A New Nano-hybrid Composite with Improved Surface Gloss

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OBJECTIVE

To compare the surface gloss of Herculite XRV Ultra, a new nano-hybrid restorative, with several commercial resin-based composites: Herculite XRV, Premise, Filtek Supreme and Filtek Supreme Plus.

MATERIALS

Herculite XRV Ultra	Kerr
Herculite XRV	Kerr
Premise	Kerr
Filtek Supreme	3M ESPE
Filtek Supreme Plus	3ME SPE

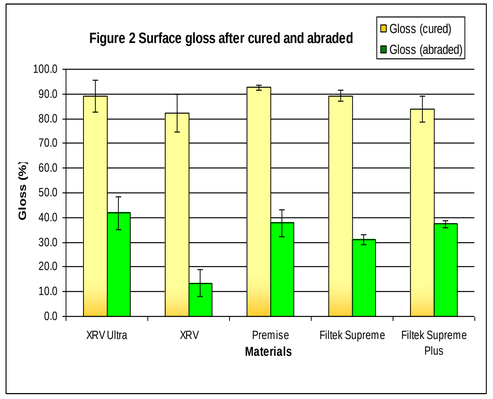
METHOD

The specimens (diameter×thickness =50×2 mm, n=3) were prepared, light-cured and polished first by sandpaper and then by diamond polishing paste according to manufacturer's instruction. Toothbrush abrasion was conducted (Figure.1) as previously described (IADR 2001, Abstract #535). The surface gloss of the sample was measured by a micro-tri-gloss gloss-meter (BYK-Gardner, MD, USA). The measurement of specularly reflected light from the sample surface at 60˚ geometry were collected. The initial gloss was measured immediately after polishing and final gloss obtained after 2000 tooth brushing strokes. Gloss retention (%) was determined by final gloss against initial gloss. The data were analyzed by ANOVA and Tukey tests ($p \leq 0.05$).

Table 1. Surface gloss of materials

Materials	XRV Ultra	XRV	Premise	Filtek Supreme	Filtek Supreme Plus
Gloss after curing (%)	89.1 6.5^{a,b}	82.3 7.7^{a}	92.7 1.0^{b}	89.2 2.3^{a,b}	83.9 5.2^{a}
Gloss after abrading (%)	41.8 6.6^{a}	13.4 5.4^{b}	37.8 5.0^{a}	31.1 2.1^{c}	37.4 1.4^{a}
Initial gloss after polishing (%)	79.4 1.6^{a}	64.7 3.5^{b}	70.8 2.3^{b}	67.1 5.3^{b}	69.7 5.2^{b}
Final gloss after toothbrushing (%)	66.5 2.5^{a}	6.3 0.4^{b}	46.7 6.3^{c}	55.3 6.3$^{a, c}$	44.3 6.4^{c}
Gloss retention after toothbrushing (%)	83.8 2.1^{a}	9.7 0.9^{b}	65.8 7.0^{c}	82.3 5.6^{a}	64.0 11.9^{c}

Note: Superscript letters (a, b, c) represent statistically equivalent means for each property measure



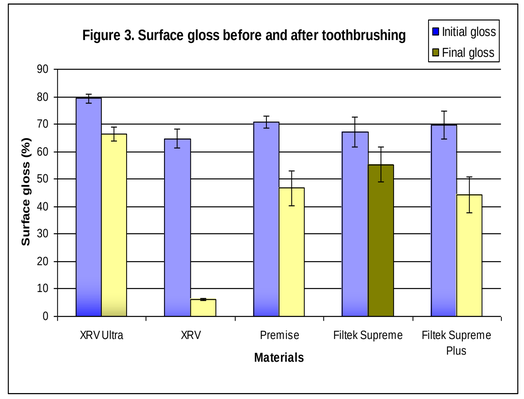


Figure 1. Toothbrushing abrasion tester

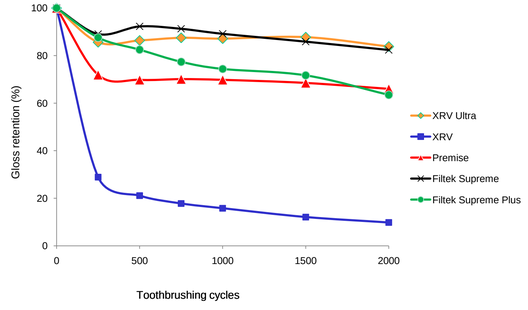


Figure 4. Profile of gloss retention vs. toothbrushing cycles

RESULTS

The gloss data after curing, abrading, polishing, and tooth-brushing were shown in Table 1, and Figure 2, 3 & 4. Polishing by sandpaper is a simple and quick way to test the gloss of materials. XRV Ultra has significantly higher or equivalent gloss as compared to the other commercial composites after abrading (Table 1 and Figure 2). A better simulation of clinic gloss is toothbrush abrasion, because toothbrush abrasion shows gloss retention over time. Herculite XRV Ultra exhibited the highest initial surface gloss among the tested composites after fine polishing (Table 1 and Figure 3). As shown in Figure 4, the gloss retention of XRV rapidly dropped to 29% of initial gloss after 250 tooth-brushing cycles, but XRV Ultra, Filtek Supreme and Filtek Supreme Plus showed the high gloss retention at 86-89%. With the increasing of tooth-brushing cycles, Filtek Supreme Plus and XRV continue to decrease, XRV Ultra, Filtek Supreme and Premise kept their gloss retention relatively stable up to 2000 tooth-brushing cycles.

CONCLUSION

Herculite XRV Ultra has significantly higher or equivalent surface gloss after polishing and tooth brushing compared to other materials in this study. Herculite XRV Ultra showed significantly higher gloss retention than XRV, Premise and Filtek Supreme Plus and statistically equivalent to Filtek Supreme.