

On loading protocols and abutment use in implant dentistry

Clinical studies

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska Akademin vid Göteborgs universitet kommer att offentligen försvaras i sal Europa (Lyktan), Konferenscentrum Wallenberg, Medicinargatan 20A, Göteborg, fredag den 4 mars 2016, kl. 13.00

av

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Avhandlingen baseras på följande delarbeten:

- I. **Göthberg C**, André U, Gröndahl K, Ljungquist B, Thomsen P, Slotte C. Immediately loaded implants with or without abutments supporting fixed partial dentures: 1-year results from a prospective, randomized, clinical trial. *Clin Implant Dent Relat Res*. 2014 Aug;16(4):487-500.
- II. Slotte C, Lennerås M, **Göthberg C**, Suska F, Zoric N, Thomsen P, Nannmark U. Gene expression of inflammation and bone healing in peri-implant crevicular fluid after placement and loading of dental implants. A kinetic clinical pilot study using quantitative real-time PCR. *Clin Implant Dent Relat Res*. 2012 Oct;14(5):723-36.
- III. **Göthberg C**, André U, Gröndahl K, Thomsen P, Slotte C. Bone response and soft tissue changes around implants with/without abutments supporting fixed partial dentures: Results from a 3-year, prospective, randomized, controlled study. *Clin Implant Dent Relat Res*. 2015 Mar 19. doi: 10.1111/cid.12315.
- IV. **Göthberg C**, Gröndahl K, Omar O, Thomsen P, Slotte C. Complications and risks of implant-supported prostheses: 5-year RCT results. *Submitted for publication*.



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ABSTRACT

Research questions: The influence of immediate or delayed loading and the use of abutments in implant dentistry with regard to peri-implant tissues and the effect of risk parameters.

Methodology: Fifty partially edentulous patients each received three Brånemark TiUnite™ implants. The patients were randomly assigned to a test group (immediate loading) or a control group (delayed loading). The test patients received a temporary prosthesis within 48h. The prosthesis was attached directly at implant level (IL) or via abutments: a machine-milled surface (AM) or an oxidized surface (AOX, TiUnite™). Clinical examinations and intraoral radiographs were performed during a 5-year period. For a subgroup, crevicular fluid was analyzed with qPCR.

Results: Up to 1-year, six implants were lost. Thereafter, no implants were lost, resulting in 5-year cumulative survival rates of 93.9% and 97.0%, for test and control groups, respectively. After 5 years, significantly lower marginal bone loss (MBL) was found at superstructures connected to AM than at sites with superstructures attached to IL. Soft tissues retracted mostly during the first year and thereafter minor changes were seen. With time, proximal probing pocket depth, plaque and bleeding increased, whereas a minor decrease for bleeding was found between 3 and 5 years. Similar bleeding-on-probing levels were seen at 3 and 5 years for various connections. The prevalence of peri-implantitis was 4.0% and 9.1% at implant and patient level, respectively, after 5 years. Technical complications were scarce after the first year; the most common was porcelain chipping. In a multiple linear regression model, the independent variables – health change, medication for high blood pressure, periodontal disease experience, smoking (≤ 10 cigarettes per day), and proximal pocket depth – explained about 27% of MBL variations. The gene study demonstrated correlation between some genes and clinical findings, but there is need for more research.

Conclusions: The results demonstrated similar implant survival and marginal bone loss, irrespective of loading protocol. The use of a machined abutment should be preferred regarding marginal bone stability over time. There is still a lack of scientific support for placing superstructures directly on the implant. Factors related to systemic health and medications as well as periodontal disease experience and smoking, are associated with marginal bone loss. Peri-implantitis was found in 9.1% of the patients, indicating the need for supportive maintenance.

Keywords: abutment design; clinical studies; dental implants; dental prosthesis, implant-supported; gene expression; health; immediate implant loading; marginal bone loss; osseointegration; prosthodontics; risk factors; smoking; treatment outcome.

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