Effects of repeated manual disassembly and reassembly on the positional stability of various implant-abutment complexes: an experimental study

Semper W, Heberer S, Mehrhof J, Schink T, Nelson K. Effects of repeated manual disassembly and reassembly on the positional stability of various implant-abutment complexes: an experimental study. Int J Oral Maxillofac Implants. 2010; 25 : 86-94.

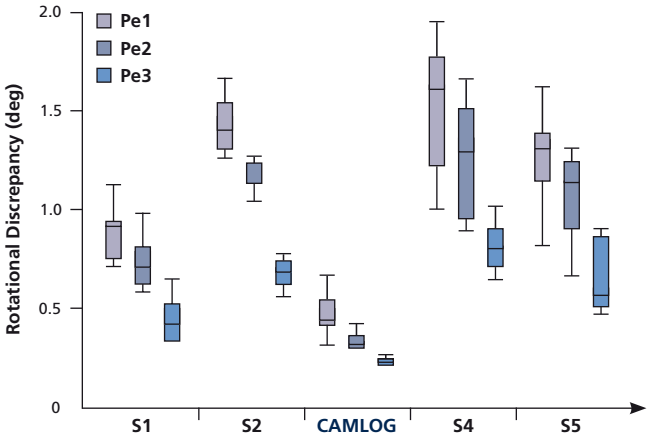
SUMMARY: Rotational Stability of the CAMLOG® Implant System is significantly greater than any other Implant System tested

Aim

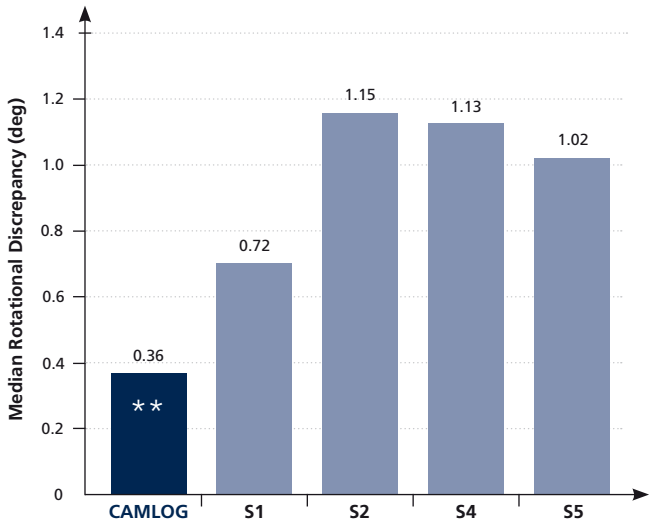
To evaluate the positional stability of five commonly used implant-abutment complexes in vitro by measuring rotational, vertical, and canting changes after manual removal and reassembly.

Results

Rotational Deviations: The CAMLOG® Implant System produced the least rotational discrepancies.



***Rotational Discrepancy**. Five implant systems were tested: S1, S2, S4, S5, and CAMLOG. Pe1, 2, and 3 represent results from three independent test persons. Figure adapted from Fig. 4 of Semper et al., 2010.*



***Median Rotational Discrepancy**. The CAMLOG® Implant System showed a significantly smaller rotational discrepancy than any other implant system tested (**p<0.001). Data extracted from Semper et al., 2010.*

The dimension of rotational freedom influences the likelihood of screw loosening[1] and the stability of the implant-abutment joint is known to affect implant treatment success[2].

Vertical Deviations: Vertical discrepancies were significantly higher in the systems based on conical elements.

Deviations in Angulation: No significant differences were observed between the implant systems investigated.

Conclusion

Implant-abutment-connection design influences the rotational, vertical, and angular positioning accuracy.

The CAMLOG® Implant System performed best, showing the least rotational deviations among all users and all implant systems tested.

[1] *de Barros Carrilho et al. Int J Prosthodont 2005;18:165–166*
[2] *Salinas TJ. Pract Proc Aesthet Dent 2001;13:352*

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PURPOSE: The purpose of this study was to evaluate rotational, vertical, and canting changes in the position of the rotation-safe component in the implant-abutment assemblies of five different implant systems (ITI, Steri-Oss, Camlog, Astra Tech, and Replace Select) after manual removal and reassembly.

MATERIAL AND METHODS: Prefabricated stainless steel models were used for each implant system, into which six implants were fixated with polymethylmethacrylate resin. Rotation-safe abutments (components) were screwed into the implants according to the manufacturers' specifications. Three test persons with varying knowledge of the theory and practice of implant dentistry manually assembled and reassembled the implant-abutment joint using each system-specific screwdriver 20 times each. A coordinate reading machine was used to detect discrepancies in position after each reassembly in relation to a coordinate system. Rotational freedom, changes in vertical height, and deviations in angulation were assessed. Statistical analysis was performed based on the nonparametric analysis of variance of repeated measurements.

RESULTS: The tested complexes showed rotational freedom that ranged from 0.92 to 4.92 degrees, with significant differences between the systems. Camlog was significantly different from all other systems tested regarding rotational freedom, whereas Steri-Oss, Astra Tech, and Replace Select showed no significant difference between each other because of their nondiscrepant mean degree of rotational freedom. Vertical alterations in position ranged from 1 to 83 microm. A statistically significant difference was detected between butt-joint and beveled implant-abutment connections, with ITI and Astra Tech showing no significant difference when compared to each other, but displaying a significant difference versus all other systems tested. Canting discrepancies were not significant, with no influence of implant system or test person clearly detectable.

CONCLUSION: Three-dimensional changes in the location of the abutment in relation to the implant result after manual assembly and reassembly of the implant-abutment complex.

Order

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