Title: Evaluation of implant-supported single crowns fabricated by incorporating intraoral scanner-based mandibular movement data: A Clinical study

Objective: This clinical study aimed to assess the performance of single implant-supported single crowns fabricated by utilizing intraoral scanner-based mandibular movement data.

Methods: Thirteen adult participants who underwent single-implant treatments in the posterior region were included in the study. Three single crowns were fabricated for each participant, divided into three groups: Group VA, Group S, and Group SWM. In Group VA, an implant-level impression was taken using impression copings, and the values for articulator elements were obtained with a jaw motion tracking device (JMA-Optic System; Zebris Medical GmbH). The crown was designed using computer-aided design (CAD) software (Dental System; 3Shape A/S) and the virtual articulator tool. In Group S, digital scan data were obtained using an intraoral scanner (TRIOS 3; 3Shape A/S) and a scanbody (GMS Scanbody; GeoMEDI). After replicating the scan data, the mandibular movement was recorded additionally, and the crowns were fabricated by incorporating this movement in the CAD software to manufacture the crowns of Group SWM. The weight of the crowns was measured before and after the occlusal adjustment, and pre- and post-adjustment scan data were obtained. Changes in crown weights and root mean square (RMS) values were analyzed to evaluate the differences among the three groups. Statistical significance was set at $\alpha=0.05$.

Results: The weight difference of Group VA was significantly larger than that of Group SWM ($p=0.004$). With regard to RMS values, no significant differences were observed among the groups ($p>0.05$).

Conclusion: Incorporating intraoral scanner-based mandibular movement data in the fabrication of single implant-supported single crowns may reduce the need for occlusal adjustments and contribute to more precise prosthesis fabrication.

Keywords: single implant-supported crown, intraoral scan, mandibular movement, computer-aided design, virtual articulator