Effect of Luting Cement Opaqueness on the Final Colour of Titanium- Base Supported Lithium Disilicate Abutments

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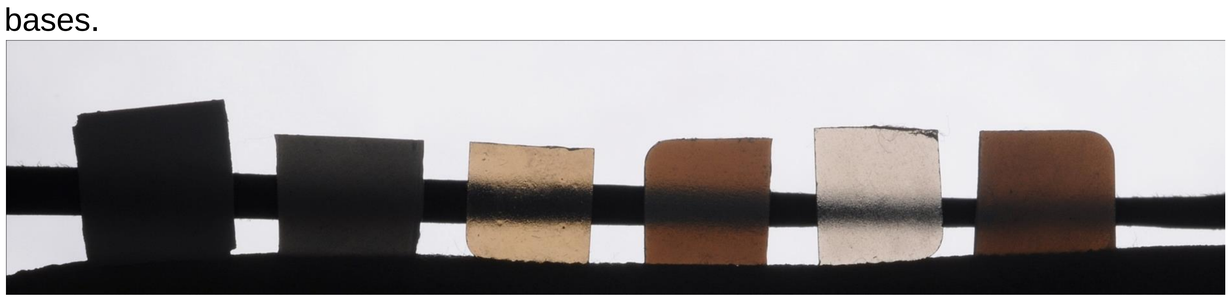
Objective

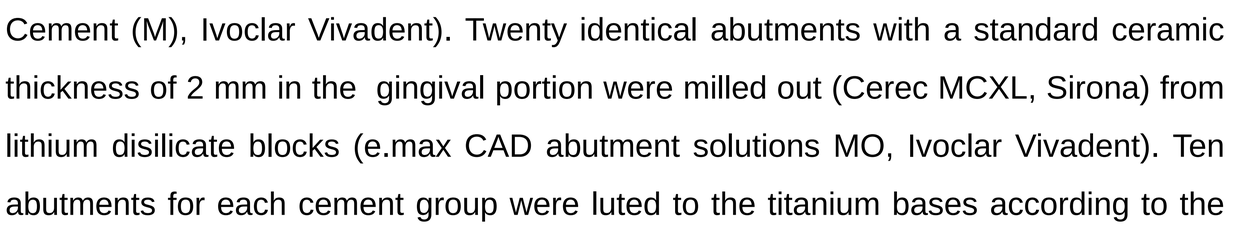
Current approach in individualized abutments is to use titanium bases (Ti-bases) for supporting zirconia or lithium disilicate ceramic abutments to achieve both esthetics and mechanical resistance against intraoral forces. The opacity and high value of the currently used zirconia led to an increased use of more translucent, thus more close-to-nature lithium disilicate materials as implant abutments. Ti-bases might lead to greyish reflections from the highly translucent glass-ceramic abutments. To avoid this, an opaque luting resin cement use for adhering the individualized glass-ceramic abutment to the titanium base might be a solution for this clinically overlooked situation. The aim of this study was to compare two resin luting cements with different opaqueness on the final colour of lithium disilicate abutments supported by titanium bases.



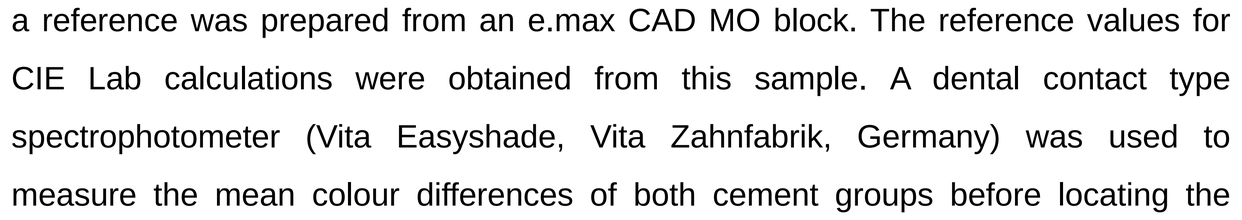
When 0.5 mm slices are obtained from zirconia and lithium disilicate (E) materials, zirconia appears opaque while glass-ceramic materials bear varying degrees of translucency that helps mimicking natural esthetics. (Left to right: zirconia, E-high opacity, E-medium opacity, E-low translucency, E- high translucency, leucite ceramic)

Materials and Methods

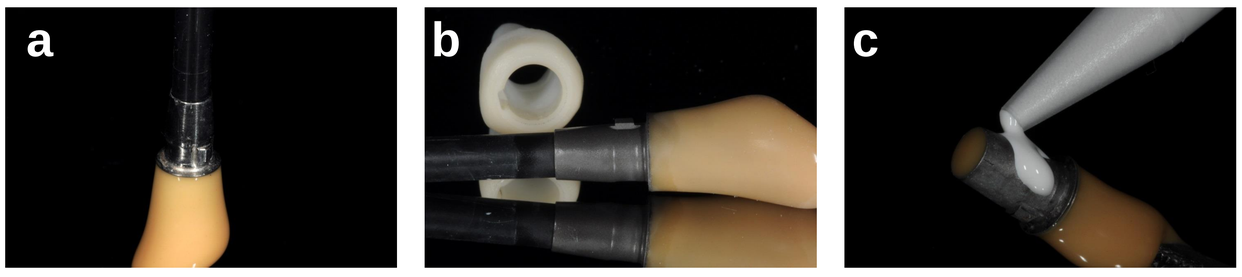
Twenty titanium bases (Conelog Ti-base, Camlog) were divided into two lutin gresin cement groups (n=10/group) (Panavia F 2.0 (P), Kuraray; Multilink Hybrid Abutment Cement (M), Ivoclar Vivadent). Twenty identical abutments with a standard ceramic thickness of 2 mm in the gingival portion were milled out (Cerec MCXL, Sirona) from lithium disilicate blocks (e.max CAD abutment solutions MO, Ivoclar Vivadent). Ten abutments for each cement group were luted to the titanium bases according to the manufacturers' instructions. A sample for further colour difference measurements as a reference was prepared from an e.max CAD MO block. The reference values for CIE Lab calculations were obtained from this sample. A dental contact type spectrophotometer (Vita Easyshade, Vita Zahnfabrik, Germany) was used to measure the mean colour differences of both cement groups before locating the abutments on titanium bases and after luting on these bases by CIE Lab formula. The interaction of ΔE values were analyzed by a one-way analysis of variance at 5 % level.



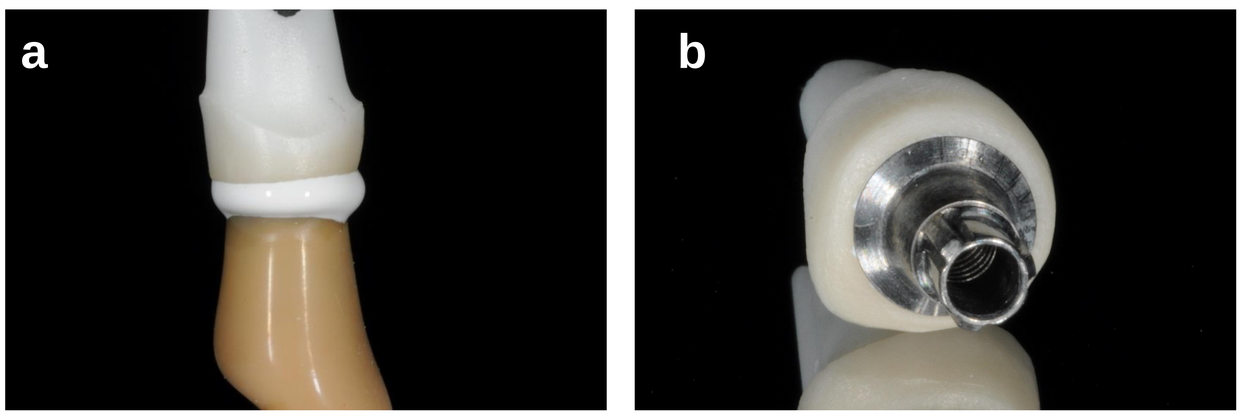
a:Digital design of the abutments; **b**:Lithium disilicate abutment block, **c**:The milled abutment before crystallization phase (after screw detachment, the abutments were crystallized according to manufacturers' instructions).



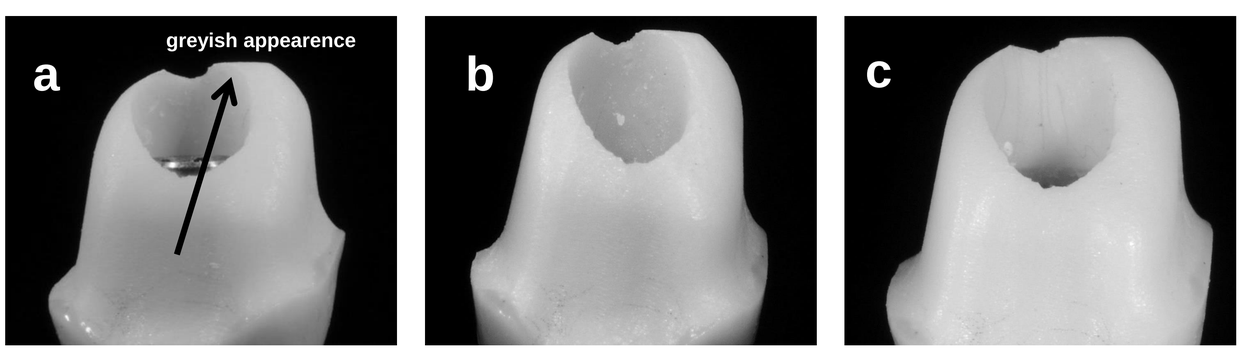
a:The translucent adhesive cement; **b**:The opaque adhesive cement with the accompanying silane coupling agent; **c**:Visual evidence of the different translucencies of both cements.



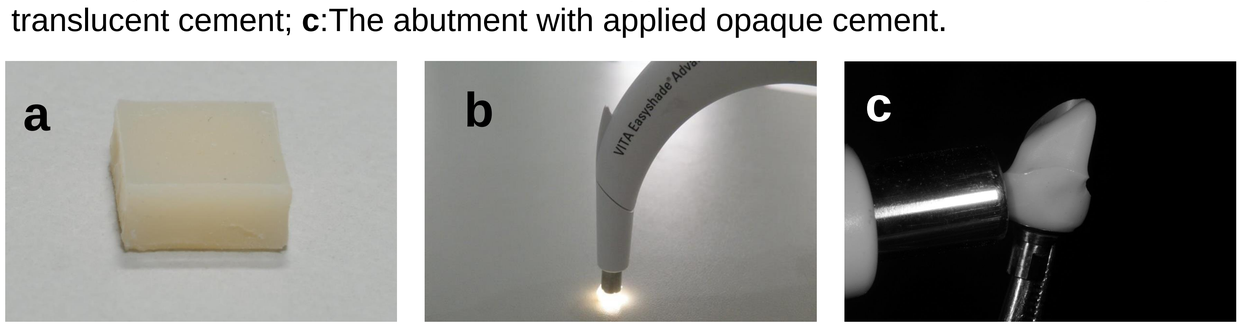
a:Titanium bases were placed on the analogues and gingival portions were isolated to avoid from possible damage from the sandblasting process; **b**:The sandblasted titanium base; **c**:The application of the adhesive cement on the titanium base.



a:The cementation of the abutment to the titanium base; **b**:The hybrid abutment after excess cement removal and cleaning process.

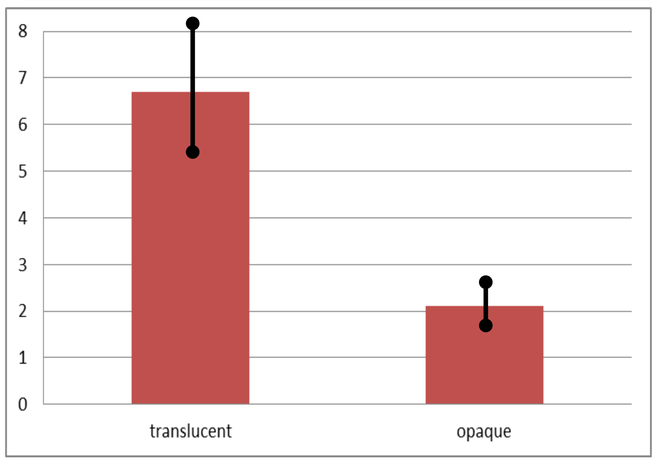


a:The hybrid abutment before cement application; **b**:The abutment with applied translucent cement; **c**:The abutment with applied opaque cement.



a:Reference sample for CIE Lab measurements; **b**:Reference measurements from the sample with a contact type dental spectrophotometer; **c**:Colour measurements from the abutment. Both calculations were repeated 3 times and then their median values were obtained and ΔE values were achieved according to CIE Lab formulae.

Results



The final color of the abutment crowns were significantly affected by the translucency of both tested adhesive cements. M cement resulted in a ΔE value of 6.7±1.9 (P<0.05) . Cement M resulted in less color difference than P (P<0.05); that had a ΔE value of 2.1±0.6.

Conclusion

The final color of lithium disilicate abutment crowns was influenced from the opaquness of the luting cement. In clinical situations where lithium disilicate abutments are preferred; a more opaque adhesive luting cement should be preferred in order to mask the underlying metal show-through of the titanium base.

References

1. Al Ben Ali A, Kang K, Finkelman MD, Zandparsa R, Hirayama H. The effect of variations in translucency and background on color differences in CAD/CAM lithium disilicate glass ceramics. J Prosthodont. 2014 Apr;23(3):213-20. doi: 10.1111/jopr.12080.
2. Chaiyabutr Y., Kois JC., LeBeau D., Nunokawa G. Effect of abutment tooth color, cement color, and ceramic thickness on the resulting optical color of a CAD/CAM glass-ceramic lithium disilicatereinforced crown. J Prosthet Dent 2011;105:83-90)