishing and polishing procedures were conducted with polishing discs, interproximal abrasive strips and polishing pastes (Sof-Lex Pop-On, 3M ESPE, St. Paul, MN, USA; Enamelize, Cosmedent, Chicago, IL, USA). Right after restoration conclusion, the patient was given hard acrylic occlusal guard to protect restoration from further wear and to manage bruxing habit. Canines' reconstruction using direct resin restoration enabled the achievement of both harmonious esthetics and adequate function (Figs. 9 and 10).

At 1-year follow-up, the patient reported that the occlusal splint was not used as oriented. This fact could be clinically observed, since worn facets were again present in the restorations of both upper and lower canines (Fig. 11). The resin lost during bruxism episodes resulted in the exposition of the opaque

resin used for the reconstruction of the dentin portion. This follow-up outcome is of extreme importance, since it indicates that adhesive procedures, including enamel etching with Er:YAG laser, were capable of providing the restoration with sufficient adhesion, so that it could tolerate the intensive occlusal charges generated during bruxing without any failure. Since adhesion was successful, the clinical consequence of continuous grinding during one year was the composite restoration wear. In spite of this, the canine guidance was still present, and the patient was oriented to effectively use the occlusal splint to avoid further wear and the need of a new restorative procedure. The presence of guidance was responsible for the closure of the diastema between the upper right canine and lateral incisor, and this could be observed one year after restoration (Fig. 11).

Discussion

Tooth surface loss may be caused by erosion, abrasion, attrition and abfraction.² Clinical observations indicate that these factors seem to generally act in combination.³ Attrition between teeth are frequently observed during parafunctional habits. In the present clinical case, this fact was responsible for causing wear facets in the upper and lower canines.

The restoration of the worn canines was indicated with the aim of re-establishing dentition function by the recovery of the canine guidance. Esthetics recovery was also targeted; however, it should be achieved as a consequence of the correct association between adequate functional reconstruction and strict application of restorative concepts. Indirect restoration of worn teeth with ceramic crowns is frequently reported in the literature.^{9, 10} The direct technique was chosen for the present case, especially because of its conservative approach. A ceramic crown was considered an invasive treatment to be provided to a young woman presenting healthy teeth, and it would be indicated only in case of pre-existing wide restorations in the teeth to be reconstructed.

Since bruxing habit does not cease after teeth restoration,^{11, 12} the night wear of the occlusal splint was indicated in order to prevent the restorations from further wear, as well as to manage bruxing habit and stabilize occlusion. Despite emphatically ori-

Fig. 8_Procedures repeated in the lower canines.

A_ Surface aspect after enamel conditioning with Er:YAG laser.

B_ Resin accommodation in the empty space of the stent.

Fig. 9A_ Right lateral movement before restoration. Contacts on lateral incisors, premolars and molars can be noticed.

Fig. 9B_ Left lateral movement before restoration, with contact on lateral incisors and premolars.

Fig. 9C_ After the reconstruction of right canine guidance, an adequate space was created between antagonist incisors, premolars and molars during lateral movement.

Fig. 9D_ Space between antagonist incisors, premolars and molars during left lateral movement after the reconstruction of canine guidance.





Fig. 10 Final clinical status. The patient was oriented to use an acrylic occlusal guard to preserve the results.

Fig. 11 At 1-year follow-up, wear of the restorations was caused by the misuse of the occlusion guard. Restorations adhesion to teeth was sufficient to tolerate occlusal stress and the canine guidance was still present in both **A)** right and **B)** left sides. The re-establishment of the canine guidance was also responsible for the closure of the diastema.

ented, the patient did not use the occlusal splint and that lead to the continuing restoration wear. This fact was important to allow the observation of restorations behavior under intense occlusal stress. After one year, restoration adhesion to laser-etched enamel proved to be successful. The intense charges exerted during bruxing events were sufficient to cause loss of resin substance, but not to detach it. The use of Er:YAG laser for enamel etching has proved to provide adequate bonding resistance, since the laser is capable of creating a micro-rough surface that favors the mechanical adhesion of resin to enamel.¹³⁻¹⁵ In case the patient had been provided with ceramic crowns, the misuse of the occlusal guard might have caused fracture of restoration, or even of teeth. Thus, the successful adhesion played an important part in the present case, since the permanence of the resin restoration during the following bruxing episodes was crucial to protect the teeth from further wear, without jeopardizing its resistance.

The successful outcomes obtained in the present case are attributed not only to the correct diagnosis and clinical conduction, but also to the treatment planning. The technique performed included a meticulous examination in mounted casts, a simulation of the adequate canine guidance with diagnostic waxing, and a reliable reproduction of the planned restoration in mouth with the use of the silicone matrix. This accurate technique was associated with high technology for better clinical results, such as enamel conditioning with Er:YAG laser. Consequently, the outcome achieved was harmonious esthetics with the re-establishment of adequate dentition function.

Conclusion

The re-establishment of the canine guidance with a combination of diagnostic wax-up, polyvinyl siloxane stent, and enamel conditioning with the Er:YAG laser, enabled the adequate reconstruction of worn canines with composite resin, resulting in harmonious esthetics and recovery of function.

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Acknowledgements

The authors would like to express their gratitude to CNPQ (Grants No.303798/2005-0 and No.552210/2005) and FAPESP.

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Integration of diode laser surface decontamination in periimplantitis therapy—a twelve year review of a fit for practice concept

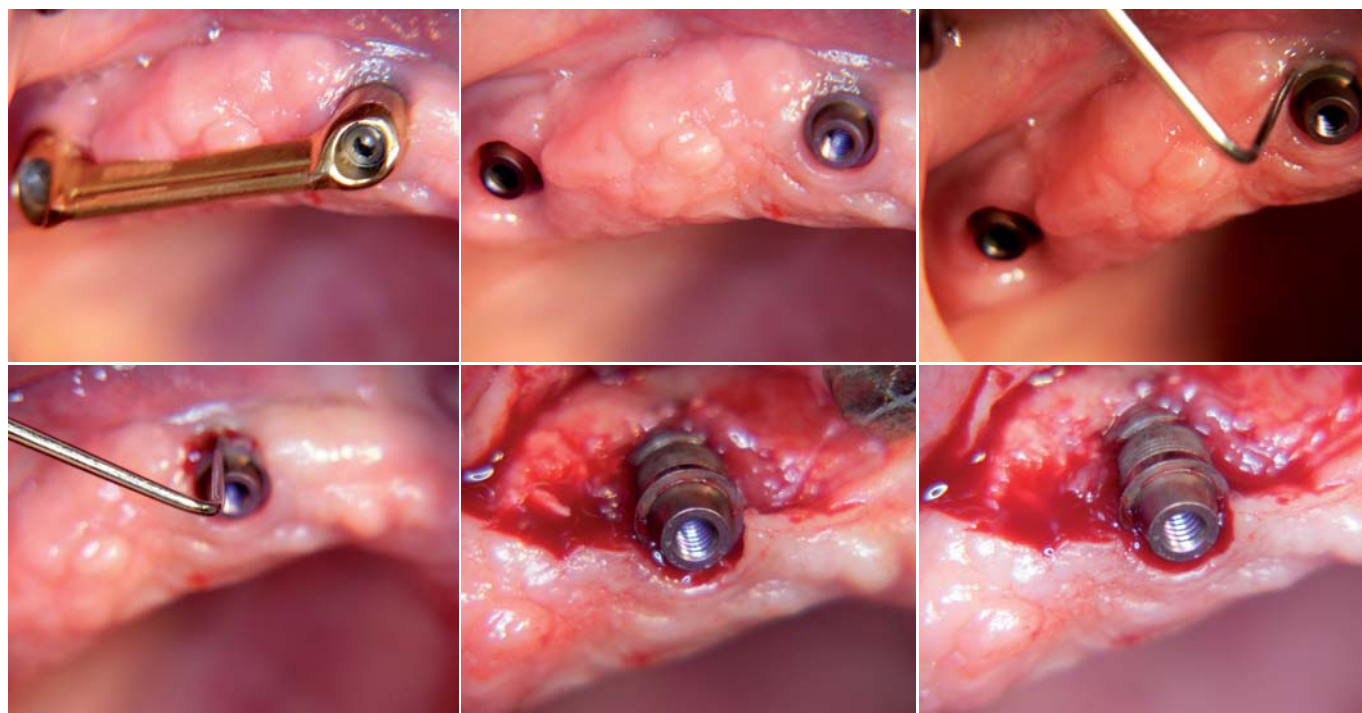
author_Georg Bach, Germany

Manifestation of periimplantitis

On probing, secretion is released at the mesial implant, though the clinical appearance is inconspicuous and further probing leads to a substantial bleeding. After mobilization of the soft tissues, the typical crater-shaped periimplant bone defect becomes visible.

After many years of great euphoria, a certain disillusion has spread in implantology, which is especially due to the reason that implants with corresponding suprastructures do not last forever, like it has often been pointed out. Anyway, complications cannot totally be excluded. Professor Herbert Deppe, Chair for the Dental Surgery and Implantology Department of Munich University, has recently reported on the fact that approximately an eighth of incorporated implants show periimplantary lesions after about 10 years. In the beginning, the main fear was that enossal implants had to face early complications. Nowadays, this is no more the case since sophisticated surgery techniques and improved implant surfaces have re-

duced these risks. One still has to worry about long-term sequelae shown in artificial abutments caused by periimplantary lesions after some years of strain. However, periimplantitis is mainly induced by bad oral hygiene and/or the inability to carry out mouth care (eg in old patients), and it is not associated to a certain type of implant (system-independent). Numerous therapy approaches have been made to preserve artificial abutments suffering from periimplantitis. A four phase treatment model is usually applied (hygienization phase, surgical resective phase, reconstructive and augmentative phase, recall phase). This model has considerably been enhanced by the launch of diode or injection lasers, which have



later been complemented by CO₂ laser, Er:Yag laser and Er,Cr:YSGG laser respectively. Since the mid-nineties, diode lasers belong to the established wavelengths used in dentistry. Today, diode lasers with short pulse technique are predominant, though it all started out with the cw mode. High performance diode lasers emit monochromatic, coherent light of wavelength 810 nm, which is especially well absorbed by dark surfaces. Thanks to these physical conditions, the injection laser (= diode laser) is perfectly suitable for incisions applied in standard dental surgery, as well as for the resection of benign tumors in the oral cavity, the uncovering of implants and for application in mucogingival surgery. The good cutting properties of diode lasers are due to the extraordinary absorption of laser light by the hemoglobin located inside the tissue. Additional to soft tissue surgery, the diode laser is also used for decontamination of surfaces covered with microbes (on implants and teeth). It could be demonstrated that especially the gram-negative, anaerobe microbiological spectrum was properly damaged by laser light (Bach und Krekeler (1995; 2000)). In compliance with reasonable performance and time parameters, which have been confirmed sustainably by clinical long term studies (Moritz (1996), Gutknecht (1997), Bach et. al. (1995, 1996, 1998, 2000, 2001)), a thermic or morphological damage of the implant surface and the surrounding bone tissue can definitively be excluded (Bach and Schmelzeisen (2002)). It was the aim of the present study to demonstrate and evaluate a treatment model for periimplantitis therapy, which shows sustainable results and which is absolutely suitable for practice. There is no doubt that the conventional methods for periimplantitis treatment, which have often been described in literature, permit adequate surface cleaning and thus also the reduction of pathogenic microorganisms on the implant surfaces. Nevertheless, the complete removal of relevant bacteria cannot be ensured. Moreover, the conventional removal of biofilms has only little influence on those bacteria infiltrating the soft tissue. The integration of diode laser light in periimplantitis therapy must be seen as a new approach.

_Material and method

Ten patients (with n = 17 implants) have been treated and examined for a period of more than 12 years (since May 2007). In spring 1995, all of them suffered from periimplantitis on their artificial titanium abutments.

_Pathogenesis of periimplantitis

Periimplantitis therapy represents a border area between implantology and parodontology. The causes for parodontitis and periimplantitis

are bacterial infections, in particular they are biofilm based infectious diseases. Gram-negative and anaerobe microbes are mainly responsible for the destruction of the parodontal and periimplantary supporting tissue. As a rule, one of the following microbes causes parodontopathy in case of one of both biofilm based infectious diseases:

- _ *Actinobacillus actinomycetemcomitans*
- _ *Prevotella intermedia* and
- _ *Porphyromonas gingivalis*

Whereas periimplantitis is mainly caused by the following microbes:

- _ *Fusobacteria*
- _ *Prevotella intermedia* and
- _ *Porphyromonas gingivalis*

The principal object of periimplantitis therapy carried out in our dental clinic was to remove the biofilm and hence the removal of the mentioned pathogenic microorganisms.

_Patients treated

For detailed data, age and sex of the patients, please see Figs. 1 and 2. It should be mentioned that an accumulation of the diseases first incidence is registered in the middle years (age: 30 to 50 years) in both groups. Sex-specific differences could not be ascertained.

Age	Number of patients
20–30 years	1
30–40 years	3
40–50 years	3
50–60 years	2
60–70 years	1

Fig. 1_ Age pattern of the examined and treated patients in 1995.

Sex	Number of patients
Female	5
Male	5

Fig. 2_ Evaluation according to the sex of the examined and treated patients.

_Inclusion and exclusion criteria

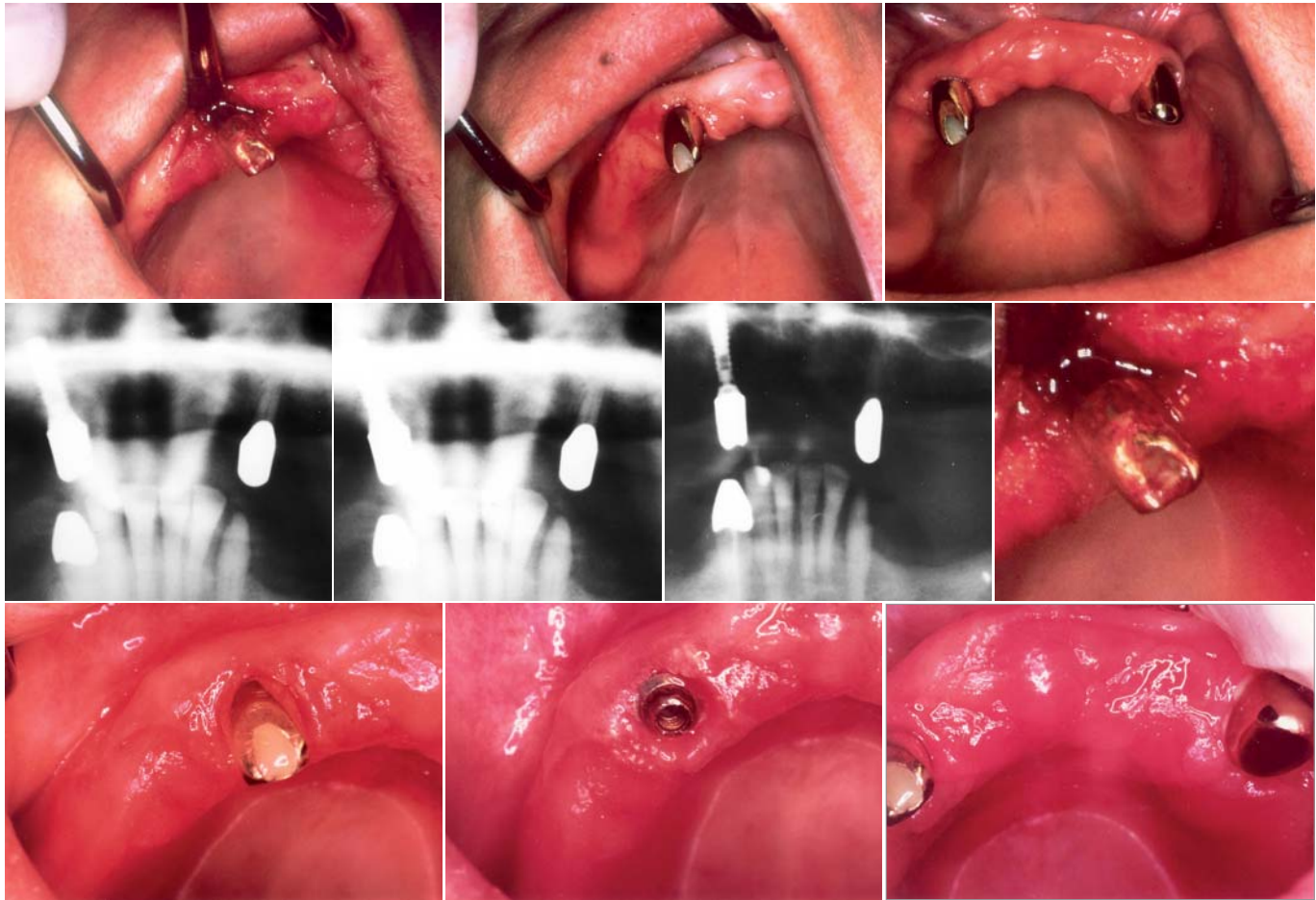
All patients involved had to meet strict inclusion criteria as there were:

- _ Clinically visible inflammatory signs like BOP (bleeding on probing) and high probing depths
- _ Radiovisible periimplantary bone lesions ("crater")

Exclusion criteria were:

- a) Severe primary diseases
- b) Nicotine or alcohol abuse
- c) Lack of compliance

Due to the strict inclusion and exclusion criteria only a limited number of people could be admitted for this study.



Periimplantitis therapy:

You can see the first patient, who had undergone periimplantitis treatment, by means of diode laser decontamination, according to our model. November 1994: Manifestation of periimplantitis at implant regio 13. The panoramic tomography (detail) shows a significant bone loss at the artificial abutment. After mobilization of the soft tissue the situation of the defect becomes clearly visible. January 2008: The prosthesis made in 1990, is still in the same position. The situation of the treated regio 13 implant does not show any irritations with and without suprastructure. There is no evidence of probing depth. The panoramic tomography shows a stable bone situation. Besides the reconstructed defect of regio 13, only the root filling of 43 protrudes. This is the only difference compared to the tomography taken in 1995.

_Treatment procedure

Equal treatment procedures for all periimplantitis patients:

1. Initial therapy:

- _ Motivation and instruction of patients
- _ Cleaning and polishing
- _ Application of disinfecting agents

2. Resective phase:

- _ Forming of a mucoperiosteal flap
- _ Removal of granulation tissue
- _ Decontamination by means of diode laser light ($p = 1.0 \text{ watt}$, $t_{\text{max}} = 20 \text{ sec.}$)
- _ Apical shifting of soft tissues

3. Reconstructive phase:

- _ If necessary, bone augmentation
- _ Where applicable, mucogingival corrections

4. Recall phase:

- _ After four weeks, six months, one year and then annual evaluations of clinical findings, taking of X-rays (PSA), decontamination of eventually exposed areas by means of diode laser light.

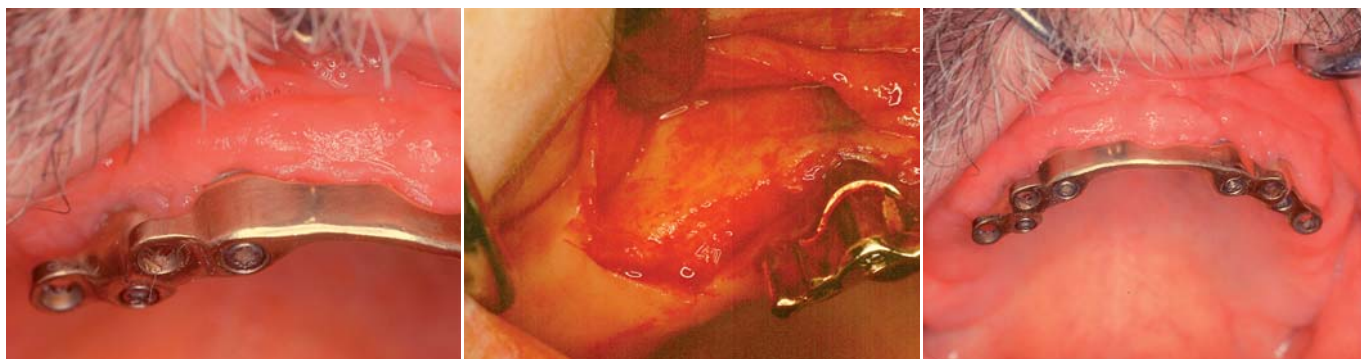
_Image processing methods

As a rule orthopantomograms (panoramic tomography) and additionally dental films in parallel

technique were chosen as an adequate image processing method. In some cases of exacerbated inflammations A/B scan ultrasonic methods were applied. A preoperative orthopantomogram and the dental film status (dental shots of the respective areas) were taken. A postoperative orthopantomogram was directly taken after surgery. A panoramic tomography was taken one year later and then every two years. The advantage of the orthopantomogram is its panoramic-like view of all teeth, the osseous limbus alveolaris and important neighbouring anatomical structures. The dental film in parallel technique allows statements concerning progression, stagnation of loss of hard and soft tissue, and it shows the course of the limbus alveolaris in a reproducible way.

_Microbiological diagnosis

Time schedule: Preoperative, four weeks postoperative, one year postoperative and in a 5 to 10-year postoperative interval germs were eliminated from the effected areas. We did not apply the classical microbiological examination technique (isolation of microbes—cultivation—pure cultures—microscopic samples—gas chromatography—antibiotic sensitivity testing—and biochemical identification, the so-called "bunte Reihen/colour ranks"). We used DNA-RNA hybridization probes instead. The advan-



tage of these hybridization probes is that no living material of the areas probed is needed for cultivation purposes, which minimized the work in the dental clinic (without direct access to an Institute of Microbiology). Additionally, the results were much faster on hand as is the case with classical microbiological examinations. The disadvantage of this rapid test is its high price. Furthermore, only special marker microbes can be detected and **not all** pocket microorganisms can be determined. The germ extraction site had to be dried carefully with a cotton swab, the paper tip was placed, and after a waiting time of 10 seconds put into a sterile storage vessel and sent to the manufacturing company for microbiological diagnosis. The company is in charge of microbiological diagnosis and evaluation of the so-called microbe marker values. The classification of marked microbes was: less than 0.1 % = negative; 0.1–0.99 % = low; 1.0–9.9 % = middle, more than 10 % = high.

Laser light decontamination

Decontamination formed an essential part of the whole therapy. It was carried out by means of diode laser light with 1 watt performance and 20 seconds of application time per implant under fiber contact. A special program (I = implantology-parodontology) was at our disposal, which was used together with the corresponding device (Oralia 01 IST). Performance and time limitation (1.0 watt, 20 seconds) were already fixed parameters of this program. When observing these parameters (time limitation and limitation of performance) it can be guaranteed that the disease causing microbes will be damaged sufficiently and thus, pulpa, periimplantary and periodontal tissue structures will not suffer any thermic damages (Bach and Krekeler (1995)).

Results

Alltogether 10 patients could be examined and checked up during the whole 12 years. In 1994/1995 the "Diode Laser Basic Study" of the Department of Periodontal Surgery of the Dental Clinic in Freiburg/Germany included 50 periimplantitis patients. Due to moving, change of dentist, dead of patients and

other unknown reasons the number of patients was reduced to 10, who are still patients of my dental clinic.

a) Microbiological results

For microbiological results please see Fig. 3. It must especially be emphasized that *Porphyromonas gingivalis* could nearly be completely eliminated during the whole examination period, and a significant reduction of other anaerobe, Gram-negative bacteria could be achieved. We could obtain similar results for *Porphyromonas gingivalis* and *Fusobacteria* except for two cases of low concentration and one of middle concentration, these bacteria could be limited to the lower level of detection in other patients, whereas other relevant marker microbes could be considerably repressed.

b) Recurrence

One of the following results was considered to be a case of recurrence:

- Occurrence of probing depths of more than 4 mm
- Loss of implant
- Recurrence of an inflammation
- Excessive soft tissue inflammation with pocket activity

After 12 years the quota of recurrence was 23% in the periimplantitis group (4 implants). It is stated in international literature that the five year observation period recurrence rate is 30 %.

c) Losses after 140 months

Within the examination period of 12 years we suffered the following losses: two of 17 implants (12 %).

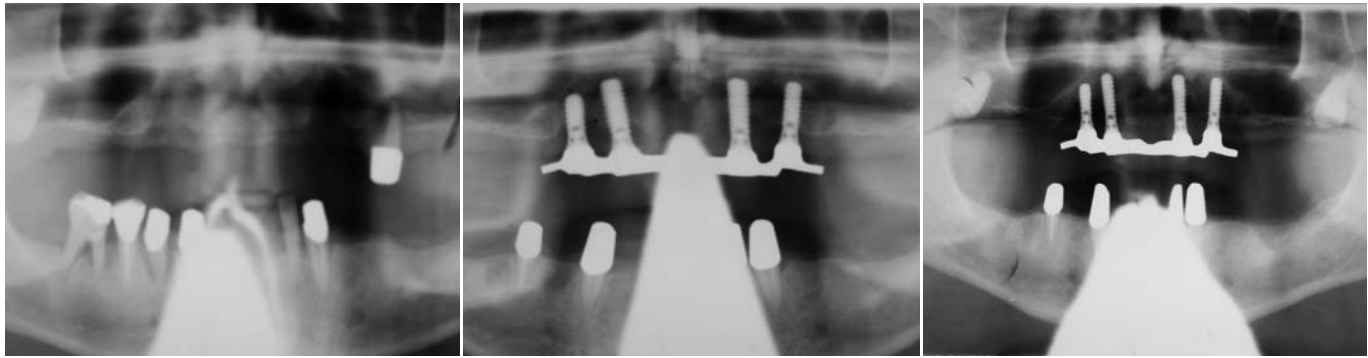
d) Radiological results

On the occasion of the one year check up, a reconstruction of the once crater-shaped defect could be found at the first thread and implant cervix respectively in all 17 implants. After five years this was the case in twelve implants, after ten years in ten implants and in nine implants, when the last X-ray control was carried out. In two implants a successive loss of the bony supporting tissue forced us to remove the artificial abutment in one case af-

Saving of a prosthesis by treating periimplantitis of a strategically important implant in the upper jaw.

March 1995: Just one year after the incorporation of a very sophisticated and for the patient nearly too expensive implant-supported prosthesis in the upper jaw, the manifestation of periimplantitis was detected in the first quadrant. After mobilization of the soft tissue (below) the defect situation becomes clearly visible. Four months after the surgical resective phase there were no clinical signs of irritation.

November 2007: The prosthesis is still in its intraoral place. Meanwhile, the patient has reached the age of 63 years. The situation of the treated implant regio 13 (total suprastructure) does not show any clinical signs of irritation in toto and in the former surgical area. There is no probing depth.



The radiological situation

We are lucky to have a panoramic tomography, taken by the pretreating dentist/referral dentist, which shows the situation BEFORE the implant's incorporation. Please note the profound parodontal lesions (above). March 1995 (below): Only half a year after incorporation, a considerable bone loss at the artificial abutment (below) can be seen on the panoramic tomography (detail). Another half a year later (upper right) it has drastically expanded and also affects the mesial implant. This was the date, when the patient was referred to our dental clinic. The bony situation seems to be stable when looking at the panoramic tomography from 2006. Besides the 2/3 reconstructed former defect of regio 14, the nearly completely stable reconstruction of the implant regio 13 is certainly impressive.

ter seven and in another case after nine years. After the last X-ray control, the remaining six implants showed losses of horizontal supporting tissue on the level of the first/second thread.

e) Importance of the present study for patients

Two implants got lost and together with their ex-corporation the corresponding continuous beam (in one case) and bridge reconstruction (in the other case) had to be removed as well. All the other treated implants are properly functioning, even 12 years after periimplantitis detection. Though, at the moment, not all implants are in stable conditions and again bony losses occurred after years of therapy, as already described in the Result chapter, it can certainly be judged favorably that most implants could be preserved. This is of special importance to older patients, who were not in favor of explantation, augmentation and renewed implantation or whose state of health would not have allowed or at least would have limited these highly invasive measures.

_Discussion

The authors considered the 12 year lasting continuation of this study as necessary in order to show that periimplantitis therapy can also be carried out successfully "on the conditions of a private dental clinic". It also proves that "sooner or later not every periimplantitis" leads to the loss of the artificial abutment. The extremely long term of the study was a limiting factor for the contingent of patients involved in examination and treatment. The low number of patients participating in this study was due to the strict inclusion and exclusion criteria. Nevertheless, these severe restrictions helped to minimize the

risk of probable influences on the results by external factors. After years of incessant euphoria in implantology, nowadays dentists have to face a considerable number of complications. In my opinion, periimplantitis is the main challenge for today's implantology. The huge number of incorporated abutments and the growing age of our patients, which is one of the main reasons for the increasing loss of ability to handle and clean complicated suprastructures, will lead to a progredience in periimplantitis. The chief purpose of the systematic therapy in case of apparent periimplantitis is the removal of biofilm and pathogenic microorganisms (biofilm management). On the basis of the present results of implant surface decontamination, we believe the integration of diode laser decontamination to be a tried and tested means for treating periimplantitis. Additionally, it implicates a considerable lowering of recurrences and a notable improvement for the prognosis of this clinical picture.

The reference list can be requested from the editorial office.

Fig. 3 Development of PI microbe marker values 1995–2005.

_contact

laser

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Date:	preoperative	4 weeks p.o.	1 year p.o.	5 years p.o.	10 years p.o.
Microbes					
<i>Fusobacteria</i>	2n/3m/1h	2n	2n	2n/1m	2n/1m
<i>Prevotella intermedia</i>	4n/2m	1n/1m	2n/1m	2n/2m/1h	2n/2m
<i>Porphyromonas ging.</i>	2n/4m/2h	1n/1m	2n/1m	2n/2m	2n/2m
(Legend: k.N. = no findings; n = low; m = middle; h = high)					

Use of Er:YAG laser in daily dental omnipractice

author_S. Maamary, S. Makhan, S. Nammour, Belgium

_Introduction

Dentistry is slowly evolving. Primitive dental drills were used in 18th and early 19th centuries. In the early 20th century the first electric burring instrument was created. In the 1970s, the turbine was introduced. The use of Er:YAG laser in dentistry began in the 1990s. Nowadays, this laser is highly appreciated in daily dental practice. Numerous manufacturers and engineers have fought to create more compact and efficient machines in order to respond to the needs of practitioners. The Er:YAG laser was submitted to loads of research thus resulting in many yearly scientific publications.

The Er:YAG laser's efficiency in the ablation of hard dental tissues has continuously improved thanks to the development of pulse technology software. The microsecond long pulses coupled with high peak powers, enable rapid and quite painless hard dental tissue ablation as in enamel, dentine and bone. The time imputable to cavity preparations becomes comparable to conventional techniques (eg, turbine). There is no direct contact, hence no more vibrations which increases the comfort of the patient and the use of anesthetics becomes superfluous in certain cases.¹⁻³ The laser hand pieces are more and more ergonomic, easy to sterilize and maintain. The manufacturers having developed new

tips, the therapeutic fields have increased, allowing easy access to deep distal cavities, periodontal pockets, etc.

The Er:YAG laser is also a proven tool for soft tissue surgery applications: frenectomy, gingivectomy, gingival pigmentation, periodontal treatments, tumor removal, etc.^{4-5,6-9} A bloodless surgery can be performed by the suppression of the air-water spray.

The Er:YAG laser has become a helpful tool for the omnipractitioner. In this paper we will try to describe some Er:YAG laser uses in daily dental practice.

_1. Applications in conservative dentistry

Case 1: Caries removal children dentistry

Nine year old boy with an occlusal caries of the upper left deciduas molar (Fig. 1). The treatment was done without anesthetic. The non sustained enamel and the carious tissue were removed by the Er:YAG laser (Fig. 2) with the following settings: synthetic sapphire tip, spot diameter: 0.8 mm, VSP mode (pulse width: 100 μ s) with cooling spray, Energy per pulse: 140 mJ, Frequency: 15 Hz, Fluence: 27.85 J/cm², Power density: 417.78 W/cm², Total number of pulses: 1,230. Figure 2 shows the laser etching aspect of the lased enamel. The cavity was filled with composite resin (Fig. 3).

_Case 1



_Case 2



Case 2: Caries removal adult dentistry

Thirty nine year old man with two cervical caries of the lower right canine and lower right premolar (Fig. 1). The treatment was done without anesthetic. The non sustained enamel and the carious tissue were removed by the Er:YAG laser (Fig. 2) with the following settings: synthetic sapphire tip, spot diameter: 0.8 mm, VSP mode (pulse width: 100 μ s) with cooling spray, Energy per pulse: 200 mJ, Frequency: 15 Hz, Fluence: 39.79 J/cm², Power density: 596.83 W/cm², Total number of pulses: 1,779. Figure 4 shows the laser etching aspect of the lased enamel. The cavity was filled with composite resin (Fig. 5).

Case 3: Caries removal adult dentistry

Thirty six year old woman with a mesial interdental caries of the upper right first incisor (Fig. 1). The treatment was done without anesthetic. The non sustained enamel and the carious tissue were removed by the Er:YAG laser (Fig. 2) with the follow-

ing settings: synthetic sapphire tip, spot diameter: 0.8 mm, VSP mode (pulse width: 100 μ s) with cooling spray, Energy per pulse: 250 mJ, Frequency: 15 Hz, Fluence: 49.74 J/cm², Power density: 746.04 W/cm², Total number of pulses: 867. The cavity was filled with composite resin (Fig. 3).

_2. Applications on oral soft tissues

Case 4: Child lower labial frenectomy

Nine year old child with a bad insertion too close to the lower incisors (Fig. 1). The treatment was done with anesthetic. The frenulum was removed by the Er:YAG laser (Fig. 2) with the following settings: hand piece with non contact mode, spot diameter: 0.8 mm without water, LP mode (pulse width: 600 μ s), Energy per pulse: 130 mJ, Frequency: 15 Hz, Fluence: 25.86 J/cm², Power density: 387.94 W/cm², Total number of pulses: 643. Figure 3 shows a satisfactory healing aspect at 8 days.

Case 5: Gingivoplasty

Twenty seven year old woman with a local gingival infection (Fig. 1). The treatment was done with anesthetic. Teeth were protected by means of metallic matrix to avoid damage of the enamel (Fig. 2). The gingival plasty was done by the Er:YAG laser (Fig. 3) with the following settings: hand piece with non contact mode, spot diameter: 0.8 mm with cooling spray, LP mode (pulse width: 600 μ s), Energy per pulse: 250 mJ, Frequency: 15 Hz, Fluence: 49.74 J/cm², Power density: 746.04 W/cm², Total number of pulses: 637. Figure 3 shows a satisfactory healing aspect at 8 days.

Case 6: Implant operculum

Twenty eight year old man was treated (Fig. 1).

_Case 3



_Case 4



The treatment was done with topic anesthetic only. The gum was removed in order to expose the implants by means of Er:YAG laser (Fig. 2) with the following settings: hand piece with non contact mode, spot diameter: 0.8 mm with cooling spray, VSP mode (pulse width: 100 μ s), Energy per pulse: 300 mJ, Frequency: 10 Hz, Fluence: 59.68 J/cm², Power density: 596.83 W/cm², Total number of pulses: 615. Figure 3 shows a satisfactory healing aspect at 15 days. In this case we used VSP mode to avoid an overheating of the implant surface.

Discussion

The 2,940 nm wavelength of the Er:YAG laser is highly absorbed by water. Thus, the heat generated in the underlying tissue layer is neglectable which results in better postoperative comfort for the patient.¹⁰ Following caries treatment, the patient suffers less from pulpal hyperhemia and dental hypersensitivity. Oral soft tissue surgery will produce less inflammation than with other wavelengths. Concerning the soft tissue oral surgery, some of the treatments necessitate a drug prescription (anti-inflammatory and analgesic) for a shorter period.^{1, 10}

The caries treatment with Er:YAG laser respects the minimal invasive principle. A selective ablation of caries tissues can be done with minimal ablation of sound dentine under specific irradiation parameters.¹¹⁻¹³

The non contact mode offers better comfort to the patient with less anxiety. Furthermore, many conservative dental treatments and some oral surgeries can be performed without anesthetics which improves the psychological impacts on the patients.¹⁻³

Er:YAG laser allows practitioners to perform various treatments in different fields of daily dental practice, eg, apicectomy, bone graft, osteotomy for removal of impacted teeth, gingival and periodontal treatments and decontamination of laser tissues.^{4, 6-9, 14, 15}

Unfortunately, the financial impact of the laser apparatus can slow down the diffusion of this promising technique.¹¹

To conclude, the Er:YAG laser technique increases the therapeutic clinical applications of practitioners and improves the relation between patients and practitioners.

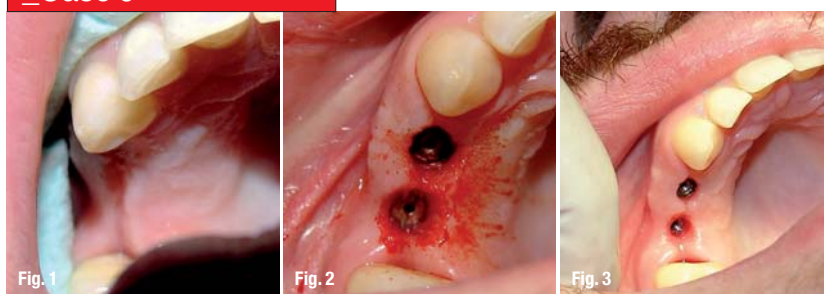
Abstract

The Er:YAG laser system was developed for cutting hard dental tissue and has been approved as a useful alternative method for cavity preparation. This new technique has a good percentage of acceptance and tolerance. A high success rate for hard and soft tissues treatment is obtained without

_Case 5



_Case 6



anesthesia. The Erbium lasers are very effective in pediatric dentistry and are good treatment options. Cavity preparation with the Er:YAG laser would seem to be an option for fearful children, since, without anesthesia, it produces less pain and has acceptable efficiency compared to the conventional mechanical preparation.

The Er:YAG laser can provide caries removal and cavity preparation in an adequate preparation time respecting the minimal invasive theory in conservative dentistry with minimal patient discomfort.

In this paper, we tried to describe some clinical applications on hard and soft dental tissues.

To conclude, we believe that Er:YAG technique is very helpful in our daily dental practice and enlarges our therapeutic possibilities.

The literature list can be requested from the editorial office.

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laser

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Use of laser technology in the endodontic treatment

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Laser technology is being developed very quickly, as well as the understanding of laser interaction with biological tissues. The development of new delivery systems, including thin and flexible fibers and new endodontic tips, has made it possible to apply this technology in various endodontic procedures. The purpose of this article is to describe the clinical applications of lasers in endodontics where conventional treatments cannot provide comparable results or are less effective.

Fig. 1 The prototype of the RCLase™ Side Firing Spiral Tip is shown in the root canal of an extracted maxillary canine in which the side wall of the root was removed to enable visualization of the tip.

Fig. 2 The RCLase™ Side Firing Spiral Tip.

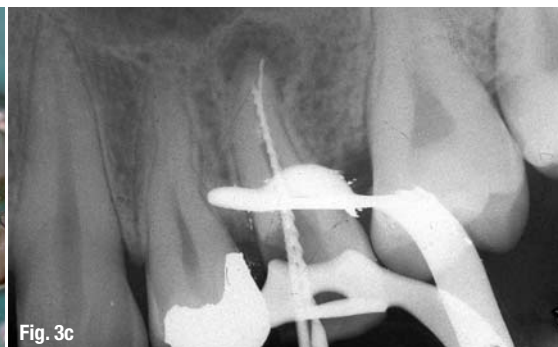
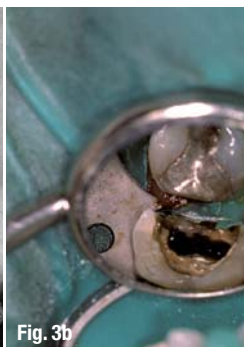


Successful endodontic therapy mainly depends on the elimination of microorganisms from the root canal system. This is accomplished by means of bio-mechanical instrumentation of the root canal. However, studies showed that the complete removal of microorganisms and smear layer from the root canal system is virtually impossible Bystrom (1981), Sjogren et al. (1990).

The smear layer consists of a superficial layer on the surface of the root canal wall approximately 1–2 μ thick and a deeper layer packed into the dentinal tubules to a depth of up to 40 μ . Mader et al. (1984). It contains inorganic and organic substances including microorganisms and necrotic debris, Torabinejad et al. (2002).

In addition to the possibility that the smear layer may be infected, it can also protect the bacteria already present in the dentinal tubules by obstructing intra-canal disinfection agents Haapasalo & Orstavik (1986). Pashley (1984) considered that a smear layer containing bacteria or bacterial products might provide a reservoir of irritants. Thus, complete removal of the smear layer would be consistent with the elimination of irritants from the root canal system, Drake et al (1994).

Also, Peters et al. (2001) demonstrated that more than 35% of the canals' surface area remained un-



changed following instrumentation of the root canal using four NiTi preparation techniques.

Since most currently used intra-canal medicaments have a limited anti-bacterial spectrum and a limited ability to diffuse into the dentinal tubules, it has been suggested that newer treatment strategies designed to eliminate microorganisms from the root canal system should be considered. These must include agents that can penetrate the dentinal tubules and destroy the microorganisms, located in areas beyond the host defense mechanisms, where they cannot be reached by locally administered antibacterial agents, Oguntebi (1994).

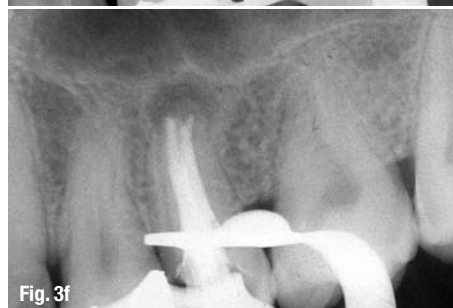
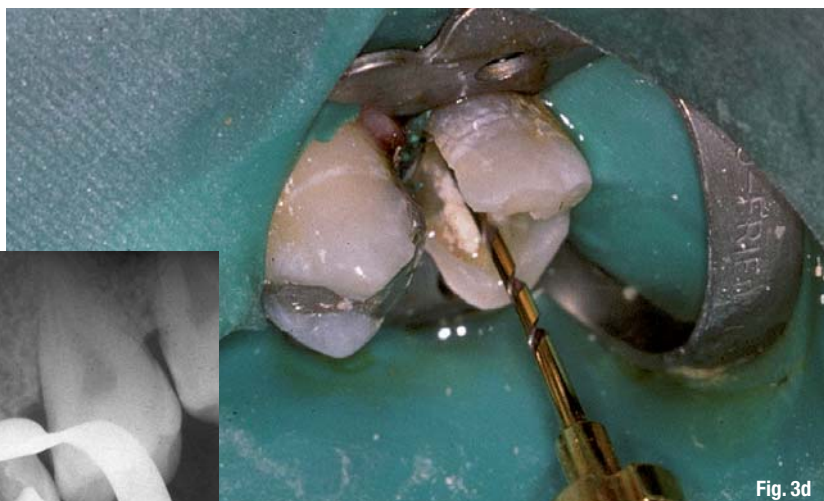
Numerous studies by Anic et al. (1996), Harashima et al. (1997), Moshonov et al. (1995), Yamazaki et al. (2001), Takeda et al. (1998), Kimura et al. (2002) have documented that CO₂, Nd:YAG, argon, Er,Cr:YAG and Er:YAG laser irradiation has the ability to remove debris and smear layer from the root canal walls following biomechanical instrumentation.

The task of cleaning and disinfecting a root canal system which contains microorganisms gathered in a biofilm became very difficult.

Bacteria in a biofilm are resistant to both antibiotic therapy and host defense mechanisms, Costerton et al. (1999).

Biofilm is the manner of bacterial growth to survive unfavorable environmental and nutritional conditions; the root canal environment in both primary and post-treatment infections will favor biofilm formation. Additionally, biofilm mode of bacterial growth offers other abilities such as resistance to antimicrobial agents, increase in the local concentration of nutrients, opportunity for genetic material exchange, ability to communicate between bacterial populations of same and or different species and produce growth factors across species boundaries.

Bergmans et al. (2006), tried to define the role of laser as a disinfection tool by using Nd:YAG laser irradiation on some endodontic pathogens *ex vivo*.



They concluded that Nd:YAG laser irradiation is not an alternative but a possible supplemental to existing protocols for canal disinfections as the properties of laser light may allow a bactericidal effect beyond 1 mm of dentine. Endodontic pathogens that grow as biofilms, however, are difficult to eradicate even upon direct laser exposure.

In their review, "Lasers in Endodontics", Matsumoto and his team (2000) suggested that "removal of smear layer and debris by laser is possible, however it is difficult to clean all root canal walls, because the laser beam is emitted straight ahead, making it almost impossible to irradiate the lateral canal walls." They strongly recommended improving the endodontic tip to enable irradiation of all areas of the root canal walls. The Er:YAG laser has gained increasing popularity among clinicians following its approval by the Food and Drug Administration (FDA) for use on dental hard tissues Cozean et al. (1997).

Stabholz et al. (2003) and his colleagues reported the development of a new endodontic tip to be used with an Er:YAG laser system. The beam of the Er:YAG laser is delivered through a hollow tube, with an endodontic tip that allows lateral emission of the irradiation (side-firing), rather than direct emission through a single opening at its far end. This new endodontic side-firing spiral tip was designed to fit the

Fig. 3a-h

3a_Preoperative radiograph of a second left maxillary premolar with chronic apical periodontitis. A peri-apical radiolucent area can be clearly seen; a root canal retreatment is indicated. Following access opening, the old root canal filling material was removed; the occlusal view shows very unclean root canals.

3b_A length measurement radiograph.

3c_Demonstrates the presence of two separate root canals. Using Er:YAG laser irradiation for cleaning of the root canal system, the RCLase™ Side-firing Spiral Tip is introduced to the root canal (**3d** and **3e**) after biomechanical preparation of the root canal with NiTi (ProTaper™) files was completed.

3f and **3g**_Radiographs showing both root canals filled with gutta-percha. A Six-month postoperative radiograph shows good repair (**3h**).

shape and the volume of root canals prepared by NiTi rotary instrumentation. It emits the Er:YAG laser irradiation laterally to the walls of the root canal through a spiral slit located all along the tip. The tip is sealed at its far end, preventing the transmission of irradiation to and through the apical foramen of the tooth (Fig. 1 and 2).

The efficacy of the endodontic side-firing spiral tip, in removing debris and smear layer from distal and palatal root canals of freshly extracted human molars, was examined. SEM of the lased root canal walls revealed clean surfaces, free of smear layer and debris Stabholz et al. (2003). The dentinal tubules in the root run a relatively straight course between the pulp and the periphery, in contrast to the typical S-shaped contours of the tubules in the tooth crown Pashley (1984).

In various laser systems used in dentistry, the emitted energy can be delivered into the root canal system by a either thin optical fiber (Nd:YAG, KTP/ Nd:YAG, Er:YSGG, argon, and diode) or by a hollow tube (CO₂ and Er:YAG). Thus, the potential bactericidal effect of laser irradiation can be effectively utilized for additional cleansing and disinfecting of the root canal system following biomechanical instrumentation. It was demonstrated in this vitro study that in addition to its ability to remove smear layer from the walls of root canals, Er:YAG laser irradiation when used inside the root canal system with the RCLase™ side-firing spiral tip has also an antibacterial effect on *Enterococcus faecalis*, by reduction the bacteria in more the 50 %, Sahar-Helft et al.(2008)

Based on these results it appears that an efficient cleansing of the root canal system can be achieved by using the Er:YAG laser irradiation with the RCLase™ side-firing spiral tip following bio-mechanical preparation of the root canal with NiTi (ProTaper™) files (Fig. 3 a-h).

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_contact	laser
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Depigmentation of gingivae and lip with **Digital Pulsed Diode Laser**—an integral part of Cosmetic Dentistry

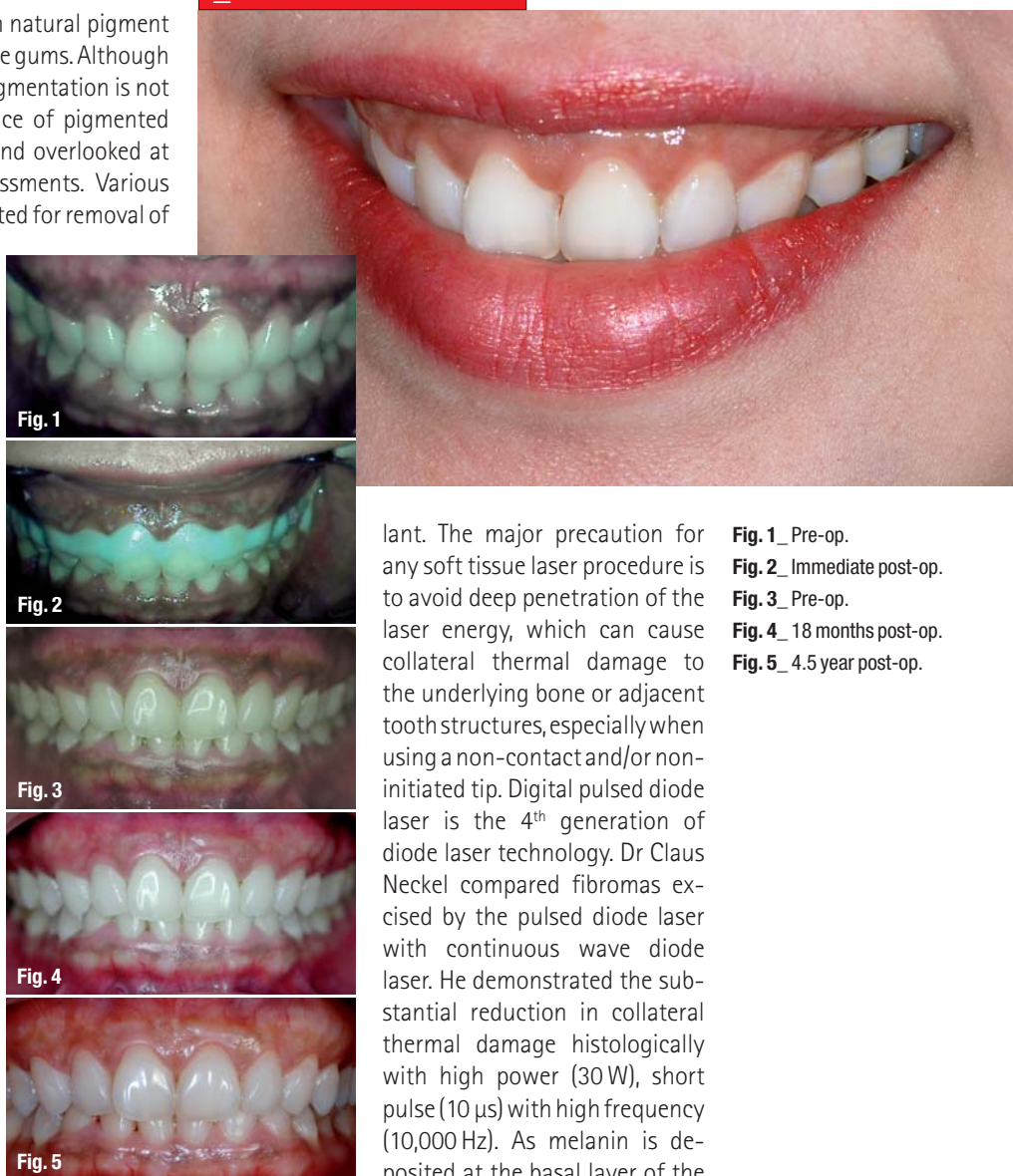
author_Kenneth Luk, Hong Kong

Melanin is the most common natural pigment contributing to normal colour of the gums. Although ethnic and physiologic melanin pigmentation is not a medical pathosis, the appearance of pigmented gums is considered unaesthetic and overlooked at times in cosmetic dentistry assessments. Various laser wavelengths have been reported for removal of melanin pigment with good results. Removal of mucosa to the basal layer is the common procedure using lasers or conventional abrasive technique using diamond burs. Pigmentation of the lip is another aesthetic concern to patients affecting their confidence and quality of life.

Background

Diode laser at 810 nm is transmissive through water, and is attracted to pigment such as haemoglobin and melanin. The continuous wave or the mechanically gated pulsed mode both produce a long tissue interaction time, which require much longer relaxation time for tissue to cool down. Hence, low power (1 to 3 W) is recommended for most soft tissue procedures. The use of "High Fluency Technique", for 980 nm diode wavelength developed by Dr Mick Swick, is able to increase power and reduce collateral tissue damage and heat stacking effect by using water irrigation as a cooling

Case 1



lant. The major precaution for any soft tissue laser procedure is to avoid deep penetration of the laser energy, which can cause collateral thermal damage to the underlying bone or adjacent tooth structures, especially when using a non-contact and/or non-initiated tip. Digital pulsed diode laser is the 4th generation of diode laser technology. Dr Claus Neckel compared fibromas excised by the pulsed diode laser with continuous wave diode laser. He demonstrated the substantial reduction in collateral thermal damage histologically with high power (30 W), short pulse (10 μ s) with high frequency (10,000 Hz). As melanin is deposited at the basal layer of the

Fig. 1_ Pre-op.

Fig. 2_ Immediate post-op.

Fig. 3_ Pre-op.

Fig. 4_ 18 months post-op.

Fig. 5_ 4.5 year post-op.

mucosa, removal of this pigment by various lasers have been reported by direct ablation (cutting) of the mucosa to this layer. Energy delivery time ranges from 10 to 30 minutes in an area of 1st premolar to 1st premolar of one arch. The technique described in this case series differs from other laser techniques in terms of tissue absorption and procedure time.

Procedure for depigmentation of gingivae

Ellexion Claros DPL Laser set at 30 W, 16 μ s, 20,000 Hz; average power close to 10 W.

Under local anaesthesia, a non-initiated 600 μ m fiber delivers the energy at a distance of 2 mm to 5 mm to the pigmented area with constant movement under water irrigation as coolant. There is no direct ablation of the pigmented mucosa but rather the hemoglobin and melanin absorbing the laser energy. Procedure time ranges from two minutes to seven minutes in an area of 1st premolar to 1st premolar of one arch.

Case 1

The procedure took approximately 2 minutes to complete between upper left and right premolar region. 4.5 year post-op showed mild relapse of pigmentation but patient is still happy with the colour. Laser soft tissue crown lengthening was carried out on upper anterior incisors and canines.

Case 2

The procedure took approximately 7 minutes to complete between upper left and right premolar region.

Case 2



Fig. 1_Pre-op.
Fig. 2_1.5 year post-op.

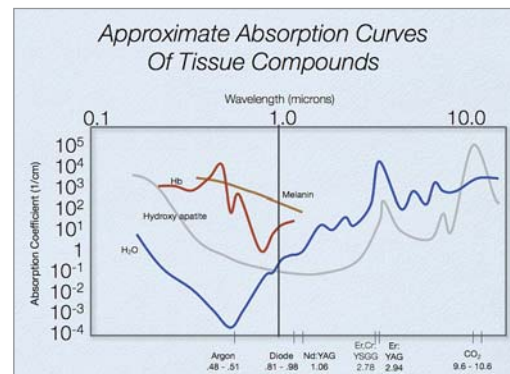


Table 1_Graphic display of chromophores of various wavelengths. The 810 nm diode is indicated.

Case 3

The procedure took approximately 2.5 minutes to complete between lower left and right premolar region. Ceramic crowns replacing all porcelain fused to metal crowns

Procedure for depigmentation of lip

The procedure is the same as for gingival depigmentation. As it took only seconds to complete the procedure, there was no need for water cooling.

Case 4

The procedure took 8 seconds to complete under local anaesthesia.

Case 5

Procedure time: 3 separate visits under topical anaesthetic over 8 months (4 sec, 5 sec, 11 sec)

Case 3



Fig. 1_Pre-op.
Fig. 2_3 months post-op.



_Case 4

Fig. 1



Fig. 2



Fig. 3

Fig. 1_Pre-op.

Fig. 2_Immediate post-op.

Fig. 3_1.5 year post-op.

_Case 5

Fig. 1



Fig. 2

Fig. 1_Pre-op.

Fig. 2_6 months post-op.

_Results

There are two possible immediate visual post-op results. In ideal case (Case 1), the mucosa turns pink without any signs of surface mucosal damage. Sub surface coagulation of blood vessels gave a pink coloured appearance. No laser peeling of mucosa was noted post-operative result. Other cases vary in degree of immediate aesthetic improvement or darkening of the pigmented mucosa where absorption by melanin is the dominant. Laser peeling of the mucosa were reported within a few days of treatment. In all cases, there were zero to mild post-op pain. No analgesics were required.

_Conclusion

This technique requires specific high power settings. Operator should be aware of tissue interaction during the procedure and adapt accordingly. Long term relapse of the condition is comparable to direct removal of pigment by lasers or other techniques. Pa-

tients were all satisfied with the results. The main advantages with this technique are minimal invasive technique, short procedure time and immediate aesthetic results in some cases.

Advantages

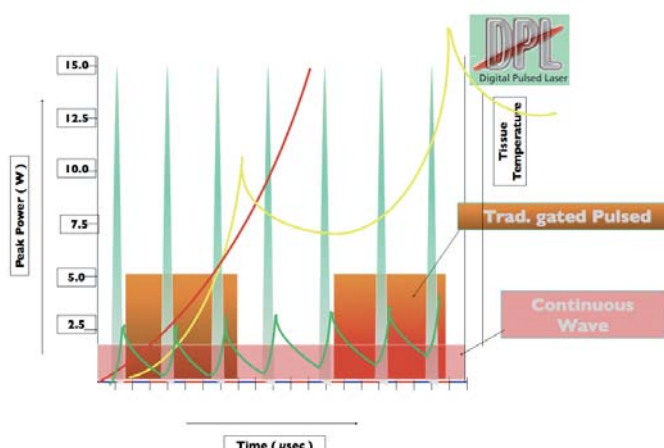
Minimal invasive technique
Short treatment time
Pain free post-op
(Immediate aesthetic results)

Disadvantages

Local anaesthetics
Immediate aesthetic results cannot be achieved in every case
Technique sensitive
Specific power settings not applicable to other diode lasers

_contact**laser**

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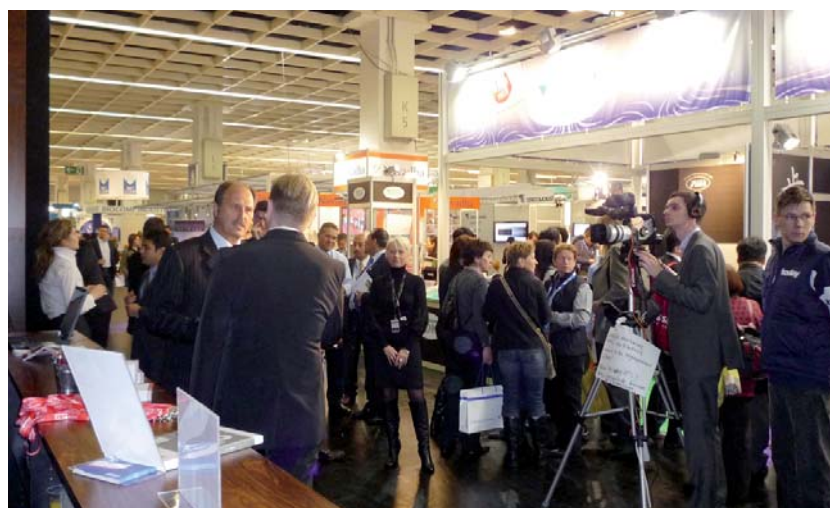
Pulse & Tissue Damage Relationship

Laser dentistry is booming

An interview with Prof Dr Norbert Gutknecht

author_Editorial Office

On the occasion of IDS 2009, the international leading trade fair for dentists, dental technicians, dental industry as well as for specialist dental trade, we met Prof Dr Norbert Gutknecht from RWTH Aachen University at the booth of Oemus Media AG.



Global economic slowdown—heard about everywhere. Do you also notice the economic slowdown in the dental sector?

Yes, if you listen into the dental market you hear of course some complaints. But I think the dental market does not suffer as much as other industries. Especially when I walk through the exhibition I see all the ready-for-innovation technologies and I notice a completely different tendency. We progress against the general stream. Here you can see that people are ready for investing. Moreover, people are ready to open niches mainly in particular technologies in dentistry. Therefore, I have the impression that we are spared from the downturn at the moment.

That sounds positive. The topic "innovative technologies" is a very good bridge to laser tech-

nology. You are a specialist in this field and on the laser market. What do you think about this specific sector that has paced up and down?

Especially in that sector I can see this development abundantly clear. If you look back one or two years many critics of laser technology said that it has been only a dayfly that will come to nothing. Here on IDS, we can observe that not only the well-established laser producers have attended this trade fair for many years. Many new manufacturers are present from countries that have not played a role on the laser market yet, eg China. We can see a development that I consider as positive. We are not only moving upwards we already arrived on the up and up. Especially in this field the increasing interest in the technology can be seen. Manufacturers that have not dealt with it yet, due to their basic principles or basic products, now present a laser on their booth.

You are President of the German Society for Laser Dentistry (DGL) and President of the World Federation for Laser Dentistry (WFLD). Which contributions make these two societies to education and training in laser dentistry?

This is a very important subject for both societies. The WFLD is a global organisation associating almost all national societies. It is very important that the education and training is put on an ethically solid base. The education should be founded on evidenced-based laser dentistry. All offshoots, may I put it in this way, in which everybody feels called upon performing laser dentistry education without having attended a profound education themselves should be overcome.



Especially the last point has brought many criticisms. Our goal in Germany, as can be seen in the association with DGZMK and collaboratively executing and arranging the last German Dentists Conference, is offering a sound education for resident dentists who did not learn laser technology during their academic studies. Therefore, we have to start at point zero. We have to educate and train dentists in a way that they are able to treat patients in a competent ethically way and take over leadership in therapeutic achievements. The same applies to the WFLD, I can say in the same breath. The rules we represent in Germany I would like to see in every laser dentistry society worldwide.

We are not meeting coincidentally at the Oemus Media AG booth. In your hands you hold the brand new international laser magazine. Are you satisfied with the issue?

I am very, very proud of it. The WFLD has not have an own brand, no journal or magazine in which the user could identify themselves. It has been very important for us that this international laser magazine is not a scientific journal. There are already enough of those on the market. It has been crucial for us to show the users that the laser not only has its eligi-

bility but also advantages in treatment by means of case studies and summarised scientifically studies. On the other hand this magazine provides independent product information. The users can make free decisions about what he/she would like to see. There are so many different fields. Additionally, societies are recognized. They have a forum to present their congresses and education offers. Moreover, they can report about new strategies and goals. I think we have published a very interesting magazine not only in this context. First resonances I have received are very positive. Why? Because we have caught the spirit of the times.

Prof Dr Gutknecht, thank you very much for your time.

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laser

Prof Dr Norbert Gutknecht

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Continuing Education Courses of AALZ

Part 1—Master of Science in “Lasers in Dentistry”

In cooperation with the Clinic for Dental Conservation, Periodontology and Preventive Dentistry at the University of Excellence RWTH Aachen, the Aachen Center for Laser Dentistry (AALZ) has created the first dental laser education institute in Germany. Known for its research in laser-assisted dentistry, it cooperates nationally and internationally with major research facilities.



Since its foundation in 1991, the AALZ has been the leading worldwide specialist in dental laser education. It offers recognized and accredited trainings and helps to meet the goal of becoming a laser specialist.

Continuing education courses

1. Introduction to Laser Dentistry
2. Laser Safety Course
3. Wavelength-Workshops
4. Mastership Course “Lasers in Dentistry”
5. Master of Science (MSc) in “Lasers in Dentistry”

The University of Excellence RWTH Aachen, in collaboration with the AALZ, has been offering the accredited postgraduate “Lasers in Dentistry” Master course since 2004. It is aimed at dentists from all over the world who want to keep pace with their patients’ wishes for innovative and gentle treatment methods.

In standard academic studies in dentistry, dentists have never learned about dental laser technology and treatment concepts. Building on a university degree in dentistry, the necessary professional knowledge for laser applications in dental practice is taught at the highest academic level in theoretical and practical modules during this two-year extraoccupational Master course.

The scientific director of this master course is Professor Dr Norbert Gutknecht who is Professor at the Clinic for Dental Conservation, Periodontology and Preventive Dentistry at the University of Excellence RWTH Aachen. He is President of the German Society for Laser Dentistry (DGL) as well as President of the World Federation for Laser Dentistry (WFLD).

All important theories and application options pertaining to laser use in dentistry are taught. Participants obtain sound theoretical knowledge in lectures and seminars led by renowned, competent and experienced international scientists and practitioners. Skill training sessions, exercises, practical applications, live operations and workshops with intensive assistance from scientific associates with doctorates guide participants on 42 days towards using lasers successfully and professionally in their own surgeries. Carefully documented working material serves as a sound reference work for everyday practice. The participants receive specialist literature that allows immersion in the subject and supplements the personal technical library. The training as a certified Laser Safety Officer is also part of the course.

Dr Dimitris Strakas, MSc, reports: “If a dentist has decided to invest in the new field of laser dentistry by purchasing or planning to purchase a laser device and wants to stand out as a specialist amongst colleagues, then without doubt he/she has to attend this Master course. The quality of the program and its elaborate structure will certainly give you the boost that you need in the fields of comprehending using and successfully treating with lasers. Moreover, you gain the self-confidence and knowledge so as to deal with the multiple problems that occur in everyday dentistry, with the use of one or several wavelengths.”

Modules

Each module covers an independent topic in which the participants gain an extended knowledge in interdisciplinary fields.

- _ Module I Physics of Light
- _ Module II Physics of Lasers
- _ Module III Laser Safety, Biological Effects of Laser Light
- _ Module IV Laser Types in Dentistry
- _ Module V Lasers in Periodontics and Endodontics
- _ Module VI Lasers in Oral Surgery and Implantology
- _ Module VII Lasers in Cariology, Dental Laboratory Lasers
- _ Module VIII Low Level Laser Therapy, Laser Marketing
- _ Module IX Master Thesis
- _ Module X Final Exams

During the ten modules, students remain in steady contact with the RWTH Aachen University and the lecturers between attendance days via the e-learning system. This kind of segmentation allows established dentists to remain active in their surgeries while getting their Master degree. For every module a participant passes, he or she receives a certificate.

For each successfully finished module the participant is awarded with credit points. These points refer to the European Credit Transfers System (ECTS) which is a standard for comparing the study attainment and performance of students of higher education across the European Union and other collaborating European countries. A total of 60 are given for the Master course that are equivalent to 1,500–1,800 hours of study.

Each student completes the Master course by turning in a Master thesis and presenting ten clinical cases. On the graduation ceremony the RWTH Aachen University confers the Master of Science (MSc) Degree. Moreover, more than 100 graduates have additionally received the degree "European Masters Degree for Oral Laser Applications" (EM-DOLA) of the European ERASMUS Program for Post-graduate Studies. These dentists come from eg Germany, EU, Canada, China, Japan, Iran, Iraq, and Saudi Arabia and have received an additional Diploma Supplement from RWTH Aachen University. They also receive a legalization (Apostille) of the Master Degree certificates for application abroad. The academic degree and the Master Degree of the RWTH Aachen University are issued in German or English. Participants attend international scientific congresses with posters and abstract and they are encouraged to issue in scientific publications. Dr Iris Brader, MSc states: "While I was finishing my master thesis I enjoyed working scientifically again and this has been enriching my daily work. Since then I have also given several lectures. Attending the laser congress and giving a lecture in Hong Kong 2008 has been my personal highlight."

The Master course "Lasers in Dentistry" is the first accredited dentistry laser Master program in Germany and indeed the world, recognized in the EU and all countries of the Washington Accord (USA



and Anglo- American nations) and of the Bologna Reform as an internationally valid academic degree. The European Commission has awarded it the bronze medal for lifelong learning.

Dr Alireza Fallah, MSc concludes: „Thanks to Aachen University, I must say that there was a big boost in the income of my office after inserting the laser into its protocol ending to this decision that we should start a professional laser dental clinic. Just being graduated from Aachen University and using high tech equipments will make lots of patients. From the other side, I must say my patients are so much thankful for making everything easier and more fearless with much better quality. I hope we can have such training as we had in Germany in our country too."

After already five successful years the eleventh course of "Master of Science in Lasers in Dentistry" starts on 14 September 2009.

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laser

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Selected Events 2009/2010

OCTOBER 2009

October, 23–24

*1st Meeting of the South American Division
of the World Federation for Laser Dentistry*

São Paulo, Brazil

Phone: +55 11 30 91-76 45

E-mail: acca@usp.br or pfreitas@usp.br

*5th Congress of the Brazilian Association
in Laser Dentistry (ABLO)*

NOVEMBER 2009

November, 06–07

Annual Congress of DGL

Cologne, Germany

Phone: +49-3 41/4 84 74-3 08

Fax: +49-3 41/4 84 74-2 90

Web: www.oemus.com

*LASER START UP 2009/ 13th Starters Congress
in Lasers in Dentistry*

Cologne, Germany

Phone: +49-3 41/4 84 74-3 08

Fax: +49-3 41/4 84 74-2 90

Web: www.oemus.com

MARCH 2010

March, 02–04

*Biannual WFLD World Congress in Conjunction
with UAE International Dental Conference &
Arab Dental Exhibition*

Dubai, UAE

Web: www.aeedc.com





**Lay the Foundations to your
successful Future now!**

The next master course starts on 14 September 2009



Master of Science (M.Sc.) in Lasers in Dentistry

Would you also like to be part of European Dentists' Elite?

- The first accredited M.Sc. programme in dentistry in Germany
- Career-accompanying postgraduate programme of two years at the University of Excellence RWTH Aachen
- Double degree: European M.Sc. in „Oral Laser Applications“ (EMDOLA)
- Internationally accepted and accredited by the German Government, the European Union, the Washington Accord and the Bologna Process
- Science-based and practice-orientated on highest national and international level
- Bronze Award of the European Union for „Life-Long Learning programmes“



Aachen Dental Laser Center

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In cooperation with the University
of Excellence RWTH Aachen

**RWTHAACHEN
UNIVERSITY**

WFLD congress as a parallel arrangement of the AEEDC 2010

Mr Abdul Salam Al Madani, Executive Chairman of AEEDC® Dubai, and Dr Burton Conrod, President of the World Dental Federation (FDI), had signed a memorandum of understanding on March 11th, 2009, on the occasion of the AEEDC® Dubai Night, at the Jebel Ali Golf Resort and Spa Hotel, in the presence of Dr Tariq Khoory, Director of Dental Department at the Dubai Health Authority, and a number of local and international representatives. The FDI represents one million Dentists Worldwide, and now the MOU will provide Continuing Learning Programs to dentists who are registered members of the FDI and AEEDC® Dubai. AEEDC® Dubai was granted an exclusive authorization in the Middle East and North Africa to employ this program.



ing for the World Dental Federation for Laser Dentistry 2010 Dubai Congress. The meeting was attended for the first time by the Executive members of the Federation, and they discussed preliminary arrangements comprising scientific program constitution, in addition to planning for the "World Federation for Laser Dentistry Congress 2010" which will be held from 9-11 March 2010 at the Dubai International Convention and Exhibition Centre parallel to AEEDC 2010. The Congress will feature topics such as Physics of Laser and Biological Effects of Laser Light, Laser Types in Dentistry, Laser in Periodontist, Laser in Endodontics, Laser in Oral Surgery and Implantology, Laser in Cardiology.

Mr Abdul Salam Al Madani, Executive Chairman of AEEDC® Dubai was very pleased to announce the affiliation of World Federation of Laser Dentistry Congress and AEEDC® Dubai in 2010, he said: "This enormous event will open a new platform for the ever growing and

Mr Al Madani said "We are looking forward to be the Number One Dental Congress in the world by 2020, in our efforts to follow the steps of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice President of UAE, Prime Minister, Ruler of Dubai, to be the first always in all the events."

On the Sidelines of the last day of AEEDC 2009 Conference and Exhibition, a press Conference was held chaired by Dr Tariq Khoory, Honorary Chairman AEEDC® Dubai and Director of Dubai Dental Centre at Dubai Health Authority, Mr Abdul Salam Al Madani Executive Chairman of AEEDC® Dubai, Prof Norbert Gutknecht, President, World Federation of Laser Dentistry (WFLD) and Prof Toni Zeinoun, President of the WFLD, Middle East and Africa Division, Chairman of the WFLD Dubai Meeting, they announced that AEEDC® Dubai will be hosting the Preliminary Meet-



robust City of Dubai to showcase the rich and traditional Arabian culture to global audiences and concurrently, reinforce business and education through international events like WFLD Congress and AEEDC."

Fig. 1 _The President of WFLD and Executive Chairman of AEEDC Dubai signing an agreement to host WFLD 2010 Dubai Congress Memorandum of Understanding.

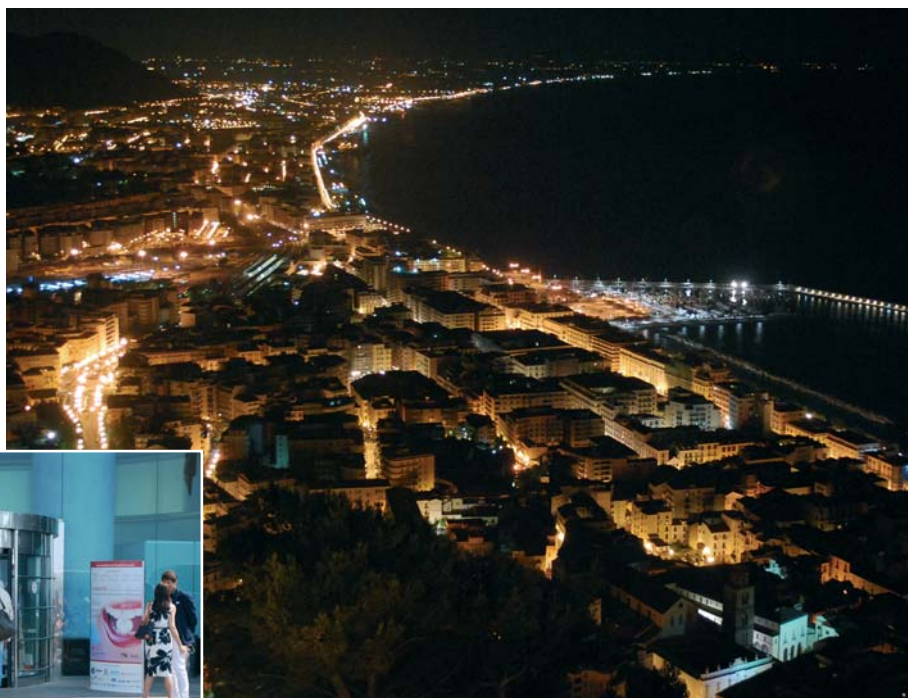
The 6th National SILO Congress in Salerno

In the beautiful background of Salerno one of the pearls of Italian Southern coast on next Friday 5th June will take place the 6th National SILO Congress. The Congress titled "Laser & Science" is joined with the 2nd Dental Tribune International Congress named "Cosmetic Beauty & Science". The decision to combine the SILO Annual main event within a manifestation dedicated to the esthetical Dentistry, was determined both by the great potentiality of lasers in this discipline and by the increasing request by patients of therapeutic solutions pointed to resolve not only pathologic but even cosmetic problems.

The program of the Congress will be enlightened by the presence of worldwide prestige authors invited by SILO President Claudia Maggiore and by the Scientific Committee formed by Paolo Vescovi, Alessandro Del Vecchio, Carlo Fornaini and Roly Kornblit, directed by the SILO Vice President Umberto Romeo.

The scientific program includes a lecture by the President of WFLD Professor Norbert Gutknecht from Aachen University about the modern possibilities of lasers in Periodontology. Later Professor Adam Stabholz from Tel Aviv University will discuss an update about laser and Endodontics. Professor Sevil Gurgan from Ankara University will relate about the potentiality of lasers in dental bleaching and at last Professor Maurizio Valeriani will take a lecture about laser treatment of perioral soft tissues. As we can see an extraordinary team of "first class" authors.

Joined to this prestigious international team the scientific program includes also a large space dedicated to scientific contributions by young SILO researchers coming from the whole Italy with posters



and oral presentations. Moreover in the afternoon many workshops sponsored by the main Italian laser firms will update the participants about various aspects of laser dentistry as "Low Level Laser Therapy" and "Laser oral aesthetics".

The efforts of Professor Maggiore and of the Scientific Committee will permit to all the participants to enjoy a rare occasion to gain new knowledge directly from the most important international researchers who attested with their presence their friendship and their support to SILO.

To host you in the magnificent gem of "Costiera Amalfitana" is for SILO a great pleasure and we hope it will be shared by the participants to this meeting dedicated to knowledge and beauty.

2nd Congress of World Federation for Laser Dentistry— European Division

author_Ingmar Ingenegeren, Germany



Fig. 1_Folklore at opening.



Fig. 2_WFLD-ED reception.

After the first international congress of the WFLD (former ISLD) in 2008 in Hong Kong, the meeting of the European Division of the WFLD took place from May 14-17, 2009, in the Harbiye Askeri Museum & Conference Center in Istanbul, Turkey. The Congress President, Prof Dr Ferda Tasar, addressed welcome messages after she succeeded in joining more than 300 people from 22 countries, under the motto "let's enlighten where the continents meet". Politician Mr Emin Alici expressed his compliments for the organisation and was pleased to welcome the participants in Turkey. The president of the WFLD, Prof Dr Norbert Gutknecht, started with a phrase of Atatürk: "the scientific and technical conditions are not given to create a modern civilisation, if men and woman are not matching together for this common goal" and mentioned in his opening lecture how Laser Dentistry and the WFLD were developed and are inerasable estab-

lished all around the world, followed by the second opening lecture of Prof Dr Paul Bradley who enlightened how he came to use lasers in TMJ surgery after being unhappy about always having to cut and destroy tissue before achieving a healing. He invented the terminology LILT (Low Intensity Laser Therapy) and made us enthusiastic to be a LILTer too.

Many graduates from the MSc program of Aachen were present and besides a great number high class presentations, divided over two halls in two days, there were following keynote lectures: Prof Gutknecht (Aachen Germany) showed a long term follow up of laser assisted treatment of complicated and uncomplicated crown fractures and a new approach to laser assisted bleaching. Prof Bradley (Florida, USA) explained about laser interstitial photothermolysis for orofacial hemangiomas and tumors, and neurolysis for pain control. Prof



Fig. 2_Price giving.

Fig. 3_Gala diner.

Fig. 4_Boat on Bosphorus.

Fig. 5_Speech Mr. Emin Alici.

Fig. 6_left to right:

Profs. Nammour, Rocca, Tasar, Bradley, Gutknecht, Esen.

Rocca, president of WFLD-ED and president elect WFLD (Nice, France) gave examples where Er:YAG lasers are currently used in oral surgery. Prof Strauss (Virginia, USA) brought interesting aspects of laser application in cosmetic facial surgery and management of oral leukoplakia and dysplasia. Prof Nammour, former president ISLD (Liège, Belgium) explained about the indications and limits of CO₂ laser applications in periodontics. Prof Stabholz (Jerusalem, Israel) enlightened the use of Er:YAG laser in endodontics and what's new on side firing tips. Prof Gurcan (Ankara, Turkey) showed all aspects of laser assisted bleaching. Prof Frentzen (Bonn, Germany) presented his speciality; laser as an



optical tool in diagnostics. Prof Kocadereli (Istanbul, Turkey) held her lecture about many different indications for laser applications in orthodontics. Prof Esen (Adana, Turkey) lectured about the application of CO₂ laser in oral surgery. Prof Vitale (Pavia, Italy) presented laser supported new strategies in preventive dentistry. Prof Ilday (Istanbul, Turkey) showed applications of ultra fast fibers in laser dentistry. Prof Vescovi (Parma, Italy) explained the surgical and non surgical laser assisted management of biophosphonate associated osteonecrosis of the jaws. Dr Ingenegeren (Bottrop, Germany) presented the world wide first no anaesthesia implant bed preparation with laser, using a surgical guide.

The industry was present in the adjacent halls and many different laser systems were displayed. The gala diner took place on a boat which sailed the Bosphorus along ancient monuments and under the

famous bridges between Europe and Asia. Prices for the three best presentations went to Turkey, Israel and Germany and the best poster price to Italy. The president of the WFLD expressed his thanks and compliments to Prof Tasar and her crew for organising this successful and unforgettable event. Next WFLD: São Paulo 2009, Dubai 2010.

_contact

laser

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2nd Pan-hellenic Congress for Laser Dentistry

author_Dimitris Strakas, Greece



Fig. 1 Prof Norbert Gutknecht lecturing on the pre-congress workshop.



Fig. 2 Greek colleagues being taught the secrets of working with a laser by Prof Gutknecht.

The second Pan-hellenic Congress for laser Dentistry was held during 27-29 March 2009 in Athens. Greek Society for Laser Dentistry (GSLD) organised a complete three-day program at Hotel Titania, right in the heart of Athens under the title: "Lasers in Dentistry: The new clinical reality".

GSLD as the first and only academic society in Greece was honored to welcome the President of the World Federation for Laser Dentistry (WFLD), Professor Norbert Gutknecht as the key lecturer of the congress. For the first time in Greece a President of WFLD attended such an event, supporting our continuously growing society. Together with Dr Jan Tuner, famous for his work and studies in LLLT, Prof Kiriaki Marti from the University of Athens and also with the presentations from MSc members of GSLD, a high quality Congress for the Greek dentist was produced.

Starting on Friday afternoon a 4-hour pre-congress hands-on workshop took place. The participants had the unique opportunity to participate on a two hour seminar on Basic Laser Physics from Prof Norbert Gutknecht and the next two hours to work with all the latest laser de-

vices from the whole range of companies that produce them.

Due to the amount of applications the organising committee had to extend the number of allowed participants to 32. After the completion of the workshop Prof Norbert Gutknecht handed out the workshop certificates to the participants.

On Saturday the Congress opened by welcome speeches of the President of GSLD, Dr Dimitris Strakas and of the President of the World Federation for Laser Dentistry Prof Norbert Gutknecht.

The program started with the lecture of Prof Kiriaki Marti about 'Face and neck rejuvenation with the use of laser'. She is a Professor of Oral and maxillofacial surgery department in the University of Athens.

Numerous aspects of laser dentistry were covered by the lectures of GSLD members. Amongst others reviews, new studies, and clinical presentations have been showed to the audience regarding endodontic treatment, periodontology, cavity preparation and laser tooth bleaching.

Of great importance was the lecture of the next keynote lecturer, Dr Jan Tuner who is a board



Fig. 3 Congress participant being informed on AALZ's booth.

Fig. 4 Night out at famous Restaurant 'Theofilos'. On the left Mrs Io, the well-known restaurant owner.

member of WALT—World Association for Laser Therapy. He presented the lecture "Laser phototherapy—widening the scope of general dentistry" which showed in detail how useful and therapeutic to our patients can be the correct use of low level laser radiation in every day occurrences to our practice.

Of course during the coffee and lunch breaks, the participants had the opportunity to visit the booths of the companies that were in the Congress Exhibition. The companies were completely satisfied by the organisation of the exhibition, the attendance and the time offered to them to exhibit their new products in the main Hall room.

On Sunday two lectures of Prof Norbert Gutknecht was the summit of the Congress. Two main lectures on lasers on Periodontology and a conclusive lecture about the future of lasers in Dentistry kept the audience literally 'on their toes', absorbing the huge amount of information that was offered to them by our President.

But the meeting is not only lectures and presentations. Proving their strong bonds of the so-

cieties the evenings were not typical dinners, but really a gathering of friends or to be more precise of a family. The food, the music, and the singing of the company made this truly, a night to remember

The end of the second Pan-hellenic Congress found the Greek colleagues more than satisfied to be present on such a great event, making them intrigued and stimulated to improve or in some cases, motivated to involve in laser dentistry. More than 130 participants registered and 18 new members joined the family of WFLD through this Congress.

Greek Society for Laser Dentistry is a pioneer society in Greek laser dentistry. With the unlimited assist of the World Federation for Laser Dentistry we try to serve the aim of our family, which is to exchange, advance and disseminate scientific knowledge, related to the use of lasers for application and research in the oral and dental environment in our country. The bonds of GSLD and WFLD will remain strong and intact and hopefully annually this Congress will be a successful meeting point for the Greek dentists.

Sociedad Española de Láser Odontoestomatológico— IX Congreso de la SELO

author_Josep Arnabat, Spain



_This past November (28–29 November 2008) we celebrated the IX SELO Congress 2008 in the city of Salamanca. More than 150 professional—dentists, hygienists, and assistants—took part in the conference held at the Alameda Palace Hotel located in the center of the historic city of Salamanca. This was the first time that the Sociedad Española de Láser Odontoestomatológico worked together with Ordem dos Médicos Dentistas has organized the First Laser Meeting Hispano-Luso, in part because of the close proximity of Salamanca to Portugal. We also celebrated the 3rd edition of the meeting for the hygienist and dentist assistants. In this occasion we spoke about the basic laser knowledge for them and also talked regarding laser secu-

city norms, bleaching and Hipersensitivity. This 9th edition of SELO Congress was presided over by Dra Maria J Pérez Rodríguez and her organizing committee. She worked exhaustively in order to make a successful congress. The congress was inaugurated with the course of accreditation on the basic knowledge of laser for dentists. During all morning the doctors Antonio España Tost and Josep Arnabat, revised all the physics bases of the laser, the different types of lasers, as well as the security measures that are needed when you work with a laser in a dental clinic. When the course finished they took a test exam so as to obtain the SELO certificate in accreditation on the basic knowledge in dental laser. During Friday's morning there were also presented dif-

Fig. 1 _Dr Josep Arnabat and Dra Amelia de la Ballina.

Fig. 2 _New Board: Dr Antonio España Tost, Dr Antonio Bowen, Dra Maria Perez, Dr Josep Arnabat, Dr Gonzalo López de Castro, Dra Isabel Sáez de la Fuente, Dra Marcela Bisheimer, Dr Daniel Abad.





Fig. 3 Award to the best oral communications.

Fig. 4 Gala diner: Dr Roeland De Moor, Dr Carlo Fornaini and his wife, Dr. Antonio España, Dr. Joao Barga and Dr. Josep Arnabat.

ferent oral communications, as well as posters. All of them with a high scientific level. So as to the participation we can remark the different speakers who exposed their conferences on Friday's afternoon as well as Saturday morning and afternoon. Dr Enrique Conejero exposed in an easy way all the laser physics fundamentals and Dr España cleared us the ideas in reference to the use of laser and the dentin adhesion. Dra Amelia de la Ballina introduced us in the kinesiology and the laser. To end the day Dr Gonzalo López Castro showed us the utilization of the laser in implantology. During the Saturday morning reports we had the pleasure to be able to have some lecturers of a great prestige at an international level. As in the previous SELO meetings the international lectures gave a great prestige to the meeting showing a great scientific level. The doctors Dr Carlo Fornaini, Dr Roeland De Moor and Dr Olaf Oberhorfer showed us part of their investigation and demonstrate to be professionals of great level and prestige in the field of the dental laser. During the Saturday evening we had the experience of being able to count with Drs Joao Barga and Dra Alexandra Vinagre de Portugal, and with Dr Antonio Bowen who spoke respectively about laser applications in oral surgery and in implantology. The final session ran in charge of Dra Isabel Saez de la Fuente who analyzed the applications of the laser in periodontics.

The gastronomic tradition of the organizing city, Salamanca, has left a pleasing memory in all the assistants. The organizing committee and its president the Dra María J Pérez Rodríguez has delighted us with some fantastic and splendid dishes. All the work foods were excellent without lacking

the famous Ham of Guijuelo of course. Elegance's dinner took place in the historical Palace of Figueroa's (old casino of Salamanca) being an unforgettable veiled so as to his gastronomic level but also to the relationship among all the assistants of the congress.

Of a great importance was the commercial exhibition that was carried out because of the SELO Congress. It is necessary to remark that this year the SELO has gotten the presence of entirely all the brands who commercialize different types of lasers in our country. The commercial houses have been represented are: Biolase, Casa Schmidt, Group Fadente, KaVo, Master dental, Fotona, DEKA, DiB; Periowave, and also other brands as MozoGrau, Gazeta Dental, Previson Sanitaria Nacional and Normon.

To all them, the directive meeting of SELO thanks its participation and the carried out effort. Without their collaboration these scientific acts would not be possible to carry out concluded the congress, it took place the ordinary general assembly and later the extraordinary assembly in which the new directive board of SELO was chosen. Once carried out the voting the results were the followings:

- _ Dr Josep Arnabat as President
- _ Dra Isabel Sáez de la Fuente as Vice-president
- _ Dra Marcela Bisheimer as Secretary.
- _ Dra Maria Perez as Treasurer
- _ Dr José M^a de la Fuente Llanos as Vocal
- _ Dr Antonio Bowen Antolin as Vocal
- _ Dr Gonzalo López de Castro as Vocal
- _ Dr Antoni España Tost President Scientific board
- _ Dr Daniel Abad Sánchez as Web Manager.



Fig. 5 Gala diner: Dra Isabel Sáez de la Fuente, Dr Antonio España Tost, Dra Maria Perez, Dra Luz Aguiló, Dr Gonzalo López, Dra Marcela Bisheimer, Dr Josep Arnabat.

Fig. 6 University of Salamanca.

Manufacturer News

elexxion

Two wavelengths and 50 W pulse output in one machine

Among the products they presented at the IDS, elexxion AG, based in Radolfzell (Germany), included their internationally-patented combination laser elexxion delos. The elexxion delos combines two of the most frequently studied and scientifically recognised wavelengths (810 nm and 2,940 nm) in one machine so that both hard and soft tissue can be treated with one single machine. At present, according to elexxion, most applications can be reasonably treated with this combination system. For example, the elexxion delos can be used for the removal of con-



crements, decontamination, cavity preparation, root resection and bone ablation. Over 100 digitally stored indications can be accessed on a large touch screen and activated at a "touch". Output modifications can be easily and individually fine-tuned. The practitioner saves time, the dosage accuracy is guaranteed.

Especially for peri-implantitis therapy and the treatment of bio-film, elexxion has co-operated with the University of Düsseldorf on the development of special sapphire tips. These feature the ability to direct 90% of the laser's power lateral to the surface of the implant. Further advantages of the elexxion delos for soft-tissue applications are: Together

elexxion delos: 100 digitally stored indications can be easily activated using the touch screen

with the ultra-short pulse durations of as little as 9 µs, the modern diode technology with its 50 W pulse output enables a gentle, efficient soft-tissue surgery at a speed which, according to elexxion, was previously unattainable. A flexible fibre guide is an additional relief for the dentist during treatment. At the same time, the newly developed fibre increases the output density thanks to an optimized beam profile. This means higher removal speed, for example in the tooth enamel. The machine can be connected comfortably to the internal compressed-air supply or to an external compressed-air supply. The external connection permits the water spray to be precisely adjusted and, thus, improves the removal performance. The elexxion delos combination laser can be purchased in Germany from the specialized distributor Pluradent.

elexxion AG

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78315 Radolfzell, Germany
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Syneron

The LiteTouch Edge

Syneron Dental has developed a new laser technology, the laser-in-handpiece design. This technology is incorporated in the new LiteTouch: Er:YAG laser system for both hard and soft tissue treatment which is currently sold all around the world. LiteTouch's laser chamber is located within the handpiece, distinguishing it from other dental lasers. This innovation eliminates the need for the optical table and the fiber or articulated arm typical in other laser systems, as well as the standard optical table. The novel LiteTouch handpiece—the size of a turbine drill—grants the dental practitioner great maneuverability, precision and speed. The LiteTouch system streams the laser beam straight to the handpiece, preventing the energy loss that accompanies fiber use.

Thus, efficiency is increased and reliable delivery guaranteed. Incorporating the smallest laser chamber in the industry, this system allows for the greatest possible flexibility, resilience and



ease of maintenance. The importance of the laser handpiece can not be overstated. With this in mind, LiteTouch's designers created an elegant, ergonomic piece that incorporates the dentist's top priorities. While the LiteTouch handpiece looks and feels like a turbine drill, the system cuts like a laser. Its head swivels 360 degrees, giving the practitioner complete freedom within the oral cavity. A flexible cord enhances flexibility, and along with the best treatment angles and feather-touch accuracy, makes for top notch performance.

In addition, LiteTouch uses a novel mechanism that changes energy output. The amplitude of power per pulse is fixed for hard tissue and soft tissue and energy changes in accordance with pulse duration. For further information please contact:

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KaVo

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The KaVo KEY 3 LASER with its gentle, effective and low-pain application in periodontics, conservative dentistry, endodontics and surgery has been established in dental practices for years. Together with a new periodontic handpiece, KaVo presents the new KEY 3 plus LASER with greater performance than its predecessors and variable pulse lengths at IDS 2009.

Through greater ablation speed in hard dental tissue and bone, treatment length is significantly reduced compared to conventional LASERs. Fine ablation with variable pulse length also permits finishing the cavity margins. As a result, better aesthetics can be achieved than with conven-

tional technologies. KEY 3 LASERs already in the market can be easily upgraded, with a very positive effect upon value preservation of existing systems.

In periodontics, the unique feedback system of the KEY 3 LASER allows the selective, complete and low-pain removal of calculus, with excellent protection of the root support structures. Bacteria are killed and any biofilm on the tooth surface is dehydrated and deactivated. The new periodontic handpiece 2261 is small and features an impressively easy exchange of application tips.

In conservative therapy, the Er:YAG LASER is suitable for caries prepa-



ration, enamel/dentine conditioning and fissure sealing. With the aid of the special, caries contact handpiece, the diseased tissue may be removed with direct intimate contact of the tooth surface, while using the feedback system.

Furthermore, the KEY 3 plus LASER is suitable for numerous other indications in endodontics and surgery, such as drying and sterilising the root canal, implant exposure and root tip resection.

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Published by	Oemus Media AG Holbeinstr. 29, 04229 Leipzig, Germany, Phone: +49-3 41/4 84 74-0, Fax: +49-3 41/4 84 74-2 90 E-mail: kontakt@oemus-media.de, www.oemus.com	

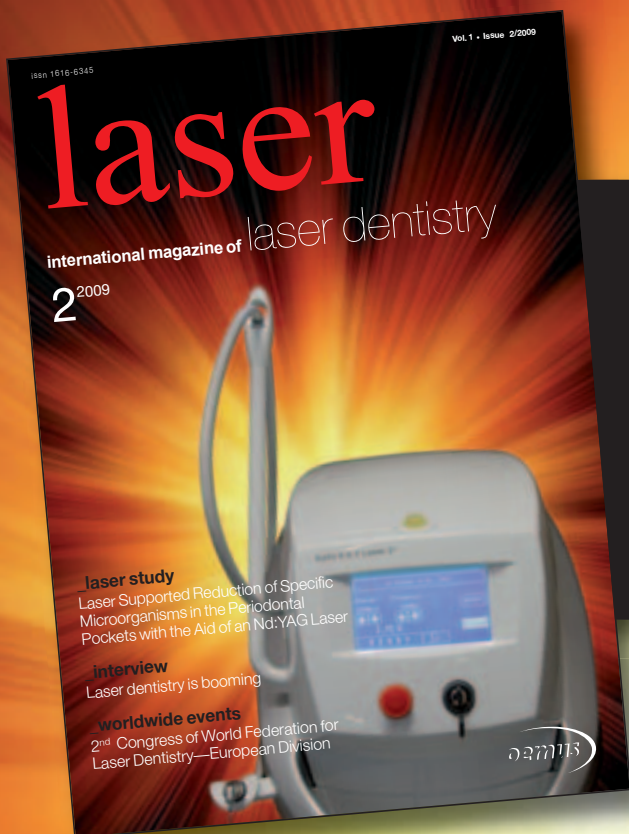
laser international magazine of laser dentistry is published in cooperation with the World Federation for Laser Dentistry (WFLD).

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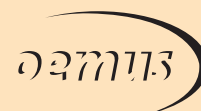
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