In Vitro Retentive Strength of All Ceramic Crowns

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Materials and method

The retentive strength of different resin cement systems (CompoSite/EBI Multi, CompoSite/EBI Multi/Rocatec, SuperBond C&B, SuperBond C&B/Rocatec, SuperBond C&B/Porcelain Liner M, Panavia F, Dyract Comp/Xeno III, ChemiCise II/Porcelain Liner M, RelyX Luting, Ketac Cem/Ketac Cond, Ketac Cem, RelyX Unicem) were examined for luting zircon-oxide ceramic crowns (LAVA, 3M ESPE) on extracted human teeth. 120 extracted human molars and premolars were stored in 1% Chloramin-B-hydrate for a week and kept wet afterwards using tap water. A preparation of a 5° cone was made using 125 µm (Komet 8965.314.035) and 30µm finishing diamond (Komet 8965.314.025; all preparations were made within dentin, no core-reconstruction was effectuated. All the stumps had the same height (5mm) and had a plane top surface of the preparations. New preparation diamonds were used for each group of 10 teeth. The determination of the tooth preparation surface was carried out according to the method described by Dahl and Olof (Dahl & Olof, Dent Mater 2: 17-26, 1986). Polyether-impressions (Impregum Penta Soft) of all teeth were taken and conventional type stone models were made. The LAVA all ceramic crowns were cemented using resin cements, a compomer cement, and a self-modified glass-ionomer-cement. A low-shrinkage resin composite allowed a binding to the LAVA cap and was held in a big undercut in a prefabricated Paladur impression (Impregum Penta Soft). All the stumps had the same height (3mm) and had a plane top surface. The entire setup of the debonding-unit is shown in the figure below. The debonding force per mm² was determined by means of the debonding-unit and was held in a big undercut in a prefabricated Paladur impression. The preparation of the test materials followed manufacturer’s recommendations. The cemented crowns were thermocycled 5,000 times (5-55°C, dwell time 30 s in each bath), followed by the bonding procedure, using a Zwick universal testing device with a cross head speed of 1mm/min. The mean (+/- SD) retentive strength data [N/mm²] are shown in the figure below; the Median, Max., Min. Q1, and Q3 data in the table underneath. Statistical significances after the Bonferroni-correction (p<0.0008) are printed in red in the table below.

Results:

The mean (+/- SD) retentive strength data [N/mm²] are shown in the figure below; the Median, Max., Min. Q1, and Q3 data in the table underneath. Statistical significances after the Bonferroni-correction (p=0.0008) are printed in red in the table below.

Conclusion:

Superbond C&B (+ Rocatec) showed the highest median retentive strength. Within the materials used without pretreatment of the ceramic, SuperBond C&B, Panavia F, Dyract Comp/Xeno III, RelyX Luting, and Rely X Unicem showed the highest values in median retentive strength and were within the same level of statistical significance.

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