

TWO YEARS OF RESTORATIONS CLINICAL PERFORMANCE CONSIDERING DIFFERENT ADHESIVE' SOLVENTS



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Introduction and Objectives

Dental adhesive' solvents can compromise restorations performance. To compare clinical performance of class II composite restorations, considering different adhesive' solvents, acetone and butanol.

Material and Methods

Two prospective clinical trials, two-years, approved by the Ethics Committee, in 52 adult patients of FCS-UFP. Incremental restorative technique with Ceram-XTM mono; Adhesive systems (solvents): Prime&BondNT[®] (acetone), and XPBond[®] XenoTMV (butanol); 142 restorations evaluated with USPHS/FDI criteria (aesthetic, functional, biological parameters), by calibrated examiners (ICC \geq 0.910); Comparison of restorations clinical performance (success rate, %) with non-parametric tests ($\alpha=0.05$).

Table 1 - Adhesive systems characteristics

Adhesive System Trademark	Adhesion Technique	Main Composition	Main Solvent composition*
Prime&Bond [®] NT TM	ER	Prime & Bond [®] NT TM : Di- and Trimethacrylate resins PENTA (dipentaerythritol penta acrylate monophosphate) Nanofillers- Amorphous Silicon Dioxide Photoinitiators Stabilizers Cetylamine hydrofluoride;	Acetone
XP Bond TM	ER	Carboxylic acid modified dimethacrylate (TCB resin); Phosphoric acid modified acrylate resin (PENTA); Urethane Dimethacrylate (UDMA); Triethyleneglycol dimethacrylate (TEGDMA); 2-hydroxyethylmethacrylate (HEMA); Butylated benzenediol (stabilizer); Ethyl-4-dimethylaminobenzoate; Camphorquinone; Functionalized amorphous silica;	t-butanol
Xeno [®] V	SE	Bifunctional acrylate; Acidic acrylate; Functionalized phosphoric acid ester; Acrylic acid; Water; Initiator; Stabilizer;	Tertiary butanol

Prime & Bond[®]NTTM, XP BondTM and Xeno[®]V-DIRECTIONS FOR USE; * According to manufacturer.; ER: Etch-and-Rinse; SE: Self-Etch

RESULTS

At 2 years, restorations/adhesives with acetone (n=61, 13% dropout) and butanol (n=71, 2% dropout) solvents showed success: Aesthetic 100% and 98.6%; Functional 98.4% and 100% (T.Fisher, $p>0.05$); Biological 98.4% and 88.7% ($p=0.037$), respectively.

There were clinically unacceptable: One (1.6%) restoration adhesive/acetone solvent in marginal integrity (repairable) and one (1.4%) with adhesive/butanol solvent in marginal staining. Recurrent caries occurred in one (1.6%) restoration adhesive/acetone and 8 (11.3%) with butanol solvents. During two years follow-up, the restorations change levels of clinical acceptability: those with adhesive/acetone solvent in marginal integrity and fracture/retention (T.Fisher, $p<0.05$); those with adhesive/butanol solvent in marginal integrity ($p=0.013$); Only restorations/adhesive with butanol solvent showed significant recurrence of caries (T.Fisher, $p=0.003$). Monitoring of restorations/adhesives with different solvents should be carried out for long-term evaluations.

Table 4- Evaluation results and longitudinal differences regarding clinical performance of Class II restorations, regarding Adhesives-Solvent, Acetone and Butanol

U.S. Public Health Service/ FDI* Criteria	Baseline to 2 years follow-up p-value**	
	ACETONE Prime&Bond [®] NT TM	BUTANOL XP BOND TM and Xeno V
Aesthetic Parameters		
Colour Match	0.098	0.245
Marginal Staining	0.215	0.211
Surface Luster	0.098	N.A.
Functional Parameters		
Marginal Integrity	0.014	0.013
Fracture /Retention	0.045	N.A.
Biological Parameters		
Recurrence of caries	0.466	0.003
Postoperative Hipersensibility	N.A.	N.A.
Periodontal response	N.A.	N.A.

Source: Hickel et al., 2007 and Cvar and Ryge, 1971. NA: not applicable; Fisher test**

Table 2- Success rates (n and %) alpha/bravo Ryge scores or level 1, 2 and 3 FDI criteria* for Class II restorations with acetone and butanol solvents in adhesive systems composition at 2 years follow-up.

Adhesive systems solvents	Acetone Adhesive Solvent	Butanol Adhesives Solvent	p-value**
Aesthetic	61 (100%)	70 (98.6%)	$p > 0.05$
Functional	60 (98.4%)	71 (100%)	$p > 0.05$
Biological	60 (98.4%)	63 (88.7%)	$p = 0.037$
TOTAL	60 (98.6%)	63 (88.7%)	

*Source: Hickel et al., 2007 and Cvar and Ryge, 2005; ; Fisher test**

Table 3- Success rates (n and %) according to Ryge and FDI criteria* for Class II restorations with acetone and butanol solvents in adhesive systems composition at Baseline and 2 years follow-up.

U.S. Public Health Service/ FDI* Criteria		Baseline		2 Years Follow-up	
		Adhesive Solvent		Adhesive Solvent	
		Acetone (control group) Prime&Bond [®] NT TM	Butanol XP BOND TM and Xeno V	Acetone (control group) Prime&Bond [®] NT TM	Butanol XP BOND TM and Xeno V
Colour Match	α	68 (97.1%)	72 (100%)	58 (95.1%)	69 (97.2%)
	β	2 (2.9%)	-	3 (4.9%)	2 (2.8%)
	γ	-	-	-	-
	δ	-	-	-	1 (1.4%)
Marginal Staining	α	70 (100%)	72 (100%)	59 (96.7%)	68 (95.8%)
	β	-	-	2 (3.3%)	2 (2.8%)
	γ	-	-	-	-
	δ	-	-	-	-
Surface Luster	α	70 (100%)	72 (100%)	58 (95.1%)	71 (100%)
	β	-	-	3 (4.9%)	-
	γ	-	-	-	-
	δ	-	-	-	-
Marginal Integrity	α	70 (100%)	72 (100%)	54 (88.5%)	65 (91.5%)
	β	-	-	6 (9.8%)	6 (8.5%)
	γ	-	-	1 (1.6%)	-
	δ	-	-	-	-
Fracture /Retention	α	70 (100%)	72 (100%)	57 (93.4%)	70 (98.6%)
	β	-	-	4 (6.6%)	1 (1.4%)
	γ	-	-	-	-
	δ	-	-	-	-
Recurrence of caries	absent	70 (100%)	72 (100%)	60 (98.4%)	63 (88.7%)
	present	-	-	1 (1.6%)	8 (11.3%)
	γ	-	-	-	-
	δ	-	-	-	-
Postoperative Hipersensibility	absent	70 (100%)	72 (100%)	61 (100%)	71 (100%)
	present	-	-	-	-
	γ	-	-	-	-
	δ	-	-	-	-
Periodontal response	absent	58 (82.9%)	72 (100%)	61 (100%)	71 (100%)
	present	12 (17.1%)	0 (0%)	-	-
	γ	-	-	-	-
	δ	-	-	-	-

Acceptable performance: α (alfa); β (bravo) Ryge scores corresponding to levels 1, 2 and 3 of FDI criteria; Unacceptable performance: γ (charlie); δ (delta) Ryge scores corresponding to levels 4 and 5 of FDI criteria. *Source: Hickel et al., 2007 and Cvar and Ryge, 2005

Conclusions

Restorations with adhesives/solvents, acetone and butanol, showed similar and acceptable aesthetic and functional performance; lower performance occurred in a biological criterion of those with butanol.

Clinical implications

Adhesives with acetone/butanol solvents have satisfactory clinical performance in class II composite restorations.

Keywords Adhesive systems, adhesives solvents, composite restorations, clinical performance, Ryge criteria, FDI criteria, clinical trial

References Prime & Bond[®]NTTM DIRECTIONS FOR USE. Available in (<http://www.dentsply.com.au/www/770/files/dfu-primeandbondnt.pdf>); XP BondTM DIRECTIONS FOR USE. Available in (http://www.dentsply.es/DFU/eng/XP_Bond_SUD_eng.pdf) Xeno[®]V-DIRECTIONS FOR USE. Available in (http://www.dentsply.es/DFU/eng/XenoV_DFU_eng.pdf); Hickel et al., 2007 and Cvar and Ryge, 2005

