♦P17

Effect of Light Intensity on the Polymerization Rate of Composite Resin Using Real-time Measurement of Volumetric Change

Sung-Ho La, In-Bog Lee, Byeong-Hoon Cho, Ho-Hyun Son

Department of Conservative Dentistry, College of Dentistry, Seoul National University, Seoul, Korea

Objectives : The aim of this study is to evaluate the effect of light intensity variation on the polymerization rate of composite resin using IB system(experimental equipment designed by Dr. IB Lee) by which real-time volumetric change of composite can be measured.

Methods : Three commercial composites [Z100(Z1), AeliteFil(AF), SureFil(SF)] were photopolymerized with Variable Intensity Polymerizer unit (Bisco, U.S.A.) under the variable light intensity (75/150/225/300/375/450mW²) during 20sec. Polymerization shrinkage of samples was detected continuously by IB system during 110 sec and the rate of polymerization shrinkage was obtained by its shrinkage data. Peak time(P.T.) showing the maximum rate of polymerization shrinkage was used to compare the polymerization rate.

Results : Peak time decreased with increasing light intensity($p<0.05$). Maximum rate of polymerization shrinkage increased with increasing light intensity($p<0.05$). Statistical analysis revealed a significant positive correlation between peak time and inverse square root of the light intensity (AF:R=0.965, Z1:R=0.974, SF:R=0.927). Statistical analysis revealed a significant negative correlation between the maximum rate of polymerization shrinkage and peak time(AF:R=-0.933, Z1:R=-0.892, SF:R=-0.883) and a significant positive correlation between the maximum rate of polymerization shrinkage and square root of the light intensity (AF:R=0.988, Z1:R=0.974, SF:R=0.946).

Discussion and Conclusions : The polymerization rate of composite resins used in this study was proportional to the square root of light intensity. Maximum rate of polymerization shrinkage as well as peak time can be used to compare the polymerization rate. Real-time volume method using IB system can be a simple, alternative method to obtain the polymerization rate of composites.

♦P18

AUTHORS AND INSTITUTIONS

H.K. Kim, S.C. Song , I.Y. Jung, K.Y. Kum , S.J. Lee

Department of Dentistry, The Graduate School of Dentistry, Yonsei University, Seoul, Korea

Periapical tissue reactions and root resorption following replantation with different calcium hydroxide pastes

Aim

Along with the expanded clinical use of calcium hydroxide, literatures have suggested mixing calcium hydroxide with various vehicles. We evaluated and compared the periapical tissue reactions and root resorption after the canals were filled with various preparations of calcium hydroxide in replantation of rat molar.

Methodology

The study was conducted on 31 maxillary first molars of Sprague-Dawley female rats aged 30 days old. The upper 1st molars were extracted and the mesiobuccal canals were instrumented with K-files. The teeth were randomly divided into 4 groups and filled with one of the following materials: aqueous preparations of calcium hydroxide (mixture of saline), Metapaste (mixture of polyethylene glycol), Vitapex (mixture of silicone oil), or IRM, and then replanted. Rats were sacrificed 3 weeks after replantation; blocks containing replanted teeth were obtained and fixed. After paraffin embedding, the blocks were cut into 4-㎛-thick sections and stained with hematoxylin-eosin. Apical tissue responses were observed under light microscope.

Results

1. In aqueous preparation-group and Metapaste group, losses of pastes were observed in the apical portion of all samples.
2. In aqueous preparation-group and Metapaste group, the fibrous capsule widths were significantly thicker than in Vitapex group and IRM group ($P<0.05$).
3. There was no statistical significant difference in the prevention of root resorption among the groups.

Conclusions

Within the evaluated parameters of this study, it appears that aqueous preparation and Metapaste, which were absorbed faster in the

apical portions of the root canals, elicited a greater number of inflammatory cells and thicker fibrous capsules than Vitapex and IRM.

♦P19

Shear bond strength between old composite and newly additioned composite.

Soo-Young Choi, Won-Mann Oh, In-Nam Hwang
Department of Conservative dentistry, College of dentistry, Chonnam Natl. Uni., Kwangju, Korea

This study evaluated the effect of time before addition and surface treatment on the shear bond strength between new and old(direct and indirect) composites. One hundred specimens of Charisma(Heraeus Kulzer, Germany) and thirty-five of Artglass(Heraeus Kulzer, Germany) were prepared in cavities(10mm×5mm) in acrylic resin molds. Charisma specimens were stored for 5min., 1hr., 24hrs., and 1 week in 37℃ distilled water and Artglass specimens were stored for 1 week in 37℃ distilled water. Surface treatment methods included the following: grinding with sand paper; bonding agent application, phosphoric acid etching, hydrofluoric acid etching, and treatment with silane coupling agent. Data were analyzed using one-way ANOVA test and Student-Newman-Keuls test. The shear bond strength of Charisma specimens stored for 1hr. were significantly higher when applied with bonding agent after grinding and when applied with hydrofluoric acid, silane and bonding agent after grinding compared with grinding alone($p<0.05$). Application of phosphoric acid and bonding agent after grinding and application of hydrofluoric acid, silane and bonding agent after grinding produced significantly higher bond strength than grinding alone in Charisma specimens stored for 1week($p<0.05$). There was significant difference between the bond strengths of 24hr. and 1wk. specimens in Charisma specimens applied bonding agent after grinding($p<0.05$). The bond strength of specimens stored for 24hrs. was significantly higher than others in Charisma specimens applied phosphoric acid, silane and bonding agent after grinding($P<0.05$). Most of Charisma specimens showed cohesive fractures. There was no significant difference between the shear bond strength of Artglass specimens($p>0.05$).

♦P20

Infrared thermographic analysis of temperature rise on the surface of Buchanan plugger.

Sung-A Choi, In-Nam Hwang, Won-Mann Oh
Department of Conservative Dentistry, College of Dentistry, Chonnam Natl. Uni., Gwangju, Korea.

This study was performed to evaluate the temperature rise on various position of the Buchanan plugger, the peak temperature of plugger's type and the temperature change by its touching time of heat control spring. The System B (Model 1005, Analytic Technologies, USA) and the Buchanan pluggers of F, FM, M and ML are used for this study. The temperature was set to 200℃. The power level on it was set to 10. The heat control spring was touched for 1, 2, 3, 4 and 5 seconds respectively. The temperature rise on the surface of the pluggers were measured at 0.5 mm intervals from tip to 20 mm length of shank using the infrared thermography (NEC San-ei Instruments, Ltd, Japan). The temperature peaked approximately at 1.0 mm to 1.5 mm far from the tip of Buchanan pluggers ($p<0.001$). The temperature was constantly decreased toward the shank from the tip of it ($p<0.001$). The peak temperature (the range from 253.33±10.51℃ to 192.05±3.31℃) was the highest in a quick touch for 1 sec, and decreased with an increase of touching time. A touch for 5 sec. revealed the lowest peak temperature (the range from 164.91±2.04℃ to 158.43±1.83℃) ($p<0.001$).). Data was analyzed using a one way ANOVA followed by Duncan' multiple range test and linear regression test. The results indicated that pluggers are designed to concentrate heat at around its tip and a quick touch of heat control spring for 1sec reveals the highest temperature rise.