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The Effect of Cavity Configuration on the Mechanical Properties of Resin Composites.

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The objective of this study was to evaluate the effect of configuration of cavity on the mechanical properties such as flexural strength and elastic modulus of resin composites. The materials used were Clearfil™ AP-X(Kuraray, Japan) and Esthet-X™(Dentsply, USA) as resin composite. Dentin-bonding systems used in the study were Clearfil™ SE Bond(Kuraray, Japan) and Prime & Bond NT™(Dentsply, USA). The specimens were prepared as 6 groups with 2 control groups and 4 experimental groups. The specimens were prepared as followed : the specimens of control groups were made in a split steel mold(25×2×2mm), the C2(C-factor of 2.4) groups were made in a simulated cavity(25×5×3mm) made of glass plates. In the experimental groups, before filling the resin, the inner surfaces of the cavity were sandblasted, treated with silane and corresponding dentin bonding systems. C3(with C-factor of 3.4) groups were same as C2 groups except for the magnitude of the simulated cavity(25×5×5mm). All specimens were stored in water at 37°C, for 1 day prior to testing. Flexural strength and elastic modulus were evaluated in three-point bending. The specimens were tested on a universal testing machine(EZ test, Shimadzu, Japan) in bending on a span of 20mm at a crosshead speed of 1mm/min. The amount of the linear contraction of two resin composites was determined with linometer. After flexural strength testing, a fragment of each specimen was examined with SEM(Hitachi, Japan). One-way ANOVA/Turkey' s test was used to determine significant difference at $\alpha \leq 0.05$ level.

	Control	C2	C3	Control	C2	C3
Clearfil AP-X	200.79±25.01 ^a	174.77±9.7 ^b	131.07±15.7 ^c	10.96±0.94 ^a	8.04±0.44 ^b	7.6±11.26 ^b
Esthet-X	117.48±20.72 ^a	112.45±23.7 ^a	93.44±17.71 ^a	17.49±0.81 ^a	5.07±1.01 ^B	4.47±0.54 ^B
	Flexural strength (MPa ±S.D.)			Elastic modulus ±GPa (S.D.)		

This results suggest that hybrid composite is more influenced than micro-hybrid composite by increase of C-factor and increase of C-factor of the cavity decreases the mechanical properties such as flexural strength and elastic modulus of the resin composites.

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A confocal microscopic study of dentinal infiltrations in one-bottle adhesive systems bonded to Class V cavities

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The purpose of this study was to evaluate the effect of dentinal sclerosis and tubular orientation on Class V restoration bonded with three dentin bonding agents using confocal laser scanning microscope(CLSM). Class V cavities were prepared from freshly extracted caries-free human teeth. thirty of these cavities were divided into two groups based upon the status of class V cavities : Group 1, cervical abrasive lesions without preparation; Group 2, artificially-prepared wedge-shaped cavities. Resin-dentin interfaces were produced with two one-bottle dentin bonding systems-ONE COAT BOND(OCB; Coltene) and Syntac Sprint(SS; VIVADENT) and Scotchbond multi-purpose(SBMP; 3M Dental Products) according to manufacturers' instructions. Cavities were restored with Spectrum (Dentsply). Specimens were immersed in saline for 24 hours and sectioned longitudinally with a diamond disc. The resin-dentin interfaces were microscopically observed using CLSM. The quality of resin-infiltrated dentin layers were evaluated by five dentists using 0-4 scale. Confocal laser scanning microscopical investigations using primer labeled with rhodamine B showed that the penetration of the primer occurred along the cavity margins. In area with perpendicular tubule orientation, broad hybrid layer and long resin tags were observed. Statistical analysis using one-way ANOVA revealed that in the group 1 and 2, the primer more effectively penetrated at the gingival interface than at the occlusal interface. but in the group 2-SBMP, there was no significant difference. At the occlusal interface of SBMP, occlusal and gingival interfaces of OCB and gingival interface of SS, the primer more effectively penetrated in the group 2 than group 1. But in the other area there was no significant difference.