Evaluation by SEM observation of root canal sealer (MetaSEAL)

Objectives:
Eugenol sealer was used conventionally for root canal filling, however, some reports were already presented that eugenol has irritant to periapical tissue and non-adhesive property. CANALS-N (Showa Pharmaceutical co. Japan) which is non-eugenol sealer was reported that there is non-irritant to periapical tissue.

It is desirable that root canal filling material have adhesive property for root canal wall to prevent from coronal leakage and apical leakage. Adhesive property to root canal wall will decrease the rate of leakage. Conventional resin sealer has high adhesive property to root canal wall, but it needed complicated operation.

Methodology:
1. The extracted single root human teeth were used. Crown and pulp were removed before using for the experiment.
2. After enlargement of root canal with Ni-Ti file (K3 #30 06taper; SybronEndo, U.S.A.), root canal was irrigated with 15%EDTA and 2.5%NaClO to remove smeared layer.
3. Specimens were filled with MetaSEAL and a gutta-percha point or filled with CANALS-N and a gutta-percha point.
4. After storage in 100% humidity at 37°C for 14 days, specimens were cut for longitudinal (Fig.1).
5. The specimens were observed a point of 1, 2, 3, 4 and 6mm from apex using SEM. The interface between root canal wall and sealer was evaluated gap, hybrid layer and resin tugs.

MetaSEAL(PARKELL, INC., U.S.A.) which was released in U.S.A. in February, 2007 is newly self-etching root canal sealer based on dual-cure resin containing 4-META.

The purpose of this study was to evaluate of interface between root canal wall and sealer after root canal filling with MetaSEAL or CANALS-N using scanning electron microscope (SEM, JSM-5610LV).

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**Results and Discussion:**

In the case of MetaSEAL, hybrid layer and resin tugs were formed in all interface (Fig.2). It was considered that MetaSEAL (include HEMA, dimethacrylates and water-soluble polymerise catalyst: Table1) was formed hybrid layer and resin tugs in root canal wall after removed smeared layer (Fig.4).

In the case of CANALS-N, the gap between root canal wall and CANALS-N was observed in all interface (Fig.3). Sealer did not penetrate to dentinal tubules. It is clarified that CANALS-N dose not have adhesive property to root canal wall.

It was suggested that MetaSEAL will be better obturation than CANALS-N.
Table 1

<table>
<thead>
<tr>
<th></th>
<th>MetaSEAL</th>
<th>CANALS-N</th>
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</thead>
<tbody>
<tr>
<td>Constitution and composition</td>
<td>Liquid: HEMA, 4-META, dimethacrylate Powder: zirconium oxide, silica amorphous, water-soluble polymerization initiator</td>
<td>Liquid: fatty acid, propylenegliccol Powder: zinc oxide, barium sulfate</td>
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<tr>
<td>Classification</td>
<td>resin root canal sealer</td>
<td>non-eugenol sealer</td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Operation method</td>
<td>liquid/powder=3/1</td>
<td>liquid/powder=3/1</td>
</tr>
<tr>
<td>Operation time</td>
<td>35min.</td>
<td>30min.</td>
</tr>
<tr>
<td>Polymerization (catalyst)</td>
<td>chemical and light cured reaction (water-soluble polymerization initiator)</td>
<td>acid base reaction</td>
</tr>
</tbody>
</table>

Fig. 2

Interface of MetaSEAL

(mm from apex)
Fig. 4

Hybrid layer

Resin tug

4 mm

6 mm