



Original Article

The comparison of the surface roughness and surface morphology of sintered and chairside polished monolithic zirconia implant crown

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Abstract

Background: Low temperature degradation, also known as ageing, is the major challenge we cannot avoid in zirconia restorations. Changes in temperature, pressure, mechanical force and moisture are few of the factors which contribute to ageing which eventually leads to failure of zirconia restorations.

Objectives: To compare the phase transformation, surface roughness and grain morphology as indications of low temperature degradation that might occur in translucent monolithic zirconia after try in procedure which finished the restoration by chairside polishing or annealing technique.

Materials and methods: A total of 10 single implant crowns would be milled from the one Vita HT (VITA-Zahnfabrik, Germany) monolithic zirconia block. Before delivery, all the crowns would be examined under X-ray diffractometry, scanning electron microscope, and contact profilometry to serve as base line information regarding crystalline phase, surface roughness, and surface morphology. After proximal contact and occlusal surface adjustment, 5 of 10 polished specimens would be selected to undergo annealing at 1000°C for 15 minutes. Both polished and annealed groups would then be re-examined following the same methods as control. The data would be analysed by means of paired sample t-test.

Results: On the occlusal surface, the percentage of tetragonal and rhombohedral phases as well as the surface roughness showed significant difference (p -value < 0.05) between before delivery in both the polished and annealed zirconia crowns. Data obtained from the buccal surface showed significant difference between before and after delivery in percentage of tetragonal and monoclinic phases in the both annealed and polished groups (p -value < 0.05). As for the proximal surface, significant difference between before and after delivery was seen in percentage of tetragonal phase in the annealed and polished groups, monoclinic phase in the annealed group, and the surface roughness for both groups (p -value < 0.05).

Conclusion: Within the limitations of this study, it was shown that finishing and polishing does affect the surface morphology of zirconia restoration, crystalline phase of zirconia, and surface roughness of zirconia. Annealing at 1000°C for 15 minutes did show an increase in tetragonal phase content.

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Keywords: monolithic zirconia, phase transformation, low temperature degradation, LTD, surface roughness, grains, X-ray diffractometry, XRD, zirconia

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