

Comparative Study of Prefabricated vs. Digitally Generated Zirconia Crowns for Primary Incisors

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Objectives: Early childhood caries (ECC) is a chronic disease present in young children. When untreated, a child's smile may be compromised, thus affecting them emotionally. Due to high esthetic demands, primary anterior teeth are commonly restored with prefabricated zirconia crowns. The possibility of using digital technology to fabricate these restorations should be explored. The aim of this study is to compare the marginal fit of digitally generated crowns versus prefabricated zirconia crowns for a primary maxillary central incisor (#E). **Null Hypothesis:** The marginal fit of digitally generated zirconia crowns and prefabricated crowns will have no significant difference.

Methods: A typodont tooth #E was prepared for a zirconia crown and digitally scanned using Planmeca technology. Forty, three-dimensional (3D) printed models were generated using an Asiga Max printer. The preparations were divided into two groups of twenty: PC (prefabricated crowns) and DC (digital crowns). PC crowns were selected based on best overall fit and size. DC crowns were digitally designed and milled using PlanCAD Premium software and a Planmeca 50S. All crowns were cemented with Ketac. The marginal fit was evaluated under Opti Spec microscope and the following points were measured: mid-buccal, mid-lingual, mid-mesial and mid-distal. A score was given for the amount of overhang (+mm) extending over the prep margins.

Results: All analyses were performed using R Statistical Software. The average marginal overhang difference in PC vs DC in all four points were significant with P-values ($2e-16 < 0.05$) suggesting digital crown marginal fit was more accurate than prefabricated crowns. The R-value > 0.80 at all four margins successfully recognizes the P-values' significance in correctly accrediting the difference in marginal fit to the difference in the two types of restorations.

Conclusions: The marginal fit of digitally generated zirconia crowns is more accurate than prefabricated zirconia crowns. Integrating digital technology for fabrication of pediatric crowns chairside is possible.

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