



CHAPTER IV

RESULTS

Table 2. The result of push out bond strength.

Luting cement	0 Cycle		10 ⁶ cycles	
	Group No.	Mean±SD(MPa)	Group No.	Mean±SD (MPa)
Superbond C&B ^a	G1	12.23±6.35	G5	10.93±4.48
Panavia F 2.0 ^c	G2	5.90±3.46	G6	4.50±1.90
Maxcem Elite ^c	G3	5.22±3.56	G7	3.78±2.42
Rely X Unicem ^b	G4	8.55±2.32	G8	6.71±2.08

Groups with different letters are significant different.

The mean and standard deviations of push out bond strength were presented in Table 2. Two-way ANOVA revealed that the bond strength was significantly affected only by different luting cements ($p < 0.01$), while cyclic loading had no effect to push out bond strength (Table 3). One-way ANOVA of pooled data further demonstrated there was significantly difference among 4 luting cements. Dunnett T3 post hoc test revealed that Superbond C&B provided the highest bond strength which significantly different from Panavia F 2.0, Maxcem Elite and Rely X Unicem ($p < 0.01$, $p < 0.01$ and $p = 0.03$ respectively). Rely X Unicem presented significantly higher bond strength than Panavia F 2.0 and Maxcem Elite ($p = 0.029$ and $p = 0.005$ respectively). Maxcem Elite provided the lowest bond strength which was not significantly different from Panavia F 2.0.

Table 3 Two-way ANOVA results for push out bond strength of fibre reinforced post bonded to intraradicular dentin using 4 luting cements.

Source	Type III Sum of Squares	<i>df</i>	Mean Square	F	<i>P</i>
Bond strength					
Corrected Model	688.441	7	94.063	7.238	.000
Intercept	4177.784	1	4177.784	321.482	.000
cement	613.019	3	204.340	15.724	.000
cyclic loading	44.551	1	44.551	3.428	.068
cement * cyclic loading	.871	3	.290	.022	.995
Error	935.667	72	12.995		
Total	5771.892	80			
Corrected total	1594.108	79			

Table 4. The result of microleakage test.

Luting cement	0 cycle		10 ⁶ cycles	
	Group No.	Mean±SD(μm)	Group No.	Mean±SD (μm)
Superbond C&B	G1	122.75±30.18	G5	332.48±241.13
Panavia F 2.0	G2	142.77±16.75	G6	700.7±308.55
Maxcem Elite	G3	539.74±280.66	G7	637.88±302.21
Rely X Unicem	G4	446.23±329.98	G8	948.69±526.19

Groups with connected line are significant different.

The mean and standard deviations of microleakage were presented in Table 4. Two-way ANOVA revealed that the microleakage was significantly affected by two main factors, luting cements ($p<0.01$) and cyclic loading ($p<0.01$), and its interaction ($p=0.046$) (Table 5). Dunnett T3 post hoc test revealed that the effect of cyclic loading on microleakage only existed in Panavia F 2.0 between with and without cyclic loading groups ($p=0.006$). Without cyclic loading, Superbond C&B provided the lowest microleakage among 4 luting cements but statistically significant only existed between Superbond C&B and Maxcem Elite ($p=0.02$). Panavia F 2.0 also presented significantly lower microleakage compared with Maxcem elite ($p=0.03$). Microleakage of Rely X unicem was not significantly different from the other luting cements.

Regarding with cyclic loading, there was no statistically significant difference in microleakage among 4 luting cements. Superbond C&B showed the lowest microleakage while Maxcem Elite showed the highest microleakage.

Table 5 Two-way ANOVA of microleakage of fibre reinforced post bonded to intraradicular dentin using 4 luting cements with and without cyclic loading.

Source	Type III Sum of Squares	<i>df</i>	Mean Square	F	<i>P</i>
microleakage					
Corrected Model	5,610,141.38	7	801448.769	9.025	.000
Intercept	18,733,230.38	1	18,733,230.38	210.960	.000
cement	2523229.516	3	841076.505	9.472	.000
cyclic loading	2340200.70	1	2340200.70	26.354	.000
cement * cyclic loading	746,711.80	3	248903.932	.2802	.046
Error	6393592.337	72	88799.894		
Total	30,736,964.10	80			
Corrected total	12003733.720	79			

SEM observation

Fig. 7. SEMs of debonded surfaces of the 4 luting cements after the push out test were presented with 5000X magnification.

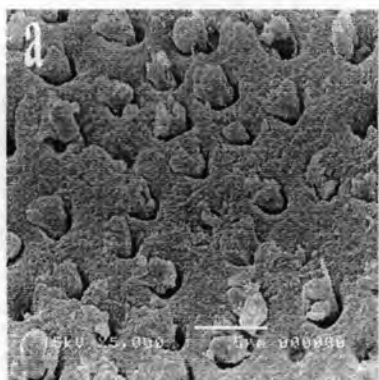


Fig. 7a; Superbond C&B, 0 cycle

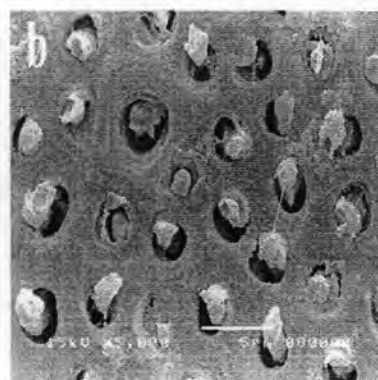


Fig. 7b; Superbond C&B, 1x10⁶ cycles

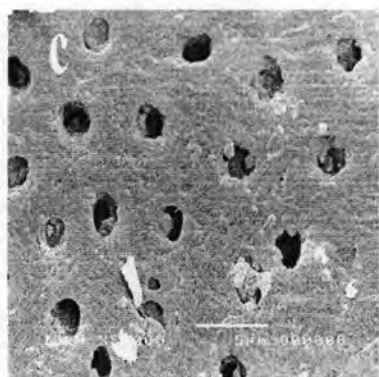


Fig. 7c; Panavia F 2.0, 0 cycle

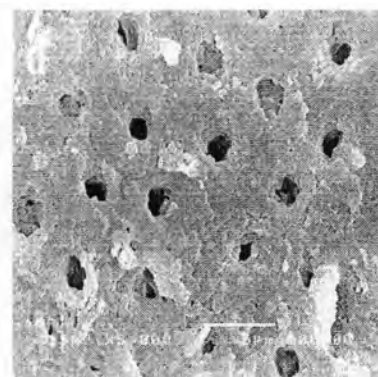


Fig. 7d; Panavia F 2.0, 1x10⁶ cycles

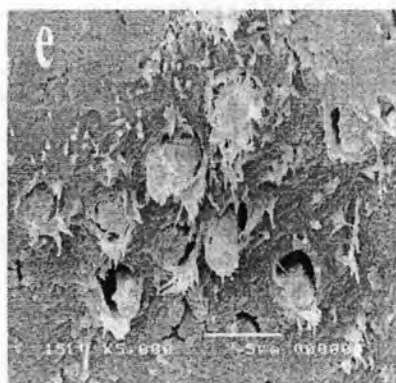


Fig. 7e; Maxcem Elite; 0 cycle

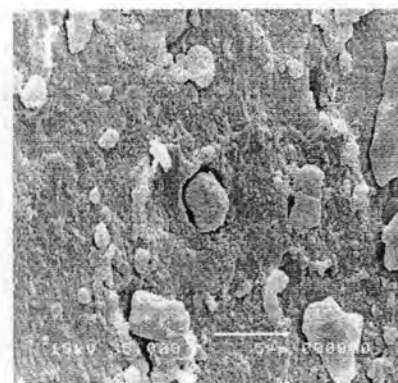


Fig. 7f; Maxcem Elite; 1x10⁶ cycles

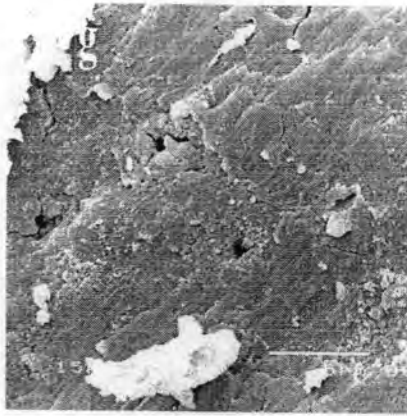


Fig.7g; Rely X Unicem; 0 cycle
(dentin surface)

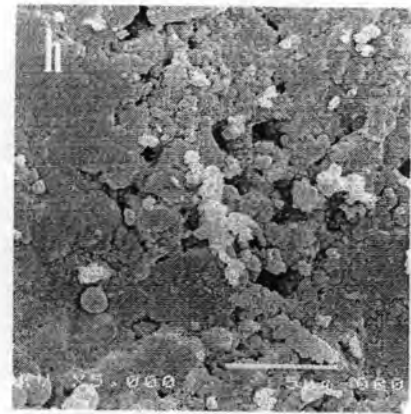


Fig.7h; Rely X Unicem; 1×10^6 cycles
(dentin surface)

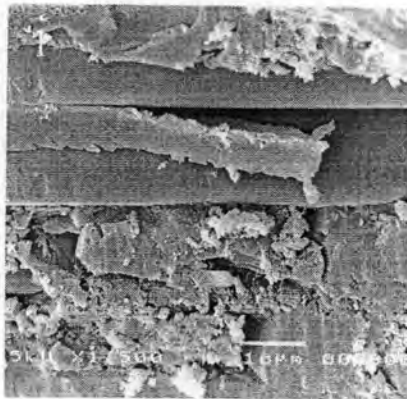


Fig.7i; Rely X Unicem; 0 cycle
(post surface)

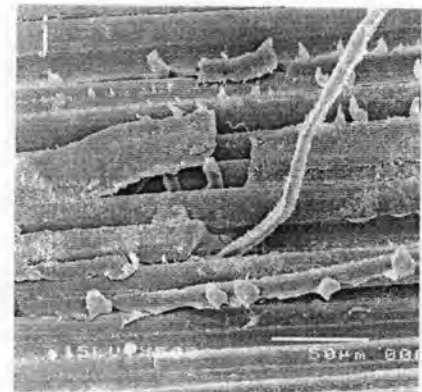


Fig.7j; Rely X Unicem; 1×10^6 cycles
(post surface)

Figure 7a, Superbond C&B without cyclic loading showed uniform etched dentinal tubules with resin tags. Figure 7b, Superbond C&B with cyclic loading demonstrated PMMA resin tags which broke down cohesively. Figure 7c, Panavia F 2.0 without cyclic loading could partially open the dentinal tubules and smear plugs were observed in the tubules. Figure 7d, Panavia F 2.0 with cyclic loading shown adhesive failure which tags were dragged out of dentinal tubules and some smear debris remained. Figure 7e, Maxcem Elite without cyclic loading could not etch through the smear layer resulting in irregularity, non uniform of tubules and small amount of smear plugs were observed sporadically. Figure 7f, Maxcem with cyclic loading showed small amount and short tags remained in dentinal tubules. Figure 7g and h, Rely X Unicem with or without

cyclic loading demonstrated the dentin surface was covered by cement which some 'cohesive' failure occurred in cement itself. Figure 7i and j, Rely X Unicem with or without cyclic loading presented some 'cohesive failure' within the post.