Treatment of experimental periodontal disease with antimicrobial photodynamic therapy in nicotine-modified rats


Abstract

Background: The aim of this study was to compare antimicrobial photodynamic therapy (aPDT) as an adjunctive treatment to scaling and root planing (SRP) for induced periodontitis in nicotine-modified rats.

Material & Methods: A total of 240 rats were evenly divided into two groups: C – saline solution treatment; N – nicotine treatment. Periodontal disease was induced in both groups at the first mandibular molar. After 7 days, the ligature was removed. All animals were submitted to SRP and were divided according to the following treatments: SRP – irrigation with saline solution; Toluidine Blue-O (TBO) – irrigation with phenothiazinum dye (100 μg/ml); LLLT – laser irradiation (660 nm; 0.03 W; 4 J); and aPDT – TBO and laser irradiation. Ten animals in each group/treatment were euthanized at 7, 15 and 30 days. The histometric and immunohistochemical values were statistically analysed.

Results: Intragroup analysis demonstrated that in both groups the aPDT treatment resulted in lower bone loss (BL) when compared to SRP in all experimental periods. Intergroup analysis demonstrated that aPDT treatment resulted in lower BL in Group N than in Group C treated with SRP in all experimental periods.

Conclusion: Antimicrobial photodynamic therapy was an effective adjunctive treatment to SRP for induced periodontitis in nicotine-modified rats.

Periodontal disease (PD) is a multifactorial pathological condition that involves both host systemic alterations and the presence of local pathogenic microbiota (Cullinan et al. 2009). The main signs that characterize PD are attachment loss caused by apical migration of the junctional epithelium and alveolar bone loss (BL) (Ebisu & Noiri 2007).

The metabolism of alveolar bone is controlled by proteins such as RANK, RANKL and OPG, which mark cell activity. RANK is present on the membranes of osteoclasts and dendritic cells (Evans et al. 2006), and its dimerization allows for the formation of multinuclear TRAP-positive cells with clastic cell immuno-reactivity (Iwamoto et al. 2004). RANKL, in turn, is produced by osteoblasts, bone stromal cells and activated T-lymphocytes, and promotes bone resorption when linked to RANK (Khosla 2001). By contrast, OPG inhibits osteoclast forma-

Conflict of interest and source of funding statement

The authors declare no conflicts of interest.

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