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INFLUENCE OF THE PRIMER IN AN ALTERNATIVE ETHANOL BONDING APPROACH

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INTRODUCTION

Ethanol-wet bonding (EWB) is a bonding philosophy[1] that relies on the idea that water replacement from interfibrillar and intrafibrillar spaces by ethanol provides a fairly hydrophobic, ethanol-suspended demineralized collagen matrix for infiltration by resin monomers[2,3,4]. The obtained hybrid layer shows decreased water sorption[5,6], preventing hybrid layer degradation and extending the longevity of resin-dentin bonds[7,8].

The presente study proposes an alternative approach, simplifyng the use of ascending ethanol concentrations.

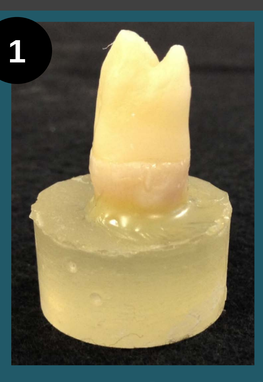
OBJECTIVES

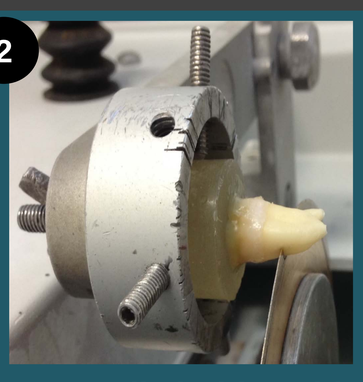
To evaluate the immediate resin-dentin microtensile bond strength (μTBS) produced by an experimental approach of the EWB technique; and to clarify the influence of an experimental primer on the *in vitro* performance of EWB.

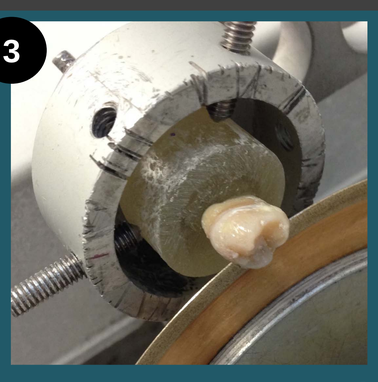
MATERIALS AND METHODS

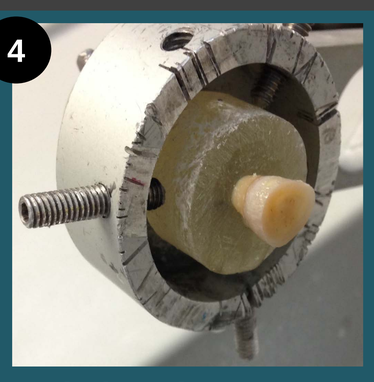
15 recently extracted molars were assigned to 3 groups (n=5): 1) WWB (control): primer [Adper Scotchbond Multipurpose™ (SBMP) - (3M ESPE)] applied following the manufacturer's instructions; 2) EWB-w/P: increasing ethanol concentrations (70% and 96%, 30s each), followed by an experimental hydrophobic primer (50 wt% ethanol 96% + 50 wt% adhesive resin); 3) EWB-w/o-P: same as 2), without experimental primer application. After dentin conditioning, a 3-step E&R adhesive (SBMP) was applied in all groups. Data were statistically analyzed using one-way ANOVA and Tukey post-hoc tests.

TEETH PREPARATION



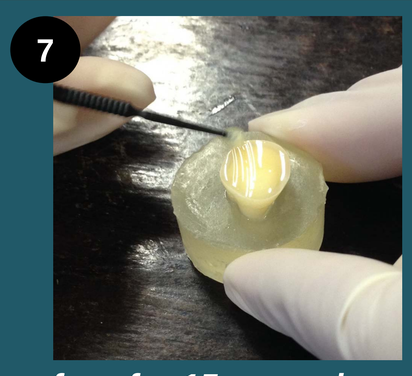


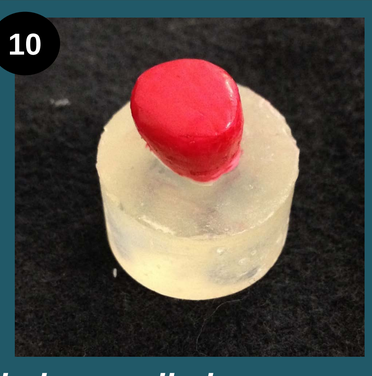




1 – Tooth attached to an acrylic holder with sticky wax 2 – Root cutting 1-2 mm below the CEJ 3 – Occlusal enamel and superficial dentin removal 4 – Flat mid-coronal dentin surface 5 – Creating the smear layer on a mechanical grinder

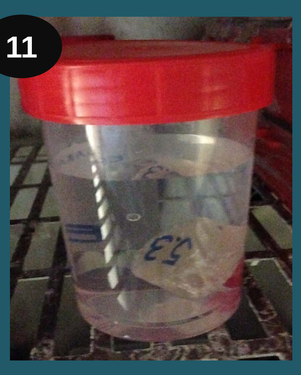
ADHESIVE PROCEDURES

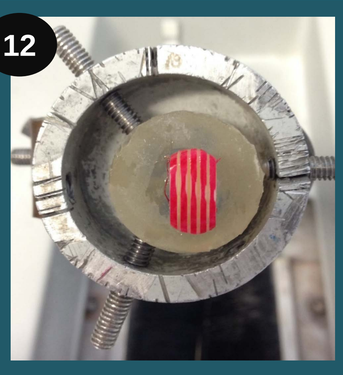


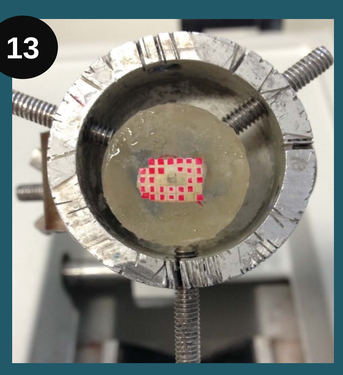


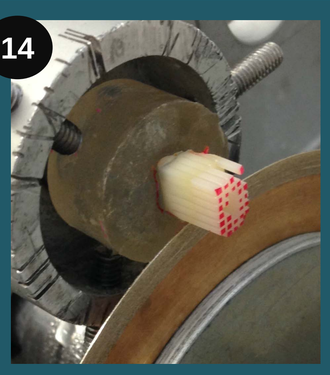
6 – Etching the dentin surface for 15 seconds 7 – Vigorous ethanol application 8 – Adhesive being applied 9 – Adhesive was light cured for 20 seconds 10 – Resin build up, after being painted with waterproof ink

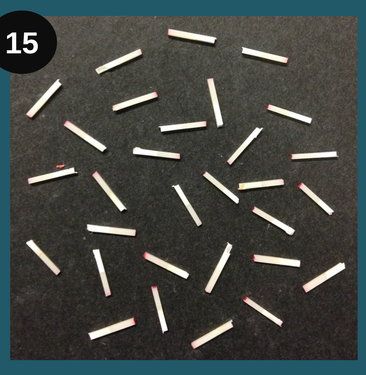
PREPARATION FOR μTBS TESTS





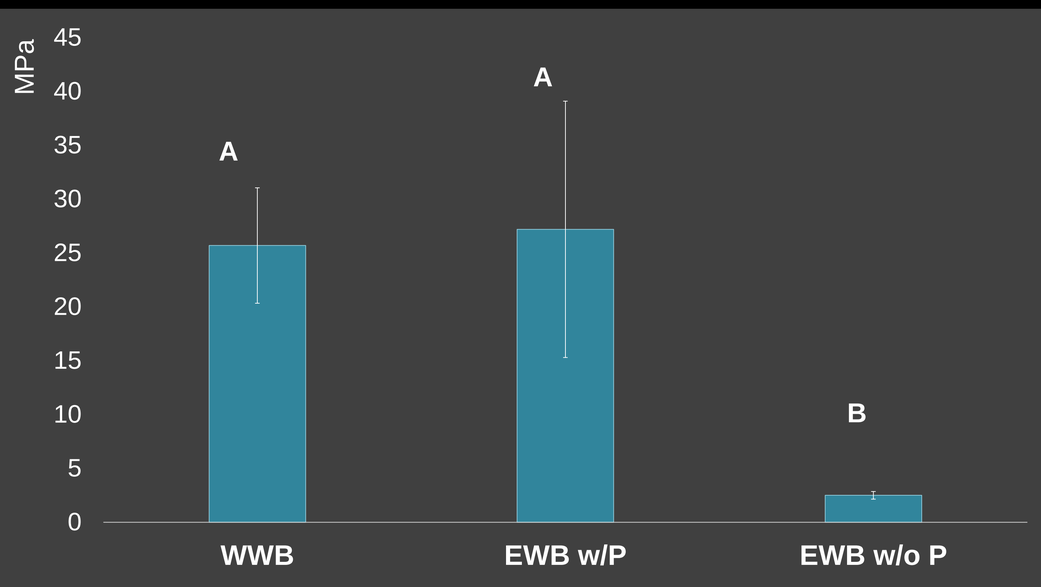






11 – Storage for 24h at 37ºC 12 – Cuts in the "x" direction 13 – Cuts in the "y" direction 14 – Final cut to separate the sticks from the acrylic holders 15 – Sticks obtained after the final cut (1 mm²)

RESULTS



Graphic 1: Mean μTBS value and standard deviation for each group: WWB–25.7±5.36MPa; EWBw/P–27.2±11.9MPa;EWBw/oP-2.5±0.35MPa..

No differences were found between EWB w/P and WWB (p=0.945).
EWB w/o P achieved a statistically lower μTBS than the other two groups (p=0.001).
Adhesive fractures were the most prevalent in all groups.

CONCLUSIONS

In this study, the experimental approach of the EWB technique performed similarly to the gold standard, if the experimental primer was used. The study demonstrated that the primer is essential to achieve acceptable bond strengths.

References: 1 – Pashley DH, Tay FR, Carvalho RM, Rueggeberg FA, Agee KA, CarrilhoM , Donnelly A, García-Godoy F. From Dry Bonding to Water-Wet Bonding to Ethanol-Wet Bonding. A Review of the Interactions between Dentin Matrix and Solvated Resins Using a Macromodel of the Hybrid Layer. American Journal of Dentistry 2007; 20(1):7–20. 2 – Nishitani Y, Yoshiyama M, Donnelly AM, Agee KA, Tay FR, Pashley DH. Effects of Resin Hydrophilicity on Dentin Bond Strength. J Dent Rest 2006; 85(11):1016–21. 3 – Osorio E, Toledano M, Aguilera FS, Tay FR, Osorio R. Ethanol Wet-Bonding Technique Sensitivity Assessed by AFM. Journal of Dental Research 2010; 89(11):1264–69. 4 – Sadek FT, Br, Muench Aaga RR, Liu Y, Pashley DH, Tay FR. Ethanol Wet-Bonding Challenges Current Anti-Degradation Strategy. Journal of Dental Research 2010; 89(12):1499–15045 – Hosaka K, Nishitani Y, Tagami J, Yoshiyama M, Brackett WW, Agee KA, Tay FR, Pashley DH. Durability of Resin-Dentin Bonds to Water- vs. Ethanol-Saturated Dentin. Journal of Dental Research 2009; 88(2):146–51. 6 – Liu Y, Tjäderhane L, Breschi L, Mazzoni A, Li N, Mao J, Pashley DH, Tay FR. Limitations in Bonding to Dentin and Experimental Strategies to Prevent Bond Degradation. Journal of Dental Research 2011; 90:953–68. 7 – Sauro S, Toledano M, Aguilera FS, Mannocci F, Pashley DH, Tay FR, Watson TF, Osorio R. Resin-Dentin Bonds to EDTA-Treated vs. Acid-Etched Dentin Using Ethanol Wet-Bonding. Part II: Effects of Mechanical Cycling Load on Microtensile Bond Strengths. Dental Materials 2011; 27(6):563–72. 8 – Tjäderhane L. Dentin Bonding: Can We Make It Last? Operative Dentistry 2015; 40(1):4–18.

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