

Peri-implantitis and periodontitis

Experimental and clinical studies

Akademisk avhandling

som för avläggande av odontologie doktorsexamen vid Sahlgrenska akademien vid Göteborgs universitet kommer att offentligens försvaras i föreläsningssal 3, institutionen för odontologi, Medicinaregatan 12E Göteborg fredagen den 10 april 2015, kl. 9.00

av

Olivier Carcuac
leg tandläkare

Fakultetsopponent:

Prof. Dr med Dent, clinical professor Frank Schwarz
Department of Oral Surgery, Heinrich Heine University, Düsseldorf, Germany

Avhandlingen baseras på följande delarbeten:

- I. **Carcuac O.**, Abrahamsson I., Albouy J.P., Linder E., Larsson L., Berglundh T. (2013) Experimental periodontitis and peri-implantitis in dogs. *Clinical Oral Implant Research* **24**, 363-371.
- II. **Carcuac O.**, Berglundh T. (2014) Composition of human periodontitis and peri-implantitis lesions. *Journal of Dental Research* **93(11)**, 1083-1088.
- III. **Carcuac O.**, Abrahamsson I., Charalampakis G., Berglundh T. (2015) The effect of the local use of chlorhexidine in surgical treatment of experimental peri-implantitis in dogs. *Journal of Clinical Periodontology* doi: 10.1111/jcpe.12332 [Epub ahead of print]
- IV. **Carcuac O.**, Derks J., Charalampakis G., Abrahamsson I., Wennström J.L., Berglundh T. (2015) Adjunctive systemic antibiotics enhance treatment outcomes of surgical therapy of peri-implantitis at implants with modified surfaces but not at implants with non-modified surfaces. A randomized controlled clinical trial. *In manuscript*.



UNIVERSITY OF GOTHENBURG

Abstract

Peri-implantitis and periodontitis

Experimental and clinical studies

Olivier Carcuac

Department of Periodontology, Institute of Odontology, the Sahlgrenska Academy at University of Gothenburg, Box 450, SE 405 30 Göteborg, Sweden.

Peri-implantitis is an increasing problem in implant dentistry. The current series of studies employed a translational approach with the aim to compare peri-implantitis and periodontitis lesions and evaluate the influence of implant surface characteristics and the adjunctive use of systemic antibiotics/local antiseptics on healing following surgical treatment of peri-implantitis.

Tissue reactions following ligature removal in experimental periodontitis and peri-implantitis were analyzed in a dog model (**Study I**). Histopathological characteristics in human peri-implantitis and periodontitis lesions were evaluated in 80 patients (**Study II**). Labrador dogs were used to analyze the effect of surgical treatment of experimental peri-implantitis at implants with different surface characteristics using different anti-infective procedures (**Study III**). 100 patients with severe peri-implantitis were treated surgically with or without adjunctive systemic antibiotics or the local use of chlorhexidine for implant surface decontamination. Treatment outcomes were evaluated after 1 year. A binary logistic regression analysis was performed to identify factors influencing the probability of treatment success (**Study IV**).

It was demonstrated that :

- the amount of bone loss that occurred during the period following ligature removal was significantly larger at implants with a modified surface than at implants with a non-modified surface and at teeth. The histological analysis revealed that peri-implantitis sites exhibited inflammatory cell infiltrates that were larger, extended closer to the bone crest and contained larger proportions of neutrophil granulocytes and osteoclasts than in periodontitis. (**Study I**)
- peri-implantitis lesions were more than twice as large and contained significantly larger area proportions, numbers, and densities of CD138-, CD68-, and MPO-positive cells than periodontitis lesions. (**Study II**)
- the local use of chlorhexidine has minor influence on resolution of peri-implantitis following surgical treatment. (**Study III**)
- treatment outcome was influenced by implant surface characteristics. (**Study III and IV**)
- the adjunctive use of systemic antibiotics increased the probability for treatment success at implants with modified surfaces but not at implants with a non-modified surface. (**Study IV**)

Key words: dental implant, animal experiment, biopsy, radiology, histology, immunohistochemistry, inflammation, peri-implant disease, periodontal disease, treatment, systemic antibiotics, antiseptics.

ISBN 978-91-628-9301-9

<http://hdl.handle.net/2077/38001>