Lasers in Periodontics

A Review of the Literature. Cobb CM (2006; 77:545–564).

In response to the above-mentioned article, I would like to present a different point of view on numerous issues concerning the utility of lasers in periodontal therapy based on evidence in the literature.

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■ The author states in the abstract that the purpose of the paper was "to determine the state of the science concerning the application of lasers to common oral soft tissue problems, root surface detoxification, and the treatment of chronic periodontitis." However, he did not address many issues, such as detection and removal of calculus, reduction of periodontopathogens in the pocket, control of the junctional epithelium migration, treatment of gingival overgrowth, and management of periimplant lesions. These subjects should be included in a comprehensive review paper on laser therapy. The author indicates that studies dealing with "commercial laser technology" were not incorporated into this paper. This is a sensitive issue because all trademarked products used professionally are in a sense tainted commercially, because they were developed by industry. However, an independent literature review should include all studies based upon their merit. The author lists different available laser wavelengths with applications in clinical dentistry and periodontics (Table 3). However, there are other wavelengths with clinical applications in dentistry, such as the 980-nm diode laser (periodontics, oral surgery, and implantology) and the 9.6-µm carbon dioxide (CO_2) laser (decay removal), as well as photodynamic therapy (PDT), that are useful in different disciplines (oral medicine and periodontics). Wound healing studies (including studies from our research group) that demonstrated delayed healing in extraoral (and not intraoral) wounds (rat skin) should not be included in this literature review for the field of periodontics because there are differences with respect to tissue responses and wound contraction in the skin. In these studies, the rate of wound healing after the neodymium-doped:yttrium, aluminium, and garnet (Nd:YAG) laser irradiation and scalpel incisions was similar if the power parameters were used properly. However, there was no or less skin pigmentation in the lased tissues of low power compared to the scalpel incisions. Some other studies[1,2] related to wound healing of intraoral tissues after laser therapy also were not addressed. These studies[2] pertaining to rat mucosa demonstrated (using immunohistochemical techniques) that when laser therapy was compared to scalpel incisions, the connective tissue matrix responded significantly better to laser therapy. Histologic documentation also showed that after laser therapy, there initially was less rapid reepithelialization because of factors such as reduced inflammatory tissue response, but the final wound tissue had less wound contraction.[1] Other investigators addressing intraoral wound healing also showed less contraction after CO_2 laser wounds compared to other surgical methods.[3] With regard to bacterial reduction using adjunctive laser therapy, publications by Ben Hatit et al.,[4] Moritz et al.,[5] and Gutknecht et al.[6] showed statistically significant reduction of periodontopathogenic bacteria in the laser-assisted therapy compared to conventional treatment. Laser treatment alone does not replace conventional scaling and root planing (no significant reduction of the bacteria), but it may be an adjunct to classic periodontal therapy. Calculus removal is important in the treatment of periodontitis. However, only selective power parameters and laser wavelengths, like the erbium-doped:YAG (Er:YAG) and erbium, chromium-doped:yttrium, scandium, gallium, and garnet (Er,Cr:YSGG), may be used for calculus removal. In contrast to what was stated in the review paper, the defocused, non-contact mode of the laser and not very high power parameters can be effective for calculus removal without damaging root cementum. This was demonstrated by Aoki et al.[7] using 30 mJ per pulse and 10 Hz frequency effectively with the Er:YAG laser. They were able to remove calculus selectively without damaging the cementum. Removal of epithelium in the pocket has been documented after laser irradiation using different laser wavelengths. In general, in periodontics, several studies[8,9] have focused on the control of epithelial migration as it relates to wound healing. However, it is not scientifically proven that control of epithelial migration is a key factor for connective tissue regeneration. Other authors[10,11] stated that stabilization of the coagulum is important to get regeneration of the periodontium. In this regard, coagulation and clot stabilization may be enhanced by the different laser systems. This is due to better absorption by hemoglobin, based on the physical properties of the correct wavelength and the laser-tissue interactions.[12] Independent of the laser technology (laser equipment or also laser wavelength), authors such as Gold and Vilardi[13] using an Nd:YAG laser and Romanos et al.[14] with the 980-nm diode laser, demonstrated better removal of the pocket epithelium com-