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Influence of a specially designed geometric device and modified scan bodies on the accuracy of a maxillary complete arch digital implant scan: An in vitro study**Haidy Anwar**

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Statement of problem: Capturing accurate complete arch digital implant scans remains a challenging process because of the lack of recognizable anatomic landmarks. The effect of modified scan bodies (SBs) on improving scanning accuracy is unclear.

Purpose: The purpose of this in vitro study was to evaluate and compare the accuracy of a maxillary complete arch digital implant scan when using a specially designed geometric device with the accuracy of modified scan bodies.

Material and methods: Four implants were placed in an edentulous maxillary model made of porous bone material with polyurethane attached gingiva. Scan bodies were attached to the implants and then digitized with a high precision laboratory scanner to create the reference scan. Round depressions were made on the buccal and palatal surfaces of the scan bodies, and the model was scanned with an intraoral scanner using 4 different scenarios: the model with no geometric device or modified scan bodies (ND-NM), device only without modified scan bodies (D-NM), no device but with modified scan bodies (ND-M), and device with modified scan bodies (D-M). Each group was scanned 10 times for a total of 40 scans. Trueness and precision were evaluated using inspection software to measure the 3D surface deviation. Trueness was measured by superimposing each test scan on the reference scan, and precision was calculated by superimposing the test scans of the same group with each other. Data were analyzed using the GraphPad Prism version 8.0.0 software program. Two-way ANOVA was performed to assess the effect of the device and modifications on trueness and precision ($\alpha=.05$).

Results: Both the geometric device and SB modifications had a significantly significant effect on trueness and precision ($P<.001$). Regarding trueness, group D-M had the lowest mean and standard deviation (0.158 ± 0.028 mm) in contrast with group ND-NM, which had the highest deviation (0.282 ± 0.038 mm). In terms of precision, group D-M showed the lowest mean and standard deviation (0.134 ± 0.013 mm), while group ND-NM revealed the highest deviation 0.222 ± 0.031 mm). However, no statistically significant interaction was found between the device and modifications regarding either trueness or precision ($P>.05$).

Conclusions: Using a specially designed geometric device improved both the trueness and precision of complete arch digital implant scans. The modified SBs had a positive influence on the scanning trueness and precision, and the best accuracy was achieved when using the geometric device and the modified SBs simultaneously.

Biography

Haidy Anwar studied in Fixed prosthodontics Department. He worked as a Faculty of Dentistry in the Arab Academy for Science. He has research works in the Technology and Maritime Transport, in Egypt.