

Peri-implantitis from a microbiological perspective

Akademisk avhandling

som för avläggande av odontologie doktorsexamen vid Sahlgrenska Akademin vid Göteborgs universitet kommer att offentligen försvaras i föreläsningssal 3, institutionen för odontologi, Medicinaregatan 12 E, Göteborg fredagen den 15 mars 2013, kl. 13.00

av

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leg. Tandläkare

Fakultetsopponent:

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Avhandlingen är av sammanläggningstyp och baseras på följande delarbeten:

- I. Charalampakis G, Leonhardt Å, Rabe P, Dahlén G.
Clinical and microbiological characteristics of peri-implantitis cases: a retrospective multicentre study.
Clinical Oral Implants Research 2012; 23(9): 1045-54.
- II. Charalampakis G, Rabe P, Leonhardt Å, Dahlén G.
A follow-up study of peri-implantitis cases after treatment.
Journal of Clinical Periodontology 2011; 38(9): 864-71.
- III. Dahlén G, Charalampakis G, Abrahamsson I, Bengtsson L, Falsen E.
Predominant bacterial species in subgingival plaque in dogs.
Journal of Periodontal Research 2012; 47(3):354-64.
- IV. Charalampakis G, Abrahamsson I, Carcuac O, Dahlén G, Berglundh T.
Microbiota in experimental periodontitis and peri-implantitis in dogs.
Submitted.



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Abstract

Peri-implantitis from a microbiological perspective

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Background and aims: Peri-implantitis is an infectious disease affecting the supporting tissues of the dental implant. Long-term follow-up of peri-implantitis cases clinically and microbiologically is lacking and, the microbiota involved has been poorly characterized. The objectives of the present thesis were to:

- i) in a patient sample identify clinical and microbiological features of peri-implantitis (Studies I & II)
- ii) in a dog model, used for experimental research on periodontitis/peri-implantitis, identify the predominant subgingival species (Study III), and compare the microbiological profile of teeth/implants during spontaneous progression of ligature-induced periodontitis and peri-implantitis (Study IV)

Methods: The platform for studies I & II was 281 peri-implantitis cases selected consecutively from the Oral Microbiological Diagnostic Laboratory, Gothenburg, Sweden and analyzed by culture and/or molecular DNA-DNA hybridization method. The identification of subgingival species in the dog was based on phenotypical tests, checkerboard and DNA sequencing technology (Study III). The quantification of microbiota during experimental periodontitis and peri-implantitis was based on checkerboard methodology (Study IV).

Results: Peri-implantitis was a poly microbial anaerobic infection with increased number of Aerobic Gram negative bacilli (AGNB) in 18.6% of patients. Microbiological findings did not correlate fully to the clinical findings, probably due to accessibility problems (Study I). It was not feasible to establish peri-implant health in 54.7% of the patients. A rough surface may be associated with early disease development and inability to treat disease successfully (Study II). The subgingival microflora in dogs used for experimental purposes shows greater heterogeneity but does not differ substantially with the respective one in humans, at genus level. Nevertheless, marked differences existed at species level (Study III). Suspected subgingival bacteria, including *Pasteurella*, *Porphyromonas* and *Treponema* genera are involved in experimental periodontitis and peri-implantitis. Bacterial growth increased around teeth and implants during the period following ligature removal and established an anaerobic Gram-negative microflora (Study IV).

Conclusions: Peri-implantitis shares similar predominant species to periodontitis both in humans and experimental dog model. All studies confirm that peri-implantitis is a non-specific, polymicrobial and heterogenous disease of endogenous nature. The potential role of AGNB in disease aetiopathogenesis needs further investigation.

Keywords: Animal experiment, bacterial load, culture, checkerboard, dental implants, infection, microbiota, peri-implant disease, peri-implantitis, titanium

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