Evaluation of hardness increase of GIC restorative surface in saliva

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Objective

Increasing of surface hardness of Glass Ionomer Cement (GIC) in saliva is one of unique phenomenon. The aim of this study was to evaluate the surface hardness of new experimental GI filling system.

Methods

Materials

Filling materials
- Fuji IX GP EXTRA (F9E)
- EFI-300 (EQUIA Forte Fil)

Coating materials
- G-COAT Plus (GCP)
- EQC-107 (EQUIA Forte Coat)

Test method

Filling materials were filled into acrylic mold (7mm in diameter, 2mm in depth). Then, the specimens were stored in the chamber (37℃, 100% R.H.) for 1 hour. After stored, those specimens were stored in distilled water or human saliva at 37℃. The storage solutions were changed once a week. After 0, 1, 4, 7, 14, 28, 35, 42 and 63 days, surface hardness of each materials were measured with micro vickers hardness machine (SHIMADZU: HMV-G21DT). For XSC, XWC, ESC and EW: specimens were coated after surface hardness measurement. The coatings were removed from the GI surface before measuring vickers hardness. The specimens were re-coated before immersion to storages from 0 to 28 days. 28 days after, all specimens were immersed in the solutions without coatings. The datas were analyzed by one-way ANOVA and Tukey’s test (P < 0.01).

Results and Discussion

Table 1.

<table>
<thead>
<tr>
<th>Fillings</th>
<th>Storages</th>
<th>Coatings</th>
<th>Specimens</th>
</tr>
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<tbody>
<tr>
<td>F9E</td>
<td>D.W.</td>
<td>Saliva</td>
<td>D.W.</td>
</tr>
<tr>
<td>XW</td>
<td>XS</td>
<td>XSC</td>
<td>EW</td>
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</table>

Figure 1. Vickers hardness value changing of the F9E

Figure 2. Vickers hardness value changing of the EFI-300

These results are occurred by ion equilibrium. Ions move high concentration to low. But coatings inhibit ion migration.

Conclusions

This research indicated that there is a good benefit to coat the GI surface at early setting stage. It is because unique phenomenon was found, that is, secondary surface hardness jump was occurred. These results indicate that EQUIA and EQUIA Forte Systems are ideal process for advancing GI reaction.