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In Vitro Evaluation of Marginal Adaptation of Metal Copings Produced by LaserCUSING®, Rapid Prototyping and Conventional Casting Techniques

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Objective: To evaluate the functionality of CAD/CAM systems in the production of metal copings.

Methods: Metal copings that are produced by a new CAD/CAM system called LaserCusing® and conventional casting techniques were compared in terms of marginal adaptation and the combination of old and new technology, CAD/MAM was used as a control group. 120 extracted human molar teeth were used. Samples were divided into 3 groups (1) LaserCusing®, (2) Rapid Prototyping, (3) Conventional casting technique. All samples underwent same procedure till the metal coping production stage. Tooth preparations were completed with flat occlusal surfaces and chamfer margins. All samples were cast in non-precious metal alloys. For evaluating marginal adaptation, sectioning technique was used and the results were mathematically analyzed on the binocular stereomicroscope (Leica optical microscope, Leica Cambridge Ltd, Cambridge, United Kingdom) in the means of marginal gap range and absolute marginal fit. In the evaluation of the data, besides the descriptive statistical methods (mean, standard deviation), the binary groups were compared with the use of Tukey's method of analysis and ANOVA tests.

Results: Marginal gap and absolute marginal fit mean values for LaserCusing®, CAD/MAM and conventional casting techniques were 51.78 µm-136.08 µm, 69.64 µm- 223.27 µm and 80.39 µm-202.05 µm, respectively;

Conclusions: Regarding all of the data analyzed, rapid prototyping systems that are recently added to the CAD/CAM systems can be a good alternative to the lost wax technique, saving time and material in the production of metal-supported fixed restorations by providing high sensitivity of CAD/CAM systems as well.

Key words: Marginal adaptation, metal coping, CAD/CAM, rapid prototyping, metal alloy