

BIOMECHANICAL AND AESTHETIC DEMANDS OF IMPLANT ABUTMENT STRUCTURES

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Keywords: Zirconia, glass-ceramics, translucency, hydrothermal treatment, reliability

Titanium-6 aluminum-4 vanadium (Ti-6Al-4V) alloy designed and machined using computer-aided design and computer-aided manufacturing (CAD-CAM) technology has been a commonly used material for implant abutments to retain or support the final restorations because of its desirable physical and mechanical properties. However, the metallic colour of Ti-6Al-4V abutments can reflect through soft tissue, especially in thin and/or translucent phenotypes. The development of high-strength ceramics, such as zirconia, has provided an applicable ceramic alternative for anterior sextants, with improved gingival aesthetics even with compromised soft tissue thickness. Some implant abutments are made entirely of zirconia, whereas others are hybrid, made with a titanium insert, either friction fit or bonded to zirconia. When bonded to the zirconia component, the titanium insert is in contact with the implant platform and abutment screw. Addition of the bonded insert to the tooth-coloured material in the abutment design allows for development of a titanium abutment/titanium implant fixture interface, which has been shown to reduce the risk of implant platform damage under function. Lithium disilicate glass-ceramic has more favourable mechanical properties compared with conventional dental porcelains and has excellent optical properties. Although the mechanical properties of lithium disilicate are inferior compared with zirconia, it has been considered superior in terms of translucency. Recently, high translucency zirconia has been developed for processing of monolithic zirconia crowns and fixed dental prostheses (FDPs). In order to enhance the translucency of zirconia, residual pores and impurities play a major role. Alumina, which is added to zirconia improve the mechanical properties and prevent low temperature degradation, is the most common impurity. However, increasing yttria composition from original doping with 3 mol% in zirconia may also enhance optical properties of zirconia. Evidences including reliability of tooth-coloured implant abutments and effect of hydrothermal treatment on optical properties translucent zirconias of above issues will be addressed and presented to support the advancement of dental ceramics.

References

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