

Title

INFLUENCE OF IMPLANT POSITION OVER THE ACCURACY OF INTRAORAL OPTICAL SURFACE SCANNING (IOS) FOR COMPLETE-ARCH IMPLANT IMPRESSION: A RANDOMIZED IN VITRO TRIAL

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Body

Objective:

The aim of this study was to evaluate the influence of implant position on the accuracy of a confocal microscopy intraoral scanner for complete-arch implant impression.

Materials and method:

An edentulous maxillary master model set-up with 6 internal connection dental implant analogues, placed with different depth and inclination, was scanned with an extraoral optical scanner to achieve a standard tessellation language (STL) file to be used as a reference for the study measurements. Six titanium scan bodies were screwed onto the implants and scanned with an intraoral scanner by 3 operators to obtain 45 test STL files. The test files were aligned to the reference scan with a 0,01-mm tolerance best fit algorithm. Linear (X, Y and Z-axis) and angular deviations (δ ANGLE) were measured for each analogue (n=270). Absolute values of the linear discrepancies were summed up to obtain a tridimensional discrepancy value (δ ASS). Implant position influence over δ ASS and δ ANGLE was statistically analyzed through a hypotheses test for mixed model analysis of variance with Tukey adjustment for multiple comparison (p<0,05).

Essential results:

Considering δ ASS, implant 2.6 resulted as the less accurate (estimated mean 172.4 micron) with a significant difference compared to implants 1.2 (p = 0.0107), 2.2 (p = 0.0004) and 2.4 (p = 0.0200). Implant 2.2 resulted as the most accurate (estimated mean 81micron) with a significant difference compared to implant 2.6 (p = 0.0004). Considering δ ANGLE implant 2.4 resulted as the most accurate (estimated mean 0.4625°) with a significant difference compared to all the other implants 1.6 (p = 0.0061), 1.4 (p = 0.0002), 1.2 (p < 0.0001), 2.2 (p < 0.0001) and 2.6 (p = 0.0010). Implant 2.2 resulted as the less accurate (estimated mean 0.8681°) with a significant difference compared to implant 1.6 (p = 0.0233) and 2.4 (p < 0.0001).

Conclusions:

Within the limitations of this study, the accuracy of digital complete-arch implant impression obtained through a confocal microscopy IOS is influenced by implant angulation and position considering linear deviation and angular deviation respectively.