ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 09, pp.57317-57322, September, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

CASE STUDY

PERIODONTAL APPLICATIONS OF SOFT TISSUE DIODELASERS

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ARTICLE INFO

Article History:
Received 23rd June, 2017
Received in revised form
12th July, 2017
Accepted 10th August, 2017
Published online 29th September, 2017

Key words:

Soft tissue laser, Diode laser, Depigmentation, Gingivectomy, Crown lengthening, Surgical pocket therapy, Frenectomy.

ABSTRACT

Lasers, which were first used in dentistry in 1960, are now an integral part of the dental practice. They are used in cavity preparation, surgical procedures and various other procedures. They can be used not only as adjunct but also as an alternative to conventional techniques. Soft tissue lasers can be put to use for a number of treatment options in periodontics. Here are case series reviewing the periodontal applications of soft tissue diode lasers.

Citation: Dr. Waleed Khalid, Dr. Neha Rathore and Prof. M.Sankari, 2017. "Periodontal applications of soft tissue diodelasers, *International Journal of Current Research*, 9, (09), 57317-57322.

INTRODUCTION

Laser stands for light amplification by stimulated emission of radiation. It is a device which generates a high intensity, monochromatic parallel beam of electromagnetic radiation. Lasers have been used in medicine and dentistry since 1960's. In 1960, Maiman *et al* developed the first laser prototype using ruby crystals as an active medium based on the Einstein's principle of stimulated emission theory (1917) (Husein, 2006). To study the effectiveness of a pulsed ruby laser on human caries, lasers in dentistry were experimented (Husein, 2006). The diode, ruby, Ho: YAG, Er: YAG, Nd: YAG, dye lasers for photodynamic therapy and various other laser systems have been used for treating diseases (Werner *et al*., 2009). The wide range of laser wavelengths and delivery systems are used to perform periodontal, restorative and surgical treatment procedures (Lee, 2007). This article aims to review the periodontal applications of a soft tissue diode laser and presents a case series in this regard.

Soft Tissue Diode Lasers

A combination of Aluminum, Gallium and Arsenide is used to change electrical energy into light energy in diode laser which is a solid state semiconductor (Naik *et al*., 2010). The diode laser is ideal for using in periodontal surgery, bleaching, photodynamic therapy, soft laser therapy and other procedures as it uses a wavelength of 635 – 980 nm (Naik *et al*., 2010; Olivi *et al*., 2009).

Naik *et al*. (2010) and Mahajan *et al*. (2011) summarized the advantages of lasers in dental practice:

- Tissue surface sterilization and reduction in bacteremia
- Dry surgical field and better visualization
- Decreased pain
- Decreased swelling, edema and scarring
- Increased patient acceptance
- Faster healing response
- Minimal mechanical trauma

Coluzzi *et al* discussed the soft tissue interactions of lasers that can be seen based on the different wavelengths available (Coluzzi, 2004):

- Reflection: No interaction occurs as the beam reflects off the surface
- Transmission: No interaction occurs as the beam passes directly through the tissue

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- Scattering: An interaction as the beam disperses in a non-uniform manner throughout the tissue
- Absorption: Light radiation is absorbed by specific tissue elements.

Absorption and scattering are the interactions amongst these which occur inside the oral cavity (Gillis and Stron, 1983). The factors influencing tissue interactions are (Naik *et al*., 2010):

- Duration and rate of pulse
- Unfocussed beam versus focused beam
- dissipation and conduction of heat
- Vasculartiy

The clinician has control over these through the following factors (Naik *et al*., 2010):

- Energy density
- Power density
- Duration and repetition of pulse
- Manner and mode of delivery

Applications of Diode Laser in Periodontal treatment:

Diode lasers are a viable alternative to scalpel for various procedures in periodontal treatment.

Gingivectomy/Gingivoplasty:

To gain access to perform restorative treatment in areas located below the gingival margin, gingivectomy or gingivoplasty are performed. Gingival hyperplasia can also be treated using soft tissue diode laser.

Crown Lengthening:

Soft tissue diode laser is also used for clinical crown lengthening without gingival flap elevation as is the requirement of esthetic and prosthetic purposes (Roshna and Nandakumar, 2005).

Frenectomy:

Clinicians can use diode lasers for performing frenectomy procedure.Kafas P *et al* found satisfactory results while performing diode laser frenectomy, even without local anaesthesia for paediatric patient (Kafas *et al*., 2009).

Depigmentation:

For the purpose of reduction of tissue pigmentation, diode lasers are preferred over scalpel (Gillis and Stron, 1983).

Low Level Laser Therapy:

To produce biostiumlatory effects and analgesia at a nonthermal level, low level laser therapy is used as it keeps energy output at a lower level (Bhandari *et al*., 2014). As put forward by Hong-Meng *et al*, it can be used to reduce pain and accelerate wound healing effectively during orthodontic treatment, and bacterial load in ulcerative conditions and infections is also reduced (Hong-Meng *et al*., 1995).

Photodynamic Therapy:

A photosensitive dye is used in photodynamic theory which binds to the target cells. This dye is then activated using light of appropriate wavelength. The free radicals which are formed during activation, is found to be toxic to bacteria, hence making it useful for treatment of localized microbial infections (Polansky *et al*., 2009).

Dentinal Hypersensitivity:

At low powers, diode lasers can be used to block the depolarization of peripheral C-fibre afferent and inhibits sensitivity and pain, sealing the dentinal tubules (Naik *et al*., 2010). Sicilia *et al* enhanced the inhibition of hypersensitivity by combining with fluoride gel (Sicilia *et al*., 2009).

Surgical Pocket Therapy:

In accessible deep surgical pockets such as furcation areas and deep intrabony defects can be debrided using lasers, but it may also lead to carbonization of the bone and root surface (Naik *et al*., 2010).

Important Considerations when using soft tissue lasers:

During use of soft tissue lasers, the temperature rise of the soft tissue of ≥100 ºC can cause breakdown of protein-based elements to hydrocarbon and carbon residues. Charring and carbonization of the tissues occur due to this at temperatures ≥200 ºC, which has to be avoided (Miserendino *et al*., 1995).

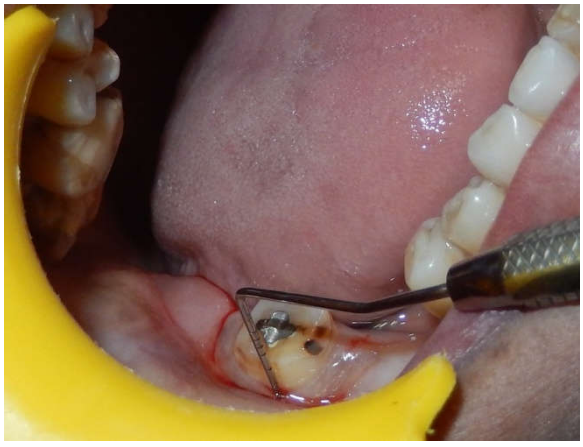
The following guidelines, put forward by Pang *et al* are to be followed during treatment with lasers (Pang *et al*., 2010):

- While directing the laser beam, the delivery system must be kept in motion
- Using water moistened gauze, built up char should be regularly removed.
- Tissue cooling should be allowed, which can be done by adjusting the pulse repetition rate, interrupting the energy delivery, using high volume suction, utilizing the water spray or applying ice near the site of treatment.
- To avoid complications, the practitioner should understand the characteristics and limitations of the laser device before proceeding to use on the patient.

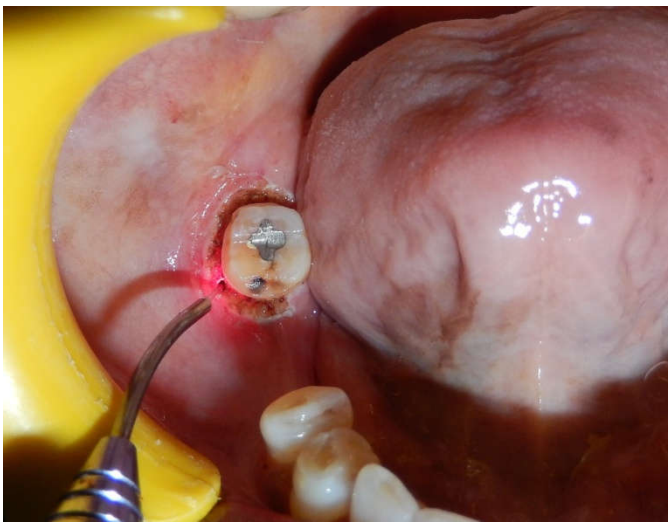
Case Report I: Gingivectomy

A 37 year old female patient was referred for the management of clinically short crown in relation to 47. After examination, it was planned to use laser for gingivectomy for increasing the crown length. Satisfactory healing was revealed in postoperative healing after 2 weeks.

Case Report I: Picture 1: Preoperative view 47



Case Report I: Picture 2: Gingivectomy done using laser



Case Report I: Picture 3: Postoperative view 47

Case Report I: Picture 4: Postoperative view after two weeks

Case Report II: Depigmentation

A 24 year old male patient was referred for management of gingival hyper pigmentation in upper and lower anterior region. Depigmentation was carried out using laser, and after two weeks, postoperative review revealed a satisfactory esthetic result.

Case Report II: Picture 1: Preoperative view

Case Report II : Picture 2: Postoperative view of upper arch after depigmentation

Case Report II: Picture 3: Postoperative view of lower arch after depigmentation

Case Report III: Surgical Pocket Therapy

A 32 year old female patient was referred for management of bleeding gums. On examination, she was found to have deep pockets of 6mm in posterior molar region on all quadrants. A surgical pocket therapy was planned using laser, after successful non- surgical preparation. Postoperative review revealed an uneventful healing and reduced pocket depths.

Case Report III: Picture 1: Preoperative view

Case Report III: Picture 2: Sulcular debridement done using laser

Case Report III: Postoperative view buccal arch

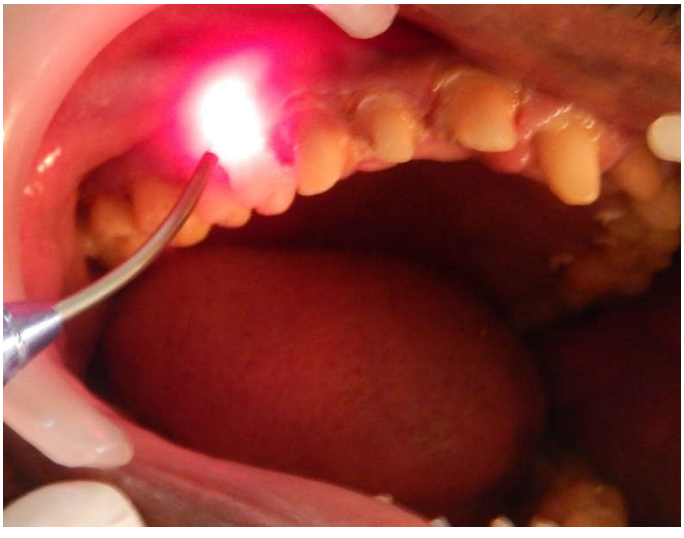
Case Report IV: Crown Lengthening

A 52 year old male patient was referred for management of clinically short crowns in relation to all teeth. On examination, he was diagnosed with bruxism and severe attrition of all the teeth. A full mouth rehabilitation treatment was planned. Following initial crown preparation, crown lengthening was done using laser. After three weeks, satisfactory healing was seen and after complete healing of tissues, restoration and rehabilitation was completed.

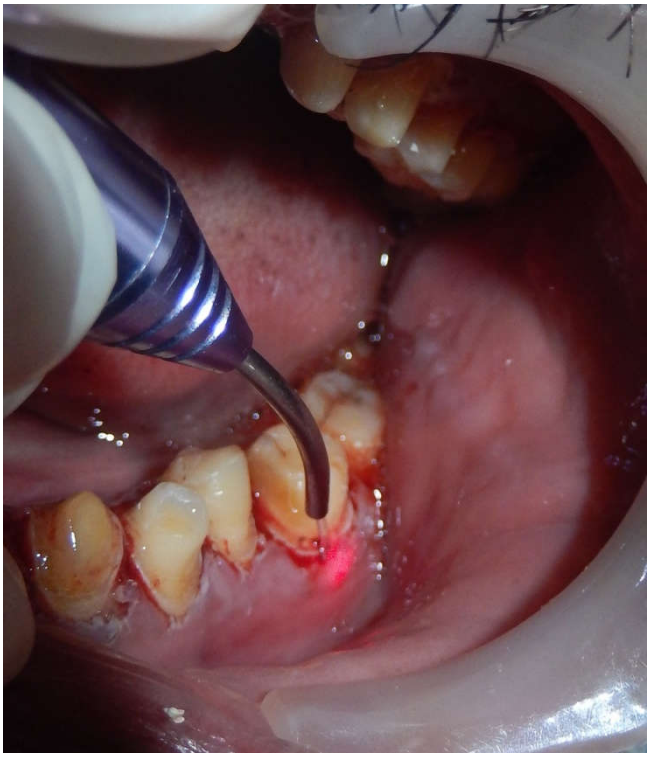
Case Report IV: Picture 1: Preoperative view:

Case Report IV: Picture 2: Crown Preparation done

Case Report IV: Picture 3: Crown lengthening done in upper arch



Case Report IV: Picture 4: Crown lengthening done in lower arch



Case Report IV: Picture 5: Immediate postoperative view of upper arch

Case Report IV: Picture 6: Immediate postoperative view of lower arch

Case Report IV: Picture 7: Postoperative view after restoration

Case Report V : Frenectomy

A 23 year old male patient was referred for management of ankyloglossia. Lingual frenectomy was planned using laser. Following the procedure and review appointments, patient had satisfactory healing and tongue protrusion.

Case Report V: Picture 1: Preoperative view high lingual frenum attachment

Case Report V: Picture 2: Tongue protrusion affected by high lingual frenum attachment

Case Report V: Picture 3: Postoperative view after lingual frenectomy done using laser

Conclusion

Viable alternative to scalpel and adjunct for periodontal therapy are soft tissue diode lasers. To avoid complications, practitioner should practice the technique. To avoid complications, the practitioner should follow the technique strictly.

REFERENCES

Bhandari R, Singla K, Sandhu SV, Malhotra A, Kaur H, Pannu AK. 2014. Soft tissue applications of lasers: A review. *International Journal of Dental Research*, 2: 16-19

Coluzzi D. 2004. Fundamentals of Dental Lasers: Science and Instruments. *Dent Clin North Am*., 8 : 751-770

Gillis TM, Stron MS. 1983. Surgical lasers and soft tissue interactions. *OtolaryngolClin North Am*., 12- 775-784.

Hong-Meng L, Kenneth KKL, David KLT. 1995. A clinical investigation of the efficacy of low level laser therapy in reducing orthodontic postadjustment pain. *American Journal of Orthodontics and Dentofacial Orthopedics*, 108: 614-22.

Husein A. 2006. Applications of lasers in dentistry: a review. *Archives of Orofacial Sciences*, 1 : 1-4

Kafas P, Stavrianos C, Jerjes W, Upile T, Vourvachis M, Theodoridis M, Stavrianou I. 2009. Upper-lip laser frenectomy without infiltrated anaesthesia in a paediatric patient: a case report. *Cases Journal*, 2:7138

Lee DH. 2007. Application of lasers in periodontics: a new approach in periodontal treatment. *Dental Bulletin*, 12:23-5.

Mahajan A. 2011. Lasers in periodontics: a review. *European Journal of Dentistry and Medicine*, 3: 1-11.

Miserendino LJ, Levy G, Meserendion CA. 1995. Laser interaction with biologic tissues. Lasers in Dentistry, Chapter3.Quintessence Publishing Co, Inc. 39-55

Naik VK, Sangeetha S, Victor DJ. 2010. Lasers in periodontics- a scientific boon or bane? *SRM University Journal of Dental Sciences*, 1: 91-8

Olivi G, Genovese MD, Capriologlio C. 2009. Evidence-based dentistry on laser paediatric dentistry: review and outlook. *European Journal of Paediatric Dentistry*, 10: 29-40.

Pang P, Andreana S, Aoki A, Coluzzi D, Obeidi A, Olivi G, *et al*. 2010. Laser Energy in Oral Soft Tissue Applications. *J Laser Dent*, 18: 123-131.

Polansky R, Haas M, Heschl A, Wimmer G. 2009. Clinical effectiveness of photodynamic therapy in the treatment of periodontitis. *J Clin Periodontol*., 36: 575-580.

Roshna T, Nandakumar K. 2005. Anterior Esthetic Gingival Depigmentation and Crown Lengthening: Report of a Case. *The Journal of Contemporary Dental Practice*, 15 : 139-147

Sicilia A, Cuesta-Freschoso S, Suzrez A, Angulo J, Cordomingo A, DeJuan P. 2009. Immediate efficacy of diode laser application in the treatment of dentin hypersensitivity in periodontal maintenance patient: A randomized clinical trial. *J ClinPeriodontol*., 36: 650-660.

Werner JA, Dunne AA, Folj BJ, Lippert BM. 2009. Transoral laser microsurgery in carcinomas of the oral cavity, pharynx, and larynx. *Cancer Control*, 9:379-88

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