



Three-Body Wear of Fissure Sealants

C. MURNSEER*, M. ROSENTRITT, M. BEHR, G. HANDEL

(Regensburg University Medical Center, Department of Prosthetic Dentistry, Germany)

417



Objectives:

The efficiency of fissure sealants may be reduced due to occlusal wear. The aim of this investigation was to compare and rank the wear resistance of different fissure sealant materials in three-body abrasion test.

Materials and Methods:

Specimens were provided of seven fissure sealant materials:

Clinpro Sealant (3M Espe, G)	Delton FS (Dentsply-Detrey, G)	Embrace WeiBond (Pulpdent, USA)	Experimental sealant Grandio Seal (Voco, G)	Guardian Seal (Kerr, USA)	Helioseal F (Ivoclar-Vivadent, FL)	Ultrasal XT plus (Ultradent, USA)	Sinfony (3M Espe, G)
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A laboratory-made veneering composite (Sinfony, 3M Espe) was used as a reference. The materials were applied in the cavities of the tooth-wheel shaped sample holder (Fig.1). Each material was light cured (Elipar TriLight, ESPE) according to the manufacturers instructions. The equipped wheel (diameter= 50 mm, thickness= 10mm) was grinded flat. In the three-body abrasion device (Fig. 2: ACTA, Willytec, G) a smaller antagonist wheel (d= 16mm, t= 6mm; 60 r/min) causes a wear trace in the middle of the specimens wheel (130 r/min). Different wheel speed and counterclockwise rotation cause a slip between the two wheels (pressure 20N). As an abrasion medium a mixed millet seed shell - rice food bolus was used. 120g rice and 30g seed shells were ground in a rotating blade grinder (Moulinette, Moulinex, Paris, F), mixed with 275 ml distilled water and allowed to swell for 1 hour.

The wear trace was measured in comparison to the non-worn surface as reference. Measurements of the depth of the wear trace were performed every 20.000 cycles up to 120.000 cycles using a profilometer testing device (Perthometer S6P, Mahr-Feinprüf, G). Statistical analysis was performed with the Mann-Whitney U-test ($\alpha=0.05$).

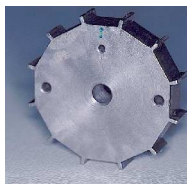


Fig. 1: Sample Holder

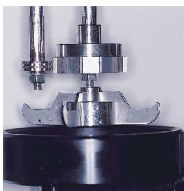


Fig. 2: Three-Body-Abrasion layout

Results:

After 120.000 cycles the experimental fissure sealant Grandio Seal, Ultrasal XT plus and Delton FS+ showed the highest wear resistance. Clinpro Sealant and Guardian Seal had higher wear than the reference.

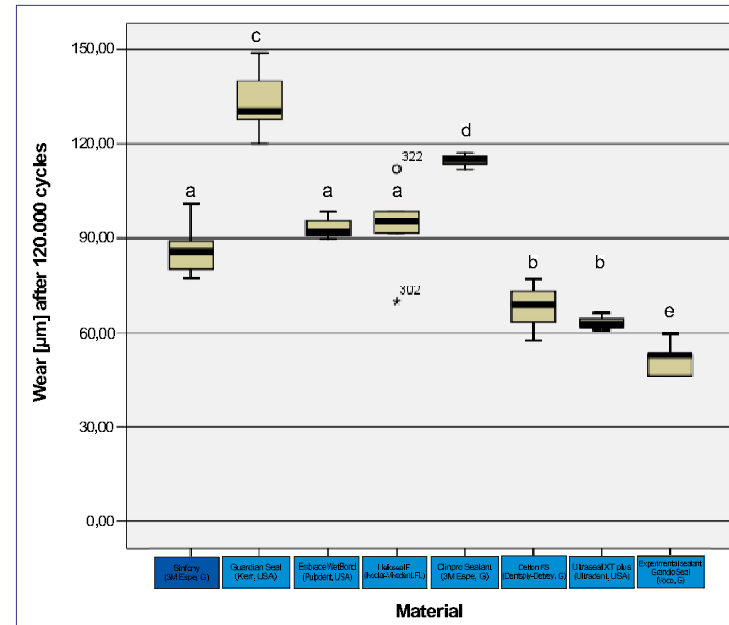


Fig. 3: Three-Body Wear [µm]; Median [25%, 75%]; identical letters indicate no significant differences

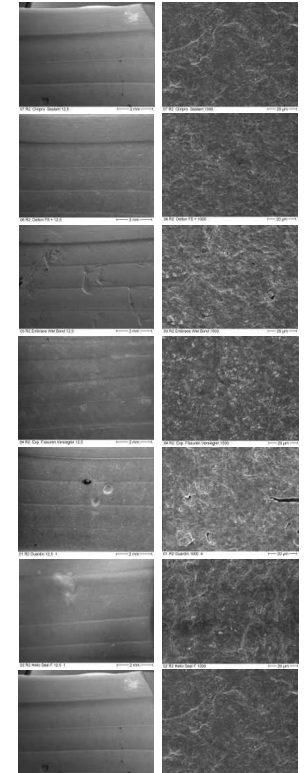


Fig. 4: surfaces after three-body abrasion; (12.5 x and 1000 x magnification)

Conclusions:

There were found significant differences between the three-body wear resistance of fissure sealants. Five of seven materials showed comparable or higher wear resistance than a veneering reference.