

Suitability of flow composites as adhesives in bonding fiber reinforced composites for orthodontic retention. An in vitro study.

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INTRODUCTION: Fibre reinforced composites are now becoming available for orthodontic use. However little is known about the bonding properties of available FRC for orthodontic retainers. This study was to investigate the shear bond strengths of an FRC retainer to different flowable composites.

METHODS: EverStick® ORTHO FRC retainer sticks were tested against five different flowable composites (Grandio® Flow, Synergy® Flow, Tetric® Flow, Tetric® Flow Chroma, Unitek Transbond LR®) for their adhesive properties. Each group contained 15 probes. The composite FRC interface had a rectangular surface of 1 x 5mm and the probes underwent 1000 aging cycles between 5 and 55°C. An Instron 4444 was used to measure shear bond values of the FRC stick to composite interface.

RESULTS: Shear forces typically raised to almost 40N (20.4-72.5N) for a 5mm² contact area between composite and FRC retainer before a fracture occurred. When converted to MPa mean values between 6.5MPa (Tetric Flow) and 8.5MPa (Synergy Flow) were obtained with standard deviations ranging between 1MPa (Tetric Flow) and 2.9MPa (Synergy Flow). Comparing the adhesive properties of the five different groups no significant differences were found ($p > 0.05$).



Fig. 1: Retainer side of the fracture zone (50x magnification). The glass fibres lay bare from surrounding EverStick composite/PMMA matrix.

the EverStick Ortho retainer (Fig 1). As the huge majority of glassfibres did not break off the retainer, only few glassfibres remained on the sheared off composite block. We could not determine whether the composite splinters were originating from the EverStick composite or from the five tested composite groups.

DISCUSSION & CONCLUSIONS: FRC retainers are a highly esthetic alternative to multistranded wire retainers. High transparency allows for a very incisal placing and might thus enhance gingival health and structural resistancy against acting on forces. Another advantage may be a cost reduction since no technician is involved in the fabrication of the retainer.

Shear forces measured in this study indicate that enough bonding strength can be expected from all combinations of flowable composites and the EverStick® ORTHO FRC. The fracture always occurred within the retainer itself and not at the retainer composite interface. Therefore, the major problem remains the stable integration of glass fibers into the adhesive matrix, even with an industrially silanized retainer.

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The fracture zone of all probes is characterized by composite splinters adhering to free glassfibres of