

Accuracy of full-arch implant prosthesis, utilizing a reverse scan body in a complete digital workflow

Objectives: To evaluate the accuracy of a complete digital workflow utilizing a novel reverse prosthetic scan body, implementing different scan patterns.

Materials and methods: A mandibular cast with 4 multi-unit abutment implant analogs (Screw-Retained Abutments) with adequate antero-posterior spread simulated a common clinical patient situation. This cast served as the master cast and an interim screw-retained prosthesis was fabricated on it. Novel reverse scan bodies were connected to the interim prosthesis and extra-oral scanning was performed with an intraoral scanner and 3 different scan patterns: starting from the occlusal surface of the interim prosthesis (O – group 1), starting from the intaglio (I – group 2), and helix pattern (H – group 3). The produced STL files from the 3 groups were then imported to a computer-assisted design (CAD) software (exocad) and after the digital design, the STL file was exported to a computer-assisted machining (CAM) milling machine generating in total 15 milled prosthesis prototypes per group. Two clinicians assessed the accuracy of fit of each digitally fabricated prosthesis prototype on the master cast, utilizing a screw-resistance test and a subsequent radiographic evaluation. The Fisher's exact test was used to test the difference between the 3 groups.

Results: Out of the 3 different groups, O group scan pattern led to 100% accuracy of fit, while the prototypes generated from I and H groups led to 80% and 53% accuracy of fit. The results were statistically significant ($P=0.008$).

Conclusions: Occlusal scan pattern leads to accurately fitting milled prosthesis prototypes after the extra-oral scanning of the interim prosthesis with reverse scan bodies, without intraoral implant data acquisition. Scan pattern has a significant effect in the accuracy of the fit of the full-arch implant supported milled prosthesis prototypes.

Keywords: Digital workflow, Scan Body, Full-arch prosthesis, implant-supported restoration, provisional prosthesis