BLUE LASER-ASSISTED EXCISION OF ORAL SQUAMOUS CELL PAPILLOMA ON SOFT PALATE: CASE REPORT

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Aim: oral squamous cell papilloma is a benign hyperplastic exophytic localized proliferation with a verrucous or cauliflower-like morphology, with a sessile or pedunculated base. This case report aims to share our experience with using blue diode laser for surgical excision of Human Papillomavirus (HPV) oral lesion on the soft palate.

Methods: a 53-year-old male presented to our department for presence of a verrucous lesion on soft palate with diameter of 0,7 mm. Complete surgical excision of the lesion with an area of perilesional tissue to prevent recurrence was performed using blue diode laser (445 nm) with parameters; power of 1.8 Watts in pulsed mode, and fiber diameter of 320 µm.

Results: the histological report confirmed diagnosis of oral squamous cell papilloma. Optimal healing was observed in 3 months follow-up without recurrence.

Conclusions: HPV oral lesions treatment of choice remains the complete surgical excision of disease site.

Laser surgery offers numerous advantages over traditional scalpel excisional biopsy for the treatment of papillomatous lesions. These advantages include greater precision cutting, reduced intraoperative bleeding, a reduction in postoperative pain and swelling, and improved healing.

The use of a laser for excision of this lesion with its particular localization provides better accessibility without the need for suturing and possibility of performing the procedure on an outpatient basis. In addition, the generated heat by laser may increase the viral destruction on the wound bed after excision and may eventually decrease the rate of recurrence.

EFFECTS OF PHOTOBIOMODULATION ON LIP EROSIVE LICHEN: EVALUATION WITH CAPILLAROSCOPY

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Aim: the aim of this case report is to evaluate the regenerative and biostimulatory potential of Photobiomodulation (PBMT) in tissues affected by oral erosive lichen planus. Lip erosive lichen planus requires treatment to prevent pain, persistent ulcerations and impairment of oral function. Without therapy, it can cause difficulty in feeding and speaking, as well as an increased risk of superinfections. Furthermore, early management reduces the risk of malignant transformation.

Methods: a patient affected by labial erosive lichen planus was treated with PBMT to reduce the painful symptoms and biostimulate the ulcerated tissue to promote tissue regeneration. The patient underwent two sessions per week of PBMT for five consecutive weeks, lasting three minutes per session, with alternating wavelength diode laser. At the beginning and end of the session, an assessment with capillaroscope was performed, to evaluate whether PBMT could have an effect on tissue microcirculation to promote tissue healing. In addition, the VAS and SWAS scales were evaluated at each appointment.

Results: at the end of the five weeks, the erosive labial lesion was significantly reduced in size and the painful symptoms had regressed. In the assessments carried out by the capillaroscope, it is possible to observe a statistically significant result on the increase in capillary ramifications, an increase in capillary diameter and therefore in neoangiogenesis.

Conclusions: photobiomodulation can be a therapy that can be used to reduce the symptoms of erosive labial lichen, also confirmed at the microscopic level.

Doi: 10.19256/abstract.cduo.07.2025

VERRUCOUS CARCINOMA OF THE TONGUE ON EROSIVE LICHEN PLANUS: SURGICAL TREATMENT WITH ND:YAG LASER, CROSS-LINKED HYALURONIC ACID AND RESORBABLE CELLULOSE MEMBRANE

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Aim: Oral Erosive Lichen Planus (OELP) is an immune-mediated disorder characterized by painful ulcerative and erythematous lesions, with a known risk of malignant transformation. Early detection and management of suspicious lesions are crucial. The aim of this report is to assess the efficacy of a combined approach using Nd:YAG laser, cross-linked hyaluronic acid gel (xHyA) and Surgical oxidized cellulose resorbable membrane in the treatment of verrucous carcinoma of the tongue on OELP.

Methods: a 70-year-old female patient, HCV positive, presented with a well-defined, non-ulcerated white plaque on the tongue dorsum. An incisional biopsy performed in November 2024 revealed verrucous carcinoma with lichenoid dysplasia. Surgical excision was performed under loco-regional anaesthesia using Nd:YAG laser. Afterward, an xHyA gel administrated via syringe was applied to the bottom of the wound and a pre-shaped cellulose resorbable membrane was placed to match the defect profile.

Results: follow-up demonstrated rapid, inflammation-free healing: after 3 months the re-epithelialization of the wound was complete without functional impairment.

Conclusions: our approach shows encouraging results in wound healing: the Nd:YAG laser, absorbed by melanin and hemoglobin, enhances hemostasis. xHyA gel is a hygroscopic and viscoelastic substance that accelerates tissue regeneration, ensuring high patient tolerability. However, further studies are needed to evaluate benefits and potential applications of this combined approach.

CROSS-LINKED HYALURONIC ACID AND ER: YAG LASER IN THE SURGICAL MANAGEMENT OF MEDICATION-RELATED OSTEONECROSIS OF THE JAWS: EFFECTIVENESS ON POST-OPERATIVE RECOVERY - A CASE REPORT

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Aim: Medication-Related Osteonecrosis of the Jaw (MRONJ) can occur in patients receiving antiresorptive or antiangiogenic drugs. Treatment remains controversial with no standardized protocol. This case illustrates a laser-assisted surgical approach using Er:YAG (2490 nm) and cross-linked hyaluronic acid (xHyA), enabling precise necrotic bone removal and enhanced healing through the regenerative, anti-inflammatory, analgesic properties of xHyA and the bactericidal, biostimulatory effects of the laser.

Methods: a 77-year-old female with osteoporosis on Alendronate therapy was referred for a spontaneous left mandibular stage II MRONJ, which had been present for at least 18 months. Computed Tomography revealed extensive bone remodeling extending beyond the mandibular canal. Initial treatment included 2 antibiotic cycles (amoxicillin 1g and metronidazole 500 mg). Surgery involved a full-thickness triangular flap, meticulous isolation of the inferior alveolar nerve, bone resection and Er:YAG laser ablation. xHyA gel (1.6% xHyA, 0.2% native HA) was applied before flap closure. Patient underwent a complete cycle (4 applications) of photobiomodulation.

Results: postoperatively, the patient reported temporary paresthesia, managed with α-lipoic acid 5%. At six weeks complete healing with mucosal closure, no bone probing and full recovery of lip sensitivity were observed, stable at 2-year follow-up.

Conclusions: according to our results, Er:YAG laser and xHyA combination is effective in managing patients affected by MRONJ, highlighting encouraging clinical and biological advantages.

PHOTOBIOMODULATION WITH ATP38 IN TISSUE REGENERATION FOR IMPLANT-PROSTHETIC REHABILITATION

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Aim: Photobiomodulation (low-level laser therapy LLLT), involves the application of low-intensity light (red or near-infrared spectrum, 600-1000 nm) to tissues to stimulate cellular processes, including wound healing, pain reduction, and tissue regeneration. There is an improvement in the stimulation of the cytochrome c oxidase and increase in adenosine triphosphate ATP production, and there is an absorption of light energy by chromophores within cells, leading to biochemical changes that influence gene expression, cellular proliferation, and tissue repair, supporting its use in dentistry, dermatology, and musculoskeletal disorders.
Methods: an 82-year-old patient, diagnosed with Non-Hodgkin's lymphoma in 2016 and treated with chemotherapy until October 2017, presented in July 2020 with the spontaneous loss of tooth 15, without generalized periodontitis. After laser-assisted decontamination and regeneration, external PBM sessions with ATP38 were performed biweekly from July to November 2020. Two implants were placed in sites 15 and 16, two months apart. Following fractures of teeth 34-35, two implants were inserted, but rapid onset of apical bone lesions occurred.
Results: thanks to multiple ATP38 PBM sessions, the condition has been stabilized, allowing successful implant-prosthetic rehabilitation.
Conclusions: PBM can be a fundamental aid for dental care. Photobiomodulation, performed with ATP38 twice a month, may have contributed to rebalancing osteoclastic functions, effectively promoting and consolidating bone regeneration and implant stability.

LASER ASSISTED BONE REGENERATION WITH THE USE OF TMI AND FLAT TOP HANDPIECES

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Aim: photobiomodulation, or low-level laser therapy, is a non-invasive therapeutic technique that involves the application of low-intensity light (600-1000 nm) to biological tissues. This process stimulates cellular activity, promoting tissue repair and reducing inflammation; it can significantly improve the regeneration of both soft and hard tissues.
Methods: patient with a previously devitalized and restored upper first molar (tooth 26) presented with a periapical lesion. A prior apicoectomy worsened the condition, creating a vestibular bone fenestration. Upon evaluation, it was decided to extract the tooth and proceed with regeneration using PRF and natural bone substitute. The bone regeneration was preceded by decontamination with a diode laser and hydrogen peroxide (H_2O_2). Photobiomodulation therapy was performed every two weeks for four months, both internally using a diode laser with the TMI (Total Mouth Irradiation) handpiece and externally with the Flat Top handpiece, which ensures uniform energy distribution across the treated area. After four months an implant was placed, followed by additional sessions of internal and external photobiomodulation every two weeks.
Results: radiographic imaging demonstrated significant regeneration of both soft and hard tissues, after both external (flat top) and internal (TMI) photobiomodulation.
Conclusions: photobiomodulation performed every two weeks can enhance bone regeneration and long-term bone levels stability.

LASER-ASSISTED EXCISION OF PYOGENIC GRANULOMA ON LOWER LIP: CASE REPORT

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Aim: the study aims to share our experience with the laser-assisted excision of Pyogenic Granuloma (PG), which is uncommonly localized extraorally on the lower lip.

Methods: a 67-year-old male was referred to our department for a lesion that extended outward from the lower lip on left side. The lesion dimensions were 1.5 x 0.6 x 0.5 cm. It had a sessile base and had an ulcerated exophytic surface exhibiting colour variation. The upper part appeared older and darker, while the lower part appeared more erythematous and ulcerated.

Results: an excisional biopsy of the lesion was performed using a combined technique. Initially, the exterior portion was incised with a cold blade; subsequently, a diode laser (445 nm) was employed at a power of 2 watts in continuous mode to excise the deeper portion and effectively control bleeding, promoting hemostasis. The excised lesion was immediately fixed in formalin. The histological examination confirmed the diagnosis of PG. The patient is under routine follow-ups.

Conclusions: PG is a benign, vascular lesion commonly found on the skin or mucous membranes. It is often associated with trauma, medications, or hormonal factors. Surgical excision is the preferred treatment. The use of a diode laser offered superior coagulation and reduction of predicted bleeding and enhanced the healing outcomes with minimal postoperative pain. The combination of laser excision and the lesion's unusual localization and presentation makes this case particularly noteworthy. Given the reported risk of recurrence, long-term follow-up is recommended.

USE OF LASER IN THE TREATMENT OF MUCOCELES IN PEDIATRIC DENTISTRY

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Aim: the purpose of this study is to report a case of a pediatric patient with two mucoceles and a ranula that emphasizes the effectiveness and benefits of laser technology as an alternative minimally invasive procedure, substituting most conventional surgical techniques.

Methods: the patient underwent conscious sedation with oral midazolam (5 mg) and was monitored throughout the procedure using a pulse oximeter. Perilesional anesthesia was administered before excising the lesions with a 980 nm wavelength laser ("Leonardo", Dental Medical Technologies, Lissone, Italy) with a 320 µm optical fiber The laser used was the Leonardo model from DMT, operating at a power of 2.0 Watts in Continuous Wave (CW) mode. No sutures were required post-procedure.

Results: a follow-up examination was performed at 14, 30, and 180 days after the procedure. The wound on the floor of the mouth and lip was fully healed, with complete tissue repair and no signs of infection or complications. The clinical outcome was satisfactory, with no adverse effects observed.

Conclusions: the laser technology was found to be an effective and minimally invasive method for the excision of mucoceles and ranulas. The procedure was well tolerated, it required no sutures, and it promoted rapid healing with minimal discomfort. These findings support the use of laser therapy as a valuable alternative to conventional surgical techniques.

EFFECTIVENESS OF DIODE LASER IN TREATING ORAL-MUCOSAL VASCULAR LESIONS IN SYSTEMIC SCLEROSIS PATIENTS: A CASE SERIES

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Aim: Systemic Sclerosis (scleroderma, SSc) is a rare autoimmune disease characterized by skin and organ fibrosis and microvascular damage. Oral manifestations, affecting about 40% of patients, result from collagen deposition in tissues and around nervous and vascular structures. These include xerostomia, microstomia, caries, periodontal disease, enamel erosion, mandibular resorption, trigeminal neuropathy, and telangiectasia. This review summarizes recent studies on systemic sclerosis. A case series evaluated the effectiveness of diode laser in treating vascular lesions of the labial and oral mucosa.
Methods: after applying topical lidocaine, 5 female patients (ages 50-65) with confirmed systemic sclerosis underwent diathermocoagulation of vascular lesions using a diode laser (980 nm and 645 nm, 3 W, 300-micron fiber) with the diascopy technique.
Results: the treated patients reported no pain, postoperative bleeding, or discomfort and did not need pain relievers. No septic complications were observed. Clinical improvement was noted, with full recovery after 15 days. Follow-up visits every 15 days for four months confirmed the stability of the diode laser treatment, with no recurrences.
Conclusions: the correct use of diode laser for treating low-flow oral-mucosal vascular lesions, even in scleroderma patients, provides significant, stable therapeutic effects. The treatment results in reduced healing times, satisfactory aesthetic outcomes, and the absence of infectious complications and pain.

Q-SWITCHED ND:YAG LASER TO TREAT GINGIVAL PIGMENTATION: A CLINICAL *IN VIVO* ASSESSMENT

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Aim: gingival melanin hyperpigmentation, although benign, can compromise smile aesthetics and patient satisfaction. This study explores a transepithelial laser-based strategy for managing this condition using a Q-Switched Nd:YAG device, aiming to assess its clinical efficacy and patient tolerability.
Methods: ten individuals with varying degrees of gingival pigmentation underwent treatment with Q-Switched Nd:YAG laser, following a standardized protocol. The procedure was completed in up to four sessions per patient, all performed without local anesthesia. To quantify outcomes, the Oral Pigmentation Index (OPI) and Melanin Pigmentation Index (MPI) were recorded at baseline and three weeks after the final session. Patient-reported discomfort was assessed via the Numeric Rating Scale (NRS) on days 1, 3, and 5 post-treatment.
Results: full depigmentation was observed across all cases, with minimal discomfort reported (NRS 0-3), and no major adverse effects noted. Follow-up at one year confirmed stable results without recurrence.
Conclusions: the Q-Switched Nd:YAG laser, applied transepithelially, appears to be a safe, non-invasive, and effective option for treating gingival melanin hyperpigmentation, offering durable esthetic improvement with high patient acceptance.

EVALUATION OF THERMAL DAMAGE IN LASER-ASSISTED EXCISION OF POTENTIALLY MALIGNANT DISORDERS (OPMDS) USING OPTICAL COHERENCE TOMOGRAPHY (OCT)

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Aim: the use of diode laser in surgical excision of OPMDs has reported advantages about invasiveness and post-operative comfort, although the thermal effect could lead to alterations of the surgical piece. This study aims to evaluate the laser thermal effects using OCT to confirm the absence of alterations in the diagnostic interpretation and to validate OCT as a tool for ultrastructural and morphometric supervision in such lesions.

Methods: 15 patients referred to Dental School of Turin with clinical and histologicaldiagnosis of OPMDs without dysplasia - maximum size of 1.5 cm - were selected. Diode laser in contact mode with continuous emission was used and scans with SD-OCT were performed on the surgical samples. Histological slide measurements of the tissue margins were taken and compared with the corresponding OCT scans.

Results: 15 samples diagnosed with leukoplakia without dysplasia (8M - 7F) were evaluated. Histologically, the mean epithelial damage was 288.9 μm and connective tissue damage 430.30 μm; OCT scans showed an average remodeling of 0.028±0.05 mm and of 0.040±0.05 mm respectively. Comparison of OCT scan and slide showed an average concordance of 88.5%.

Conclusions: using diode laser can be a safe procedure for patients with OPMDs. No thermal effects produced artefacts altering the analysis of the scans. The high concordance index validates the potential use of this device for supervision of post-excision tissues both in the evaluation of marginal thermal damage and in pathological diagnosis by defining the morphological patterns of OPMDs.

SEM ANALYSIS OF PROPOLIS PENETRATION INTO DENTINAL TUBULES OF EXTRACTED TEETH: A PILOT STUDY

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Aim: this *ex vivo* pilot study evaluated the penetration of a 10% ethanolic propolis solution into dentinal tubules following standard irrigation protocols, with or without the application of an 810 nm diode laser.

Methods: nineteen extracted maxillary central incisors were used. Eighteen were prepared to size #40 and irrigated with 5.25% sodium hypochlorite and 17% EDTA; one was left untreated as a negative control. The first experimental group received diode laser pretreatment (810 nm, 0.8 W, 3 × 30 s, spiral motion), followed by 10% ethanolic propolis, left to evaporate. While the second group received the same protocol without laser. Longitudinal sections were analyzed by SEM (up to 1000×) to assess propolis penetration into dentinal tubules in the apical, middle, and coronal root regions.

Results: SEM revealed good tubule occlusion in the apical and middle thirds, less in the coronal region. Penetration depth was limited to a few microns but was deeper and more uniform in laser-treated samples. Sodium hypochlorite favored tubule opening in coronal and middle areas, aiding penetration; smear layer was observed apically. No thermal or structural damage was detected.

Conclusions: overall, the 10% ethanolic propolis solution was effective in occluding dentinal tubules, and pretreatment with a diode laser further enhanced its depth and uniformity of penetration. The combined protocol may be a promising addition to conventional endodontic disinfection and sealing methods.

LOW-LEVEL LASER THERAPY (LLLT) AS A TREATMENT FOR ORAL MUCOSITIS: AN *IN VITRO* STUDY

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Aim: this study aims to evaluate the effects of diode laser irradiation on the proliferation and migration of Human primary Gingival Fibroblasts (HGF) cultured *in vitro*. The objective is to provide experimental evidence supporting the use of Low-Level Laser Therapy (LLLT) to enhance oral soft tissue healing, particularly in the context of oral mucositis.

Methods: cells were cultured under standardized conditions and divided into two groups: a test group, subjected to diode laser irradiation (635 nm, 40 mW, 5.0 J/cm², 45 Hz), and a control group, which was not irradiated. A wound healing assay was performed, and cell proliferation and migration were monitored using a phase-contrast inverted optical microscope. Images were analyzed with ImageJ software to quantify changes in wound closure.

Results: after 24 hours, the test group showed significantly higher cell density compared to the control group. At 48 hours, cell densities between groups were comparable; however, the test group exhibited more regular wound margins and greater mitotic activity (24h: 16 *vs* 1, 48h: 12 *vs* 3). Wound closure rates were 76% in the test group and 72% in the control group, indicating enhanced cell proliferation associated with LLLT.

Conclusions: LLLT demonstrated a positive effect on cell proliferation, though no improvement in cell migration was observed. Further investigations are required to establish optimal dosing parameters, exposure durations, and potential synergies with other therapeutic strategies to maximize wound healing outcomes.

ERBIUM:YAG LASER AND PERI-IMPLANTITIS: A CRITICAL REVIEW OF THE LITERATURE

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Aim: this study aims to compare post-operative discomfort after surgical treatment of peri-implantitis using two approaches: 1. debridement with manual instruments followed by air-spray polishing and 2. debridement with manual instruments followed by irradiation with Erbium:YAG (Er:YAG) laser. Secondary outcomes include the evaluation of differences between clinical parameters (Probing Depth (PD), Clinical Attachment Level (CAL), Bleeding on Probing (BOP), and Suppuration (S)) among the 2 treatments.

Methods: a critical literature review was conducted through a keyword-based search on Medline using “periimplantitis”, “Erbium laser”, “Er:YAG” and “Er,Cr:YSGG” with the Boolean operator “AND”. The findings set the stage for an ongoing pilot study (approved by Ethics Committee AVEN – code: 7083) on 28 patients with peri-implantitis.

Results: the review included 38 articles: 25 *in vitro* studies (66%) and 13 *in vivo* studies (34%).

Seventy percent reported benefits by using the Er:YAG laser in peri-implantitis treatment. However, data shows high variability in laser settings (energy (30-500 mJ), frequency (10-20 Hz), and power (0.4-5 W)) outlining the lack of a standardized protocol and complicating the evaluation of laser efficacy.

Conclusions: Er:YAG laser is a highly promising and safe tool for the surgical treatment of peri-implantitis, offering high microbial decontamination capacity, minimal surface alterations, no thermal damage and good peri-implant bone response.

Further clinical studies are needed to assess its effects on periodontal parameters like CAL, PD, and BOP.

LASER TREATMENT FOR VENOUS MALFORMATIONS IN THE UPPER AIRWAY REGION: A SYSTEMATIC REVIEW

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Aim: laser therapy has recently been proposed as a treatment option for Venous Malformations (VMs), which are commonly found in the upper airways. This systematic review aims to evaluate the effectiveness of laser treatment in managing oropharyngeal VMs.

Methods: a comprehensive search was conducted across five major electronic databases: MEDLINE (PubMed), Scopus, Embase, Cochrane Library, and Web of Science. OpenGrey was also used to identify relevant grey literature. Articles published from 1900 to February 20, 2023, were considered, excepting those still in the publication process. Reference lists of selected studies were also manually screened for additional sources. Data regarding the clinical features of VMs, laser types and treatment protocols, therapeutic outcomes, and any reported complications were extracted. A qualitative synthesis was then performed.

Results: nine studies met the inclusion criteria and were analyzed. The Nd:YAG laser was used in seven studies, while two studies utilized a diode laser. Nearly all cases showed a volume reduction greater than 75% following treatment. No major complications were reported across the studies.

Conclusions: despite the lack of detailed clinical information in several studies, the findings suggest that laser therapy may serve as an effective and minimally invasive treatment for oropharyngeal VMs. Further controlled clinical trials are necessary to better define the role of laser treatment in this context.

THE EFFICACY OF LOW-LEVEL LASER THERAPY FOR DRY SOCKET TREATMENT

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Aim: dry socket is a fairly common, but painful, complication of any tooth extraction or dental surgery that causes delayed healing. Standard of care consists of antiseptic dressings (Alveogyl) to decrease bacterial load while reducing pain. The aim of this study is to assess LLLT in the management of the symptoms of alveolitis and to compare its effectiveness with standardized therapies.

Methods: a systematic review of the literature was conducted on PubMed, Lilacs, Web of Science, Scopus and Cochrane of articles published from January 2000 to September 2023. Methodology: In PubMed, the keywords “laser” and “dry socket” were searched together using Boolean operator AND. Overall, a total of 65 studies were identified; five of which met our inclusion and exclusion criteria as described above for systematic review and meta-analysis. The meta-analysis comparison was performed for LLLT by Alveogyl with the symptom relief of Alveolitis especially on the pain reliving aspect.

Results: the findings indicated that Low-Level Laser Therapy (LLLT) was more effective than Alveogyl for alleviating pain associated with dry socket. At day 3 of treatment, the mean difference in effect overall was -2.01 (95% CI: -2.43 to -1.59; $p < 0.05$).

Conclusions: in conclusion, the findings indicate that Low-Level Laser Therapy holds promise as a treatment modality to alleviate symptoms of alveolitis such as painful symptoms. However, LLLT should perhaps not yet be viewed as a complete substitute for traditional therapies. Nonetheless, additional large-sample, high-quality studies employing sound standard operating protocols remain necessary to confirm its longer-term effectiveness and broader clinical use.

USEFUL OF LASER ACUPUNCTURE IN TEMPOROMANDIBULAR DISORDER PAIN

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Aim: the aim of this study is to conduct a systematic review and meta-analysis of the existing scientific literature on the efficacy of acupuncture and laser acupuncture in pain reduction associated with Temporomandibular Disorders (TMDs). This review aims to summarize the available clinical evidence regarding these treatment approaches.

Methods: we conducted a systematic review of RCT studies comparing acupuncture or laser acupuncture with alternative therapies for TMD. We performed systematic searches of PubMed, EMBASE, and SCOPUS databases until July 2023 without any language limitation. In such a process, we excluded studies without clinical data and studies including high-complexity interventions. We assessed study quality using the Cochrane risk of bias tool (RoB 2). Meta-analyses were performed comparing acupuncture and laser acupuncture with placebo.

Results: eleven RCTs fulfilled our inclusion criteria. Acupuncture is suitable for the treatment of muscle pain due to TMD for a short time. The meta-analyses revealed that both the efficacy rate of acupuncture and laser acupuncture was significantly higher than that in the placebo group, which implies that TMD treatment with acupuncture is effective.

Conclusions: this systematic review indicates that acupuncture may alleviate pain symptoms of TMD, but the current evidence base remains limited. Additional high-quality studies are necessary to better validate its salubrious effects. However, laser therapy produced superior outcomes on TMD symptoms.

ENHANCEMENT OF IMPLANTS' SECONDARY STABILITY THROUGH PBM

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Aim: Photobiomodulation (PBM) is a non-invasive method aimed at boosting osteoblastic activity and tissue regeneration. It works by providing energy to cells as ATP molecules, which activate Na/K pumps through ATPase stimulation. This study aims to assess the effect of PBM on implant stability.

Methods: a total of seven PBM sessions were conducted over two weeks, on alternate days, using an A2G-Stomatology 7, Diode Laser (940 nm) on the same patient with two "All-On-Four" prosthetic rehabilitations, one upper and one lower, following a "split mouth" design. After implant insertions with a torque of 30N and MUA positioning, an initial stability measurement was taken using the Osstell® device with MUA-specific SmartPeg. PBM was applied transmucosally, first on the buccal side, then on the oral side, for 40 seconds per implant, with a mean power of 0.1 W and a total energy dose of 4000 mJ per session, using a 6 mm fiber spot size. This procedure was repeated during the following six sessions. Stability measurements were also recorded at 3 weeks, 6 weeks, and 4 months.

Results: Osstell® measurements at the end of the treatment showed similar implant stability at 4 months although with a higher overall stability at 3 and 6 weeks for the PBM-enhanced sample.

Conclusions: PBM's potential for promoting long-term stability is indicated due to anti-inflammatory effects and acceleration of the transition to secondary implant stability, decreasing the risk of short-term implant failure. Further studies are needed to confirm these findings.

DIODE LASER AND CHLORHEXIDINE: BATTLE AGAINST *STREPTOCOCCUS MUTANS* - A PILOT STUDY

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Aim: to assess and compare the oral cavity disinfection efficacy of a diode laser and 2% chlorhexidine.

Methods: fifteen extracted molars teeth were sterilized and prepared with standardized cylindrical class I Black cavities. Each cavity was conditioned for 24 hours at 37 °C with sterile stimulated saliva and subsequently for another 24 hours at 37 °C with a *S. mutans* culture. The teeth were then randomly assigned to three groups (five teeth per group): Group I (control, no disinfectant treatment), Group II (2% chlorhexidine) and Group III (diode laser). Group II was treated with a 2% chlorhexidine gluconate solution for 30 seconds, gold standard treatment (positive control), while Group III was irradiated with a diode laser (980 nm, 2.5 W, continuous mode) for 30 seconds. Specimens obtained from each cavity were incubated in Brain Heart Infusion Broth for 24 hours at 37 °C, after which bacterial growth (CFU/ml) was quantified in a bacterial culture medium.

Results: a significant reduction in CFU/ml was observed in both Group II and Group III compared to the control group (Group I).

Conclusions: this pilot study suggests that both the 980 nm diode laser and 2% chlorhexidine are effective in reducing, *in vitro*, the growth of *S. mutans*. Based on these findings, it could be useful to further investigate the laser disinfectant potential to reduce the use of chlorhexidine in routine practice.

DUAL-WAVELENGTH DIODE LASER IN EXCISIONAL BIOPSIES: CLINICAL AND HISTOPATHOLOGICAL OUTCOMES FROM A RANDOMIZED CONTROLLED TRIAL

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Aim: the 645 nm wavelength is known for its ability to reduce post-operative pain, promote tissue healing, and reduce inflammation, making it valuable in oral surgery. This study aims to compare post- operative pain, bleeding, healing and histopathological outcomes between the 980 nm + 645 nm and the 980 nm diode laser in patients undergoing excisional oral biopsies.

Methods: a double-blind randomized controlled trial was conducted, including a total of 24 patients. The study protocol comprised five visits: T-1 (screening), T0 (biopsy), and follow-up at 1, 2, and 4 weeks. VAS, VRS, SF-MPQ, satisfaction, bleeding, and healing (EHS, PHI) were assessed, along with the histopathological analysis of biopsy samples. Data analysis was performed using R software. Statistical analysis included normality assessment (Kolmogorov-Smirnov test), non-parametric comparisons (Mann-Whitney and Friedman tests), and Dunn's post hoc test for significant results ($p < 0.05$).

Results: significant differences were observed in PHI and EHS at T1 between the trial group (980 nm + 645 nm) and the control group (980 nm) ($p < 0.05$). Additionally, VAS, VRS, and SF-MPQ scores indicated a significant reduction in post-operative pain in the trial group ($p < 0.05$). No significant differences were found in histopathological findings between groups.

Conclusions: the 980 nm + 645 nm diode laser effectively reduces post-operative pain and enhances healing compared to the 980 nm diode laser. Despite potential thermal effects, its advantages in comfort and recovery suggest the need for further investigation.

980 NM DIODE LASER *VS* 1064 NM ND:YAG NANO-PULSE LASER IN SURGICAL TREATMENT OF BENIGN LESIONS OF SOFT TISSUES: HYSTOPATOLOGICAL ANALYSIS OF THERMAL DAMAGE AND HEALING ASSESSMENT BY OCT

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Aim: this study aims to evaluate the efficacy of the NanoYAG laser compared to the 980 nm Diode laser in the excision of benign lesions of the soft tissues of the oral cavity through specific morphometric measurement during the healing process by Optical Coherence Tomography (OCT).

Methods: patients with lesions clinically compatible with benign neoplasms were selected at the Oral Medicine Unit-CIR Dental School-University of Turin.

They were randomly divided into two groups: Group A (underwent excision using a diode laser) and Group B (using a NanoYAG laser). All patients in both groups underwent *in vivo* OCT scanning using a dedicated intraoral probe immediately post-surgery (T0) at 1 week (T1), 2 weeks (T2) and 1 month (T3) after surgery.

Results: statistically significant differences ($p < 0.01$) were highlighted in both groups when comparing the morphometric values highlighted in the OCT scans of the healing tissue (T3) and comparing the latter with those of the healthy reference tissue.

Conclusions: this is the first study that investigates by means of OCT the *in vivo* effects of the use of nanoYAG laser compared to diode laser in the excision of benign mucose lesions of the oral cavity. The findings indicate that both lasers provide effective and minimally invasive treatment,with Nd:YAG exhibiting less thermal damage and enhanced postoperative healing, supporting its use in oral surgery.

NON-INVASIVE DIODE LASER THERAPY: EXTRAORAL PHOTOBIOMODULATION FOR UNCOOPERATIVE PATIENTS

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Aim: this study aims to evaluate the effectiveness of red-light diode laser (Doctor Smile Wiser 3, Series LA12D, model LA12D001,5®), used for photobiomodulation, when applied externally in non-cooperative patients. The goal is to determine how the delivered dosage (expressed in joules) should be adjusted to achieve the same outcomes as direct intraoral application, based on the results obtained.

Methods: 60 people were voluntarily selected, including patients, students, and healthcare staff from the Dental Clinic of the IRCCS Fondazione San Gerardo dei Tintori in Monza. After obtaining informed consent, each patient underwent laser application for a duration of a maximum of 10 seconds each. The amount of light passing from inside the oral cavity through the cheek was calculated by measuring the light intensity (lux) using a lux meter (Digital Lux Meter HoldPeak®). Data was collected by evaluating both the right and left cheek, and an average value was calculated for each patient. The patients were then divided into three age-based groups: group 1 0–17 years, group 2 18–40 years and group 3 41+ years. The laser used in this study is a diode laser with a wavelength falling within the red-light spectrum, specifically ranging between 620 and 700 nm.

Results: by calculating the overall averages of the obtained results, we found out that in Group 1 the loss in terms of light quantity is approximately 30%, in Group 2, 50%, and in Group 3, 45%.

Conclusions: the results indicate that in young patients, the characteristics of the skin and mucous membranes allow a better light transmission, instead of adults were the loss is nearly half of the total lux.