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Science Column

Implant Therapy Outcomes, Surgical Aspects

Immediate dental implants resonance frequency analysis and removal-torque in canines.

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Background: Initial implant stability is one of the major keys for implant success.
Aim: This canine study was aimed to evaluate resonance frequency analysis (RFA) and removal torque of newly designed dental implant.
Methods: Two mongrel dogs were used for this pilot study. The four mandibular premolars were bi-laterally extracted followed by immediate dental implants with a new design were inserted. All implants were evaluated for RFA and two implants in each dog were also evaluated for removal torque. After 4 and 8 weeks, all remaining implants were re-evaluated for RFA and three implants in each dog were also re-evaluated for removal torque.
Results: Healing was uneventful; all implants showed clinical osseointegration. The mean immediate RFA following implant placement was 64.38 (5.03 SD) and increased to 72.94 (3.89 SD) and 74.5 (3.08 SD) following 4 and 8 weeks, respectively. Average removal torque immediately following implant placement was 49.65 (20.3 SD), 49.4 (3.32 SD) following 4 weeks and 98.33 (12.34 SD) following 8 weeks.
Conclusions and clinical implications: The newly designed dental implant showed good results of RFA as well as removal torque during the initial healing phase and might be used for immediate implantation. Further research is warranted.

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Biomechanics Analysis of a "Ring" Thread SATURN Dental Implant

Authors: Prof. Haim Abramovich, Weissberg Ilan.

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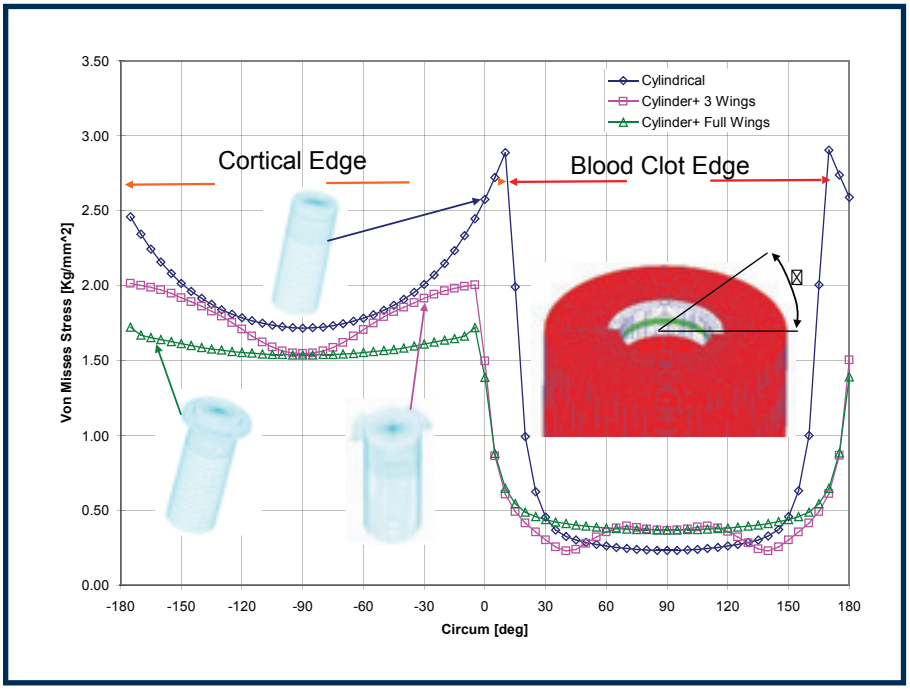
Peripheral Stress at Cortical to Implant Upper Interface for Axial Load Models 2.1, 2.2 & 2.3 (Bone with 180 deg Blood Clot)



[PATENT PENDING]

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The SATURN implant features a specially designed expanded diameter mid-crestal "ring" thread, which provides added bone contact for greater insertion torque achieving primary stability, by 3D FEM analytical model the SATURN implant was compared to a classical cylindrical implant, at the contact area with bone for vertical and oblique loads acting at the implant head.(Fig. 1-3)

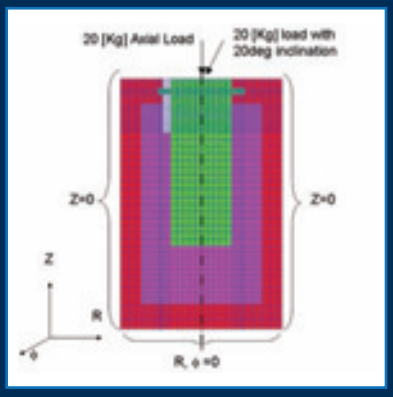
Material: Titanium Ti-6 AL 4V, Cortical bone, Cancellous bone, Blood Clot.

Axial load results: The Von-Misses and Shear stress distributions at the Cortex to Implant
upper common edge interface, due to 200 [N] axial compression load.
The both implants which contains partial and full wing at its head exhibit lower Von Misses and the Shear stresses compared to classical cylindrical implant.(Fig. 4-6)

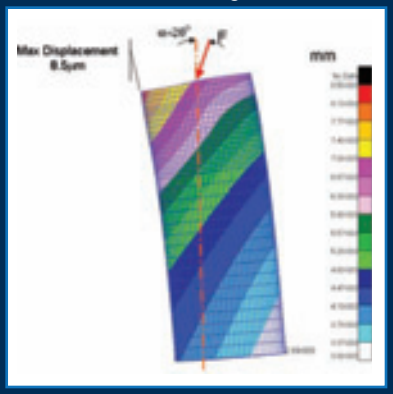
Oblique load results: The oblique load, of 200 [N] at 20 deg inclination relative to the implant axis, the implant with a full ring has the lower stress distribution at all circum axial angles, and the Saturn implant is more stable since the implant maximum displacement is 40% less then the classical implant. Also the implant inclination is reduced due to the added wing, which successfully transfer load across the blood clot.(Fig. 7-11)

Conclusion: It showed that adding a ring either partial or full at the upper part of the implant reduces and shifting the stress concentration away from the bone–implant interface and added wing also increases the implant stability especial in the case were the bone has a blood clot in the bon-implant interface.

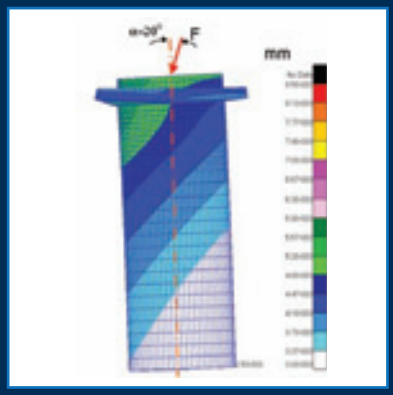
FEM model Boundary and Load Condition



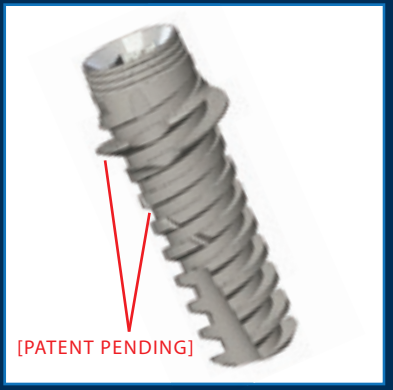
Classical Implant Displacement Due to Oblique Load of 200[N] at 20 deg



Saturn Like Implant Displacement Due to Oblique Load of 200[N] at 20 deg



Saturn Implant



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