

The European Journal of Orthodontics, Volume 18, Issue 4: August 1996.

A clinical evaluation of a glass ionomer cement as an orthodontic bonding adhesive compared with an acrylic resin

LI. Norevall, A. Marcusson and M. Persson

Department of Orthodontics, Umea University, Umea, Sweden

ABSTRACT

Glass ionomer cement (GIC) has been suggested as an alternative to acrylic resin in bracket bonding because of its fluoride release. The aim of this clinical trial was to evaluate further the suitability of GIC as a bonding adhesive compared with an acrylic resin with regard to frequency of bracket failure, fracture modes and clean-up time after debonding. Two commercially available brackets were tested, one with a meshed foil base and the other with an integral base. A total of 60 patients, with a mean age of 13 years 7 months (range 10 years 8 months to 19 years 1 month) were consecutively selected. Brackets were bonded with a GIC (AquaCem®, De Trey) and a no-mix diacrylate (Unite®, Unitek Corp.) according to random assignment for each jaw. One group of patients (n=30) was bonded with metal brackets with machine cut grooves in the base (DynaLock®, Unitek). In the second group (n=30) brackets with a meshed foil base (Unitwin®, Unitek) were used. Bracket failure location during treatment was recorded as were fracture modes and time required for the clean-up of enamel surfaces at debonding. The frequency of failed brackets was higher with GIC (36 per cent) than with the diacrylate (15 per cent). Bracket failures for the cut groove base type occurred in 50 per cent with GIC and 23 per cent with the acrylic, meshed foil bases failed in 22 per cent with GIC and in 7 per cent with the acrylic, respectively. The differences in failure between bracket types were significant at $P < 0.001$ for both bonding materials. Analysis of the fracture modes showed a small but noticeable difference in the strength of adhesion to the enamel surface, favouring GIC. Time required for the clean-up of enamel surfaces showed a significantly shorter debonding time for GIC. It is concluded that the use of a GIC for orthodontic bonding purposes considerably increases the risk of bond failures during treatment, especially in combination with a cut groove base type. One noticeable advantage with GIC bonding, however, is the shorter clean-up time for the enamel surfaces.

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Last modification: 6 November 1997.

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