Combined photoablative and photodynamic diode laser therapy as an adjunct to non-surgical periodontal treatment. A randomized split-mouth clinical trial


Abstract
Aim: Comparing the efficacy of photoablative and photodynamic diode laser in adjunct to scaling-root planing (SRP) and SRP alone for the treatment of chronic periodontitis.

Materials and Methods: Twenty-six patients were studied. Maxillary left or right quadrants were randomly assigned to sham-laser treatment + SRP or laser + SRP. This consisted of photoablative infra-extra-pocket de-epithelization with diode laser (λ = 810 nm), followed by single SRP and multiple photodynamic treatments (once weekly, 4-10 applications, mean ± SD: 3.7 ± 2.4) using diode laser (λ = 635 nm) and 0.3% methylene blue as photosensitizer. The patients were monitored at days 0 and 365 by clinical assessment (probing depth, PD; clinical attachment level, CAL; bleeding on probing, BOP) and at days 0, 15, 30, 45, 60, 75, 90, 365 by cytofluorescence analysis of gingival exfoliative samples taken in proximity of the teeth to be treated (polymorphonuclear leukocytes, PMN; red blood cells, RBC; damaged epithelial cells, DEC; bacteria).

Results: At day 365, compared with the control quadrants, the laser + SRP therapy yielded a significant (p < 0.001) reduction in PD (−1.9 mm), CAL (−1.7 mm) and BOP (−33.2% bleeding sites), as well as in bacterial contamination — especially spirochetes — and PMN and RBC shedding in the gingival samples (p < 0.001).

Conclusions: Diode laser treatment (photoablation followed by multiple photodynamic cycles) adjunctive to conventional SRP improves healing in chronic periodontitis patients.

Key words: cytofluorescence; diode laser; non-surgical/mechanical; periodontitis; photoablative; photodynamic; scaling and root planing; treatment/therapy

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It is generally assumed that the success of chronic periodontitis treatment depends on abatement of periodontopathogenic microorganisms and/or their toxic by-products — such as lipopolysaccharide (LPS) — from the dental root surface and periodontal soft tissues, as well as neutralization of host pro-inflammatory cytokines. (Bascones et al. 2005, Testa et al. 2007, Giannobile 2008, Mombelli et al. 2011). It has been demonstrated that conventional scaling and root planing (SRP) do not completely remove periodontopathogens, especially in deep