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Recent Scenario in Laser

Dr. Vishal Sahayata*

Department of Periodontology and Oral Implantology, Faculty of Dental Science, Dharmsinh Desai University, College Road, Nadiad, Gujarat, India

***Corresponding Author:** Dr. Vishal Sahayata, Department of Periodontology and Oral Implantology, Faculty of Dental Science, Dharmsinh Desai University, College Road, Nadiad, Gujarat, India.

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In last 100 years, dentistry has developed many cutting devices but still dental patients are afraid of noise and vibrations produce by the mechanical action of the air turbine or ultrasonic scalers. Laser is one of the most captivating and fascinating technologies in dental practice since Theodore Maiman in 1960 invented the ruby laser. Dentistry developed many photomechemical devices which are laser or ultrasound based. Waterlase system is a revolutionary dental device that uses laser energized water to cut or ablate soft and hard tissue. Periowave, a photodynamic disinfection system utilizes nontoxic dye (photosensitizer) in combination with low intensity lasers enabling singlet oxygen molecules to destroy bacteria [1].

Many different laser wavelengths have been used in oral and maxillofacial surgery, periodontal surgery and implant dentistry. Since there is excellent absorption of CO_2 laser at wavele ngth of 10,600 nm in the water-based tissues, and at the same time penetrates only to a few microns of the target tissue's surface, it is widely indicated in oral surgical procedures [2]. Diode laser is working on wave length of 819 and this energy level is absorbed by pigmentation of soft tissue and make it excellent haemostatic agent. It is used for soft tissue removal in contact mode giving tactile sensation. There is less traumatic bone cutting with the use of Erbium lasers resulting in less post-operative discomfort to the patients.

The management of patients with sleep apnea, TMJ derangements, dental implants, premalignant lesions, and post-traumatic facial scarring has improved significantly with the advent of laser surgery. Initial reports suggest that Laser Assisted New Attachment Procedure can be associated with cementum-mediated new connective tissue attachment and apparent periodontal regeneration of diseased root surface in humans.

Laser in endodontic therapy

The use of lasers as an aid in disinfection has been researched extensively in the last few years. The use of lasers in aiding root canal disinfection is more promising than in root canal preparation. For disinfection, laser energy can be used directly or can be combined with a photosensitive chemical that, when bound to microorganisms, may be activated by low-energy laser light to essentially kill the micro-organism *(Photodynamic Therapy (PDT)*. Another line of experiments suggests that the propagation of acoustic waves emanating from a pulsed-low energy laser may aid in distributing disinfecting solutions more effectively across the root canal system *(Photon Induced*

Photoacoustic Streaming (PIPS)) [3]. The advantages of using laser, however, are balanced by several significant disadvantages. If the temperature is high enough, the bone surrounding the tooth may also be irreversibly injured, adversely affecting the entire area, which can result in ankylosis [4]. Moreover, cycles of melting and resolidification of radicular wall dentin apparently has no positive effect on clinical outcomes.

Laser in oral implantology

The use of lasers in implant dentistry has been discussed extensively [5]. Many clinicians want to know if lasers can be used to treat peri-implantitis, but it is difficult today to investigate this question using randomized clinical trials due to the lack of comparable test and control sites [6]. However, there are applications for lasers in implant dentistry, including for second stage surgery [7], removal of peri-implant soft tissues, and decontamination of failing implants [8]. Serious concerns about the implant overheating followed by melting of the implant surface have been raised, along with concerns about a lack of reosseointegration following treatment of periimplantitis with lasers [9,10]. Recent systematic reviews have focused on the latter question and provided more information about how implants can restabilize following implant surface laser decontamination [11]. The main advantage of using CO_2 laser irradiation on implant surfaces is that this wavelength does not pose the risk of overheating [12], unlike other wavelengths, such as that of diode, Nd:YAG, and Er:YAG lasers [13,14]. Recent systematic reviews have shown that there is limited information available about laser-assisted decontamination of implant surfaces, with high heterogeneity of results and a low number of included studies. However, although information is limited about the clinical application of CO_2 laser in the surgical treatment of periimplantitis, its use appears promising [15].

Laser in periodontal therapy

Laser has definite advantages like less or no bleeding and pain during surgery. Lasers in periodontal therapy have been demonstrated to be beneficial for control of bacteremia [16], better removal of the pocket epithelium in the pockets [17,18] bacteria reduction [19-22], efficient subgingival calculus removal (using Er: YAG lasers) [23] and improvement of periodontal regeneration in animals and humans without damaging the surrounding bone and pulp tissues [24,25]. Use of low level laser irradiation to improve wound healing has been suggested but results to date are inconclusive. Further clinical trials and multicenter studies should be performed to improve the effects of laser treatment of periodontal and periimplant diseases and to develop standardized protocols so that lasers may be used in a predictable way in daily practice.

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