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Laser Assisted Dental Practice- A Perspective

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Abstract

Since the introduction of Lasers in dentistry, its varied benefits have enhanced the comfort and convenience for the patient and the ease of treatment for the dental professionals. This article gives a perspective on why the Lasers should be a part of the routine dental armamentarium and aims to inspire clinicians to adapt it as a component of everyday practice set up.

Keywords: *Lasers; Dentistry; Hemostasis; Soft Tissue Lasers*

Lasers have come a long way in the field of dentistry as flourishing and valuable equipments. A plethora of researches carried on the interminable subject of lasers shows its capacity to perform minimally invasive procedures with enhanced comfort for the patient. Even though the profound advantages of lasers in dentistry have been well established, recognition of this technology by practitioners has remained limited, perhaps partly due to the fact that this innovation affronts the periphery between biological, technical and dental research.

The credit of developing Light Amplification by Stimulated Emission of Radiation (LASER) goes to Maiman in 1960s, which has since then lead to an outbreak of the application of this technology in dentistry [1]. Lasers have been classified according to the different range of wavelengths. The CO_2 laser wavelength is ideal for soft tissue removal and hemostasis since it has high affinity for water and shallow depth of penetration. The treatment of dental hard tissues is best assisted by lasers of the erbium family which have two different wavelengths i.e. Er, Cr: YSGG (yttrium scandium gallium garnet) lasers and Er: YAG (yttrium aluminum garnet) lasers [1]. They have highest water absorption and high affinity for hydroxyapatite. The pigmented tissues highly absorb the Nd: YAG laser wavelength causing good coagulation and hemostasis. Thus, rendering it highly effective for dental soft tissue surgeries. Reduced absorption of Diode laser wavelengths by water and hydroxyapatite present in the enamel makes it not suitable for hard tissue management. On the other hand, its excellent absorption by melanin and tissue pigments makes it ideal for specific soft tissue procedures like crown lengthening, gingival contouring, inflamed tissue removal and photostimulation of herpetic and aphthous lesions [1].

Energy is conducted by laser to the cells initiating warming, welding, coagulation, protein denaturation, drying, vaporization and carbonization [2]. With the use of lasers, in esthetic procedures requiring gingival troughing and gingival cosmetic resculpting, there is no longer a necessity for vasoconstrictors and retraction cords before taking impressions [3].

Application of lasers in oral surgery provides an atraumatic procedure with no/reduced bleeding, reduced/no flap elevation, minimal post-operative swelling and pain, thus rendering a convenient, comfortable and relaxed environment for both the operator and the patients.

Post biopsy sutures can be prevented with brilliant hemostasis using dental lasers of varied wavelengths in everyday practice [4]. Using a low level dose of lasers, it can be applied in Temporomandibular disorders, Dentinal hypersensitivity and extraction sockets. This Biomodulation or Biostimulation therapy has its own benefits in the daily dental practice [5].

The hard tissue laser also has revolutionized the world of restorative dentistry. Laser tips being held slanted at an angle of 25 degrees for a Class I cavity and held at 90 degrees to make the proximal box on Class II cavities are being adapted by professionals [6]. Irreversible pulpitis can be caused by a rise in temperature of 6°C, whereas higher temperature rise (11°C) causes pulpal necrosis. There is no consensus in the literature about pulpal damage caused by laser thermal effects [7]. Its use avoids the unfavorable effect of temperature rise near pulp, as the caries are removed by ablation. Other than caries removal, there is a range of other well-established laser hard tissue procedures that include desensitization of cervical dentine, laser analgesia, laser-enhanced fluoride uptake [8]. Apel., *et al.* hypothesised that enamel after receipt of subablative energies by Er: YAG laser had shown an increase in resistance to acid from the diet and cariogenic bacteria [6].

Soft-tissue procedures, that once were forbidden because they necessitated general anesthesia, can be safely and quickly treated with lasers in the dental office. Restorative treatment in most children can be achieved with little or no local anesthetic agents and their related fears, such as lip or tongue biting, which usually take place when the child is numb [9]. Microdentistry can be performed by lasers, which help in preserving the healthy tooth structures by eliminating only the diseased tissue [9]. Hence a great supplement for everyday pediatric dentistry.

Laser induced fluorescence that aids in detection of incipient caries using diode laser wavelength averts the destruction of enamel surface often done when examining by a conventional dental probe [10]. Similar to caries detection, Laser Doppler Flowmetry also helps in an endodontic diagnosis by assessing the pulpal blood flow [11]. Even though the high set up cost presents as a barrier in its recognition, it still stands to be a very accurate diagnostic test for pulp vitality.

Even though the lasers are revolutionizing dentistry, there are latent damaging effects of it on the pulp tissue, tooth surface and the non-target tissues [7]. Usage of Laser safety eye gear and plume control methods is crucial for a fulfilling and safe practice [12]. The use of lasers by dental professionals within the range of practice where the treatment options are trustworthy, effective and consistent with proper training and experience can exponentially benefit the day to day practice of dental professionals.

Author Contributions

Mithra N Hegde: Conceived the perspective, participated in its design and coordination and helped define the final draft. Data collection, alignment and research guidance. A final review and approval of the manuscript was done.

Payal Garg: Conceived the perspective, participated in design and drafting of the manuscript with data collection, research and alignment of the article.

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