

PREVENTION AND TREATMENT OF EXPERIMENTAL PERI-IMPLANTITIS

Akademisk avhandling

Som för avläggande av doktorsexamen vid Sahlgrenska akademien,
Göteborgs universitet kommer att offentligens försvaras i F-sal 3,
Medicinaregatan 12E, den 15 dec 2021, klockan 9.00

Ahmed Almohandes

Fakultetsopponent:

Professor Andreas Stavropoulos

Avdelningen för parodontologi, Malmö universitet

Avhandlingen baseras på följande delarbeten

- I. Almohandes, A., Abrahamsson, I., Dahlén, G., & Berglundh, T. (2021). Effect of biofilm formation on implant abutments with an anti-bacterial coating: A pre-clinical in vivo study. *Clinical Oral Implants Research*, 32(6), 756-766.
- II. Almohandes, A., Abrahamsson, I., Dionigi, C., & Berglundh, T. (2021) Surgical treatment of experimental peri-implantitis using mechanical and chemical procedures. A pre-clinical in vivo study. *Submitted for publication*.
- III. Almohandes, A., Carcuac, O., Abrahamsson, I., Lund, H., & Berglundh, T. (2019). Re-osseointegration following reconstructive surgical therapy of experimental peri-implantitis. A pre-clinical in vivo study. *Clinical Oral Implants Research*, 30(5), 447-456.
- IV. Almohandes, A., Lund, H., Carcuac, O., Petzold, M., Berglundh, T., & Abrahamsson, I. (2021) Accuracy of bone level assessments following reconstructive surgical treatment of experimental peri-implantitis. *Submitted for publication*.

**SAHLGRENKA AKADEMIN
INSTITUTIONEN FÖR ODONTOLOGI**



PREVENTION AND TREATMENT OF EXPERIMENTAL PERI-IMPLANTITIS

AHMED ALMOHANDES

Department of Periodontology, Institute of Odontology, Sahlgrenska Academy, University of Gothenburg

Abstract

Peri-implantitis is a plaque-associated pathological condition occurring in tissues around dental implants. It is characterized by inflammation in the peri-implant mucosa and progressive loss of supporting bone. The aims of the present series of studies were to (a) analyze the effect of plaque-formation on implant abutments with an antibacterial coating, (b) evaluate the effect of surgical treatment of experimental peri-implantitis using different decontamination methods, (c) evaluate the effect of the use of bone substitute materials on soft and hard tissue healing following reconstructive surgical therapy and (d) evaluate the accuracy of bone level assessments using either cone beam computed tomography, intra-oral periapical radiographs or histology.

In Study I, plaque formed on implant abutments with an antimicrobial coating for 6 months. Data from radiological, microbiological and histological examinations were analyzed. In study II, III and IV, different surgical treatment protocols of experimental peri-implantitis were applied to implants with different surface characteristics. Radiographs were obtained to longitudinally evaluate disease progression and treatment outcome and block biopsies were obtained and prepared for histological analysis. In study IV, cone beam computed tomography was obtained following reconstructive treatment of experimental peri-implantitis.

Implant abutments with an antibacterial coating failed to prevent biofilm formation and did not influence the inflammatory response in the adjacent peri-implant mucosa (Study I). Disease resolution of experimental peri-implantitis occurred after surgical therapy using different methods for implant surface decontamination (Study II and III). Healing following surgical treatment of experimental peri-implantitis was superior around implants with a smooth surface than at implants with rougher surfaces. (Study II and III). Defect fill and re-osseointegration following reconstructive peri-implantitis surgery occurred at 23 out of 24 implants with a smooth surface and at 13 out of 24 implants with a moderately rough surface. The additional effect of using bone substitute materials during surgery was small (Study III). Significant correlations were observed between assessments of marginal bone levels using cone beam computed tomography, periapical radiographs or histology. Measurements in periapical radiographs consistently resulted in an overestimation of the bone level of about 0.3 mm (Study IV).

Keywords: Antibacterial, bone substitute material, CBCT, histology, implant surface, marginal bone level, peri-implantitis, radiograph, surface decontamination