

Evaluation by SEM observation of newly root canal sealer

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Objectives:

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.

MetaSEAL™ (PARKELL, INC., U.S.A., Fig.1, Table1) is newly self-etching root canal sealer based on dual-cure resin containing 4-META. The purpose of this study was to evaluate interface between root canal wall and sealer after root canal filling of the teeth which had wide dentinal tubules (around 20 yrs. old) and the teeth which had narrow dentinal tubules (around 50 yrs. old) using scanning electron microscope (SEM).

Fig.1 **MetaSEAL™**



Table1 Specifications

Constitution and Composition	Liquid: HEMA, 4-META, dimethacrylate Powder: zirconium oxide, silica amorphous, water-soluble polymerization initiator
Classification	resin root canal sealer
Pre-treatment	none
Composition	liquid/powder=3/1
Operation time	35min.
Polymerization (Catalyst)	chemical and light cured reaction (water-soluble polymerization initiator)

Methodology:

The extracted single root human teeth were used.

We divided them into two groups. The teeth of around 20 yrs. old were classified group 1 (n=5), and the teeth of around 50 yrs. old were classified group2 (n=5).

Crown and pulp were removed before using for the experiment.

After enlargement of root canal with Ni-Ti file (K3 #30 06 taper; SybronEndo, U.S.A.), root canal was irrigated with 15%EDTA and 2.5%NaClO for each 1min.

(Fig.2,3) to remove smeared layer and was filled with **MetaSEAL™** and a gutta-percha point (#30).

After keeping in 100% humidity at 37°C for 14 days in the air, specimens were cut for longitudinal of tooth axis. (Fig.4) The specimens were observed each interface of 1,2,3,4 and 5mm from apex between root canal wall and sealer using SEM (JSM-5610LV). (Fig.5)

Fig.2

Group 1: root canal wall after using 15%EDTA and 2.5%NaClO

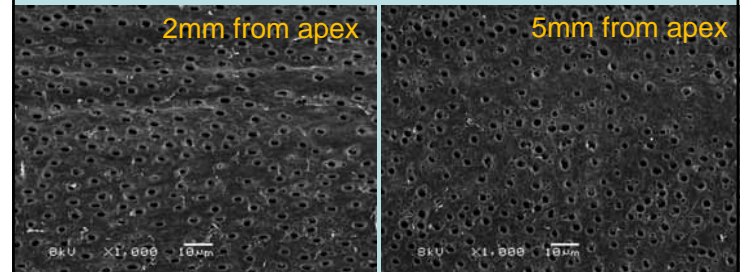
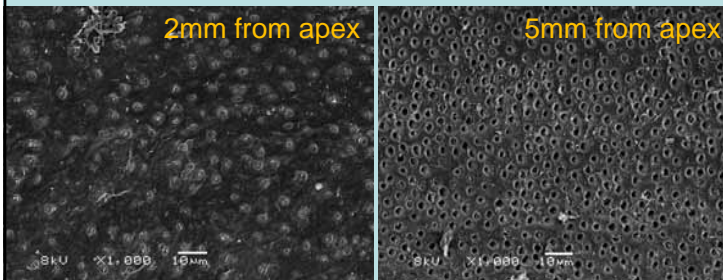


Fig.3

Group 2: root canal wall after using 15%EDTA and 2.5%NaClO



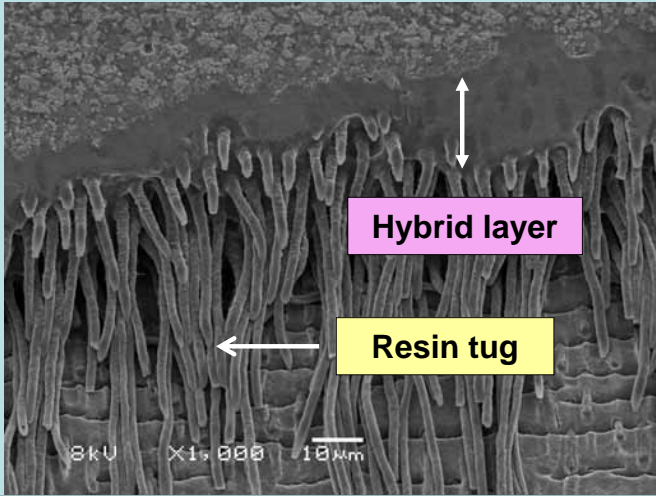
Calcified Dentin

Fig.4

longitudinal cutting surface of tooth axis



Fig.5



Results:

SEM observation showed the formation of hybrid layer in all interface in the case of group 1 and 2. In the case of group 1, resin tugs were formed in all interface, but in the case of group 2, resin tugs were not formed in root apex side.(Fig.6-1,2,3, Fig.7-1,2,3)

Fig.6-1

Group 1: Interface of
MetaSEAL™ and
Root Canal Wall

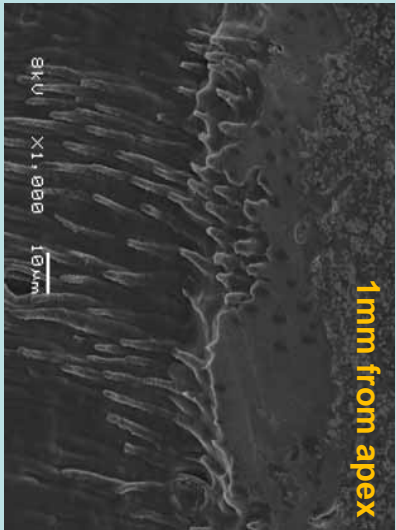


Fig.6-2

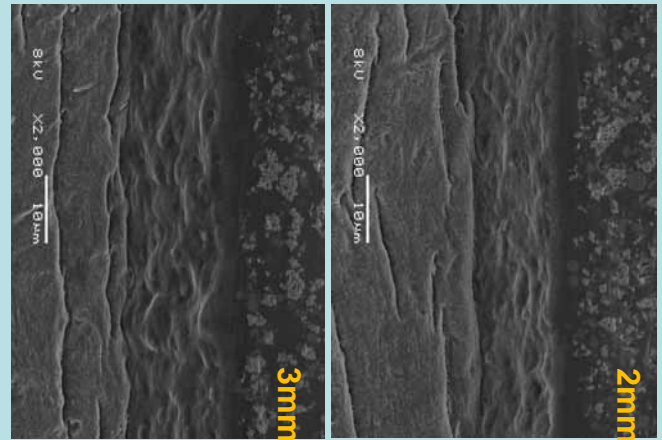


Fig.7-1

**Group 2: Interface of
MetaSEALTTM and
Root Canal Wall**

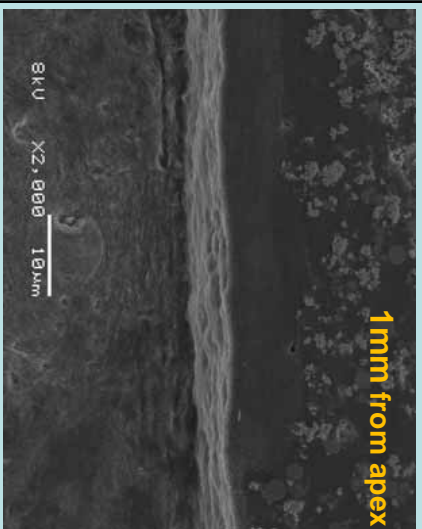


Fig.7-3

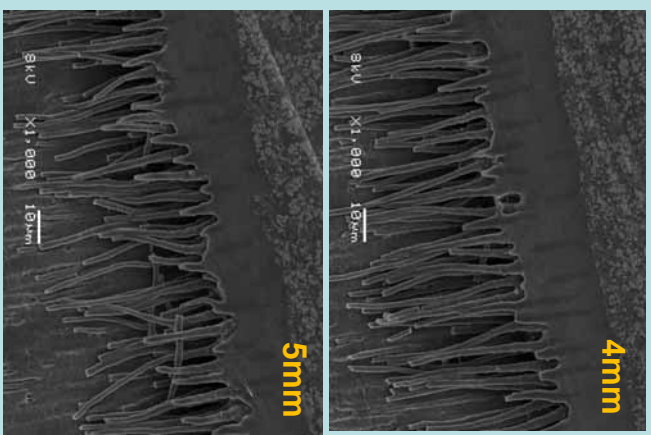


Fig.6-3

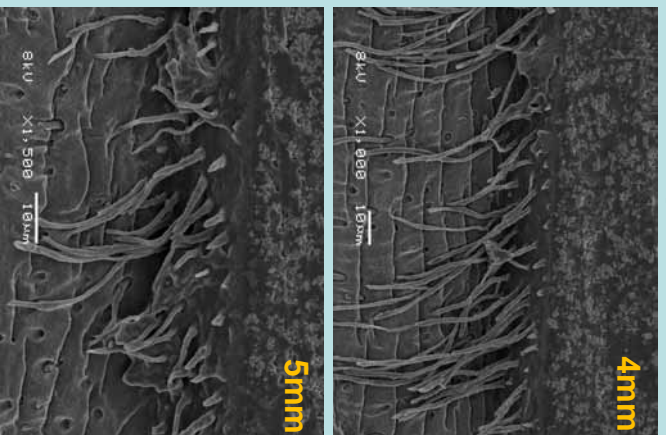
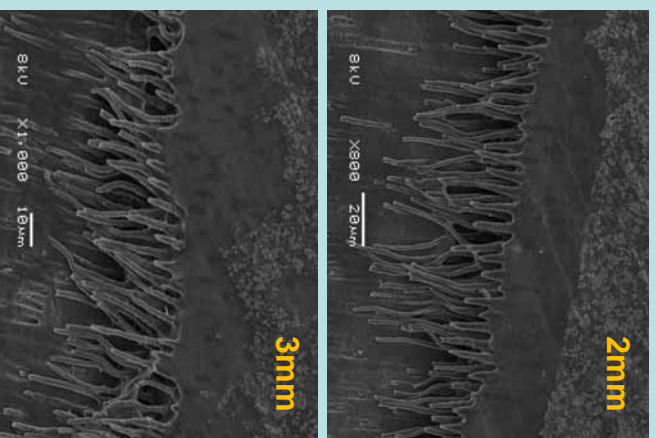


Fig.7-2



Conclusions:

Hybrid layer and resin tugs were formed in root canal wall which removed smeared layer. Only hybrid layer in the case of group 2 was formed in calcified dentin. From the above, it was supposed that **MetaSEAL™** had high adhesive property to root canal wall.