Göteborg, 2019

On percutaneous

implants fate and feature

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Arvid Carlsson, Academicum, Medicinaregatan 3, den 5e November, klockan 9:00

av **Anna Larsson**

Fakultetsopponent:

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Avhandlingen baseras på följande delarbeten

I. Implant losses for the bone-anchored hearing device are more frequent in some patients. Larsson A, Tjellström A, Stalfors J. Otology & Neurotology 2015 Feb;36(2):336-40

II. Histologic evaluation of soft tissue integration of experimental abutments for bone anchored hearing implants using surgery without soft tissue reduction. Larsson A, Wigren S, Andersson M, Ekeroth G, Flynn M, Nannmark U. Otology and Neurotology 2012 Oct;33(8):1445-51

III. Soft Tissue Integration of Hydroxyapatite-Coated Abutments for Bone Conduction Implants. Larsson A, Andersson M, Wigren S, Pivodic A, Flynn M, Nannmark U. Clinical Implant Dentistry Related Research, 2015 Oct;17 Suppl. 2:e 730-5

IV. Dermal integration of hydroxyapatite abutments in human- a pilot study. Larsson A, Eeg-Olofsson M, Dib L, Nannmark, Rasmusson L. In Manuscript

SAHLGRENSKA AKADEMIN

GÖTEBORGS UNIVERSITET

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Abstract

The main objective of this thesis was to investigate skin reactions around percutaneous abutments in the facial and retroauricular regions. Secondary objectives were to investigate the number of lost extraoral implants and their co-morbidity over time, for example complications because of skin reactions due to the skinpenetrating abutment. Another aim was to develop a new surgical technique to improve and facilitate soft tissue healing, explore an alternative material for the abutment to create a tighter adherence between dermis and the abutment surface and study the skin-abutment interface.

To assess skin reactions and long-term outcome for extraoral implants, a retrospective study on patients treated at the Sahlgrenska University hospital was performed and implant survival rate was estimated. This showed that a small group of 19 patients counted for 78 (55%) out of 141 (of total 763) of the lost implants. The over all implant loss was 18%.

A new animal model (sheep) was designed to study different types of abutments. Cylindrical and concave shaped abutments with hydroxyapatite surface material were compared with conventional cylindrical and concave titanium abutments. Samples were taken for histology, histomorphometric and qualitative analyses were carried out, showing integration between hydroxyapatite and dermis. The results suggested an advantage in using hydroxyapatite as abutment surface material. However the significance of the shape could not be determined.

Thereafter, a second study was performed to compare and further investigate the effect of abutment shape during a healing period of 4 weeks. Together, the animal studies 1 and 2 resulted in a new surgical procedure and feature of the abutment design. In sheep, the hydroxyapatite showed a firm integration with dermis.

From previous knowledge about complications with percutaneous abutments and the findings from the animal model, a cylindrical hydroxyapatite covered healing abutment was designed for human use. This newly designed test abutment was used in a pilot study examining dermis-abutment interface after implant insertion up until the second stage surgery at 12 weeks healing. Samples were taken for histology and histomorphometric and qualitative analyses. Results from the first patients showed that the hydroxyapatite surface induces a different interphase with the dermis compared to the titanium surface.

Keywords; Hydroxyapatit, bone anchored hearing aid, percutaneous, abutment, and dermal integration.

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