

AN IN VITRO 3-DIMENSIONAL COMPARATIVE ANALYSIS OF FOUR INTRA-ORAL SCANNING DEVICES INVERTICAL PREPARATION FOR FIXED DENTAL PROSTHESIS

Objectives: To test differences in term of trueness and precision among the different Intraoral scanners (IOSs) in scanning a vertical preparation on natural teeth.

Materials: A reference maxillary typodont (RT) was fabricated by performing a vertical preparation with knife edge finish line for full crown on #16 and #21. The RT was scanned with a laboratory scanner (Aadva lab scanner, GC, Tokyo, Japan) to obtain a digital reference typodont (dRT) in .stl format file. A group of 40 digital casts (dIOC) were obtained by scanning the RT 10 times with four different IOSs (Trios 3; 3Shape A/S), (I700, Medit), (Vivascan; Ivoclar), (Aadva IOS200, GC). All the obtained dIOC were imported into an inspection software program (Geomagic Control X; 3D SYSTEMS) to be superimposed to the dRT, to calculate trueness. Therefore, in order to calculate precision all the scans of the same scanner group were superimposed onto the cast that recorded the best result of trueness. Results were collected as root mean square value (RMS) on #16 and #21 abutment surfaces. The obtained data were evaluated with Kolmogorov-Smirnov for normal distribution. A nonparametric analysis Kruskal-Wallis test was performed to compare the RMS values obtained in the different IOS groups for trueness and precision. Statistically significant was set at 0.05.

Results:

Table 1: The mean values and standard deviations of each scanner regarding the trueness and precision on the prepared abutments. Letters reported the statistical significant differences in between the groups $P < 0.05$

IOS	Trueness M	Trueness I	Precision M	Precision I
Trios 3	60,2 ± 4,9 ^a	68,7 ± 4,0 ^b	31,7 ± 13,1 ^b	18,0 ± 2,7 ^a
I700	58,0 ± 8,9 ^a	83,3 ± 5,1 ^c	15,8 ± 2,7 ^a	29,8 ± 3,7 ^b
Vivascan	69,6 ± 6,9 ^a	56,0 ± 12,1 ^a	41,4 ± 20,2 ^c	49,9 ± 19,6 ^c
Aadva 200	55,4 ± 5,6 ^a	59,2 ± 2,7 ^a	10,7 ± 2,1 ^a	16,9 ± 13,8 ^a

Conclusions: Within the limits of the present study, it can be concluded that in vertical prepared teeth the trueness obtained using different scanners differ with statistical significance only in the incisor abutment, Aadva scanner resulted as the most precise in both M and I abutments.