OBJECTIVE: Translucency is a key factor for the esthetic of restorative materials. Actually, the natural appearance of a restored tooth greatly depends on the depths where light reflections and scattering phenomena occur in the dental crown. Monolithic Y-TZP crowns are claimed to have better mechanical properties than layered ones, however the lack of translucency still remains an issue in full-contour crowns. Recently a translucent hybrid cubic/tetragonal zirconia (Katana STML and UTML, Kuraray-Noritake) has been introduced to meet the demand for esthetic, pre-colored restorations. The aim of this study is to compare the translucency of CAD/CAM crowns made out of various zirconia types and lithium disilicate ceramic.

MATERIALS AND METHODS: One first lower molar was scanned with Lava intraoral scanner (COS) and used as a pattern to replicate 60 crowns using CAD/CAM technology. The crowns were made of cubic/tetragonal zirconia (20 Katana Super Translucent, STML, and 20 Ultra Translucent, UTML) and lithium disilicate (IPS e.max CAD LT). All the crowns were shaded in A2 Vita color. The nominal thickness of the crowns was established following the manufacturers guidelines: 1 mm for zirconia and 1.5 mm for lithium disilicate. The crowns were mounted in a dark chamber inlet between a LED light source and a spectrophotometer sensor according to the protocol described by Baldissara et al. The translucency was measured as the light flow (Lux) passing through the crowns. An additional measure of translucency was obtained by calculating the contrast ratio (CR) and Delta E (ΔE). Each crown was placed over black and white replicas of the proper tooth abutment using Try-In test cement (A2 shade). The analysis was performed with a dental spectrophotometer (Spectroshade). Three measurements were taken for each crown. The null hypothesis tested was that the translucency of the crowns is the same regardless the constituent material (α = 0.05). Kruskal-Wallis test followed by multiple Mann-Whitney tests were performed with Bonferroni correction.

RESULTS: Dark chamber analysis: UTML zirconia crowns showed higher values of translucency (74.95±0.53)x10^3 lx, compared to STML and lithium disilicate (35.20 ±0.93)x10^3 lx (p<0.01). Spectrophotometer analysis: the lowest CR value (higher translucency) of 0.895 ± 0.018 and the highest ΔE (13.876 ± 1.93) was recorded in Katana UTML crowns, followed by STML. The least translucent was lithium disilicate showing CR values of 0.934 ± 0.017 and ΔE values of 7.585 ± 0.95. The differences were statistically significant with p<0.01.

CONCLUSIONS AND CLINICAL RELEVANCE: The newest cubic/tetragonal zirconias allowed the construction of monolithic molar crowns significantly more translucent than LT lithium disilicate as far as this particular clinical case is concerned. Furthermore, staining and color characterizations of the zirconia restorations is not required due to the pre-colored, multi-layer arrangement of the ceramic material blocks. The hybrid cubic/tetragonal multi-layered zirconia could represent a cost-effective alternative to lithium disilicate, considering their claimed superior mechanical properties coupled with greatly improved optical properties and esthetic.

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