O-12 Micro-shear bond strength of resin-modified glass ionomer and resin-based adhesives to dentin

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Ⅰ. Objectives

Direct bonded restorative materials allow to conserve tooth structure in the cavity preparation and the remaining tooth structure may be reinforced by dentin bonding mechanism of these materials. This study was designed to compare the micro-shear bond strengths of resin-modified glass ionomer and some kinds of resin-based adhesives according to the location in the dentin.

Ⅱ. Material and Methods

Seventy five extracted human upper premolars were used in this study after removal of dental calculus and soft tissues. The teeth were embedded with self-curing epoxy resin and cut off vertically with a low speed diamond saw(ISOMET, Buehler, USA) to expose flat dentinal surface. Four dentin bonding systems and one resin-modified glass ionomer were used according to the instruction of manufacturers; Scotchbond Multi-Purpose Plus; SM(3M Dental Products, MN, USA), Single Bond; SB(3M Dental Products, MN, USA), Clearfil SE Bond; SE(Kuraray Co., Osaka, Japan), Prompt L-Pop; PL(ESPE, Seefeld, Germany) and Fuji Ⅱ LC; GI(GC Co., Tokyo, Japan). Seven specimens were prepared in one exposed dentin surface according to the location. The location was divided to four areas : Occlusal $\frac{1}{3}$, Middle $\frac{1}{3}$, Cervical $\frac{1}{3}$ of coronal dentin and root dentin. After the treatment of dentin surface with dentin bonding systems/dentin conditioner, composite/resin-modified glass ionomer buildups was performed with a tygon tube(SAINT-GOBAIN Performance Plastic Co., USA. inner diameter : 0.8mm, height : 1.0mm). After bonding procedures, all specimens were stored in distilled water at 37℃, for 24 hours prior to testing. The micro-shear bond test was performed with a Universal testing machine(EZ-test ; Shimadzu, Japan) at a cross-head speed of 1mm/min until failure occurred. The data were statistically analyzed using one-way analysis of variance(ANOVA) and Tukey's Multiple Comparison test at confidence level of 95%($p<0.05$).

Ⅲ. Results

1. In the Occlusal $\frac{1}{3}$, the results of SE were higher than those of all other adhesives. There was no significant difference between SM and SB. And PL, GI were followed.
2. In the middle $\frac{1}{3}$, bond strengths decreased as follows; SM≥ SE≥ SB≥ PL≥ GI. However, there were no statistically differences between SM and SE, SE and SB, PL and GI.
3. In the cervical $\frac{1}{3}$, there were no statistically differences among SM, SE, SB. PL and GI showed the lower bond strengths.
4. In the root dentin, the results of SM were higher than those of all other adhesives and there were no statistically differences among SB, SE, PL. The self-etching adhesive systems, that is, SE and PL, produced the lower bond strengths than the conventional adhesive system and the self-priming adhesive system with a etching step.
5. Only for SE, the bond strengths at the root dentin were significantly lower than those of other areas($p<0.05$).
6. The results of coronal dentin(Occlusal $\frac{1}{3}$, Middle $\frac{1}{3}$, Cervical $\frac{1}{3}$) of GI were significantly lower than those of other resin-based adhesive systems. But, the results of root dentin were similar to those of SE, PL. That is, there were no statistically differences among SE, PL, GI.

Ⅳ. Conclusions

This study suggests that self-etching adhesive systems can produce the lower bond strength to root dentin than those of other adhesive systems. Therefore, additional dentin treatments may be needed when applying this systems to the cavity including root dentin. And the use of self-priming adhesive systems also can be recommended than self-etching adhesive systems in this condition.