American Academy of Periodontology Statement on the Efficacy of Lasers in the Non-Surgical Treatment of Inflammatory Periodontal Disease*

The American Academy of Periodontology (AAP) periodically publishes reports, statements, and guidelines on a variety of topics relevant to periodontics. These papers are developed by an appointed committee of experts, and the documents are reviewed and approved by the AAP Board of Trustees.

Clinical application of lasers for the treatment of periodontal disease has continued to expand since their introduction for this purpose in the early 1990s[1-9] but remains controversial.[10-18] The primary purpose of this statement is to provide an evidence-based perspective on three of the purported benefits of using lasers in the non-surgical treatment of periodontal disease, i.e., sulcular and/or pocket debridement (a.k.a. laser curettage), reduction of subgingival bacterial loads (a.k.a. pocket sterilization), and scaling and root planing (SRP).

LASER-MEDIATED SULCULAR AND/OR POCKET DEBRIDEMENT

If one considers the clinical parameters of reductions in probing depth or gains in clinical attachment level, the dental literature indicates that when used as an adjunct to SRP, mechanical, chemical, or laser curettage has little to no benefit beyond SRP alone.[10-17] The available evidence consistently shows that therapies intended to arrest and control periodontitis depend primarily on effective debridement of the root surface and not removal of the lining of the pocket soft tissue wall, i.e., curettage.[18,19] Currently, there is minimal evidence to support use of a laser for the purpose of subgingival debridement, either as a monotherapy or adjunctive to SRP.[10-22]

REDUCTION OF SUBGINGIVAL BACTERIAL LEVELS

Current evidence shows lasers, as a group, to be unpredictable and inconsistent in their ability to reduce subgingival microbial loads beyond that achieved by SRP alone.[10-17] Further, this conclusion also appears to apply to the use of photodynamic therapy (PDT), either as a monotherapy or adjunctive to SRP.[23] At best, the evidence is lacking or conflicting. For example, of the 10 published clinical trials, only two showed PDT to be effective in reducing subgingival microbial loads, four reported no difference, and four did not measure reductions in microbes.[17]

SCALING AND ROOT PLANING

Erbium lasers show the greatest potential for effective root debridement (SRP). The Er:YAG laser has been shown, in vitro, to remove calculus[12] and to negate endotoxin.[12,15,24,25] There is the potential for root surface damage during the process of in vivo calculus removal since the Er:YAG is a hard tissue laser and the operator would not be able to visualize what is being lased. Clinical data on attachment level changes when compared to SRP alone are conflicting, with some studies showing a slight benefit while others show no benefit. Further study is needed to determine if laser-assisted SRP has a beneficial effect.

REFERENCES

1. Midda M. Lasers in periodontics. *Periodontal Clin Investig* 1992;14:14-20.
2. Midda M. The use of lasers in periodontology. *Curr Opin Dent* 1992;2:104-108.
3. White JM, Goodis HE, Rose CL. Use of the pulsed Nd:YAG laser for intraoral soft tissue surgery. *Lasers Surg Med* 1991;11:455-461.
4. Cobb CM, McCawley TK, Killoy WJ. A preliminary study on the effects of the Nd:YAG laser on root surfaces and subgingival microflora in vivo. *J Periodontol* 1992;63:701-707.
5. Danesh-Meyer MJ. Current applications of lasers in periodontics. *J N Z Soc Periodontol* 1992;74:17-21.
6. Morlock BJ, Pippin DJ, Cobb CM, Killoy WJ, Rapley JW. The effect of Nd:YAG laser exposure on root surfaces when used as an adjunct to root planing: An in vitro study. *J Periodontol* 1992;63:637-641.
7. Myers TD, Murphy DG, White JM, Gold SI. Conservative soft tissue management with the low-powered pulsed Nd:YAG dental laser. *Pract Periodontics Aesthet Dent* 1992;4:6-12.
8. Spencer P, Trylovich DJ, Cobb CM. Chemical characterization of lased root surfaces using Fourier transform infrared photoacoustic spectroscopy. *J Periodontol* 1992;63:633-636.
9. Trylovich DJ, Cobb CM, Pippin DJ, Spencer P, Killoy WJ. The effects of the Nd:YAG laser on in vitro fibroblast attachment to endotoxin-treated root surfaces. *J Periodontol* 1992;63:626-632.

* This statement was developed under the direction of the Workgroup to Develop Statement on Laser Use by Dental Professionals and approved by the Board of Trustees of the American Academy of Periodontology in November 2010.

doi: 10.1902/jop.2011.114001

10. Cobb CM. Lasers in periodontics: A review of the literature. *J Periodontol* 2006;77:545-564.
11. Karlsson MR, Diogo Löfgren CI, Jansson HM. The effect of laser therapy as an adjunct to non-surgical periodontal treatment in subjects with chronic periodontitis: A systematic review. *J Periodontol* 2008; 79:2021-2028.
12. Schwarz F, Aoki A, Becker J, Sculean A. Laser application in non-surgical periodontal therapy: A systematic review. *J Clin Periodontol* 2008;35(Suppl. 8):29-44.
13. Aoki A, Mizutani K, Takasaki AA, et al. Current status of clinical laser applications in periodontal therapy. *Gen Dent* 2008;56:674-687, quiz 688-689, 767.
14. Ishikawa I, Aoki A, Takasaki AA, Mizutani K, Sasaki KM, Izumi Y. Application of lasers in periodontics: True innovation or myth? *Periodontol 2000* 2009;50:90-126.
15. Schwarz F, Aoki A, Sculean A, Becker J. The impact of laser application on periodontal and peri-implant wound healing. *Periodontol 2000* 2009;51:79-108.
16. Slot DE, Kranendonk AA, Paraskevas S, Van der Weijden F. The effect of a pulsed Nd:YAG laser in non-surgical periodontal therapy. *J Periodontol* 2009; 80:1041-1056.
17. Cobb CM, Low SB, Coluzzi DJ. Lasers and the treatment of chronic periodontitis. *Dent Clin North Am* 2010;54:35-53.
18. Cobb CM. Non-surgical pocket therapy: Mechanical. *Ann Periodontol* 1996;1:443-490.
19. Cobb CM. Clinical significance of non-surgical periodontal therapy: An evidence-based perspective of scaling and root planing. *J Clin Periodontol* 2002;29 (Suppl. 2):6-16.
20. Qadri T, Poddani P, Javed F, Tunér J, Gustafsson A. A short-term evaluation of Nd:YAG laser as an adjunct to scaling and root planing in the treatment of periodontal inflammation. *J Periodontol* 2010;81:1161-1166.
21. Lopes BM, Theodoro LH, Melo RF, Thompson GM, Marcantonio RA. Clinical and microbiologic follow-up evaluations after non-surgical periodontal treatment with erbium:YAG laser and scaling and root planing. *J Periodontol* 2010;81:682-691.
22. Rotundo R, Nieri M, Cairo F, et al. Lack of adjunctive benefit of Er:YAG laser in non-surgical periodontal treatment: A randomized split-mouth clinical trial. *J Clin Periodontol* 2010;37:526-533.
23. Azarpazhooh A, Shah PS, Tenenbaum HC, Goldberg MB. The effect of photodynamic therapy for periodontitis: A systematic review and meta-analysis. *J Periodontol* 2010;81:4-14.
24. Ting CC, Fukuda M, Watanabe T, Aoki T, Sanaoka A, Noguchi T. Effects of Er,Cr:YSGG laser irradiation on the root surface: Morphologic analysis and efficiency of calculus removal. *J Periodontol* 2007;78:2156-2164.
25. Folwaczny M, Aggstaller H, Mehl A, Hickel R. Removal of bacterial endotoxin from root surface with Er:YAG laser. *Am J Dent* 2003;16:3-5.