P-BR-101

BASIC RESEARCH

Conometric retention and dynamic loading over time

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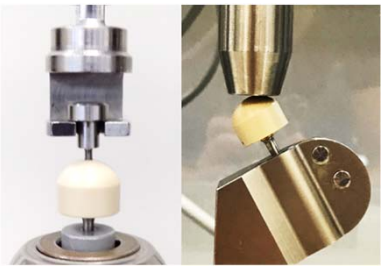
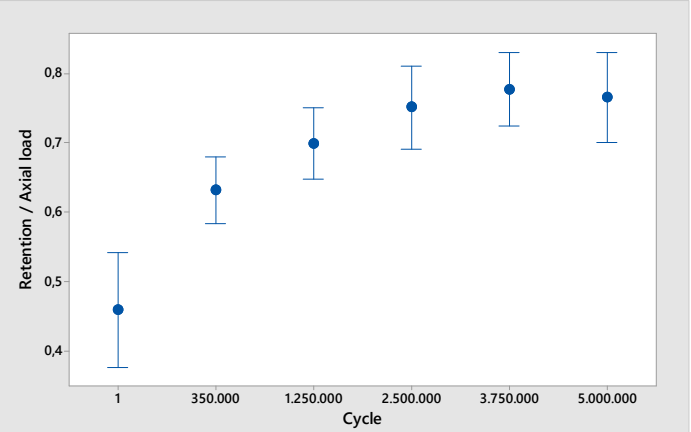
Abstract

Retention of the conometric connection over time has been investigated under dynamic loading in a test set-up based on ISO14801:2016.
The samples were subjected to dynamic load for $5x10^6$ cycles in total. Retention was measured after 1, $0.35x10^6$, $1.25x10^6$, $2.5x10^6$, $3.75x10^6$ and $5x10^6$ load cycles. The results showed that the ratio between axial load and retention increased over time but flattened out on a level between 0.6 – 0.85 after approx. $1.25x10^6$ load cycles.
It was concluded that the conometric connection of the tested samples maintains it's stability over time under cyclic loading. There was no effect of wear detected that had an negative influence on the conometric connection.



Static & dynamic test setup

Results



Retention during cyclic loading

The ratio increases over time but flattens out on a level between 0.6 – 0.85 after approx. $1.25\ x10^6$ cycles. No statistical difference of ratio between $1.25\ x10^6$ – $5\ x10^6$, however, there is a statistically significant difference between cycle 1 and $0.35\ x10^6$ – $5\ x10^6$. There is sufficient evidence to assume that the data is normally distributed (probability plot p >= 0.05).

Background and Aim

An alternative to using cement- or screw-retained coupling for single tooth restorations on implants, is a conometric connection. This excludes the risk for excess cement or the disadvantage with a screw access hole. The retention of a single tooth friction-retained connection is dependent on the cone angle, coefficient of friction, initial push-in force and the external load situation. This study was set up to evaluate the conometric mode of retention over time under dynamic loading.

Conclusion

It was concluded that the conometric connection of the tested samples maintains its stability over time under cyclic loading. There was no effect of wear detected that had a negative influence on the conometric connection.

Methods and Materials

In modified 30° test setup, acc. to ISO 14801:2016, fully embedded implants, with conometric straight Acuris abutments and caps, were loaded with defined dynamic load at 15 Hz for $5x10^6$ cycles. Retention of the conical connection abutment to cap was tested after 1, $0.35x10^6$, $1.25x10^6$, $2.5x10^6$, $3.75x10^6$ and $5x10^6$ loading cycles in a pull-off test with a constant testing speed of 2 mm/min. The ratio retention/axial load was used to evaluate the retention over time under cyclic loading . The axial load was defined as follows: axial load = fatigue load x cos(30°).

References

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