Senses & Sciences

SOCIETÀ ITALIANA LASER IN ODONTOSTOMATOLOGIA S.I.L.O.

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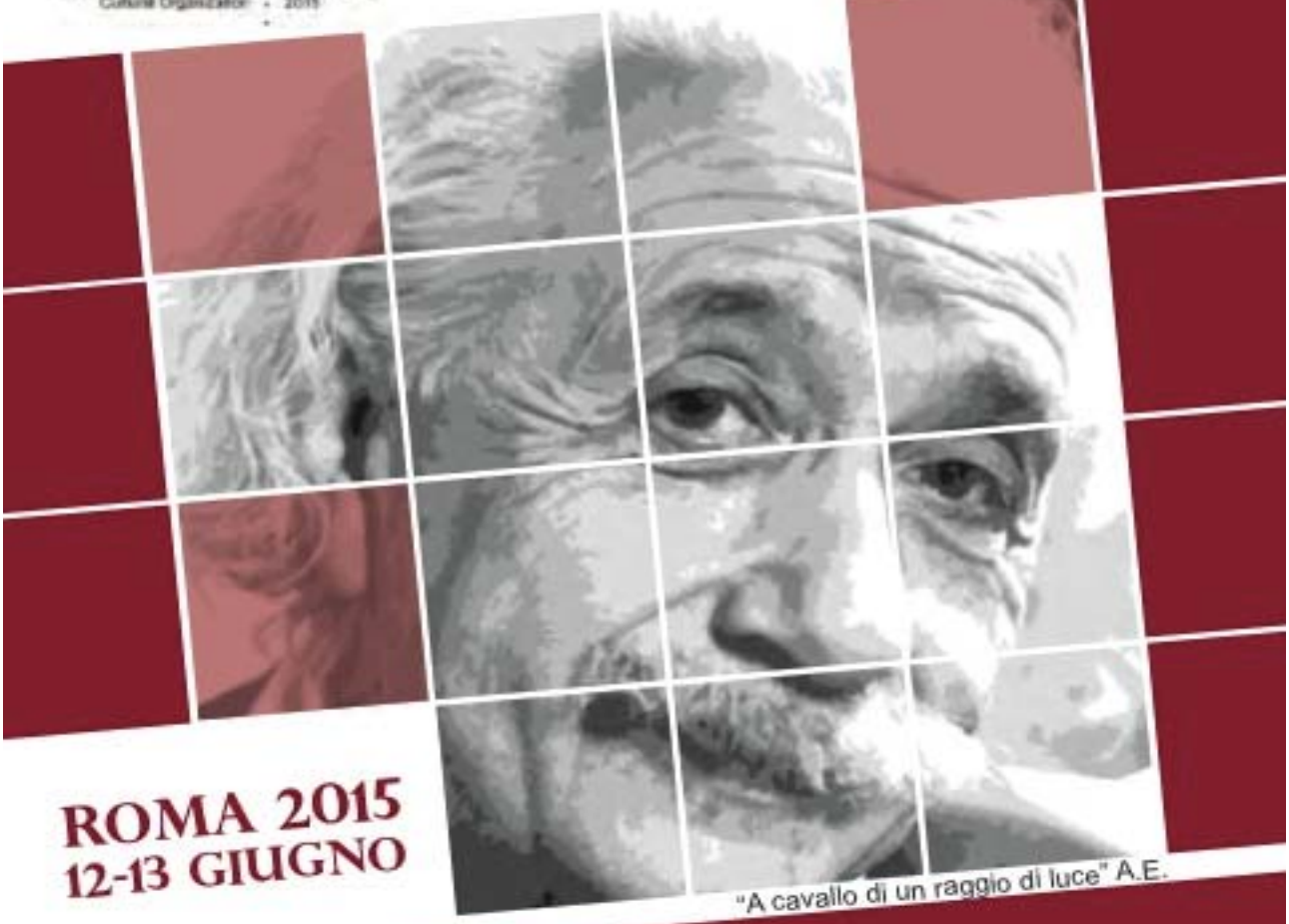

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VIII CONGRESSO NAZIONALE S.I.L.O.

SOCIETÀ ITALIANA LASER IN ODONTOSTOMATOLOGIA

2nd International Meeting S.I.L.O./I.S.L.D.

RICERCA SCIENTIFICA E VISIONE STRATEGICA DEL LASER IN ODONTOSTOMATOLOGIA

Senses Sci 2015; 2 (Suppl.4):1-61
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Laser management of gingival tissues in fixed prosthodontics

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Background

Laser can be useful in aesthetic prosthodontic as a support for prosthetic procedures for shaping the soft tissue. Diode laser can emit a light beam focused and collimated that can cause a direct interaction between the emitted beam and the biological tissues, preventing the dispersion of energy. The aim of this work is to explain the application of diode laser in the oral tissue mucogingival surgery to obtain useful changes to improve the aesthetic and functional results in the rehabilitations examined.

Materials and Methods

"Laser soft tissue design" is applied in the post diagnostic step of prosthetic rehabilitation, during the provisional step and the preparation step of dental elements involved. During this phase the aesthetic and functional diagnosis leads to the choice of using laser or not to perform resections of tissue (or in other cases the additions tissue) to obtain an ideal harmony of the white component of the dental elements.

Results

The use laser allows us to receive no-bleeding tissue, furthermore “tissue design” allows to finish the work in one appointment.

Conclusions

Diode laser is a good choice to improve and accelerate the prosthodontics treatment, without complications for the patient.

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Vascular anomalies of the oral cavity: from diagnosis to laser treatment

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Background

Different laser systems have been proposed, emitting wavelength well absorbed by haemoglobin: Nd:YAG, KTP, diode. Lasers advantages are: reduced necessity of anaesthesia, faster healing, more precise cutting, less postoperative discomfort due to the bio-stimulative effect. Vascular anomalies (VAs) frequently occur both in the oral cavity and perioral region. We distinguish two types of VAs: vascular tumours and vascular malformations, which could appear sporadically or in syndromic patients. Multiple imaging modalities (MRI, Angio-MRI and DOPPLER-Ultrasound) should be used to evaluate the characteristics of the lesion, such as size, flow velocity, flow direction, and relation to the surrounding structures (vessels, muscle, nerve, bone, skin).

Materials and Methods

We used diode laser for the laser photocoagulation and laser excision of different types of vascular anomalies both in syndromic and non-syndromic patients. This device was selected because of its affinity to the oxyhaemoglobin that provokes a photothermolysis, with erythrocytes microagglutination, thus producing the vessels obliteration reducing haemorrhage risks. Different techniques have been employed according with the lesions size: transmucosal thermocoagulation (TMT) for the small (<3x3cm) superficial lesions, and intralesional laser photocoagulation for the largest (>3x3cm) and deepest ones.

Results

All the patients shows healing in 1 or more laser sessions, depending on the type, number and extension of VAs, without discomfort or complications.

Conclusions

According to our experience, Diode laser can be considered useful in the management of different VAs.

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Laser and PDT treatment of Oral Lesion

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Introduction

The special characteristics of the laser are derived from a variety of light beam's properties, such as high intensity, collimation, and mono-chromaticity. The ability to transmit high power with single optical allows the distribution of controlled energy in distance and depth with great precision, with minimal damage to surrounded structures.

Material and Methods

Treatment of hyperkeratosis and leukoplakias of the oral mucosa, removal of benign neoplastic or dysplastic lesions, treatment of vascular lesions, bone surgery, endodontic and periodontal surgical treatment are one of the major goals of Laser Dentistry. Some clinical cases are presented.

Results

The use of laser allows to work effectively and quickly, without damaging surrounded structures. The use of lasers in dentistry improved the treatment of the oral lesions, with a reduction time of the healing processes, an improvement in post-surgical outcomes, with results that are difficult to obtain with traditional techniques, and an increased patient compliance.

Conclusions

A technique of the use the laser based by the proper operation is needed to understand the characteristics of the interaction of laser light with biological tissues, which varies with the type of equipment used and the type of laser.

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Laser assisted dentistry for primary and permanent teeth

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Background

Laser technology has a wide spectrum of applications in operative dentistry for children and adults, both for caries diagnosis and therapy, being a minimally invasive and less traumatic method. Furthermore, the laser is useful in the operative procedures with reduced need of local anesthesia, improving the patient approach.

Materials and Methods

The Erbium lasers are effective both on hard and soft tissues. Laser fluorescence helps to identify demineralized pits and fissures before sealing, to choice between invasive (fissurotomy) and noninvasive technique (conditioning). In restorative treatment of deciduous and permanent teeth, the Erbium lasers can bring advantages not only for carious removal, but also for the treatment of tooth surface modification, in case of structure anomalies or dental trauma; it is very useful for the decontamination of deep cavity (step-wise technique) and also for the vital pulp therapy (pulp capping and pulpotomy).

Results

The concept of "minimal invasive dentistry" considers not only the minimal removal of tissue by using the laser, but also the microscopic approach using different devices to reach the minimal invasive goal. Laser technology provides a "biomimetic" approach even in modern endodontics: there is not any longer the concept of "shaping for cleaning" but, conversely, a minimal preparation is today associated with a more effective irrigation when activated by laser.

Conclusions

The laser therapy offer a lot of benefits such as: biostimulation, mini-invasive technique, atraumatic approach in operative dentistry for children and adults.

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Protocols and clinical management of the patient with periodontal disease

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Introduction

This work illustrate in detail instruments and techniques, clinical protocols, comprehensive management of the periodontal patient, from the first visit to the revaluation, which culminates in periodontal maintenance, to achieve clinical stability. The laser may offer additional benefits when used with protocols and appropriate parameters, suggested by a careful review of the dental literature. The diode laser also presents indications also in case of mucositis and peri-implantitis.

Material and Methods

The objective was to remove all damaged tissue, preserving biological substance, with a non-traumatic technique. The therapy was supposed by domestic oral hygiene and professional hygiene: scaling and root planning. Some clinical cases are presented.

Results

The use of laser in the treatment of periodontal pockets improved the long-term clinical success. The treatment of peri-implantitis by laser is a safe and effective procedure.

Conclusions

The diode laser does not replace traditional methods, but may offer additional benefits when used with appropriate protocols, also in the maintenance phase.

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Is it possible to prevent tooth extraction by endodontic treatment with Er:YAG Laser?

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Introduction

During cleaning and shaping the root canal, smear layer creates on dentin surface, which prevent penetration of antibacterial irrigation solution inside to the dental tubules. The Aim of current research are: Examine the contribution and the effectiveness of the Er:YAG laser the LiteTouch™, (Syneorn Dental Laser, Israel) in:

1. Removing smear layer from the root canal walls
2. Ability of the Er:YAG laser in killing bacteria in the main root canal as well as in dental tubules
3. Measure the effect of Er:YAG laser irradiation on mineral content of dentin structure

Materials and Methods

Root canals of extracted human teeth were endodontically prepared and infected for 10-14 days by Enteroccocus faecalis. Teeth were separated into different subgroups according to irrigation solution used during irradiation: NaOCl, CHX 2%, EDTA 17% and Saline as control. Examination by Scanning Electron Microscope with high resolution was used for testing root canal surface- morphology inspection.

Results

NaOCl with use Er:YAG laser was depended on the intensity of the laser beam. CHX2% showed good results only in high power. EDTA 17% solution with Er:YAG laser irradiation showed the best results in removing smear layer, and antibacterial effect, even with a slight intensity of the laser beam.

Conclusions

The best results were taken when we used EDTA17% with Er:YAG laser, which shows the best result of the removing smear layer and biofilm from the root canal.

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Laser evaporation vs laser excision of oral leukoplakia: a retrospective study with long-term follow up

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Objectives

The aim of the present study is to compare two different surgical approaches for the treatment of oral leukoplakia (OL) in terms of recurrence in a well-defined cohort of patients with a long-term follow-up period.

Materials and Methods

The cohort consisted of 77 OLS divided in two groups: 47 treated with laser evaporation using nd: yag laser, and 30 using co2 laser for excision. A clinical and histological examination was always performed for diagnosis of OL before the treatment. We included OLS with or without dysplasia. The mean follow-up period was 60±32,49 months.

Results

Twenty-two OLS (28.5%) out of 77 patients had a recurrence during follow-up period. a significant difference was not revealed between the two types of treatment in our cohort of study (chi square 2.6; p=0.2). However, CO2 laser excision resulted in a better treatment with respect to the nd: yag laser evaporation, considering the non-homogeneous OLS (chi square 3.9; p=0.04) and OLS with mild dysplasia (chi square 4.6; p=0.03).

Conclusions

Co2 laser excision has revealed as a better choice to treat OLS with any grade of dysplasia and non-homogeneous type, in terms of recurrence. on the other hand, we suggest to use nd:yag laser for evaporation of ols without dysplasia, homogeneous, and in wide anatomical sites where the excision could induce a discomfort to the patient.

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Peri-implantitis and laser, today and tomorrow solutions

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Objectives

Dental implants have revolutionized the treatment of tooth loss , to the extent that, they are now considered the standard of care in many circumstances. Although implants are now a very predictable treatment option, occasionally they fail for a variety of reasons. Peri-implantitis is a late complication of dental implants and is the primary process that leads to late failure. Appropriate supportive treatment of implants is becoming increasingly important for the general dentist as the number of implants placed per year continues to increase.
Treatment of peri-implantitis should be tailored to the severity of the lesion (as outlined by the cumulative interceptive supportive treatment protocol), which ranges from mechanical debridement to explantation. Several surgical and nonsurgical treatment alternatives exist, and there is little consensus on superior treatment methods.

Materials and Methods

Three case report focused on implant diseases. Diode laser ,980nm . Perimucositis : P 1,2W , CW, 30 sec, three times. Perimplantitis : 1,75/2 W, CW, 30 sec on/off 1:1. Biomudulation : 0,75W, CW, 30 sec, three times.

Results

Mechanical therapy has conventionally been the mainstream of treatment; however, complete bacterial eradication and/or optimal wound healing may not be necessarily achieved with conventional mechanical therapy alone. Consequently, in addition to chemotherapy consisting of antibiotics and anti-inflammatory agents, phototherapy using lasers has been gradually integrated with mechanical therapy to enhance subsequent wound healing by achieving thorough debridement, decontamination and tissue stimulation.
Literature agreeing to claim that perimplantitis have to be intercepted early to be effectively cured; periosafe and implantsafe are two simple tests that mesure a-MMp8 levels in the perimplantar sulcular fluid.

Conclusions

Photodynamic therapy with laser guarantees good results on moderate peri implants defects, but further clinical trials are necessary.

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Low level laser therapy and invisible removal aligners

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Objectives

Evaluation of how LLLT can influence the orthodontic treatment with invisible removal aligner.

Materials and Methods

A sample of 21 subjects were divided in two groups, the laser group and the control group. all subjects were instructed to wear each aligner 12 hours a day, 7 days a week for 2 weeks. Laser external biostimulation was given in the laser group each 2 weeks.

Results

The laser group successfully finished the treatment. the control group failed at the 3-5 aligner.

Conclusions

Laser treatment seems to be superior to treatment without laser. LLLT is able to gain in 12 hours the same tooth movement obtained by fitting the aligner 22 hours a day, according to the traditional invisalign standard protocol. This could be useful for those patients who lack of compliance. LLLT makes invisible removal aligner treatment more comfortable by reducing the daily hours fitting.

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Evaluation of anti-inflammatory and analgesic of Superpulsed Low Level Laser Therapy after impacted mandibular third molars extractions: a case-control study

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Objectives

The purpose of this study is to evaluate anti-inflammatory and analgesic of Superpulsed Low Level Laser Therapy (SLLLT) after bilateral extraction of impacted mandibular third molars. Many studies in Literature showed the anti-inflammatory and analgesic efficacy of laser therapy after oral surgery. We report the preliminary results of 25 patients who underwent bilateral extraction of mandibular eighths included in a single surgery.

Materials and Methods

This is a case-control study, a site was randomized chosen to be treated with SLLLT at T0, 24 hours and 48 hours with a GaAs laser diode, while the other surgical site was evaluated as control. The suture was removed at 7 days and healing was controlled at 14 days. During the sessions were monitored and recorded the pain, using visual analog scale (VAS), and oedema with the VAS and cephalometric measurements of cutaneous points (TR-GO, GO-CA, GO-SP, GO-PO). Each patient received only antibiotic prophylaxis and analgesic therapy as needed.

Results

In the treated site SLLLT determines a reduction in pain and swelling statistically significant compared to the control site ($p < 0.05$). We found that the effectiveness of laser therapy is in the first five days after surgery, showing a significant reduction of pain and swelling in the treated site than the control site.

Conclusions

This study suggests that the SLLLT has a potential in reducing the post-operative discomfort after impacted third molar extractions, due to a reduction in post-operative pain and swelling. SLLLT has no side effects and is well tolerated by patients. It also seems to have a role in reducing the intake of drugs.

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Laser Operculectomy, is it a solution?

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Objectives

The purpose of this presentation is to outline the possibilities that the clinical laser dentist possesses in order to improve the quality of life of his patients. According to Magraw et al, pain with pericoronitis affects quality of life. Clinically important correlations exist between subjects' pericoronitis pain and lifestyle and oral function, associations not often considered by clinicians or policy makers.
The practitioner who mainly treats adolescents and young adults is often encountering this problem with his young patients suffering from acute pericoronitis. The solution often offered by oral surgeons and dentists is surgical removal of wisdom teeth. In a selected number of cases however lasers can be of great help to the dentist and the patient in order to avoid surgical extraction of impacted or semi impacted third molars, which sometimes can be a complicated procedure. Following a detailed radiological and clinical assessment in order to exclude any periapical lesion, providing that there is enough space available for the tooth to erupt and it is not inclined towards the second molar, removal of the gingival tissue and sometimes of the bone covering the impacted teeth, a five minute procedure for a laser dentist, followed by an uncomplicated recovery, is more than enough to save the patient from the handicap of swelling, pain and trismus, which might last a few days. However the position of the third molar needs to be assessed beforehand .The patient needs to be informed that this procedure might be a temporary emergency solution before ending up in removal of a wisdom tooth especially if oral hygiene is not ideal, and if the tooth is mesially inclined.

Materials and Methods

Five cases of operculectomies are presented here as a solution to a selected number of pericoronitis patients. The involved lasers are Nd:YAG 11mJ 270 Hz 3W and Er:YAG VLP mode 200-320mJ 15Hz,3,5-4W.

Results

With laser surgery, treatment times and post-operative healing periods are much shorter.

Conclusions

Advanced Nd:YAG pulse width technology is of particular benefit in oral surgery, where cutting action can be adjusted from high-speed with minimal bleeding (100 μs) to light tissue interaction with instant coagulation, or deep thermal disinfection (above 500 μs). In addition, the Er:YAG laser wavelength is also ideal for many soft-tissue treatments. Using Nd:YAG and Er:YAG lasers in soft-tissue surgery means that sutures are rarely needed, and with the laser's simultaneous disinfection effects, healing is faster with fewer post-operative complications.

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Laser surgery and patients with health vulnerability

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Objectives

The treatment of a patient with health vulnerability requires a series of preventive measures: an accurate medical and dental history, a close cooperation with medical practitioners for continuous updates on the patient's chart, a careful risk assessment of drug interactions between those given for dental procedures (mostly surgery) and those for chronic therapy already assumed by the patient. From a surgical point of view, we can offer excellent treatments to our patients using diode and Er:YAG lasers: mini-invasive surgical approach allows us to treat also complex patients without risk of major side effects. To protect our patients from hypothetical sudden emergency, a multi-parameter screen may record regularly patient's vital signs and may also be useful in unpredictable forensic controversies.

Materials and Methods

For istance the surgical removal of a big epulis localized along edentulous gengiva zone 13-23 in a patient with type 2 diabetes mellitus, essential hypertension, family history of cerebral vascular damage, hyper-cholesterol and anti-platelet therapy, may become less difficult using lasers. The surgery is generally performed under local anesthesia without suspending the anti-platelet therapy. The first surgical step is usually performed using a 980nm diode laser to remove excess tissues affecting the gum morphology. 980 nm diode can reduce the risk of bloody exudation even with patients under treatment with acetyl salicylic acid: 1.5 W-CW lasers allow us bloodless surgery through coagulation obtained with such technique. Er:YAG laser is used for the second step which makes smooth the whole treated area. 1w-20Hz- tip from 800µ-0% water-70% air; we will eliminate possible carbonization areas smoothing steps and edges.

Results

To prevent bleeding, we get closer and farther from the tissue alternating ablative to mixed laser points or even only thermal.

Conclusions

The advantage of such surgical approach is to obtain a smooth gengiva evenly molded with quick healing.

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Feasibility study for an early surgical laser approach in the treatment of ankyloglossia

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Objectives

Ankyloglossia is an oral anomaly characterized by the abnormal insertion of the lingual frenulum. The prevalence of ankyloglossia ranges between 0.1% and 10.7%. Disorders of language can be noted, as a result of limitation of tongue tip movement, as well as mandibular growth alterations, affecting facial development. The treatment options for ankyloglossia involve observation, language articulation therapy and surgical approach. Surgical approach can be difficult under the age of 5, due to lack of compliance, but most of the scientificliterature recommends intervention as early as possible. A feasibility study for laser frenectomy under 12 months of age was carried out in order to understand advantages and disadvantages of this technique.

Materials and Methods

All the parents that referred to our Unit for lingual frenotomy were properly informed and signed written informed consent. Laser frenotomies were carried out under topical anesthesia with 10% lidocaine spray using an 810nm diode laser in continuous mode with an output of 3.5W. This high power setting was chosen in order to carry out the surgery in the shorter possible time.

Results

For all the patients it was possible to carry out the surgery successfully, and all the interventions were uneventful.

Conclusions

The described technique proved to be safe, quick and effective, avoiding the risks related to general anesthesia and postoperative bleeding. Further studies are required to better evaluate the efficacy of this technique compared to the conventional one.

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Use of Er:YAG laser to treat enamel hypoplasia in patients affected by Epidermolysis Bullosa: a report of two cases

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Objectives

Epidermolysis Bullosa (EB) is a group of rare genetic skin disorders characterized by fragility and blistering to minimal trauma. Common oral findings of the EB include bullae formation, intraoral ulcerations, ankyloglossia, tongue atrophy, elimination of buccal and vestibular sulci, microstomia and atrophy of the palatal folds. Hard dental tissues can present dental anomalies of number, form, position, and structure (hypoplasia and hypomineralization). Hypoplasia and hypomineralization lead to a high caries risk due to the ingestion of sugary foods and difficulties with oral hygiene. The purpose of this study was to evaluate the efficacy of Er:YAG laser used for treating dentalanomaliesin patients with EB.

Materials and Methods

We report two cases of Er:YAG laser dental treatment in patients affected by EB. In the first case, the Er:YAG laser (2,940 μm, 265mJ, 25Hz) was used to treat caries on a deciduous maxillary canine in an 8-year-old male patientaffected by dystrophic EB. In the second case, an Er:YAG laser (2,940 μm, 265mJ, 25Hz) was used to remove the damaged enamel on maxillary incisors in a 26-year-old female patient, affected by junctional EB, with generalized enamel hypoplasia. The follow up includes a period of 12 months.

Results

Er:YAG laser allows to increase the results of conservative treatment in EB patients through minimally invasive approach that enhances patient's compliance and successfully influences dental treatment.

Conclusions

Laser treatment of dental hard tissues allows to obtain an improvement of psychological aspect in patients affected by EB and can be considered a good treatment option.

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Comparison of ER:YAG laser and conventional conservative treatment in patients affected by early childhood caries (ECC): a pilot study.

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Objectives

Early childhood caries (ECC) is a multi-factorial pathology, causing pain and impairment in eating and sleeping, loss of teeth, malocclusion. the purpose of this study was to evaluate the efficacy and tolerability of laser conservative treatment compared to conventional method in patients with ecc.

Materials and Methods

Twenty ECC patients (mean age 3.8 years) completed the study and were treated using ER: YAG laser (2940 nm, 265 mj, 25 hz) (experimental group; 10 subjects) or rotary instruments (control group; 10 subjects). patient compliance was estimated by the number of interruptions that occurred during each treatment and the number of appointments. follow-up visits at 1-3-6-12 months were performed.

Results

The mean number of interruptions during cavity preparation in the experimental group was 1.42, while in the control group 0.6. In the laser group, treatment was completed in a single appointment, in the control group, mean required visits to complete the treatment of a single tooth were equal to 1.1. The success rate of restoration survival was 10%, in the experimental group, and 20% in control group.
In the laser treated group, restorations failed after an average period retention time of 4.1 months. the reason for failure was complete restoration loss (90%). In the control group, the average period time of restorations was 3.9 months and restorative failure was due to complete restoration loss (80%).

Conclusions

The treatment of the ECC is influenced not only by the therapeutic method used, but mainly by improved oral hygiene and eating habits.

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Diode laser and low level laser therapies (LLLTS) in the third molars oral surgery

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Objectives

Surgical removal of impacted mandibular third molars (IMTMs) is one of the most common outpatient procedures in oral surgery. Pain is one of the most common symptoms in the post-operative period. Considering the local effects of the LLLTs, the aim of this prospective, randomized, double blind case-control clinical trial was to evaluate the efficacy of LLLT for decreasing post-operative pain in patients undergoing surgical removal of IMTMs.

Material & Methods

Forty-four patients were enrolled to undertake the surgical removal of IMTMs, in accordance with the classification of Winter and Pell and Gregory with the values ranging from 6 to 8. Patients were randomly divided into 2 groups: -LLLT test group, receiving real LLLT after completion of the suture; -control group, receiving inactive laser treatments, for 5 sessions (T0-T5). Numeric Rating Scale (NRS), McGill Pain Questionnaire Short-Form (MGPQ-SF) and Relief Scale (RS) were evaluated according to subjective pain and discomfort reported.

Results

Based on the Student-t test, both groups (test group: N=20, mean age: 29.85; SD±3.15; control group: N= 24, mean age: 29.71; SD±3.04), have showed a decrease in pain and discomfort intensity by starting from T0 to T5 sessions, markedly more significant in the test group (P=0.001-0.005), compared with the control group (P=0.02-0.04). In comparison, the test group recorded a constant decreasing of the symptoms (NRS: P=0.044-0.005; MGPQ-RF:P=0.042-0.0005) versus control group.

Conclusions

The irradiation with LLLT in post-extractive sites of IMTMs can represent an additional procedure for better control of postoperative pain and discomfort.

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Management with the diode laser of oral mucosal lesions during pregnancy

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Objectives

Pregnancy oral lesions are non-neoplastic, reactive, inflammatory conditional gingival enlargements that may appear during pregnancy due to the influence of sex hormones. These lesions most frequently occur on the gingiva but can also be sited on the lip, tongue, oral mucosa and palate interfering with mastication, speech and the maintenance of a good oral hygiene. Scalpel, cryosurgery and laser devices are commonly used to remove these lesions. Conventional surgical techniques have the disadvantage of more bleeding respect lasers. The aim of this study is to evaluate the effectiveness of a diode laser in the treatment, recovery and recurrence of oral mucosal lesions during the pregnancy.

Materials and Methods

Four women aged between 25 and 35 years, around the 37th week of pregnancy complained of gingival overgrowth and bleeding due to the presence of lesions on the upper gingiva. Few months after the delivery, in all the cases excisional biopsy was performed using a diode laser 808nm (SOL®, DenMat Italia, Baronissi (SA)) at 2.5W in CW, with a fluence of 1990.44J/cm^2 and a fiber diameter of 400µm. At the end of the treatment it was necessary to eliminate lesion residuals and to perform the curettage in order to avoid any recurrence; the excised samples were sent to the pathologist, inside a 10% buffered formalin, for the histological examination.

Results

All patients reported no pain after surgery and a complete healing was observed after three weeks. No recurrences have been seen during the three months follow-up period.

Conclusions

The application of the diode laser can be considered an effective and safe technique for the excision of these lesions due to minimal invasion, less intra-operative bleeding, better hemostasis, reduced pain and optimal healing.

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Medication-related osteonecrosis of the jaws: an auto-fluorescence guided surgical approach performed with ER:YAG laser

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Objectives

Medication-Related Osteonecrosis of the Jaw (MRONJ) therapy remains an unresolved problem and there are no evidence-based guidelines for its management. One of the difficulties of the MRONJ surgical removal is the precise individuation of the necrotic bone margins. However, the complete removal is essential to avoid recurrence or progression of the disease. The aim is to describe an auto-fluorescence (AF) guided surgical approach performed with Er:YAG laser.

Materials and Methods

A 73-year old male patient was affected by a multiple myeloma and received 24 infusions of zoledronic acid. He was diagnosed with a Stage III osteonecrosis of the left maxilla. After bone exposure, the VELscope™ (LED Medical Diagnostics Inc., Barnaby, Canada) system was used to induce and visualize AF of the maxillary bone. Necrotic bone areas showed no or only pale AF. Osteotomy was performed through Er:YAG laser (Fidelis Plus®, Fotona-Slovenia). After the removal of the necrotic bone block AF visualization was used to guide the marginal bone osteoplasty. Osteoplasty was performed through a traditional ball-shaped bur, non traumatic on soft tissues and useful to remove sharp angles.
AF image after osteoplasty showed an evident appearance of fluorescent bone surrounding the antrum. According to the AF image guide, Er:YAG laser was used for the vaporization of necrotic bone, up to the healthy bone.
The patient received an intra-operative application of low level laser therapy (LLLT) (Nd:YAG laser, 1064 nm, Fidelis Plus, Fotona®, Slovenia). Weekly applications of LLLT were administered for 3 weeks.

Results

This technique allowed a minimally invasive approach through the selective ablation of the non- or hypo-fluorescent areas.

Conclusions

After 8 months complete mucosal healing was evident and the patient was free of symptoms.

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Intra- and post-operative evaluation of surgical techniques for impacted mandibular third molar extraction: the advantages of ER:YAG laser.

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Objectives

Different osteotomy techniques have been proposed in order to improve the post-operative course and reduce the complications. The aim is to evaluate the possible intra- and post-operative advantages achieved with the Er:YAG laser compared to traditional burs.

Materials and Methods

Forty-one extractions of impacted third molars were performed at the Centre of Oral Laser Surgery and Pathology of Parma and randomly classified into two groups according to the instrument used for osteotomy: group 1 (G1) – Er:YAG laser: 19 cases; group 2 (G2) – traditional bur: 22 cases. Intra-operative parameters: total intervention time, number of stitches, patient's compliance. Post-operative: pain, Health-Related Quality of Life (HR-QoL), need for analgesics, oedema, trismus, intra- and extra-oral hematoma and post-operative complications.

Results

The mean time for G1 resulted 1019.49s ± 346.018; for G2 was 2043.45s ± 1200.81 ($p=0.005$). Mean number of stitches in G1 was 3.63; in G2 3.73 ($p=0.771$). Mean patient's compliance in G1 resulted 9.68, while in G2 was 9.41 ($p=0.496$). Regarding pain, VAS scale highlighted a difference statistically significant at day 3 with a mean score lower in G1 than G2 ($p=0.026$); NRS scale highlighted a difference statistically significant at days 0 and 1 with mean scores lower in G1 than G2 ($p=0.037$; $p=0.048$). Mean HR-QoL scores resulted statistically lower in G1 than G2 ($p=0.020$). Mean facial swelling at day 2 resulted statistically lower in G1 than G2 on 3 out of 4 measured lines. The trismus resulted statistically lower in G1 than G2 at day 2 ($p<0.0001$). One case (4.54%) of subcutaneous emphysema was recorded in G1 and 2 cases (9.09%) of lip paraesthesia in G2.

Conclusions

Data confirm that the use of Er:YAG laser for osteotomy in impacted third molar extractions may achieve several advantages both technical and biological.

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A comparative perspective study on intra- and post-operative course of 118 oral surgical interventions: the advantages of the ND:YAG laser

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Objectives

Nd:YAG laser may offer advantages for the operator and the patient. The aim is to evaluate differences in intra- and post-operative course associated to the use of Nd:YAG laser compared to cold blade after oral soft tissues surgery.

Materials and Methods

118 surgical interventions performed at Center of Oral Laser Surgery and Pathology of Parma were analysed. Group 1 (G1) included 77 interventions performed with Nd:YAG laser, Group 2 (G2) 41 with cold blade. Intra-operative parameters were: incision velocity, total intervention time, bleeding and need for suture. Post-operative ones were pain and Health-Related Quality of Life (HRQoL). Pain was evaluated with 3 scales: visual analogue scale (VAS), numeric rating scale (NRS) and verbal rating scale-6 (VRS-6) on the same day of surgery (0), and on 1, 3 and 7 days after. HRQoL was evaluated on day 7 using a 0-45 score range questionnaire. Data were analysed using the software STATA 12 (StataCorp LP, College Station, Texas, USA).

Results

Mean incision velocities were 0.54mm/s in G1 and 1.58mm/s in G2 ($p<0.0001$). Total intervention times were not statistically different. There was intra-operative bleeding in 29.9% of interventions in G1 and 97,6% in G2 ($p<0.0001$). Number of stitches in G1 was statistically lower ($p<0.0001$).
VAS and NRS scores were not statistically different. VRS-6 scores resulted statistically significant at day 1 ($p<0.005$) and 3 ($p=0.001$). Particularly, at day 1, 47.14% of patients in G1 and 13.16% in G2 had no pain; at day 3, 62.86% in G1 and 21.05% in G2 had no pain. HRQoL in G1 was statistically better than G2 ($p=0.0044$).

Conclusions

The data confirm several advantages associated to Nd:YAG laser for both the operator and the patient.

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The effect of laser biostimulation on the expression of osteocalcin and osteopontin after tooth extraction in rats treated with zoledronate and dexamethasone

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Objectives

Laser therapy has been used for the prevention and management of medication-related osteonecrosis of the jaws (MRONJ). The aim of this paper was to investigate the action of laser therapy on extraction socket healing in rats in conditions at risk for MRONJ, evaluating the expression of markers of bone metabolism.

Materials and Methods

Thirty male sprague-dawley rats were divided in 4 groups: control group (C, n=5), laser group (L, n=5), treatment group (T, n=10) and "treatment plus laser" group (T+L, n=10). Rats of group T and T+L received zoledronate 0,1 mg/kg and dexamethasone 1 mg/kg every 2 days for 10 weeks. Rats of group C and L were infused with vehicle. After 9 weeks the left maxillary molars were extracted in all of them. Rats of groups L and T+L received laser therapy (Nd:YAG, 1064 nm, 1,25w, 15hz, 5 min, 14,37 j/cm2) in the socket area at days 0, 2, 4 and 6 after surgery. Western Blot analysis was performed to evaluate the alveolar expression of osteopontin (OPN) and osteocalcin (OCN) 8 days after extraction.

Results

Rats of groups L and T+L showed a significant higher expression of OCN compared to rats of groups C and T (+ 348 % and + 400 %, respectively; $p = 0.013$ and $p = 0.002$, respectively). The expression of OPN did not show significant differences among the different groups.

Conclusions

Our findings suggest that laser irradiation after tooth extraction can promote osteoblast differentiation, as demonstrated by the higher expression of OCN. Thus, laser irradiation could be considered a way to improve socket healing in conditions at risk for MRONJ development.

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Galleria mellonella – candida albicans infection model to assess photodynamic therapy efficacy

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Objectives

C. albicans, commonly present on epithelial surfaces of the oral cavity, is an opportunistic pathogen able to produce superficial and systemic infections. In the last decades the excessive use of antibiotics, the high number of immune-compromised patients associated to HIV virus or the use of immune-suppressants after organ transplantation and antineoplastic therapy turned candidiasis into a human disease of increasing importance. The use of standard antifungal therapies should be limited because of toxicity (hepatotoxicity and/or nephrotoxicity), side effects, low efficacy rates, drug resistance with potential inefficacy of therapy and expensive costs.

Materials and methods

In order to search new therapeutic treatments, this experimental study assessed the efficacy of photodynamic therapy (PDT) mediated by different lasers and photosensitizers against *C. albicans* with a non-mammalian model (*Galleria mellonella*). This work employed the invertebrate wax moth *Galleria mellonella* as *in vivo* model to study the effect of PDT against *C. albicans.* PDT was applied using curcumin, erythrosine and toluidine blue as photosensitizer (PS) with three different diode lasers (red, blue and green).

Results

We verified that toluidine blue with red laser prolonged the survival of *G. mellonella* larvae infected by *C. albicans,* showing a protective action with a statistical significancy. Comparing the combination of red diode and toluidine blue with toluidine blue and laser used alone, we highlighted the importance of the synergy between laser and photosensitizer.

Conclusions

G. mellonella turns out to be a suitable model host to study antifungal photodynamic therapy *in vivo.* The use of the invertebrate model host has significant benefits when compared to mammalian animals: it decreases legal or ethical concerns, it's easy to rear, to treat and to culture in large amount of samples and it's relatively inexpensive to purchase. Additional studies will need to validate these results.

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Blue diode k-laser in the treatment of oral mucosa pathologies

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Objectives

The 445nm wavelength interacts with the substances in the living body, it's absorbed greatly by hemoglobin and its absorption by melanin is greater by more than one order of magnitude than in the case of near infrared light. It is also effective on many bacteria, thus leading to tissue sterilization. Great results, using the blue wavelength can be achieved in the incision of soft tissues, both for surgical and vascular purposes. The aim of this study is to assess patients' comfort, mucosal healing and thermal tissue damage performing biopsies of benign lesions of the oral cavity.

Materials and methods

Eltech K-Laser (Via Castagnole 20, 31100 Treviso, Italy) committed to the Oral Medicine and Pathology Department (Dental School, University of Trieste, Italy) an investigation on the blue diode laser effects on patients' tissues. In particular, a deep analysis has been conducted regarding the differences between the infrared (970nm, 1W, Ton/Toff 25ms/8ms) and the blue (445nm, 1W, t on/t off 25/8ms) lasers on patients' comfort, mucosal healing and thermal tissue damage. Patients' evaluation recorded the assumption of pain-killers, pain evaluation through a Visual Analogue Scale (VAS) and mucosal healing during 5 follow up visits (2, 7, 14, 21 and 28 days after the excisional biopsy). Moreover, a histological analysis of tissue with haematoxylin and eosin staining was performed.

Results

104 histological samples, originated from benign oral lesions biopsies evidenced a noteworthy decrease in the detectable damage on the cutting surface in the blue laser group than in the infrared one. Moreover, the lower damage lead to a faster wound healing accompanied by patients' less pain sensation and to minor pain-killers assumption during healing time.

Conclusions

Blue diode k-laser is safe and useful in the treatment of oral mucosa pathologies.

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Burning mouth syndrome and diode laser therapy

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Objectives

Burning Mouth Syndrome (BMS) manifests as an oral burning sensation in the absence of any objective lesions and laboratory test findings. BMS can be classified as primary type, when it is not associated to other local and/or systemic diseases. BMS has been associated to a neuropathic suffering affecting peripheral or central fibers of the nervous system. At present, most of the studies for BMS treatment are lacking of controls, the measurements are not reproducible and the sample sizes are limited. This case-control study aims to evaluate the change of symptoms after Low Level Laser Therapy (LLLT) in patients with primary type of BMS.

Materials and methods

Fifty-two patients diagnosed with primary BMS, who were examined at the Oral Medicine Unit, were randomly divided into 2 groups: *-a* test group, receiving real LLLT; *-b* control group, receiving inactive/placebo laser treatments. For both groups were considered 5 sessions (T0-T6). Numeric Rating Scale (NRS), Visual Analogue Scale (VAS), Verbal Rating Scale (VRS) and McGill Pain Questionnaire-Short Form (MGPQ-SF) were evaluated according to subjective pain reporting.

Results

From T0 to T3 sessions were found no differences between both groups. In LLLT group (n= 24, mean age: 61.38 SD±10.14 years), based on the Student T-test, significant score differences have been found from T3 to T6 sessions (P= 0.012-0.00011), for all pain scales, versus control group (n=28,mean age: 60,18; SD±9,55).

Conclusions

LLLT for the treatment of the BMS discomfort can be considered an alternative tool to the relief of oral pain and oral burning sensation.

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Diode laser biopsy and thermal damage of the oral tissues

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Introduction

Oral biopsy aims to obtain clear and safe histopathological diagnosis; it can be performed by scalpel or laser. The controversy in this latter application is the thermal alteration due to tissue heating. The purpose of this retrospective study is the histological evaluation of margins of "in vivo" biopsies collected by diode laser to evaluate the average size of the thermal tissue damage.

Methods

Forty-eight cases of the soft tissues lesions were examined in the unit of Oral Pathology and Medicine from February to April 2015. Specimens were excised with a 980 nm diode laser, output 1.5 W, with continuous wave modality, frequency of 50Hz and with fibers of 320 µm. Specimens were fixed in 10% buffered formalin solution and examined separately under an optical microscope by expert pathologists of the same hospital.

Results

The width of the modified tissue, measured in micrometers on each sample, ranged from 230 to 510 µm, with a mean value of 322.4 µm. A reliable histopathological diagnosis was possible in samples of at least 4.5 mm in volumetric diameter. In specimens with a mean size ≤ 4 mm the diagnosis was not reached in 40.8%.

Conclusions

The Diode laser (980 nm) used in continuous wave emission mode causes thermal damage to the treated tissues. The histological diagnosis can be achieved when the specimen size is sufficiently large.

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Diode laser treatment of gingival angiofibromatosis in 2 patients affected by tuberous sclerosis

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Objectives

Tuberous sclerosis (TS) is an autosomal dominant neuro-cutaneous syndrome characterized by multiple hamartomas in various organs, especially on skin and central nervous system. The most common features of TS include facial angiofibromas, hypomelanotic cutaneous macules, shagreen patches in the lumbar area, cerebral cortical tubers, sub-ependymal nodules, sub-ependymal giant cell astrocytomas, cardiac rhabdomyomas and renal angiomyolipomas. Frequently oral manifestations such as fibrous hyperplasia, dental enamel pitting, fibromas and angiofibromas are also observed: the latter microscopically characterized by a blood vascular component, as reported in recent studies. The aim of this study was to describe laser treatment of oral diffuse hyperplastic angiofibromatosis in 2 young patients affected by TS.

Materials and Methods

A 14-years-old and a 22-years-old female patients with TS diagnosis came to our attention in the Oral Surgery Unit of the Polyclinic of Bari. Clinical examination highlighted epidermal hamartomas on the whole body, especially on the face and scalp, and severe mental retard; diffuse gingival hyperplasia on both upper and lower jaws, covering the surfaces of the teeth, was also evaluated. Patients were treated under general anaesthesia and pathologic hyperplastic tissues were removed by pulsed diode laser (wavelength of 800±10nm) at the power of 5-6W, thus avoiding intra-operative bleeding.

Results

After laser excision, wounds healed quickly without complications. Histopathological analysis of the surgical samples confirmed the presence of variably sized blood vessels confirming the diagnosis of gingival angiofibromatosis.

Conclusions

Diode laser is very effective for the treatment of gingival angiofibromatosis in TS patients thanks to its clotting capability which allows the removal of the pathological tissue without intra- or post-operative bleeding.

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Intralesional diode laser photocoagulation of 17 voluminous vascular malformations

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Objectives

Vascular malformations (VMs) are benign lesions commonly located in the head and neck region appearing as a result of the altered blood vessels development. Several treatment modalities have been advocated such as conventional surgery, embolization and schlerotherapy. More recently, laser photocoagulation has been proposed as effective non-invasive treatment for these lesions. For voluminous and deep VMs, intralesional photocoagulation (ILP) is necessary to remove completely the lesion. This study was aimed at describing the diode laser ILP of 17 voluminous VMs.

Materials and Methods

Ten patients, 6 females and 4 males, average age 37,9 y.o., came to our attention showing 17 VMs differently located on the tongue, cheeks, parotid region, lips and palate; 2 were located on the temporal region. After clinical examination, MRI, AngioMRI and Doppler Ultrasound, all the patients were treated under general anaesthesia or local anaesthesia without adrenaline using ILP, using a diode laser (wavelength of 800±10nm) in pulsed mode (t-on 190 ms / t-off 250ms) at the power of 9-10W. The fibers (320µm) were introduced directly into the lesion through a transmucosal access and a radial pattern of laser energy was delivered staying at least 5 mm below the mucosa surface. Before, during and after laser session cool packs were used to avoid tissue thermal damage.

Results

After multiple laser sessions (average of 3) depending on lesions dimension, all VMs completely regress without signs of scars or recurrence. Intra- or post-operative complications such as bleeding or pain were not noticed, only 4 patients developed slight swelling of the treated areas that lasted a few days.

Conclusions

Diode laser ILP is a safe and effective treatment for VMs allowing complete lesions regression without risk or complications for the patients.

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Laser effect on tumour behaviour and on immune system activation

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Objectives

The main aim of this study is to provide an answer to the safety of laser therapy when performed on neoplastic areas and its role on the immune system activation.

Materials and Methods

A chemical carcinogen (4-NQO) was administered to 50 mice. 25 mice underwent to 4 laser therapy sessions (GaAlAs diode laser: 970nm, 2.5W/cm2, duty cycle 50%, 2Hz, 180J/cm2) on consecutive days, while 25 mice were used as controls. Afterwards, animals were sacrificed to perform a histological analysis. Moreover melanoma cells were implanted in 16 C57BL/6 female mice at the dorsal subcutaneous level. Mice were divided into 4 groups according to tumour size: 3 groups were subjected to different laser protocols (GaAlAs diode laser: 660nm, 100mW/cm2, CW, 3J/cm2; 800nm, 1W/cm2, CW, 20J/cm2 and 970nm, 60mW/cm2, CW, 6J/cm2) for 4 consecutive days, while the fourth group was used as control. All animals were euthanized to measure tumour volume and weight. CD1a, CD4, CD8, CD25, CD68kp1, Melan-A and the expression levels of TNFα, IFNα and IFNγ cytokines were evaluated. The same laser protocols were applied on dendritic cells. Any increase concerning the number/extension of dysplastic/neoplastic areas was registered in the laser groups ($p<0.05$).

Results

Laser therapy did not foster tumour growth or invasiveness, but it bordered and isolated tumours. In the laser groups, tumour infiltration by immune cells was higher compared to the controls, consistent with the increased expression of IFNγ ($p<0.050$). CD1a+ dendritic cells were particularly abundant in the dermis in the control group, while they migrated to "wrap" the tumour in laser groups. A reduction in TNFα ($p=0.039$) and an increase in IFNγ ($p=0.028$) expression were recorded.

Conclusions

The laser therapy is effective in boosting a potent immune response in vivo. According to these results, the treatment of any lesion in oncological patients could be safely performed.

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Laser-aided photo-rejuvenation of the perioral region

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Objectives

The photo-rejuvenation is applied to treat imperfections related to chrono- and photo-aging with the use of laser or light.

Materials and Methods

Various methods, used for this specific treatments, can be divided in non-ablative (which enable the lifting of specific colored targets: i.e. Capillaries, blemishes, etc.) and ablative ones (especially useful for the improvement of the texture and the treatment of perioral wrinkles).

Results

The ablative laser-assisted photo-rejuvenation is indicated in all situations (such as superficial wrinkles, freckles, age spots, solar keratosis, photo-aging of I and II degree) requiring a very superficial dermal abrasion. In the correction of damage from photo-aging, the choice has been identified in the chemical peeling and the surgical facelift.

Conclusions

The best results, however, may be obtained by combining several techniques (ablative and non-ablative) simultaneously during the same session or in several successive sessions: photo-fractional treatment.

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Healing and maintenance of tissues treated with laser-aided surgery

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Introduction

The management of periodontal tissues in patients candidate for prosthetic rehabilitation is crucial to ensure proper registration of the impression and the realization of a reasonable prosthesis. For these reasons, it is necessary to manage the periodontal inflammation before, during and after the restorative process by professional hygiene prophylaxis aimed at control of the oral biofilm with respect of tissues and prosthetic materials.

Objectives

The laser diode technology is a valid aid to the conventional therapies of microbiological management in the oral cavity, because it combines effectiveness with a low level of invasiveness on the patient. It also allows the use of its intrinsic properties to favor and guide the soft tissues healing when subjected to pre-prosthetic surgery in order to optimize the surgical outcome in reasonably short times.

Materials and Methods

The use of the diode laser in the management of the periodontal tissues healing and for the control of inflammatory states is applied to patients candidate for prosthetic rehabilitation as part of a clinical protocol which allows both to achieve a prosthetic phase performed on optimal tissues, that of maintaining over time the results obtained by means of the rehabilitation through the management of the oral biofilm aimed to preventing possible inflammatory problems of prosthetic abutment and periodontal tissues, which can potentially lead to the failure of the rehabilitation.

Conclusions

The properties of laser diode to act favorably on the tissues healing and on the control of bacterial plaque (especially of the gingival sulcus) is recommended in the prosthesis on natural teeths not only for management purposes of the gingival architecture but as an aid to the phase of impression and as an efficient tool for the management of the health of the periodontal soft tissues.

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Laser-assisted surgical treatment of peri-implantitis

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Aim

Use of two types of laser for the treatment of implants affected by deep peri-implantitis.

Materials and Methods

Eight patients (total of 15 implants) suffering from peri-implantitis were treated. The procedure involves the use of laser assisted surgical methods aided by the photolase system. The treatment was carried out in local anesthesia and followed by biostimulation laser in a single session.
The following clinical case illustrates the use of an Er,Cr:YSGG (BIOLASE Technologies) laser (2,780 nm) at different settings to treat patients with peri-implantitis. Erbium laser opens the flap and removes the granulation tissues. The implant surface and mineralized tissues was irradiated utilizing this laser at different settings. The usage of Er,Cr:YSGG laser to achieve the detoxifying effect of hydroacoustics. Accompanied with water micro-explosions, this laser decontaminates the rough titanium oxide surface of the implant without causing harmful increase in temperature. For the mucous membranes a diode laser 810 nm was used by the photolase system.

Results

13 implants obtained clinical and radiological healing. All the implants were controlled by probing depth during professional hygiene session.

Conclusions

This method allows biological and functional recovery of implants affected by peri-implantitis due to the decontaminant and biostimulative activities of different wavelengths.

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LLLT and enzymes therapy in periodontal and prosthetic implants

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Aim

Evaluate the synergy of laser and bio-stimulating protein amino acid (enzymes) favoring the catabolic phenomena at the cellular level, the predictability in surgical wound healing and maintenance of physiological periodontal and peri-implant.

Materials and Methods

Clinical cases illustrate the therapeutic response within the periodontal and implant with the use of diode laser and the localized application of gel mixture of natural biomaterials enriched enzymes (#Speedyimplant Gelenzime®). The design of the study compares three groups as follows: only the first laser; second only gel; third pairing of the two methods.

Results

We analyzed the degree of satisfaction of the intervention, the VAS pain and recovery time of size and healing of the periodontal tissues, in surgery and implant therapy. By combining the two techniques together (GeleEnzime containing enzymes and co-enzymes and Laser Diode) highlights an immediate hemostasis and speedy recovery with the development of epithelial neoplasm of the operated area.

Conclusions

The clinical work under study, indicate that the usage of the diode laser or enzyme, induce the faster healing process together with a satisfactory improvement in the tissue. The association of the two techniques further increases healing responses, thanks to the catabolic process with a recovery also dimensional epithelial tissue

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Hydroacoustic effects of the ER, CR:YSGG LASER for microinvasive laser dental implantsurgery into infected sites

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Introduction

The effect on implant dentistry with Er,Cr:YSGG laser energy is the usage of radiation and water to destroy the bacteria.

Aim

The purpose of this article is to show in cases reports usage of the erbium laser in support of the preparation of the implant site during the surgical procedures into infected sites.

Materials and Methods

Cases reports, having root fractures, incomplete root canal fill, and internal resorption all needing extractions, were selected for implant replacement immediately after atraumatically extraction. To detoxifying the osteotomy site Waterlase MD (Biolase) was utilized, with an MZ-4 tip inserted into the osteotomy and then fired at 1.5 Watts, 20/40 water/air, 30 Hz, in a clockwise fashion moving coronally. To placement of dental implants power output for bone is 3,5/8 W, 50/80 water/air, 20/30 Hz with an MZ-6 tip. The tip is on the target tissue in constant motion, contactless and under the control of magnifying systems. YSGG laser therapy was put to stimulate the keratinized tissue around the implant site to stimulate tissue growth and thus prevent shrinkage. Photomodulation (Diodi Gardalaser) was performed under pulsed mode operation, with 1.5 Watts grated for 30 seconds.

Conclusions

The laser was able to reduce significantly the bacteria present after laser energy was emitted. The hydrophotonic energy performs the osteotomy of the surgical site under-sized for the insertion with high torque of tapered implants. This technique provides an immediate means of placing dental implants within an infected site following laser treatments.

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Micro-invasive site laser drilling into the bone to insert dental implants

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Aim

The usage of erbium laser to support the preparation of the implant site during the surgical procedures.

Materials and Methods

Er,Cr:YSGG was used with a wavelengths of 2780 nm wavelength and pulse duration of 140 microseconds. To placement of dental implants power output for alveolar bone is 3,5/8 W, 20/30 Hz with an MZ-6 tip and for gingival tissue is 1,25/3,5 W, 50/80 water/air, 30-40 Hz MZ-5. During surgical procedures, the tip is on the target tissue in constant motion, contactless and under the control of magnifying systems. A graduated periodontal probe measures the depth of the implant bone.

Results

The hydrophotonic energy performs the osteotomy of the surgical site for the insertion of tapered implants. The site is under-sized due to have high torque for immediate or early loading.

Conclusions

The erbium laser allows precise site preparation (10-15µ) with excellent cutting control, reducing the trauma on tissues and improving post-operative course and implant integration.

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Low-level laser therapy and temporomandibular disorders

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Aim

The usage of low-level laser therapy (LLLT) in patients with temporomandibular disorders and pain.

Materials and Methods

42 patients were treated divided in two groups: 29 with predominantly muscle disorders and 13 with predominantly articular disorders. Eight sessions (once a week) were done. We used a diode laser 810nm, in CW mode, 0,5W power, three applications of 20 seconds per side. The pain was measured with the VAS (visual analogic scale) at the beginning and the end of the treatment.

Results

In both groups, it was found a lowering of the pain of 2/3 points on the vas scale with improved quality of life.

Conclusions

The diode laser has analgesic, anti-inflammatory and bio-stimulant effect in patients with temporomandibular disorders with or without the bite therapy.

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Fornix deepening and tongue debridement in caustic trauma to the mouth: case report

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Aim

The usage of the 810 nm diode laser for reconstruction of the fornix and tongue debridement in a colored patient, 13 years old, with caustic trauma.

Materials and Methods

In single session local anesthesia was done, lower lip and tongue totally joined to keratinized gum were dissected by skimming tissues with Fiber Optics according to sweeping technique. Continuous mode 2.5W power was applied under surgical aspiration as to obtain a complete hemostasis. In order to avoid relapse and protect the surgical wound a soft resin bite with vestibular bump was realized and applied with the aid of vaseline gauzes. The patient was also recommended to massage the area several times a day in order to ease the rooting of new favorable labial insertion. An antibiotic and anti-inflammatory therapy were prescribed together with topic application of spray Clorexidine 20%.

Results

Despite the presence of cicatricial tissues covering the whole area, six weeks later the vestibular fornix was one centimeter wider and the tongue reached the correct function and mobility, allowing the patient better mouth opening, satisfactory oral hygiene and the enhancement of labial and phonetic expressions. After 45 days the duct of Wharton was detected in the original position.

Conclusions

We wish to remark the simplicity of the 15 minutes operation completely bleeding less both during and after surgery, the moderate pain in absence of suture and the quicker healing generated by the bio-stimulation through diode laser together with the absence of retracing scars.

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The prevention and the laser treatment of dental infection

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Introduction

The dental caries is a disease process with multifactorial etiology, where the bacterial assumes an important role.

Discussion

The traditional approach of the restorative dentistry was removing the decayed tissue using mechanical or manual instruments and reconstruction of the residual teeth with different materials following esthetic and functional requirements. However the removal of the decayed tissue does not completely eliminate the infection of the teeth, ie the cause of the disease. The persistence of the bacteria in the remaining dentin and within the dentinal tubules, can cause a recurrence of the disease (secondary caries) and pulp complications. A modern, alternative approach can be focused on a different management of the caries disease, taking in consideration not only the elimination of the decay but also a way to treat the infection. The modern dentistry is trying to find biological and chemical agents in order to obtain a complete bacterial decontamination of the carious lesions. The lasers for their characteristics and mode of application, undoubtedly, can represent a different therapeutic modality, for the treatment of the caries infection. More than that, the laser therapy can be helpful also for the controlled and selective removal of the infected tissue that lost the potentiality for remineralization, following the requirement of Minimal Invasive Dentistry. In the last years differents studies dimonstrated the efficiency of the photodynamic therapy as a strategy for dental caries treatment, building in this way a more conservative therapy in restorative dentistry. In fact the photodynamic therapy can have a significant antimicrobial effect on cariogenic bacteria like Streptococcus mutans and Lactobacilli promising an alternative approach to prevent or treat denatl caries.

Conclusions

The usage of Erbium Laser for caries treatment is well documented and there are a lot of evidence based for the benefits and efficiency of it, making it a treatment of choice in the prevention and treatment of caries.

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Diode laser in pyogenic granuloma surgery. A case report

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Introduction

Pyogenic granuloma is a relatively common benign mucocutaneous lesion. Being a non-neoplastic growth, excisional therapy is the treatment of choice. Some alternative approaches such as cryosurgery, excision by Nd:YAG Laser, flash lamp pulsed dye laser, injection of corticosteroid or ethanol and sodium tetradecyl sulfate sclerotherapy have been reported to be effective. The following case report, proved that the treatment of pyogenic granuloma by diode laser determines a significative improvement of compliance in patients who undergo surgical therapy. The AA present a case of recurrent pyogenic granuloma in a patient treated with diode laser.

Materials and Methods

Case report, A 55 years old male showed a gingival recurrent overgrowth in 1.2-1.3 sector. The excisional surgery was realized using a diode laser. The chosen parameters were: wave length 810 nm, output power 1.5 W in CW, 320 μm fiber. Treatment plan included an excisional biopsy of the lesion. The surgery determined no intraoperative bleeding and No post-surgical antibiotics therapy was prescribed. Chlorhexidine mouthwash was given. The histological analysis confirmed the diagnosis. One week, four weeks and four months follow-up tests were done conducted and proved the quality of healing without recurrence.

Conclusions

The application of diode laser can be considered as an effective and safe technique for excision of pyogenic granuloma. This type of low power laser is mainly recommended especially near tooth roots because of less heat produced. The clinical advantages of the chosen therapy are: minimal invasion without intra-operative bleeding, absence of fasciculation, quick hemostasis, reduced pain, quality and times of healing.

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The use of laser in endodontic treatment: review of literature

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Introduction

Since the development of laser by Maiman in 1960, and the introduction of laser in endodontic treatment by Weichman in 1971, a variety of potential applications for lasers in endodontics have been proposed.

Aim

Update the usage of laser and verification of its efficiency in endodontic therapy.

Materials and Methods

The focus has been primarily on dental hard tissue removal, since its wavelength correlates closely with the maximum absorption of hydroxyapatite. In addition, the Er:YAG laser has a very high absorption in water and this increases its disinfection potential, since water is a main constituent of most microorganisms. Recently some authors demonstrated that laser-driven irrigation removes trapped air from the air column, allowing the solution to travel apically in the root canal. In 2014, others authors observed and provided evidence of the mechanism by which an Er,Cr:YSGG laser removes trapped air, using transparent models of the root canal: the disruption of the surface tension at the solution–air interface, caused by bubble implosion (cavitation), displaces air in the form of bubbles from the apical region toward the solution, which allows the solution to travel apically.

Conclusions

In endodontics there are various applications (reported in Literature) of laser device: removal of the smear layer, melting of the dentin surfaces; root canal preparation; antimicrobial effects; pulpotomy and capping of pulp; root canal sterilization; endodontic surgery. The first laser used in endodontics was reported by Weichman and Johnson who attempted to seal the apical foramen in vitro trough a high power-infrared (CO2) laser. Subsequently, attempts were made to seal the apical foramen using the Nd:YAG laser and root canal sterilization. The Er:YAG laser has been the subject of research in dentistry since the late 1980s.

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Laser in restorative dentistry: a review

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Introduction

Laser technology was introduced in dentistry by Goldman in 1967 and since that time, a major effort has been made by clinicians, researchers and companies to improve the results of clinical treatments.

Materials and Methods

The usage of Er:YAG in 1990 allowed for the treatment of hard tissues. There has recently been a rapid spread of treatments using lasers in the field of dentistry. Lasers are now widely used in minimally invasive treatment in routine clinical procedures including dental cavity preparation, removal of dental calculus, caries prevention, treatment of dentin hypersensitivity, anti-inflammation for soft tissues, pain relief, surgical operations, and hemostasis. This articles reviews laser application in dental restorative treatment for what regards various historical developments, properties, design and interaction with tissues.

Conclusions

Laser has become a ray of hope in dentistry. When used efficaciously, lasers are an exceptional modality of treatment as an alternative to the use of conventional instruments, such the turbine and micro-motor, and also in association with orthophosphoric acid, with several advantages such as better bond strength and reduced microleakage, as well as lower discomfort and higher patient satisfaction and for many clinical conditions that dentists treat on daily basis. But laser has never been the “magic wand” that many people have hoped for. It has got its own limitations. However, the futures of dental laser is bright with some of the newest on going researches.

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Mini-invasive non surgical periodontal treatment with support of diode laser on vulnerable health patients

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Introduction

Prove that the effectiveness of the usage of diode laser as a backup to Periodontal Therapy Support related to periodontal 2nd Fase treatment in a patient affected by atrial fibrillation and forced to oral anticoagulant therapy. The patient was submitted to dental hygiene at the Department of Odontostomatological Special Pathology of Policlinico Tor Vergata, Rome.

Materials and Methods

We diagnosed a severe periodontitis with particular compromission of the mesial root of the element 4.6. The executed protocol based on laser therapy guide (2,5 W * 30 sec; Ton 30 us; Toff 70 us) showed similar results to mechanic therapy at medium and long term.

Conclusions

The use of diode laser is strictly related to the necessity to perform minimally invasive procedures in vulnerable health patients who cannot suspend anticoagulant therapy or take anti-inflammatory drug without running major risks related to their systemic clinical conditions

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810nm, 980nm, 1470nm and 1950nm diode laser comparison: a preliminary "ex vivo" study on oral soft tissues

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Background and Aim

The introduction of diode lasers in dentistry had several advantages, principally consisting on the reduced size, reduced cost and possibility to beam delivering by optical fibers. At the moment the two diode wavelengths normally utilized in the dental field are 810 and 980 nm. The aim of this study was to compare the efficacy of four diode wavelengths: 810, 980, 1470 and 1950 nm diode laser for the ablation of soft tissues.

Materials and Methods

Several samples of veal tongue were irradiated by the four different diode lasers. The samples were exposed to different energies and the internal temperature of the soft tissues close to the beam was monitored with thermocouple during the irradiation. The samples were observed by microscope by two different blind operators to value the quality of excision, in terms of tissue damages and regularity on the base of established criteria.

Results

The lowest superficial and deep thermal increase was recorded for 1950nm laser. Best quality and speed of incision were obtained by the same wavelength. Epithelial, stromal and vascular damages were evaluated, with different degrees, for all the used wavelengths, with the best result, in terms of "tissue respect", for 1470 and 1950nm.

Conclusions

1470 and 2950nm diode laser showed to be the best performer wavelengths among these used in this "ex vivo" study, probably due to their greatest affinity to water.

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Management of 260 patients affected by bisphosphonates-related osteonecrosis of the jaw (bronj)s

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Objective

To compare surgical and non surgical approaches for the treatment of BRONJ and the possible usefulness of lasers.

Materials e Methods

Two hundred and sixty patients (79 males and 181 females, 192 oncological and 68 non oncological patients) affected by BRONJ were evaluated at the University of Parma, Italy, between 2004 and 2015. Treated sites were 230 and were subclassified as follows: Group 1 (G1): 33 sites treated with medical therapy; Group 2 (G2): 55 sites treated with medical therapy associated to Low Level Laser Therapy (LLLT); Group 3 (G3): 17 sites treated with the combination of medical and surgical therapy; Group 4 (G4): 42 sites treated with the combination of medical and traditional surgical therapy with LLLT; Group 5 (G5): 83 sites treated with the combination of medical and laser-assisted surgical therapy.

Results

Clinical improvement was achieved in 47 out of 88 (53.41%) non surgical treated patients (G1+G2) and in 130 out of 142 (91.54%) surgical treated patients (G3+G4+G5); surgical laser-assisted approach obtained clinical improvement in 119 out of 125 patients (95.2%) (G4+G5).

Conclusions

In our experience, percentage of success obtained with a combined approach based on medical, surgical (including laser-assisted) and LLLT (G4-G5) is significantly higher than percentage of improvement obtained in G1, G2 and G3. The management of BRONJ is still controversial: the introduction in the treatment protocols of laser-assisted and surgical approach could improve the therapeutic results.

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Laser surgical excision of HPV-related lesions of the oral cavity

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Objectives

Human Papilloma Virus (HPV) is a DNA virus with tropism for stratified squamous epithelium that covers skin and mucosa. More than 100 genotypes of HPV are known and they are classified into high-risk and low-risk genotypes, according to their power of malignant transformation. In oral cavity, the most common lesions are squamous papilloma, condyloma, oral wart and focal epithelial hyperplasia. The treatment for these lesions is surgical, by scalpel or by laser.

Materials and methods

Laser used for the surgery are CO_2 laser (10.6 μm) and Diode laser (808 nm). Surgical laser technology is improving. In fact, for the diode laser several flexible fiber are currently in use and the CO_2 lasers present articulated arm and it s a no contact device. These flexible lasers and articulated arms have overcome some of the line-of-sight limitations and now offer the ability to work around the base of tongue or the retromolar trigone, where HPV-related lesions are often located. Some clinical cases of oral HPV lesions treated by laser are presented in this study.

Results

Laser surgery allows a simplified surgical technique, shorter duration of operation, minimal postoperative pain, minimal scarring, bloodless field, very accurate cutting, reduced post-operative edema, no need of suture and the possibility to realize minimally invasive surgery. Moreover, according to other studies, these tools guarantee a minor load of HPV after surgical excision than the one obtained by scalpel, thanks to their thermal action. It is very important to decontaminate and completely eradicate viruses from squamous epithelium to avoid recurrences and malignant transformation.

Conclusions

According to the literature data and to our experience, laser surgery of HPV lesions can be considered the gold standard technique.

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Laser treatment of oral vascular malformations: suggestion for a technique to avoid thermal damage

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Objectives

Transmucosal Thermophotocoagulation (TMT) is a no-contact laser technique for the treatment of superficial vascular malformations in the oral cavity. The laser effects depend on both parameters used (wavelength, power, time/mode of emission and spot size) and chemical and physical properties of the target tissue. In fact, even using a safe technique such as TMT, thermal damage can result, due to the continuous irradiation with the scanning movement, applied as if the lesion must be erased. Exceeding the temperature of 100°C, the tissue is carbonized and the result could be a scar. The aim of this study is to suggest a technique to avoid epithelial thermal damage during the use of laser.

Material and Methods

To prevent thermal damage in superficial lesions (almost 1cm in depth), Miyazaki et al suggests a multiple-spot technique with single pulsed wave instead of the continuous irradiation with the scanning movement. In the multiple-spot technique the margins of each application of 2–3mm are separated by at least 2–3mm, similarly to "leopard spots" in order to prevent the spot overlap that can cause the increasing of the temperature in the involved area. Irradiation has to be interrupted until a color change of the lesion occurs. Some clinical cases treated with this innovative technique are presented in this study.

Results

According to literature data and to our experience, the multiple-spot technique allows to remove the lesions with good healing and aesthetic results. In fact, re-epithelization takes place smoothly from the margins of remaining untreated normal mucosa.

Conclusions

Compartmentalization and serial steps could be useful in laser treatment of oral vascular malformations, in order to prevent excessive thermal damage of surrounding tissue and guarantees a wound healing and a better post-operative period.

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Chlorhexidine digluconate and sodium hyaluronate solution. A support in oral soft tissue wound healing after laser biopsy: a randomized double blind clinical study

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Objectives

Wound healing by secondary intention is one of the greatest advantages of laser devices. It permits to not use suture, consequently being less stressful, with less discomfort and less plaque accumulation, a condition that can delay healing. Scientific evidences showed that wound healing can be facilitated and accelerated by the application of sodium hyaluronate by stimulating fibroblasts, also increasing the production of growth factors and the biosynthesis of several types of collagen.

Matherials and Methods

In this randomized double blind clinical study it was compared the secondary intention healing process of oral soft tissues and postoperative pain after laser surgery, with or without a solution of 0.2%Chlorhexidine Digluconate and 0.2%Sodium Hyaluronate (CURASEPT® Collutorio ADS020 Trattamento Rigenerante, CURADEN HEALTHCARE, Saronno, Italy). Aim of this study was to evaluate the efficacy of this compound in improving laser wound healing, comparing it with the use of only Chlorhexidine.
Patients affected by benign oral lesions like fibromas, mucoceles and HPV lesions, have been recruited, subjected to excisional biopsy performed with a Diode Laser (808nm+/-5, 100mW- 3.0W in CW, with a fiber diameter of 400µm, SOL®, DenMat Italia srl, Baronissi, Italy) and randomly divided into 3 groups. Study group received treatment with CURASEPT® Collutorio ADS020 Trattamento Rigenerante immediately after surgery and 2 times daily for 2 weeks. Control Group received treatment with 0.2% Chlorhexidine Digluconate (CURASEPT®Collutorio ADS020) with the same protocol. Placebo Group followed the same protocol, but receiving a neutral solution, predisposed by CURADEN HEALTHCARE, having the same organoleptic charateristics.

Results

Using a L-shaped benchmark and computer software, the lesion area was measured after surgery, after 7 and 14 days, calculating a Percentage Healing Index. Numeric Rating Scale was used to evaluate postoperative pain.

Conclusions

First data showed a general absence of postoperative pain in all groups, confirming the intrinsic advantage of laser.

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New at home low level laser therapy protocol in the treatment of the pain related to temporomandibular joint disorders

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Objectives

Temporomandibular joint disorders (TMJDs), are often associated with chronic, long lasting pain.
Low level laser therapy (LLLT) whose therapeutic properties reduce inflammatory processes, ensuring analgesia, has been recently introduced in its treatment; frequent criticisms to LLLT are the possible placebo effects and its feasibility, since long protocols interfere with normal clinical activity and patients' quality of life.
This study introduce a new "at home" LLLT protocol by a portable diode laser, evaluating: feasibility, efficacy and placebo effects.

Material and Methods

This protocol previews 2 applications a day, over painful areas by 808nm portable diode laser (B-cure, GD Energies Ltd, Haifa, Israel), for 1 week. Each application has 8' duration, emitting 40J. The first application will be performed by laser expert examiner, serving as training, then patients will continue treatments at home. Ninety adult patients with TMJD related pain will be enrolled and randomly subdivided by a computer in 3 groups (n=30). The Study Group (SG) will receive effective irradiations; Placebo Group (PG) will receive sham irradiations through devices, furnished by the same manufacturer, identical to effective ones but devoid of laser source. Remnants patients (Control Group, CG) will receive conventional drug therapy.
Patients who assumed analgesic drugs within 3 weeks from the trial, pregnant women, people affected by: neoplasms in the area of irradiation, epilepsy, coagulative or connective diseases will be excluded from the study.
Pain will be registered twice, before (T0), and after therapy (T1), through the Visual Numeric Scale (VNS), by a blinded examiner.

Results and Conclusions

The study will answer to questions about the possibility of successful LLLT protocol "at home" for improvement of patients' compliance and the feasibility of a long protocol by the same patients. Moreover the comparison SG/CG will show the analgesic potentiality of LLLT in TMJDs, while by the comparison SG/PG, will investigate placebo effects.

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Management of patients with coagulopathies or using anticoagulant drugs through laser devices

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Objectives

This work outlines the management through diode Laser of dental patient with hemostasis disorders (platelet abnormalities and abnormalities of coagulation factors) or using anticoagulant drugs (indirect thrombin inhibitors, direct thrombin inhibitors, coumarin anticoagulants). It becomes particularly important when programming a more or less invasive surgical intervention, such as tooth extractions, biopsies and other dental treatments, as they can cause a hardly controllable bleeding. The diode Laser as active medium presents a solid semiconductor of gallium arsenide and aluminum and emits radiation corresponding to the wavelength of the infrared (808-980 nm). It can be used both in continuous and pulsed mode with programmable frequencies up to 10.000 Hz, with the conduction realized by means of optical fibers. The radiation beam emitted selectively acts on the tissues with pigments (mainly hemoglobin) sensitive to the wavelength of 808-980 nm, whereby mucosa, richly vascularized, are among the elective targets of Laser light. This combination results in a concomitant cutting and coagulation of target tissue with selective action.

Material and Methods

Three clinical cases are presented: photocoagulation of vascular malformation in a patient with coagulopathy, fibroma removal in a patient with thrombocytopenia and removal of inflammatory hyperplasia in a patient taking anticoagulant drugs.

Results

In all three cases the use of the diode Laser has guaranteed a bloodless operatory field and wound healing by secondary intention, without requiring any suture execution.

Conclusions

According to these results, the diode laser can be currently considered a valid device in performing surgeries in these patients, which would be exposed to significant risks of bleeding with conventional surgery.

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Clinical and radiographic evaluation of alveolar ridge preservation using xenograft and PRF combined with photodynamic therapy

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Objectives

Tooth extraction determines a series of biological processes that significantly modify post-extraction socket or the alveolar ridge, leading to a substantial bone contraction. The primary aim of the study was to evaluate the regenerative potential of bone allograft and PRF combined with photodynamic therapy in post extraction sites. The secondary aim was to evaluate implant survival in patients treated with this technique of ridge preservation. The tertiary aim was to evaluate soft tissue healing after surgery.

Material and Methods

15 patients, requiring dental extractions, were selected for this study; clinical and radiographic data were collected at baseline. Patients were prepared for surgery that consisted in compromised tooth extraction, photodynamic therapy (use of stabilized hydrogen peroxide (Fixlite solution), as photosensitizer, and a diode laser (Oxylaser) with the following parameters: pulsed modality, power 2,5 Watt, Ton 20 µs, Toff 80 µs, frequency 10.000 Hz), heterologous bone and PRF graft, collagen membrane graft, suture. Collagen membrane was left exposed and healing was achieved by secondary intention. 9 months after, surgical reentry for implant placement was performed and data were collected.

Results

Data showed a minimal bone contraction after tooth extraction with this technique (average bone thickness reduction 0,07 ± 0,5 mm, average bone height reduction 0,14 ± 0,6 mm) that allowed implant placement in all cases with a survival rate of 96,2%.

Conclusions

Soft tissue healing was excellent with no adverse events or complications. This technique showed to be very effective and less invasive for patients.

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Microbiological evaluations of a new photodynamic therapy system in periodontal disease

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Objectives

Photodynamic therapy represents a novel therapeutic approach in the management of oral biofilms. the aim of this study was to evaluate the effects of a new PDT system combining a diode laser and a hydrogen peroxide photosensitizer on periodontal pathogens.

Materials and Methods

60 patients were selected for this study, showing periodontal disease and no systemic diseases. 30 patients underwent traditional non surgical periodontal therapy (scaling and root planning) and 30 patients underwent traditional non surgical periodontal therapy combined with a new PDT system, which is based on the use of stabilized hydrogen peroxide (Fixlite solution), as photosensitizer, and a diode laser (Oxylaser) with the following parameters: pulsed modality, power 2,5 Watt, Ton 20 µs, Toff 80 µs, frequency 10.000 Hz. Microbiological evaluations were performed at baseline and three months after treatment using PCR tests for *Aggregatibacter actinomycetencomitans, Porphiromonas gingivalis, Tannerella forsithia, Treponema Denticola, Fusobacterium nucleatum, Campylobacter rectus, Eikenella Corrodens* and total bacterial count.

Results

Microbiological tests showed a decrease of each bacterial species evaluated and of total bacterial count both in control and test group. However test group showed a statistically significative greater reduction of each bacterial species and of total bacterial count (average reduction 97%).

Conclusions

This PDT system showed to be more effective in periodontal pathogens reduction after scaling and root planning if compared to traditional periodontal therapy alone.

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A new combined approach in the treatment of bisphosphonates-related osteonecrosis of the jaws

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Objectives

Long-term data concerning the appropriate management of bisphosphonate-related osteonecrosis of the jaw (BRONJ) are not up today available.
The new perspectives based on the utilization of high technology instruments during the different steps of interventions, also combined with promoters of tissue repair, are characteristic of the modern oral surgery.
The advantages consist in better compliance of the patients (reduction of pain and inflammation, bleeding control) and real opportunities for soft and hard tissues healing.

Materials and Methods

Several cases of Bisphosphonates-related Osteonecrosis of the jaws (BRONJ) were observed at the Odontostomatology and Maxillo-Facial Surgery Unit of the Hospital of Piacenza and a surgical approach was performed by using different devices: Piezosurgery for removing the necrotic bone tissue and also for obtaining the bone specimen necessary for histological analysis; Er:YAG laser (2940 nm) to vaporize necrotic hard tissue until bleeding bone; Platelet-Rich Plasma (PRP) to stimulate hard and soft tissue healing; diode laser (808 nm) to biostimulate the surgical site.

Results

All treated patients reported a good postoperative comfort without use of painkillers, absence of bleeding and fast healing processes. Histological exams were of good quality without artefacts.

Conclusions

Sequential utilization of different high technologies devices during all the steps of Bisphosphonates-related Osteonecrosis of the jaws treatment allows to perform a faster and less invasive surgery with a more comfortable postoperative healing process and it represents a new and innovative approach in this severe adverse event.

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Operative limits and possibilities of the erbium laser use in special care dentistry patients conservative

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Objectives

The main priority in the management of the population with behavioral problems is to gain the confidence to facilitate the achievement of therapeutic success.
Unpleasant stimuli, such as the injection of local anaesthesia or the noise and vibration of rotary instruments, may provoke anxiety and subsequent low compliance until the treatment refusal.
The use of Er:YAG laser in conservative dentistry had a great development in these last years also thanks to new devices with great advantages when compared to the conventional instruments.

Materials and Methods

The aim of this report was to show the advantages of the Er:YAG laser in the conservative treatment of Special Care patients. Based on the experience gained on conservative laser-assisted treatments performed in a time of 5 years at our Unit, we performed a retrospective analysis of the results achieved using this device in three main groups of disabilities with behavioral disorders: cognitive impairment, cerebral palsy and autism.

Results

A high percentage of patients with intellectual deficit allowed to perform the caries removal with success, while in the other two groups the results were lower.

Conclusions

Although the Er:YAG laser, in our clinical experience, demonstrated a high effectiveness only in patients with cognitive impairment, the poor results obtained in the other two groups allowed us to increase the treatment options towards severe behavioral disorders. Therefore we may affirm that Er:YAG laser may be considered as a good way to improve the cooperation, to reduce anxiety related to rotating instruments and to reach better results with equal or shorter operating times in the Special needs patients.

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Bilaminar connective tissue grafts: laser irradiated dentinal root surfaces vs conventional technique

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Objectives

The rationale for the use of diode laser as an aid in gingival recession arises in the presence of several studies in literature attesting the effectiveness of this tool to reduce the active periopathogenic bacterial charge.
The aim of our study is to evaluate the effectiveness of the Diode laser for decontamination and conditioning of exposed root surface through the use of the of Langer and Langer modified technique associated with connective tissue graft from the palate with sampling carried out with the modified 'L-shaped incision according J.Bruno's technique.

Materials and Methods

8 patients were randomly divided in 2 groups: 4 in the "test" group treated with diode laser and 4 in the "control" group treated with ambramycin application, a local antibiotic. The established parameters that have been detected for each patient at an early stage before intervention and in the following controls at 50 days and 3 months are: Probing Depth, Recession, CAL, KT, Hypersensitivity (NRS), % Root coverage.

Results

Laser technique has proved effective for root decontamination first of the connective tissue graft placement on the donor site, although there was no statistically significant when the comparison was done between the control group (ambramycin).

Conclusions

The use of the diode laser to decontaminate and condition the surface of the exposed root would seem a safe and effective procedure not inferior to the conventional methods. It would also be a quite practical procedure with higher ergonomic level because it speeds up the decontamination and conditioning step, essential for proper healing, reducing the discomfort for the patient. This procedure also avoids the increasing problem of antibiotic resistance.

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New consideration in laser vaporization of Oral Leukoplakia

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Objectives

Oral Leukoplakia (OL) is one of the most common premalignant lesions of oral cavity. It is defined by WHO as a white patch or plaque on the oral mucosa, that cannot be removed by scraping and cannot be classified clinically or microscopically as any other diseases.

Materials and Methods

After an incisional histopathological biopsy to confirm the diagnosis, there are different approaches for OL that depend on the size of lesion and the presence of dysplasia. These approaches are: "Wait and see", Pharmacological therapy, Surgical excision, Cryosurgery, Laser vaporization or Photodynamic therapy.
Definitive treatment of OL is very important because of its recurrence rate and its occasionally observed malignant. It is reported in literature that the rate of recurrence is 7.7-38.1%, while malignant transformation is 2.6-9%. Usage of CO2, KTP and Diode laser surgery for oral mucosal lesions in particularly for the treatment of OL has widely been recommended due to presence of many advantages.
Recently, new recurred patches of OL has been observed, that may originate from potentially unstable mucosa from the margins of the lesion.

Results and Conclusions

Therefore, it is worth that more investigations should be carried out by using laser vaporization treatment and at least one year of follow up, adding safety margins 3 mm in width also in depth, will help to avoid the potentially unstable mucosa. This new consideration not only may reduce the recurrence rate but also reduce the peripheral recurrence and the malignant transformation of oral Leukoplakia.

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The soft tissue management with CO2 laser in oral cancer patients

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Objectives

CO2 laser is characterized by high power, wavelength range between 9.600 and 10.600 nm, high affinity for water and achieving its action mainly through the photothermal effect without contact. Due to the undoubted advantages associated with the usage of CO2 laser in oral surgery of soft tissues, this equipment can be used in the management of any complications in patients who had surgical operations for oral cancer.

Materials and Methods

Specifically, we present two cases treated at MoMax division (Department of Oral and Maxillo-facial Sciences, Sapienza University of Rome) by CO2 to excise reactive hyperplastic inflammatory lesions that have been diagnosed histopathologically as a pyogenic granuloma. The first case, the predisposing factor of the pyogenic granuloma was a chronic mechanical trauma of the tooth 2.7 with a medical history of a maxillofacial intervention (4 years before) for removing of a giant cell tumor in the left side of the mandible and contextual reconstruction of it; the second case, was a chronic irritation of gingival tissue in the right side of the mandible near to osseo-integrated implants inserted after a maxillofacial surgery for the removal of an ameloblastoma in the same side of the mandible followed by simultaneous reconstruction (4 years before).

Conclusions

The CO2 laser, used for treating these clinical cases, showed multiple advantages such as: rapidity in surgical execution, control of hemostasis (precious cutting without suture), intra and postoperative comfort, high quality of healing and low risk of relapse for patients as a consequence of a poor secondary proliferation of collagen and capillaries.

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Effects of 1064NM, 500PS diode-pumped solid state laser (DPSS) on oral hard and soft tissues: a preliminary "ex-vivo" study

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Introduction

The Er:YAG laser in conservative dentistry is an effective alternative to conventional instruments. Though several studies had shown the advantages of these devices, some drawbacks and unsolved problems are still present, such as the cost of the devices, the large dimensions of the equipment and the lack of an ideal delivery system. In the present study, the effectiveness of dental surface ablation and the action of cut on soft tissue (pork tongue) with a picosecond infrared diode-pumped solid-state (DPSS) laser was investigated. *In vitro* tests on extracted human teeth were carried out, with assessment of the ablation quality in the tooth and thermal increase inside the pulp chamber.

Materials and Methods

The samples were exposed to laser energy at 1064 nm at a frequency of 30 kHz and a 500 ps pulse width. The target teeth were cooled during exposures and also soft tissue. The internal temperature of the pulp chamber and of the soft tissue samples was recorded with thermocouple.

Results

Optical microscope images showed effective ablation with the absence of carbonization and micro-cracks or ultra-structural damages (as confirmed by histological analysis). The cooling system (air-water spray) allowed to maintain the temperature rise in the pulp chamber below the permitted 5.5°C. Good results were also obtained on soft tissues: accurate cutting, absence of carbonization and ultra-structural damage and temperature increase control.

Discussion

The PS domain system used in the present study combined with cooling system (water flow spray), allows to achieve an effective and clean ablation with a controlled thermal effect in the pulp chamber. The results suggest that this system could be used in clinical practice with appropriate modifications.

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Clinical evaluation of chlorhexidine digluconate and sodium hyaluronate solution for oral soft tissue wound healing and pain after laser mucosal biopsy: a randomized double blind clinical study

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Background

Wound healing is characterized by processes finishing with the restoration of the structural and functional tissues integrity. Aim of the study is the evaluation of the efficacy of chlorhexidine digluconate and sodium hyaluronate solution after performing laser biopsies. Hylauronic acid is one of the first fibroblast products that tends to cover the wound space capturing water and creating a temporary gel in order to resist to compressive strenghts.

Study design

In this randomized double blind clinical study the inclusion criteria comprehended patients, after being subjected to laser biopsies not affected by systemic, haemostatic and clotting diseases, having a good dental hygiene evaluated through the use of plaque index full mouth plaque score (FMPS). Biopsies have been performed with the Diode Laser (808nm+/-5, 100mW- 3.0W in CW, with a fiber diameter of 400µm, SOL®, DenMat Italia srl, Baronissi, Italy) and patients randomly divided in 3 groups. The Study group has been treated with 0.2% Chlorhexidine Digluconate and 0.2% Sodium Hyaluronate (CURASEPT® Collutorio ADS020 Trattamento Rigenerante CURADEN HEALTHCARE, Saronno, Italy) immediately after surgery and 2 times daily for 2 weeks. The Control Group received treatment with 0.2% Chlorhexidine Digluconate (CURASEPT®Collutorio ADS020) using the same protocol of the study group. The Placebo Group has been subjected to the same protocol, but using a neutral solution, predisposed by CURADEN HEALTHCARE. Furthermore, the lesion area has been measured immediately after surgery, after 7 and 14 days by the use of a L-shaped benchmark and computer software (Photoshop Adobe Systems Incorporated) and the Percentage Healing Index (PHI) has been calculated. In addition to this, the Numeric Rating Scale (NRS) was used to evaluate postoperative pain. In conclusion, through the Literature analysis and our data, the increased speed healing process and the decreased post-operative pain due to this compound capability has to be studied.

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The diode laser 808nm in the daily clinical practice

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Objectives

The diode laser 808nm is constituted by a semiconductor active material which produces a radiation of a wavelength within the infrared, whose emission is continuous or pulsed, the beam is transported through optical fibers of different diameter depending on the application. It presents considerable affinity for the molecules of haemoglobin and melanin, so, it can be used in the treatment of oral soft tissues. In fact, its use is mainly surgical (Oral Pathology), but it can also be used in Endodontics, Periodontics and in the treatment of Dentin Hypersensitivity.

Materials and Methods

This oral presentation will show through clinical case series, the possible uses of this diode laser 808nm (SOL®, DenMatItalia, Italy), starting with clinically benign lesions (fibroma, HPV lesions, mucocele, lipoma, angioma), going through other applications as in endodontics, periodontics and dentin hypersensitivity treatment.

Results

In all the treated cases this device has shown the well-known advantages of a diode laser of manageability and minimally invasiveness in association to increased patient compliance, small amounts of local anaesthetic infiltrations, good precision in the cut and absence of suture thanks to haemostasis. It was always possible to obtain a certainty diagnosis and a correct reading of peri-incisional margins in the oral pathology cases, confirming a histological study "in vivo" carried out by our group-work. We also obtained decontamination and better healing in endodontics and periodontics applications. The dentin hypersensitivity cases have been treated with symptoms reduction.

Conclusions

Diode laser 808nm is a device that can help to manage a lot of clinical situations. Through its greater potential can be found within surgical field, compared with traditional techniques, it can also be useful in other important everyday applications in dentistry.

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Photodynamic therapy in the management of the periodontal disease: a clinical trial study

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Objectives

The aim of this randomized controlled clinical trial was to evaluate the effects of Photodynamic therapy (PDT) as an adjunct to full-mouth debridement in the treatment of chronic periodontitis.

Materials and Methods

This study evaluated 11 patients, all non-smoking, each of whom having periodontal chronic untreated disease with pockets ≥ 3 mm in at least 4 teeth. Exclusion criteria were the presence of systemic diseases that can interfere with the success of treatment. After the compilation of the periodontal chart, each patient was submitted to scaling and root planning (SRP). Using a split-mouth design, 2 dials (Test group) were subjected to additional treatment with PDT, the other two (Control group) received only the treatment of SRP.
The treatment of PDT for the Test group was performed using HELBO®TheraLite (Bredent medical, Italy), a diode laser battery powered with a wavelength of 670 nm and output of 75 mW/cm2. As the photosensitizer was used Helbo Blue photosensitizer.

Results

Compared to the baseline, the reduction of pocket depth (PD) media was 1.44mm in Test group and 1.33 mm in the control group. A slight improvement in the Test group was underlined.

Conclusions

The application of PDT is a promising support to the methods of SRP, it could be a valuable aid in the management of pre-surgical phase and in long-term treatments. The advantage of this approach seems to include safety of adjacent host tissue with preservation of both marginal tissues and root cementum, healing of sites with limited access for mechanical instrumentation.

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In vitro retrospective measurement of temperature rise caused by laser irradiation of teeth using electronic paramagnetic resonance (EPR) spectroscopy

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Objectives

The aim of the present study is to verify if the electron paramagnetic resonance (EPR) spectroscopy may be used to retrospectively detect the thermal permanent effects generated by edge crossing laser-based dental care techniques in the volume of treated teeth and eventually to assess the temperature to which the treated tissue has been locally heated.

Background

It is well known that laser application in dentistry clinical procedures (endodontics, periodontology, bleaching and treatment of dentine hypersensitivity) can improve or in some cases determine the therapeutic success of a treatment. Lasers create thermal damage to the target tissues by a photo-thermal effect and a side effect of this reaction is an increase in the temperature of the surrounding non-target tissues; the heating of these non-target tissues may create a permanent or reversible damage. Literature studies often do not agree about the parameters (power, energy, frequency and fluence) to use for each type of laser treatment usually employed in dentistry clinical procedures in order to maximize the success rate and to reduce the possibility of producing permanent damages on non-target dental tissues.

Study design

To this aim, the investigation of the thermal damages produced on dental tissues by different types of lasers commonly employed in clinical routine is crucial. EPR spectroscopy may be used for this purpose, as it is the only method for direct detection, identification, and quantification of radicals. The EPR retrospective detection of thermally generated radicals can provide a complementary method of assessment of temperature increase in teeth, validating cameras and thermocouples records and FEM calculations. EPR measurements would allow to avoid distortions generated during the thermocouples' records and to make a comparison with the FEM evaluations feasible.

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Photodynamic therapy in periodontal therapy: clinical trial study

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Objectives

The aim of was to evaluate the effects of Photodynamic therapy (PDT) as an adjunct to full-mouth debridement in the treatment of chronic periodontitis.

Materials and Methods

This study evaluated 11 patients, all non-smoking, each of which having periodontal chronic untreated disease with pockets ≥ 3 mm in at least 4 teeth. Exclusion criteria were the presence of systemic diseases that can interfere with the success of treatment.
After the compilation of the periodontal chart, each patient was submitted to scaling and root planning (SRP). Using a split-mouth design, 2 dials (Test group) were subjected to additional treatment with PDT, the other two (Control group) received only the treatment of SRP.
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Results

The reduction of pocket depth (PD) media, compared with the baseline, was 1.44mm in Test group and 1.33 mm in the control group. A slight improvement in the Test group was underlined.

Conclusions

The use of PDT is a useful support to the methods of SRP, it could be a valuable aid in the management of pre-surgical phase and in long-term treatments. The advantage of this approach seems to include safety of adjacent host tissue with preservation of both marginal tissues and root cementum, healing of sites with limited access for mechanical instrumentation.