Evaluation of 660 nm LED light irradiation on the strategies for treating experimental periodontal intrabony defects

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Abstract

This study aims to investigate the therapeutic value of 660 nm light-emitting diode (LED) light irradiation on the strategies for treating experimental periodontal intrabony defects in vivo. Large-sized periodontal intrabony defects were created bilaterally on the mesial aspect of the maxillary second molars of 48 Sprague–Dawley rats, and the rats were equally divided into four treatment groups with primary wound intention (n = 6/treatment/time point), including open flap debridement alone (OD), barrier membrane alone (MB), xenograft alone (BG), and xenograft plus barrier membrane (MG). Each group received daily 0 or 10 J/cm² LED light irradiation. The animals were sacrificed after 1 or 4 weeks. The treatment outcome was evaluated by gross observation of wound dehiscence and healing, micro-CT imaging for osteogenesis, and histological assessments for inflammatory cell infiltration and periodontal reattachment. With LED light irradiation, the extent of wound dehiscence was reduced, wound closure was accelerated, epithelial downgrowth was prevented, inflammation was reduced, and periodontal reattachment was promoted in all treatment strategies. Significant reduction of inflammation with LED light irradiation was noted at 1 week in the groups BG and MG (p < 0.05). Osteogenesis was significantly promoted only in the group OD at both time points (p < 0.05). Our study showed that 660 nm LED light accelerates mucoperiosteal flap healing and periodontal reattachment. However, the enhancement of osteogenesis appeared to be limited while simultaneously treating with a barrier membrane or xenograft.

Keywords

Low level laser therapy Guided tissue regeneration Wound healing Osteogenesis
Electronic supplementary material

The online version of this article (doi:10.1007/s10103-016-1958-z) contains supplementary material, which is available to authorized users.

Concepts found in this article

- Periodontal Intrabony Defect
- Periodontal Soft Tissue
- Epithelial Downgrowth
- Denude Root Surface
- Guide Tissue Regeneration
- Light Irradiation
- Bone Substitute Material
- Barrier Membrane
- Fiber
- Collagen Fibril
- Periodontal Therapy
- Periodontal Ligament
- Inflammatory Cell Infiltration
- Human Periodontitis

Related articles containing similar concepts (313 articles)

- Evaluation of simulated periodontal defects via various radiographic methods

- Treatment of periodontal intrabony defects using autologous periodontal ligament stem cells: a randomized clinical trial

- Comparative study of DFDBA in combination with enamel matrix derivative versus DFDBA alone for treatment of periodontal intrabony defects at 12 months post-surgery

- Clinical and microbiological changes after minimally invasive therapeutic approaches in intrabony defects: a 12-month follow-up
  Ribeiro, F. · Casarin, R., et al. in Clinical Oral Investigations
Fig. S1 The thickness of gingiva of the edentulous ridge is generally less than 1.0 mm. Scale bar: 200 µm. Magnification: 100× (JPG 1615 kb)

References


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