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Effect of Intentional Abutment Disconnection on the Micro-Movements of the Implant-Abutment Assembly: A 3D Digital Image Correlation Analysis" *

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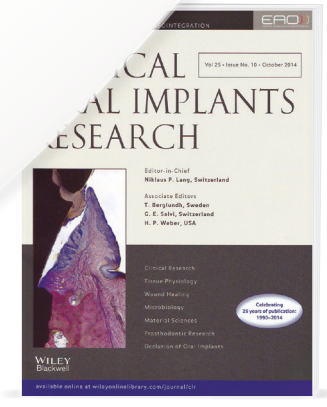

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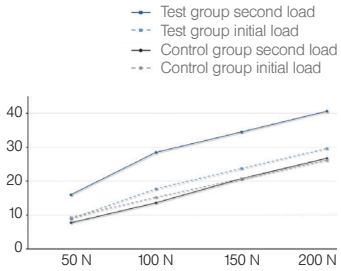

Fig. 3. Graphic representation of the mean displacement of the speckle surface of the abutment for the two groups under progressive load. Dotted lines represent the first cycle. Full lines represent the mean displacement during the second cycle. Displacement values in micrometers.

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SUMMARY.

Background

Implant–abutment assembly stability is critical for the success of implant-supported rehabilitation. The intentional removal of the prosthetic components may hamper the achievement of the essential stability due to preload reduction in the screw joint and implant-screw mating surface changes.

Objective

To evaluate the effect of intentional abutment disconnection and reconnection in the stability of internal locking hex implants and corresponding abutments using the method of 3D digital image correlation.

Material and Methods

Ten conical shape and internal hexagon connection implants (SEVEN® Implants) were embedded in acrylic resin and assembled to prosthetic abutments with 30 Ncm torque and assigned to two groups: group 1 - tested for static load-bearing capacity at 30° off-axis for two times and group 2 - underwent intentional disconnection and reconnection between tests. Micromovements were captured with two high-speed photographic cameras and analyzed with video correlation system in three spacial axes U, V and W. Screw abutment and internal implant thread morphology was observed with a field-emission scanning electron microscopy.

Results

After the intentional disconnection of the abutment, group 2 showed generally higher maximum displacements for U and V directions. Under 50N load, mean difference was 24.7 μm ($P = 0.008$) for U direction and 7.7μm ($P = 0.008$) for V direction. No significant differences were found for maximum and minimum displacements in the W direction. Mean displacement of the speckle surface presented was statistically different in the two groups ($P = 0.016$). SEM revealed non-homogenous screw surfaces with scoring on group 2 plus striations and debris in the implant threads.

Conclusion

Micro-movements were higher for the group submitted to intentional disconnection and reconnection of the abutment, particularly under average bite forces.