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0828 In-Vitro Vertical Marginal Gap Comparison of CAD/CAM Zirconium Copings

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Objectives: Limited data exists regarding dental CAD/CAM system accuracy and precision. This study evaluated the vertical marginal gap of zirconium-oxide copings from contemporary CAD/CAM systems.

Methods: Zirconium-oxide copings were milled using KaVo Everest (ZH, ZS), NobelBiocare Procera (MOD40, Piccolo, Forte), 3MESPE Lava, Wieland Zeno, and CERECinLab (InCeramZr) and compared to control cast copings(n=10). Ninety polyvinylsiloxane impressions were made of a master metal die exhibiting a 1mm heavy chamfer preparation finish-line. TypeIV stone dies were scanned, finish line detected, and copings with 50µm cement space 1mm from finish line were fabricated. Control copings were fabricated using the lost wax technique. Standardized digital photographs of each coping were taken on the metal master die and measured with ImageProExpress to obtain the mean vertical marginal gap in microns.

Results: The ANOVA on the log-transformed data revealed statistically significant differences in marginal gap between groups ($p<0.0001$). Tukey's HSD test indicated gaps observed in Piccolo and MOD40 were significantly greater than those observed in Zeno, InCeramZr, EverestZH, cast, and Lava, while gaps in Forte and EverestZS were significantly greater than EverestZH, cast, and Lava. Gaps observed in Zeno, InCeramZr, and EverestZH were significantly greater than cast and Lava**.**

Group	Mean Marginal Gap (µm)	LN Mean Marginal Gap (µm)	Group Comparisons			
Procera-Piccolo	28.23±11.27	3.27±0.41	A			
Procera-MOD40	25.80±10.08	3.17±0.45	A			
Procera-Forte	24.29±8.71	3.13±0.39	A	B		
Everest-ZS	25.77±22.38	2.99±0.70	A	B		
Wieland-Zeno	11.85±5.78	2.38±0.42		B	C	
Cerec-InCeramZr	18.35±20.6	2.37±1.11		B	C	
Everest-ZH	10.59±6.42	2.15±0.73			C	
Control-Cast	3.19±1.02	1.11±0.32				D
3MESPE-Lava	3.00±0.74	1.07±0.24				D

Means with same letter not significantly different, $p>0.05$.

Conclusion: Vertical margin gap of the CAD/CAM copings were significantly greater for all groups except one as compared to the control cast copings. Further investigations regarding horizontal marginal gap and internal coping fit are required. Supported by NIH/NIDCR T32 DEO14678, KaVoAmerica, University of Iowa, College of Dentistry.