

Comparative study on bone regeneration in dehiscence-type defects at chemically modified hydrophilic (SLActive®) or nanostructured (NanoTite®) titanium implants

An experimental study in dogs. Presented at the EAO 2008, Warsaw.

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Introduction

The aim of the present study was to evaluate and compare the influence of hydrophilic (SLActive® Bone Level Implant, Institut Straumann AG, Basel, Switzerland) and nanostructured (NanoTite® Certain Prevail®, Biomet 3i, FL, USA) titanium implant surfaces on bone regeneration in dehiscence-type defects.

Materials and Methods

Standardized buccal dehiscence-type defects (height: 4 mm; width: 4 mm; depth: 2 mm) were surgically created following implant site preparation in both upper and lower jaws of twelve beagle dogs. Both SLActive® and NanoTite® implants were randomly assigned in a split-mouth design and left to heal in a submerged position. After 4 and 8 weeks, dissected blocks were processed for histomorphometrical [coronal extension of newly formed bone in contact with the implant surface (CBI), area of new bone fill (BF), and percent of bone to implant contact in the defect (BIC) area] analysis. For the statistical evaluation of the changes within groups, the paired t-test was used. For the comparisons between groups, the unpaired t-test was used.

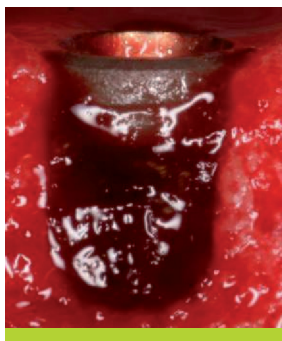


Fig. 1a: Stabilized blood clot at the SLActive® Bone Level Implant

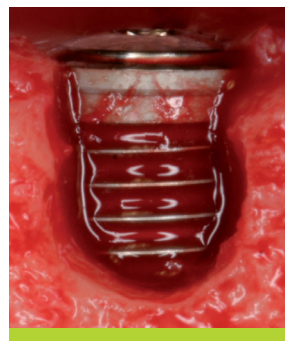


Fig. 1b: A collapse of the blood clot was commonly observed at NanoTite® Certain Prevail®

Results

At the time of implant placement a stabilized blood clot was always observed at the SLActive® implants, whereas a collapse of blood clot was commonly observed at NanoTite® implants (Fig. 1). After 4 and 8 weeks, wound healing at NanoTite® implants were mainly characterized by the formation of a dense connective tissue. New bone formation was only observed occasionally and limited to the basal compartment of the defect area.

SLActive® implants revealed significantly higher mean BIC-D values at 4 and 8 weeks resulting in a nearly complete resolution of the defect area by either newly formed trabecular (4 weeks) or parallel fibered woven bone (8 weeks) (Figs. 2 and 3). In addition, SLActive® demonstrated significantly higher BF and CBI at 4 and 8 weeks.

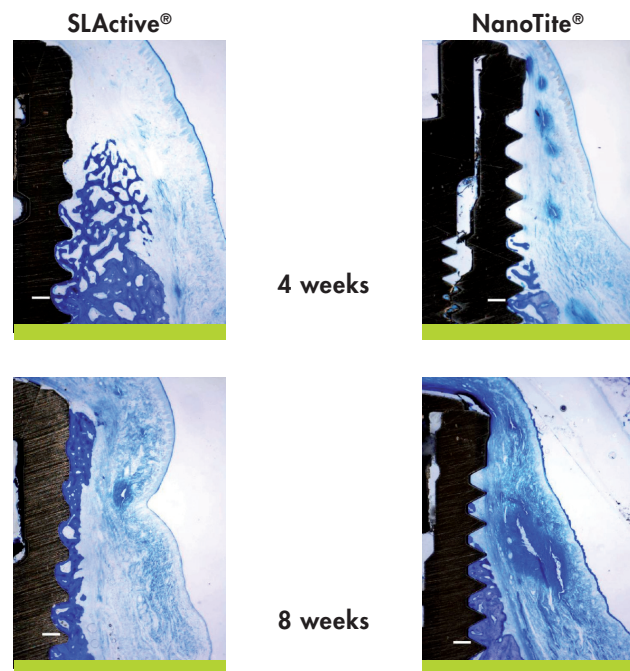


Fig. 2: Histological views after 4 and 8 weeks of submerged healing. Original magnification x30. The bar indicates the bottom of the defect.

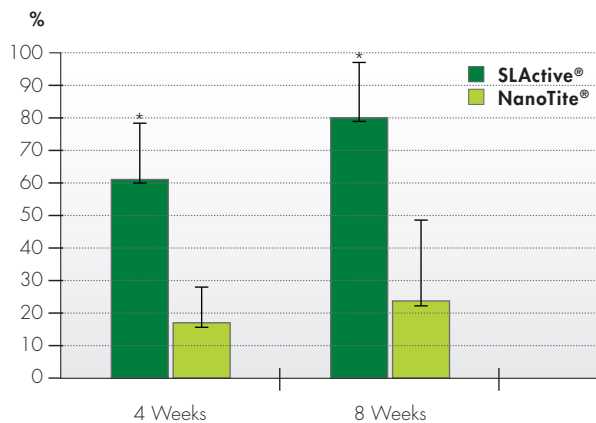


Fig. 3: Histomorphometrical analysis of BIC-D

BIC-D = percent of bone to implant contact in the defect area

* $\alpha < 0.05$

Conclusions

- Significantly higher bone-to-implant contact for SLActive® after 4 and 8 weeks
- Bone regeneration in dehiscence-type defects is supported by surface hydrophilicity rather than by nanotopography

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