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EARLY SHEAR-PEEL BOND STRENGTH OF SELF-ADHERING FLOWABLE RESIN TO HUMAN ENAMEL AND RESTORATIVE RESIN

A. Bernas*, W.A. Wiltshire

Department of Orthodontics, University of Manitoba

Introduction: Continually evolving dental adhesives in restorative dentistry may provide a springboard for simplified and improved adhesivity for the attachment of fixed orthodontic appliances to a variety of substrates in clinical orthodontics.

Purpose: Determine whether a new restorative self-adhering composite, Vertise-flow [VF] (Kerr), may be suitable for orthodontic use in the bonding of fixed appliances to both human enamel and composite resin restoratives.

Materials and Methods: Sixty flat lingual orthodontic buttons (Ormco) were divided into four groups (n=15) and bonded as follows: Gp.I: VF to pumiced tooth enamel, Gp.II: Transbond XT (3M) to etched tooth enamel (control), Gp. III: VF to pumiced composite resin (Herculite – Kerr), and Gp. IV: VF to pumiced composite resin control sample (Filtek Supreme – 3M). The test samples were mounted in a Bencor Multi T testing castle (Danville Engineering) and tested to failure. The early (<24hrs) shear-peel bond strengths were obtained using a 10kN load cell in a Zwick universal testing machine employing a 0.5mm c.h.s. The results were analysed using unpaired t-tests assuming unequal variances.

Results: The bond strengths (MPa) obtained were: Gp I: 8.53 ± 2.76 [Range = 5.03-14.17] ; Gp. II. 10.78 ± 5.13 [Range = 4.65-22.11]; Gp. III. 26.46 ± 7.44 [Range: 13.91-39.14]; Gp. IV. 17.55 ± 3.4 [Range = 9.92-24.06] MPa). Statistically significant differences ($p < 0.05$) existed between Gp. I and Gp. III, and Gp. III and IV. The coefficient of variation ranged from 22.8% (Gp. IV)-47.6% (Gp. II).

Conclusions: Vertise-flow provided higher bond strengths to composite resin than human enamel. The bond strength values to enamel fell well within the minimum magnitudes reported by Wiltshire & Noble (2010) as that required for successful clinical adhesion in orthodontics. Vertise-flow may be clinically indicated for orthodontic bracket bonding to resin restored teeth as well as a product suitable for conventional bracket bonding to enamel in the absence of etching.